

ABSTRACT

Title of Document: USING THE URBAN REGIME
FRAMEWORK TO ANALYZE HAZARD
MITIGATION SUSTAINABILITY AT THE
LOCAL SCALE

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The tally of injuries and property losses to extreme weather and flooding seems to be only growing in recent years. Global circulation changes and regional climate changes coupled with land use and land cover changes are creating more potentially hazardous spaces and places. The U.S. federal government sets guidelines for preparing for disasters and provides the bulk of disaster relief and recovery funding. In this country, however, the authority for instituting specific adaptation and hazard mitigation strategies lies with local governments. Local governments are responsible for guiding land-use decisions, for zoning and building codes, and for enforcing other strategies mandated by the federal government, such as the purchasing of flood insurance for homes with federal government-backed mortgages. Much of the research involves how and to what extent hazards policies can be best introduced and applied at local levels given competing economic, infrastructural, and social priorities. What has not been clearly established in the hazards research literature is a

connection between established hazard mitigation objectives and urban policy-making in the years following a major disaster. The city of Tulsa, Oklahoma is a test case for deepening our understanding of the relationship between the two. This study uses an expanded version of the urban regime framework to ground data collection and analysis in the framework's three main focus areas: agenda, capacity, and relationships. The framework is expanded to include the environmental and natural resource dimensions of agenda setting, and pays special attention to spatial and locational dimensions of flood control. Planning documents, financial records and print media data sources are coded and analyzed for themes and patterns. Findings suggest that successful implementation of hazard mitigation goals and principles in Tulsa led to new questions about 'balanced growth' development, land-use planning, and resource use that have implications for hazard mitigation sustainability. This study finds that some insights offered by the urban regime theory are helpful to this particular question and possibly other questions in the hazards/disaster research agenda.

USING THE URBAN REGIME FRAMEWORK TO ANALYZE HAZARD
MITIGATION SUSTAINABILITY AT THE LOCAL SCALE

By

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Chapter 1: Introduction

1.1. Background

There seems to be no end to disasters. **Figure 1.1** describes the number of disaster events experienced globally per year from 1900- 2010. The sheer number of events in the last 20 years is staggering, especially considering one or two of them can do billions of dollars in damage and take many human lives.

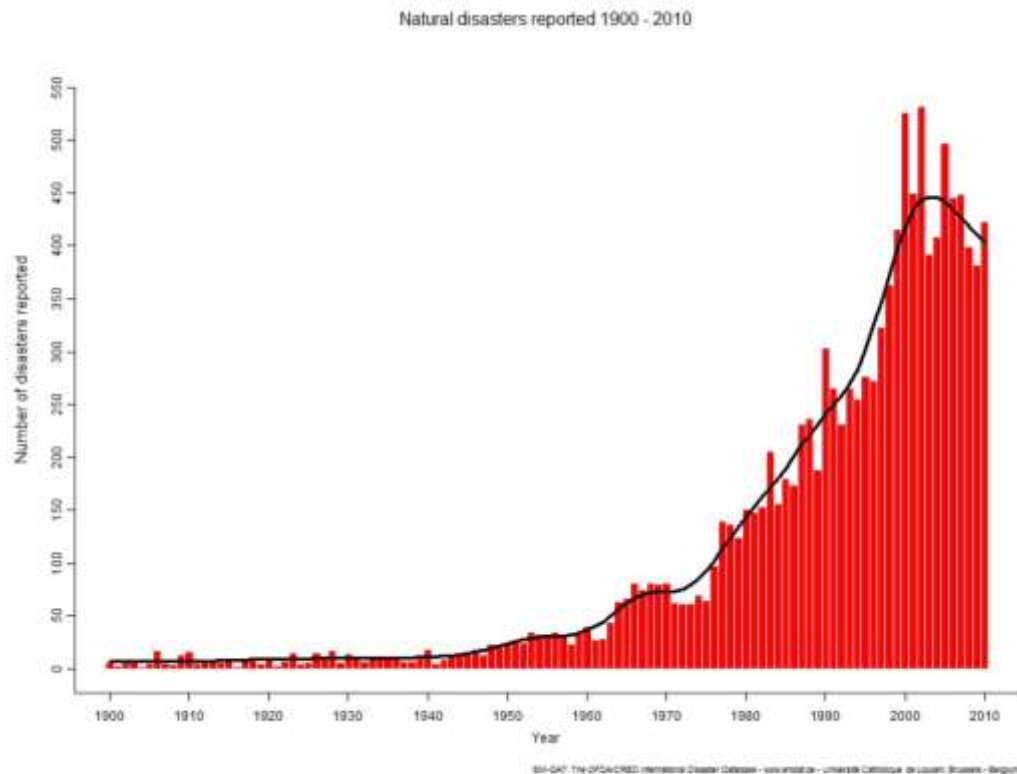


Figure 1.1 Number of disasters annually 1900-2010
Source: ISDR EM-DAT <http://www.emdat.be/natural-disasters-trends>

The majority of damage is caused by hydrometeorological events. Hurricanes and tropical storms lead to coastal storm surges and flash flooding of inland waterways. Nationwide, flooding and other disasters are making headlines with alarming frequency. While loss of life has been minimized in the United States, the resulting

damages, measured in property loss and quality of life, are significant and burdensome (Hooke 2000). According to a May 2011 report from the national weather service (**Figure 1.2**), areas of the Mississippi River watershed and the Hudson River watershed were flooding simultaneously. Hurricane Irene, which slammed the eastern United States in August of 2011, emphasized the need to reevaluate land-use and local policy decisions in several small and large cities from North Carolina to Vermont. Said a recent New York State Assemblyman to the *Albany Times Union*:

Building on a floodplain- there ought to be some serious thinking about that. When you look around at communities with the toughest building codes, you will see that they are significantly far less hit. Common sense works. (Semple, 5 September 2011).

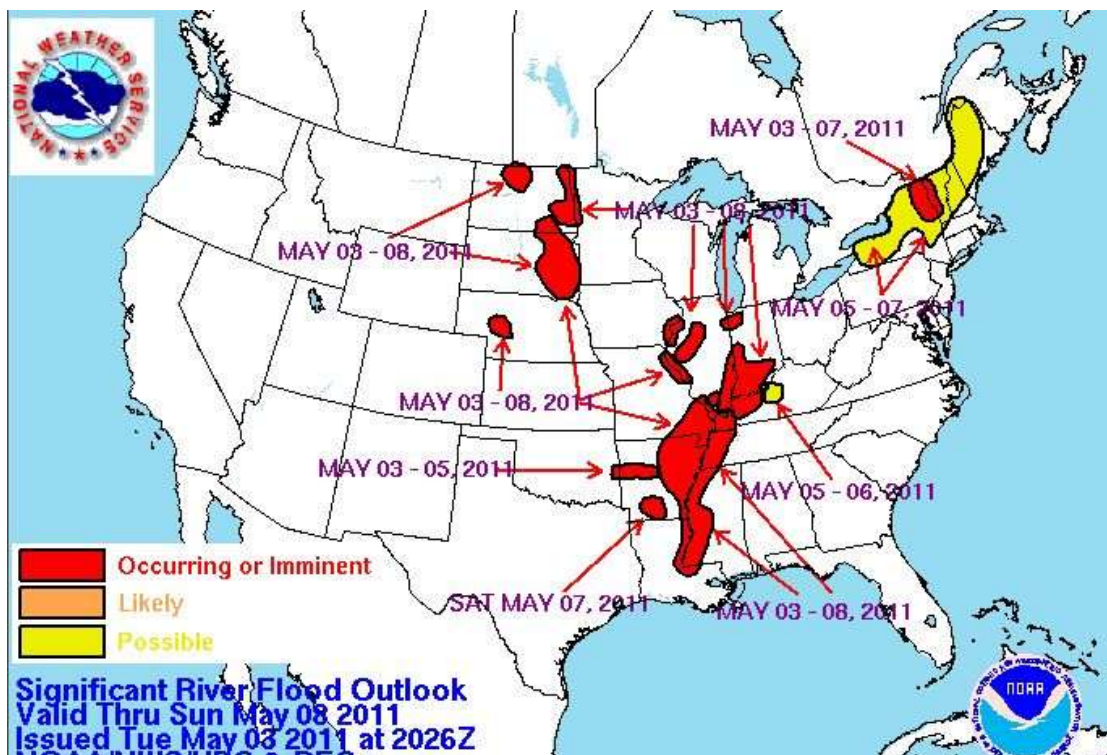


Figure 1.2 Flood Incident Map- May 2011 Source: NOAA National Weather Service <http://www.hpc.ncep.noaa.gov/nationalfloodoutlook/>

1.2. Statement of the Problem

The practical problem for hazards researchers and policy makers is how to end the cycle of disaster destruction, recovery, reconstruction and repeat destruction (Lechat 1990; Galloway 2005; FEMA 2006b). Much of the hazards-focused research to this point has dealt with the practical realities of managing local market-based development in order to *implement* best practices for hazard mitigation and disaster resilience (see Burby 1998; Godschalk et al, 1999). Significant, illuminating research has yet to be conducted, however, on *established* hazard mitigation policies and programs vis-à-vis changing urban contexts. In a guidance document for local communities, The Federal Emergency Management Agency (FEMA), suggests that community sustainability is determined by how well a community “integrates mitigation objectives with community growth and development and balances competing priorities” (FEMA 2000a, 16).

1.3. Statement of Purpose

White, Kates and Burton (2001, 91) suggest that Tulsa is a logical study area for evaluating the extent to which communities integrate hazard mitigation objectives with other competing priorities:

The case of Tulsa, Oklahoma, which has led the way in its comprehensive approach to flood and tornado hazard, is an example deserving appraisal. The appraisals that are needed should be in the broader context of community planning.

This study looks at how well flood hazard mitigation objectives have been integrated into Tulsa’s plans for growth and development since the last major flood. A broader

purpose of this project is to build upon an established urban studies framework to incorporate the spatial dynamics of land- and resource- use decisions.

Tulsa, Oklahoma has not experienced a major flood disaster in almost 25 years. The city developed a comprehensive model for mitigating flood hazards after suffering a series of flood events, culminating in a major disaster on Memorial Day 1984. By this measure, the city has been successful at stopping the cycle of destruction, recovery, reconstruction and repeat destruction. Recent public-private initiatives, however, suggest that this success may be tangential at best to the city's current identity or development plans. Almost a generation after the last major flood, there is now an opportunity to evaluate Tulsa's commitment to keeping people and property out of harm's way. The findings have as much to say about urban policy-making as they do about the sustainability of these hazard mitigation objectives.

In this study, a *hazard* is an environmental and/or technological threat to a social system (Palm 1990). *Disasters* are hazardous events which result in significant loss of life and/or property (Uitto 1998). The eastern U.S. earthquake of 22 August 2011 is an example of a natural hazard that did not lead to a disaster. The 5.8 earthquake was mitigated by building construction quality and did not disrupt human transportation systems, gas lines, or other vulnerable infrastructure or people. *Hazard mitigation* is a set of actions taken to prevent a known hazard from becoming a disaster (Geis 2000).

1.4. Research Question

The major research question guiding this study is:

What is the relationship between flood hazard mitigation and other development policies and priorities in Tulsa?

1.5. Case Study Area

For a period spanning the 1960s and 1970s, Tulsa, Oklahoma was the most frequently flooded place in the United States (Patton 1994; Flanagan 2004; Flanagan 2009). Now, Tulsa is considered a leader in multi-hazard mitigation. As a result of Tulsa’s efforts there has been a significant reduction of flood hazard-related damages since 1986. Since this time, hazards professionals have measured mitigation successes of other localities against the ‘Tulsa Model’ (Conrad, McNitt and Stout 1998; Mileti 1999; Olshansky and Kartez 1998; FEMA 2000a; White, Kates and Burton 2001). The model is summarized in **Table 1.1** below.

Table 1.1 The Tulsa Model of Flood Hazard Mitigation. Source: Patton (1994) *From Rooftop to River: Tulsa’s Stormwater Management Program*

Elements	Policies	Principles
<ul style="list-style-type: none"> ▪ Comprehensive watershed management ▪ Alert/warning system ▪ Floodplain land-use reserved for parks, sports facilities, greenway trails ▪ Comprehensive Drainage Regulations/Master Drainage Plan ▪ Capital Projects (ex. Mingo Creek project with U.S. Army Corps of 	<ul style="list-style-type: none"> ▪ Channeling and other structural modifications should be used as corrective measures only ▪ Acquisition and relocation should be used to reduce the occupancy and value of exposed property ▪ Flood insurance and flood-proofing ▪ Prevention of flooding: ▪ Direct new development to areas free from flooding 	<ul style="list-style-type: none"> ▪ Respect natural systems ▪ The urban environment and each watershed within it form a single, interactive system. ▪ Floodplains and stormwater are resources. ▪ Floodplain and stormwater management programs should serve multiple purposes and multiple means.

<p>Engineers)</p> <ul style="list-style-type: none"> ▪ Public acquisition of floodplain residences ▪ Stormwater Management Fee 	<ul style="list-style-type: none"> ▪ All development within the Tulsa Regulatory Floodplain* requires a permit ▪ Flood hazard information should be disclosed to purchasers and renters ▪ Development of a post-flood recovery program 	<ul style="list-style-type: none"> ▪ Changes in the natural balance require compensations.
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Tulsa’s landscape suggests respect for stream processes. Large swaths of open space line city creeks, a green buffer parallels the east side of the Arkansas River, and the central business district occupies an area of higher elevation.

Tulsa is an average-sized city of roughly 400,000 residents. The Tulsa Metropolitan Statistical Area encompasses a population of 929,015¹. Like cities across the United States, Tulsa hopes to weather the current economic downturn and grow. Tulsa is now planning for the next 30 years. Recent public discussions of Tulsa’s future form and function, however, imply that important lessons about floods and floodplains might have been forgotten or are at least not pertinent to today’s economic development plans.

The city’s current 30-year Comprehensive Plan and other local and regional development plans offer an official view of Tulsa’s broad development goals. The plans serve as a collective starting point for analyzing how a place balances economic development with sustainable hazard mitigation (White, Kates, and Burton 2001).

¹ U.S. Census 2009 estimation

Tulsa's updated 2008 Multi-Hazard Mitigation Plan signals the need to weigh economic development with attention to hazards. The following passage reads as a warning.

Various planning exercises offer possibilities for redefining local commitment to economic development, resource preservation, and hazard management along the river. The riverfront future may hinge on how Tulsa defines the term 'development' along the river. The future may be very different if 'development' is defined as building parks and recreation areas, rather than lowland homes and businesses . . . Virtually all of the current proposals would be expected to increase the number of people at risk in the Arkansas River lowlands (Flanagan 2009, 280-81).

Now is an appropriate time to revisit Tulsa and its commitment to minimizing the threat of flood hazards.

1.6. Overview of Research Design

This project is an urban scale case study. This research project primarily draws on several sources of documentary data published from 1990-2010, although earlier news media data are consulted to get a more complete picture of historical events. The analysis identifies patterns and themes relating flood control to urban policy, particularly land- and resource-use policy. Specific data sources include: published city and regional planning documents; city financial reports; and roughly 500 newsprint articles.

1.7. Organization of the Dissertation

The dissertation is organized into six chapters. Chapter 2 lays out the relevant findings of previous research as it applies to Tulsa. It also summarizes the urban framework which is applied to this case study. Chapter 3 provides a summary of Tulsa history, physical geography and political geography. A summary of Tulsa's

experience with flood control prior to 1990 can be found in the last section of this chapter. Chapter 4 describes the research design and methodology. Findings are presented in Chapter 5. Chapter 6 discusses the implications of those findings for understanding hazard mitigation sustainability. This chapter summarizes the usefulness of the urban regime framework as a set of valid theoretical explanations for the findings and for answering additional questions of the hazard/disaster research agenda.

Chapter 2: Literature Review

2.1. Challenges to Mitigating Hazards at the Local Level

FEMA's policy "all mitigation is local" charges local governments and partnerships with the responsibility for mitigating hazards to avoid the need for expensive federally-funded structural mitigation projects and post-disaster recovery. The body of knowledge addressing urban hazards/disasters and related policy making over the past several decades details local challenges with preparing for and mitigating natural hazards. These challenges include:

- Disincentives to oppose market forces which encourage development in hazardous areas (Burby 1998; May and Deyle 1998)
- Lack of consistent local commitment to hazard mitigation (Burby, May, Berke, Dalton, French & Kaiser 1997; Dalton and Burby 1994; May 1996; Prater and Lindell 2000; Burton and Lim 2001; Meo, Ziebro & Patton 2004; Mitchell 2006)
- Cultural models such as the response to 'overcome' and 'rebuild' rather than modify behavior (Clifford and Clifford 2007)
- Lack of capacity of local governments to plan for and manage hazards (Burby 1998; May and Deyle 1998; Burton, Kates & White 2001)
- Lack of precision in predicting flood frequency and defining floodplains (Philippi 1996; Peilke 1999)
- The complexity of communicating and establishing tolerable levels of risk (Deyle, French, Olshansky, and Paterson 1998; Smith and Petley 2009)
- Conflicting regulations and policy jurisdictions at multiple political scales (May and Deyle 1998; Changnon 1996; White 1994; Galloway 1994; NRC 2008)

The biggest problem for local governments in instituting and enforcing policies to minimize hazards is that market forces conspire to make some hazardous areas desirable for economic growth and development. Hazardous areas such as floodplains are flat and easy to build on. They may have value for real estate and industry both of which broaden the local tax base. Rich, fertile floodplain soil is ideal

for agriculture. Floodplains, by their proximity to waterways, make accessible navigation points. Moreover, risk is often diminished or misinterpreted because of engineered structures such as dams and levees. And subsidized flood insurance minimizes the cost of redevelopment should a flood occur (Kunreuther and White 1994; May and Deyle 1998; Kostoyak 2008). Also the opportunity cost of preparing for future possible events is often too great to justify reallocating resources in the immediate term (Berke and Smith 2001). All these factors combine to make it difficult for local governments to impose rules that challenge the forces of economic development, especially in areas that are already built up.

Thus, tremendous local political commitment is needed to implement a hazard mitigation strategy. Commitment is often a function of experience with hazards combined with political will and local resources (Dalton and Burby 1994; May 1996; Burby, May, Berke, Dalton, French & Kaiser 1997; May and Deyle 1998). The period of recovery immediately following a disaster event is the most productive time for planning and implementation of hazard mitigation and/or other disaster prevention policies (Prater & Lindell 2000; Burton and Lim 2001; Mileti 1999). This is the ‘window of opportunity’ (Kingdon 1984) in which “politics, problem and policy streams converge” to support innovative solutions (Meo, Ziebro & Patton 2004).

In addition to market forces, however, there is a tendency for places directly impacted by disaster to attempt to recover quickly and return to ‘normalcy’ as seen in the rebuilding of New Orleans after Hurricane Katrina. Recovery itself is best described by Mitchell (2006) as “the process by which a stricken community binds up

its wounds, reasserts order, and acquires or reacquires preoccupations beyond those of the disaster itself”(p. 232). Clifford and Clifford (2007, 177) site the cultural model of “victory over the forces of nature” when describing the story of floods that devastated Vermont in 1935. The sense of community developed while sandbagging or providing shelter during an event is also a powerful force for returning to the *status quo ante* (Wilkens 1996).

Even when there has been a show of commitment for implementing hazard mitigation strategies, research suggests that it is difficult to maintain momentum for disaster-related initiatives after only three years (Wachtendorf, Connell, Monahan and Tierney 2002). Wachtendorf et al.’s study was particularly concerned with the fate of FEMA’s *Project Impact* program which encouraged local public-private partnerships to come up with place-specific strategies to managing hazards.

Less understood is the post-problem stage or in the disaster research realm, the post-recovery period of ten to twenty or more years after a serious disaster. The post-problem stage is described by Neuman (1990) as a period in which “the old problem sinks into a period of prolonged limbo of inattention, although it’s objective conditions have not changed substantially as the public awaits a fresh issue or new hope” (p.164). Mitchell discusses the peril of inattention:

Paradoxically, therein lies a danger, for the further the disaster experience recedes from present consciousness, the more likely its lessons will be neglected or lost, thereby paving the way for another disaster (p. 232).

A capacity for managing hazards is also important. As Burby (1998) points out, the cost of mapping hazards can be prohibitive to local governments and often

requires regional, state or federal coordination. Also, many local governments lack individuals with the knowledge or technical expertise to apply hazard- resistance measures. Even as they have attempted to provide more and better information to policy-makers, hazards researchers have observed a disconnect between knowledge and appropriate or ‘wise’ land-use (White 1961; Galloway 1994; Changnon 1996; Mileti 1999; Hooke 2000; White, Kates and Burton 2001).

We are still challenged by predicting flood frequency and defining floodplains for the purposes of understanding risk (Peilke 1999). Compared to earthquakes or tornadoes, however, floods are more location-specific. Streams are visible surface features. Water seeks the lowest elevation and it has a certain volume that must either be conveyed or stored. Peak flows are more common in the northern hemisphere in the spring when snow melt in higher elevations combines with heavy rains. Computer models can help us incorporate other complicating factors such as land cover, soil type, soil saturation level, flow speed and elevation (Bronstert, Nichoff and Burger 2002).

Floodplains are “recognizable topographical features . . . which represent the transition between watershed uplands and stream and river channels” (Philippi 1996). This transition zone is not fixed in nature, but we have attempted to fix lines representing various possible flood levels. These marks represent the compromises we make between acknowledging the dynamic nature of stream flow and acknowledging the societal benefits of settling in floodplains. The 100-year floodplain, the national standard for regulating floodplains, is the mark with a 1 percent chance of being met or exceeded every year. This mark is deceiving because

areas just beyond it are not necessarily safer. Flood maps created by FEMA can quickly go out of date in fast-developing areas because land cover and land use change alter flows, which in turn alter the shape and direction of stream channels. Also, this term has confused the general public which tends to assume it means a flood that only happens every 100 years (see Peilke 1999).

Risk is the “possibility of suffering from a hazard” (Deyle, French, Olshansky, and Paterson 1998). Risk assessment includes both the quantitative and qualitative estimation of injury and damage from a range of possible hazard events (Smith and Petley 2009). As Deyle and associates (1998) point out, “where the intensities and probabilities of hazards vary over space, as with flooding” the choices about acceptable levels of risk are more complex. “While the justification for regulating development with the 100-year floodplain maybe reasonably clear” the rationale for not regulating the adjoining 101-year floodplain is less so (p.137).

In addition to quantifying the physical probabilities of a disaster event, risk also has to be assessed in ways that incorporate public perception (Treby, Clark and Priest 2006). Smith and Petley (2009) use the term ‘risk management’ to describe aims to lower threats from known hazards while also maximizing societal benefits. This often “involves controversial value judgments, because “there are great difficulties in deciding what is an acceptable level of risk, who benefits from risk assessment and management, who pays, and what constitutes success or failure in risk reduction policy” (p.36). Acceptable level of risk can also be described as a level of “risk tolerance” or “the least unacceptable option” (Slovic, Fischhoff and Lichtenstein 1981).

Another major challenge to local flood control is that responsibilities for managing floodplains, water resources and wetlands are divided, somewhat unclearly among local, state, and federal governments (May and Deyle 1998; Galloway 1994). At the federal level different agencies are responsible for managing water, floodplain, and wetland resources. A 2008 National Research Council (NRC) report identifies a major conflict with flood control measures and water quality. That is, flood control measures designed to move water out of urban areas quickly also carry more pollutants into streams and rivers (NRC 2008, 2-3). Urban areas are expected to meet certain standards of water quality under federal stormwater permits. In addition, hazard mitigation funding can come from U.S. Housing and Urban Development, the U.S. Department of Agriculture and the Federal Emergency Management Agency among others.

2.2. Solutions

In response to these challenges, hazards researchers and practitioners have promoted solutions including:

- Making disaster resistance and/or resilience a component of local planning and governance (Burby 1998; Burby 2005; Burby, Beatley, Berke, Deyle, French, Godschalk, Kaiser, Kartez, May, Olshansky, Paterson & Platt 1999; Berke and Smith 2001; Brody 2003a; Godschalk, Beatley, Berke, Brower and Kaiser 1999; Brody, Kang and Bernhardt 2010)
- Creating public-private partnerships (Tierney 1989; Wachtendorf, Riad and Tierney 2000; Tierney and Bruneau 2007; Patton and Chakos 2008)
- State and federal regulations for local comprehensive planning vis-à-vis hazards (Burby et al. 1999; Burby 2005)
- Integrating hazards policies with broader goals of sustainability (Beatley 1998; Mileti 1999; FEMA 2000a; Patton and Chakos 2008)

Research, planning and policy implementation are thoroughly integrated within the field of natural hazards. Thus, a substantial segment of academic research on preventing disasters has come from within the planning community. Burby (1998, 1) summarizes the two main potential benefits of planning: information gathering and community consensus-building:

Land use plans enable local governments to gather and analyze information about the sustainability of land for development, so that the limitations of hazard-prone areas are understood by policy-makers, potential investors, and community residents. In the process of preparing plans, local governments engage in a problem-solving process that works to ensure that all stakeholders understand the choices the community faces, and that they reach some degree of consensus about how these choices will be made.

Local governments have several tools with which to manage urban land use and carry out plans. The tools most often used are zoning, permitting and building codes. Here principles of land and resource use are codified in the form of urban ordinances.

Recognizing that not all land-use decisions are made in consensus, hazards researchers stress the need for establishing public-private partnerships. Making policy reforms with urban land-use decision-makers such as developers, builders, real estate mortgage brokers and business people (Tierney 1989; Wachtendorf, Riad and Tierney 2000; Tierney and Bruneau 2007) is intended to bridge the gap between the rights of private land-owners and the common good of the community at large.

A debate within the hazards planning community has centered on whether or not it should be mandated by state and federal law. In the case of hazard mitigation planning, mandates could force local jurisdictions to adapt 'wise use' policies. May

and Burby (1996) conclude that cooperative, rather than coercive public policies may be better for long-term local government commitment. Burby et al. (1999) worry that federal policies which encourage more intense local land uses, need revision before they can be imposed on local land-use decision-making. Burby (2005), however, finds that states which have hazard mitigation planning mandates suffer fewer losses from natural disasters. Oklahoma, which does not have a state-wide mandate for hazards planning or local planning in general, is among the top-ten states when ranked according to recorded damages (**Table 2.1**).

Table 2.1 States in top-10 when ranked by insured losses 1994-2000
Source: Burby (2005)

State	Aggregate insured losses Millions (2000 dollars)	State	Median per capita insured losses Actual (2000 dollars)
United States	33,188	United States	31 ^a
<i>Top 10 states</i>		<i>Top 10 states</i>	
1. Texas	4,106	1. Pennsylvania	107
2. California	2,962	2. North Carolina	86
3. Minnesota	2,285	3. Connecticut	77
4. North Carolina	1,790	4. Kansas	73
5. Pennsylvania	1,786	5. Alabama	70
6. Illinois	1,413	6. New York	69
7. New York	1,379	7. Massachusetts	67
8. Florida	1,267	8. New Jersey	64
9. Oklahoma	1,245	9. Maryland	59
10. Indiana	1,135	10. Oklahoma	55

The field of hazards research and practice has expanded to align with the larger conversations of global environmental change and sustainable development (Burton et al. 1993; Beatley 1998; Mileti 1999; Godschalk et al. 1999; Bullock, Haddow and Haddow 2008). Sustainable development is development which meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development 1987). Principles of sustainable hazard mitigation are listed in the box below.

Principles of Sustainable Hazard Mitigation

- Maintain and, if possible, enhance environmental quality
- Maintain and, if possible, enhance people's quality of life
- Foster local resiliency to and responsibility for disasters
- Recognize that sustainable, vital local economies are essential
- Identify and ensure inter- and intragenerational equity
- Adopt a consensus-building approach, starting at the local level

Source: Mileti 1999, pp. 31-34

2.3. Geographic Perspective in Hazards Research and Practice

Hazards research in geography is almost as old as the institutionalization of the discipline itself in the United States. Geographers have long been concerned with compelling big questions of human-environmental interaction from a variety of approaches (Barrows 1932; Murphy, de Blij, Turner, Wilson Gilmore and Gregory 2005). Geographers contribute the tools for quantifying and spatially analyzing where and why the physical environment is hazardous, patterns of human social vulnerability and resilience factors that are necessary for local hazard mitigation planning. For example, University of South Carolina geographer Susan Cutter and her associates have tried to address the problem of how to both conceptualize and measure vulnerability and resilience characteristics at the local scale. Cutter et al.'s (2008) latest Disaster Resilience of Place (DROP) model helps to encourage gathering data for both research and local marketing purposes. The focus on the positive aspects of 'resilience' as opposed to vulnerability is an acknowledgment of the practical realities of local governance. They write, "Elected officials do not want to dwell on the hazard vulnerability of their communities as it might hurt economic

investment and growth” (Cutter, Barnes, Berry, Burton, Evans, Tate & Webb 2008, 598).

Geographers bring a perspective that seeks to understand relationships between physical, economic, political and cultural systems. Political ecology is an approach for understanding how human power dynamics (politics) at multiple scales impact resource definition and use with the assumption that a society’s economic system and culture motivate political action (Zimmerer and Bassett 2003). Political ecologists were the first to point out the now widely agreed upon premise that “so-called natural disasters are primarily social in origin” (Hooke 2000, 2). Hewitt (1983) and Blaikie, Cannon, Davis and Wisner (1994) revolutionized hazards research by calling for more attention to the broader political, economic and social dimensions of disasters and to the concerns of marginal and vulnerable populations. Its attention to the cultural, political and economic factors in natural resource definition and use from the stakeholders’ points of view makes this approach valuable to an urban scale investigation (Hagerman 2007).

2.4. Tulsa as the Model for Urban Flood Resistance

Tulsa’s flood hazard mitigation program has been regarded as a successful model of urban flood management. The city has won accolades from FEMA, the National Association of State Floodplain Managers, and the Society of Engineers. Tulsa’s experience with flood control has provided a real-world laboratory for testing and verifying many of the solutions articulated above. Hazards researchers and practitioners have described the ‘Tulsa Model’ as progressive;

integrative/comprehensive; sustainable; innovative; proactive; and well-supported by strong champions.

Tulsa's model has been called progressive because Tulsa was one of the first cities to relocate properties out of floodplains prior to the Midwest flooding of the upper Mississippi basin in 1993 (Conrad, McNitt and Stout 1998; Olshansky and Kartez 1998; Godschalk et al. 1999). While this strategy was outlined in federal policy, the local-level resources required to carry out the program prohibited local governments from carrying it out. Tulsa used a combination of tax revenue surplus, interest from a bond sale, Small-Business Administration disaster loans and flood insurance payments to pay for the relocation of roughly 300 structures between 1974 and 1984 (see **Table 2.2**). Tulsa currently uses funds from the Federal Hazard Mitigation Grant program (which was originally established in 1988 as the Stafford Disaster Assistance Act) to help pay for relocations.

Tulsa Flood Acquisition Cost 1974-1984			
Year	1974-1976	1979-1982	1984-1985
Parcels	33	30	284 ^a
Purchase price	\$867,731	\$1,347,032	\$16,460,916
Appraisals/legal	\$7,993	\$5,600	\$157,476
Relocation/moving	\$4,981 ^b	\$394,993 ^c	\$647,156 ^d
<u>Administration</u>	<u>\$22,560</u>	<u>\$33,459</u>	<u>\$364,634</u>
TOTAL COST	\$903,265	\$1,781,084	\$17,630,182
LESS:			
Sale of structure/ salvage & rental	\$104,306	\$83,529	\$865,496
Insurance claims	N/A	N/A	\$3,375,411
<u>Section 1362 funds</u>	<u>N/A</u>	<u>N/A</u>	<u>\$1,864,428</u>
CITY'S NET COST	\$798,959	\$1,697,555	\$11,524,847
CITY % OF TOTAL COST	88.50%	95.30%	65.40%
a) As of October 15, 1985 b) Actual moving expenses c) Uniform relocation assistance d) Moving expense and reimbursement			

Table 2.2 Financial contribution of the city of Tulsa to floodplain buyouts and relocations 1974-1984 Source: Patton (1993); reprinted in Conrad, McNitt and Stout (1998)

Tulsa also instituted a progressive way of delineating floodplains for purposes of zoning, permitting and building (see **Figure 2.1**). The 100-year flood mark is the national standard for administering the National Flood Insurance Program (NFIP). Tulsa's floodplain management system has two noted components: 1) it is done on a

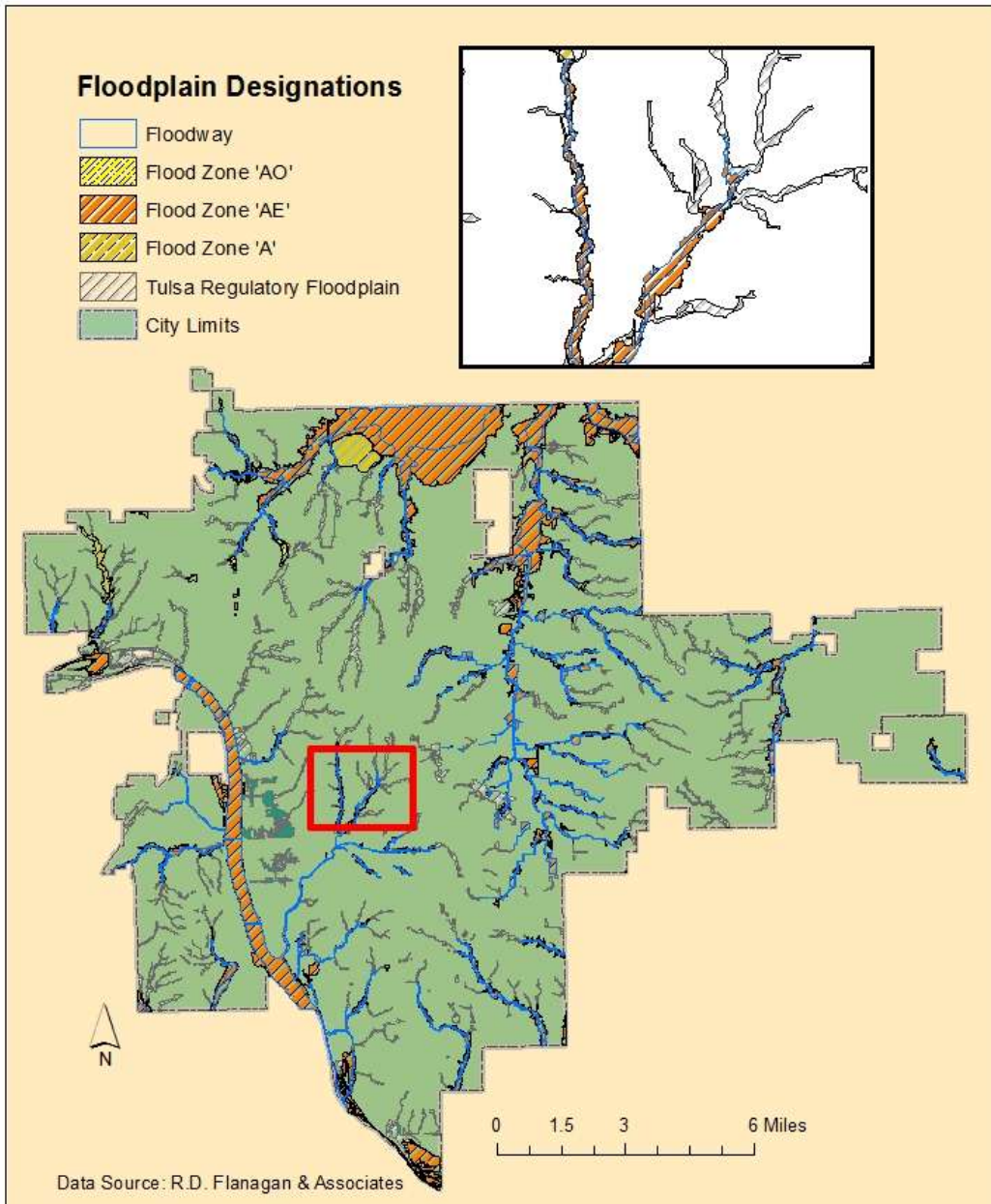


Figure 1.1 Floodplain designations for the city of Tulsa. 'Floodway' represents the path of flowing water under normal circumstances. Flood zones are categorized according to level of risk. In communities that participate in the National Flood Insurance Program's Community Rating Survey, mandatory insurance requirements apply for properties in all 'A' zones. The 'Tulsa Regulatory Floodplain,' shown in grey is the city's own standard for floodplain regulation based on completely urbanized watersheds (with 1980s development patterns).

‘watershed scale’ and 2) it takes a fully urbanized watershed into account when calculating flood risk. The Tulsa Regulatory (100-year) Floodplain (TPR) puts more land in floodplains than the federal system. The TPR was not applied to the stretch of Arkansas River that runs through Tulsa, however.

Tulsa’s program has also been described as integrative and comprehensive (Patton 1994; Flanagan 2004). The program is integrated on several levels. The Tulsa Model equates the preservation of low-lying floodplains and wetland habitat with improved quality of life for Tulsa’s residents. Several of Tulsa’s green spaces and parks also double as stormwater catchment areas. Tulsa achieved political integration when it partnered with the federal government to design and implement Federal policies in a local context. The practical integration of research and implementation was also achieved when the latest hazards research was applied to developing Tulsa’s program. Tulsans drew heavily on the expertise of geographer Gilbert F. White and city engineer Charles Hardt (Patton 1994).

Tulsa’s model is often described as sustainable in the sense that it integrates flood hazard mitigation with other environmental goals as discussed above (Meo and Ziebro 2002; Meo, Ziebro and Patton 2004). In addition, Tulsa’s program presumably enjoys both political and financial stability (Godschalk 2003). Champions cite continued local commitment to the program and an established funding mechanism- a stormwater fee- as signs that the program itself is sustainable.

Tulsa’s response to flooding was innovative, according to public policy researchers Meo and Ziebro (2002), because it involved forging new partnerships,

inspired the pursuit and acquisition of new sources of funding, and encouraged “creative individuals to solve problems” and “overcome various barriers to change.”

The literature on Tulsa leaves several unanswered questions. For how long can something be seen as innovative? Will the program’s continued success require continuous innovation, new partnerships and new resources? Those familiar with the Tulsa story like to reflect on the aligning of tragedy with a core group of dedicated individuals (Patton 1994; Patton 2008 personal communication; Meo and Ziebro 2002). This backing by influential decision-makers and advocates was necessary for establishing both formal local regulatory policy and a cultural model for how the city should treat flooding and flood mitigation. But what happens when partnerships falter, or change? What does integration with other urban policies actually look like and what were the impacts?

While helpful for understanding ‘what it takes’ to create and successfully implement a hazards mitigation program, the current literature is limited by 1) an over-reliance on how Tulsa’s hazards professionals have interpreted events; 2) a focus on flood control in relative isolation of other local priorities and development goals; 3) a cursory review of place-specific human- environmental interaction dynamics; and 4) a limited time scale for measuring long-term success.

2.4. Urban Structure and the Urban Regime Framework

There are two major theories related to urban structure. Both attempt to explain who has power and what is done with that power. One is the pluralist theory which says that decisions tend to incorporate the concerns of multiple voices

contributing to the decision-making process. The other is the so-called *elitist* theory which states that a relatively small group of political and economic leaders make decisions which impact the greater urban population. The crux of elitist and neo-elitist theories is that there are powerful interested parties who work together to achieve a vision or agenda which is beneficial to this group, even to the detriment of the majority of people impacted by the decisions (Stone 1976). The prevailing elitist theory of urban dynamics is the *city as growth machine* (Molotch 1976).

In this study, the issue of long-term disaster resistance/resilience policy is analyzed through the lens of the Stone's (1989) urban regime framework. The concept of the urban regime has been a dominant paradigm in urban studies since the early 1990s (Mossberger and Stoker 2001; Knox and McCarthy 2005; Short 1996). This framework is applied here to understand how and to what extent urban land-use decision-makers incorporate hazard mitigation into planning and policy-making. To quote Mitchell (2006), "For hazards professionals, the trick has always been to promote community sensitivity to risks and vulnerabilities without unduly stifling actions that serve other valuable goals (p.232)."

The concept of the urban regime has been used to explain public-private sector relationships at the local and regional scale. It has also been used to investigate the power dynamics of topics such as school reform (Henig et al. 1999; Stone 1998), obscenity policy (Bauroth 1998), local economic development (Clarke 1995) and the response to Hurricane Katrina in New Orleans (Burns and Thomas 2006).

Regimes are defined as "an informal, yet relatively stable groups with access to institutional resources that enable it to have a sustained role in making government

decisions” (Stone 1989, 4). Mossberger and Stoker (2001, 813) summarize key contributions of Stone’s work from 1989 to 1993:

- Regimes bridge the divide between popular control of government and private control of economic resources. Beyond the inclusion of local government and businesses, participants in regimes may vary, including neighborhood organizations or organizations representing a demographic group (e.g. middle-class African Americans).
- Cooperation is not a given; it has to be achieved. Regimes cannot be assumed to exist in all cities.
- Regimes are relatively stable arrangements and may span several administrations. Regime change is not synonymous with changes in local administrations. Whether electoral turnover equals regime change is an empirical question.
- There exist different types of regimes with distinct policy agendas (e.g. development regimes or middle-class progressive regimes) that are influenced by the participants in the governing coalition, the nature of the relationship between them, and the resources they bring to the coalition (Stone 1993).
- Consensus is built on the basis of interaction and the structuring of resources. This is achieved relatively slowly through selective incentives and small opportunities.
- Regimes do not imply complete agreement over beliefs and values, but a history of collaboration tends to bring about consensus in policy-making.

While it has been referred to as a theory, the urban regime is “more of a multi-faceted concept” (Mossberger and Stoker 2001, 814).

The basic elements of a regime analysis are summarized in **Figure 2.2** below. They are: (1) *agenda* - the formalized vision for the city decided upon by regime actors which may or may not be supported by the broader community; (2) the *relationship* - the level of cohesiveness of the actors themselves and the compromises they make with each other to support the overall agenda; (3) *capacity*- the collective financial and technical/information resources of the regime.



Figure 2.2 Major Elements of a Regime Analysis, from Burns and Thomas (2006)

2.4.1. Agenda

The identifying feature of a regime is its agenda. That is, regime participants and resources coalesce around “some set of recognized purposes, sometimes encapsulated in a slogan (e.g. ‘The Oil Capital of the World in Tulsa circa 1920), but linked as well to concrete courses of action through which diverse bases of support are gained and maintained (Stone 2001, 21).” Regime identifying agendas can be thought of as having two levels: 1) the level of purpose and 2) the “concrete level of program construction” (Stone 2001, 21).

A regime’s strength and effectiveness is based upon the strength of the purposes that make up its identifying agenda (Stone 2001). “To be a motivating force, purpose must be kept fresh and adapted to the specifics of a changing situation” (22). Stone identifies two ways in which salience of purpose might change: 1) the problems that were originally defined either grow or fade in importance; or 2) confidence in the regime’s capacity to solve problem grows or fades.

Mitchell (2006, 239) echoes Stone's observation of strength of purpose of the partnership. He makes a distinction between interest-centered partnerships, which "last only as long as the circumstances that favor a convergence of interest" exist, and partnerships based on "expansive, compelling ideas" which are more durable. He cites the durability of the concept of 'hazard.'

A recent contribution to regime theory is the explicit examination of how the natural environment is factored into regime agendas. Gibbs, Jonas and While (2002, 125) ask three important questions: 1) Does 'the environment' lend to local politics distinctive material and discursive practices; 2) Can 'policy regimes' or 'governing coalitions' for the environment exist and operate separately from, for example, 'entrepreneurial' or pro-development' regimes; and 3) Do 'pro-growth' regimes seek to circumvent local environmental policies? While Gibbs et al.'s analysis is limited to an examination of how forces for 'sustainability' relate to the forces for economic development, this work on economy-environment relations is relevant to hazards policy-making. Their main conclusions are that groups representing environmental interests are often fragmented and unable to become a part of the local governance coalition due to a lack of resources. That is, traditional business-centered coalitions do not see any incentive in finding common ground with environmental groups other than perhaps altruism.

2.4.2. Relationship

The importance of relationships built around disaster-resistance and hazard mitigation has been addressed above. Because of the infrequency of disasters, there

is generally not consistent public pressure for hazard mitigation measures. Mitchell (2006) states:

As a result, hazards management has usually been the preserve of a relatively small range of people who are permanently and directly involved with the study or implementation of programs that regulate risks and assist victims. Typically these include experts in government agencies, academia, humanitarian organizations, and non-governmental entities as well as a limited range of others in private institutions such as electrical utilities, real estate development firms, or insurance companies. It is one of the signal achievements of this constituency that they have managed to persuade public leaders to work toward the adoption of anticipatory hazard mitigation programs in place of reactive disaster relief ones. In this task, they have been mightily assisted by formal or informal partnerships that permit these interest groups to combined and lever their separate contributions and to reach out to others who were previously uninvolved (236).

This discussion is important when thinking about the long term commitment to keeping people ‘from harm’s way.’ One key area of potential research is to investigate the extent to which land use decision-makers and civil society participants are enlisted in this commitment.

2.4.3. Capacity

Capacity refers to the resources available to the regime for carrying out a certain agenda. These can be financial, technical or knowledge-based. In this study, time commitment is also considered to be a resource. If the resources brought together are inadequate to pursue the identifying agenda, the arrangements become purposeless and fade” (Chong 1991). Resources “are important not only to act on an agenda, but also to formulate one” (Stone 2001, 22). Institutions typically provide the

resources- the skills, contracts and expertise- for framing a concrete program of action.

2.4.4. The regime process

The regime process (**Figure 2.3**) is summarized by Stone as follows:

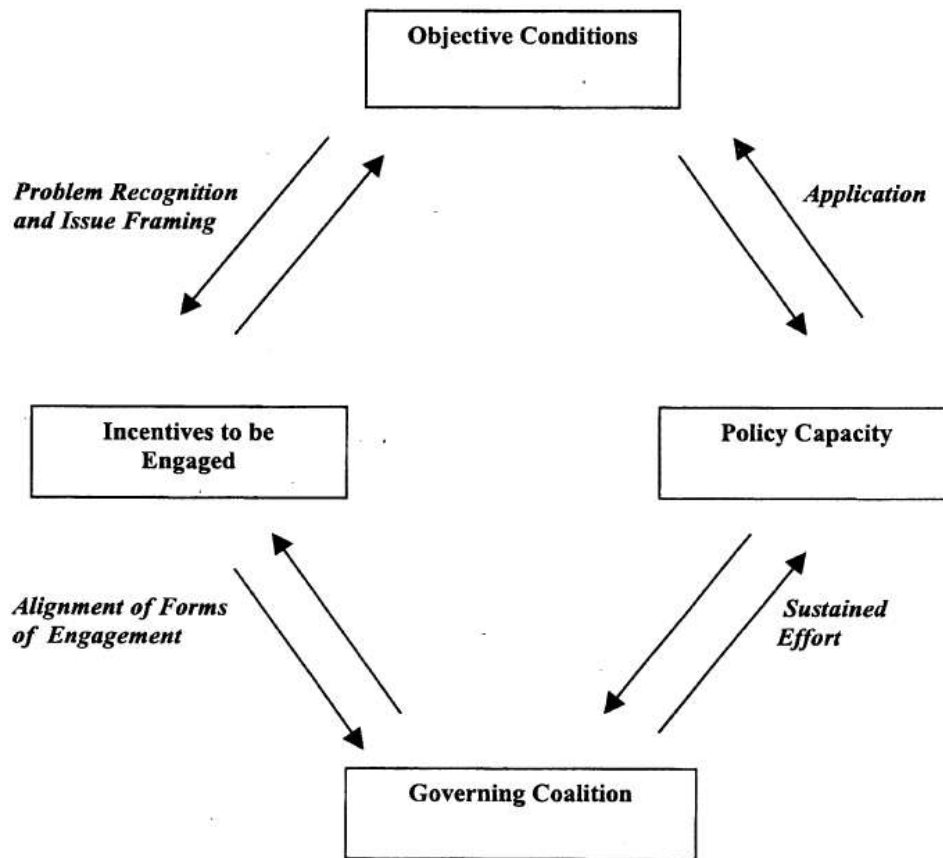


Figure 2.3 The regime process. Stone (2001)

Purpose motivates engagement; engagement, when appropriately aligned, mobilizes resources; and mobilized resources provide a problem-solving (or purpose-advancing) capacity. Purpose, engagement and capacity are central elements in forming, sustaining, and altering regime arrangements. If purpose is undeveloped,

inadequately framed or not adapted to changing conditions, then regime capacity weakens because engagement wanes.

2.4.5. Regime change

Stone (2001) revisited Atlanta to understand the connection between regime change and agenda change. His empirical works suggests that when a regime's agenda is largely accomplished, the regime may become ineffectual unless it changes to meet new pressing needs and foster new relationships. Stone recognizes the possibility of stagnation in relationship configuration, even when a regime successfully carries out its agenda. "Relationships built around the old agenda do not further a new agenda" (32). Thus, it seems expected that regimes and therefore agendas will change. This is important when considering long-term commitment to disaster resistance/resilience. If the agenda of keeping people and property "out of harm's way" (Patton 1993) is seen as being largely an accomplished agenda, it is expected that the relationship and resource configurations that lead to this success will no longer be useful.

2.4.6. Critiques to regime concept/theory

Regime theory has had at least two major critiques: 1) that it ignores the scope and consequence of wider state and economic institutions which directly limit or empower decision-making at the local level (Horan 1991; Lauria 1999; Gibbs, Jones and While 2002); 2) regime theory is too superficial in its examination of regime composition and relationship (Clarke 1995).

The first point is valid for an investigation of hazards policy because the federal government has been a significant player both financially and technically when it comes to disaster relief and recovery, including mitigation. Also, Gibbs, Jonas and While (2002, 129) observe that “changes in national legislation also tend to open up new policy spaces, or at least new discursive frames for existing policy intervention.” Federal, and to some extent state, resources and paradigms directly impact what choices are available to cities.

In addition, the absence of federal resources, such as in the dismantling of FEMA’s *Project Impact* for hazard mitigation, could limit the diversity of regime membership. Clarke (1995) suggests that this narrowing of coalition participation may be attributed to the “sheer difficulties” of mobilizing, organizing and sustaining minority interests. Thus, one might expect that as federal resources dry up for hazard mitigation, Tulsa’s governing coalition will be less-likely to include members who had previously advocated for disaster resistance/resilience.

Clarke is particularly interested in the overall structure of the ‘local institutional terrain’ and how it limits participating groups’ impacts on policy-making. Based on empirical evidence of regimes, Clarke identified Tulsa, Oklahoma as a city dominated by ‘market institutional orders.’ She reports:

The institutional setting is dominated by an array of off-budget organizations which operate by market rules and procedures. The institutionalization is high in that market logic and standard market elements dominate in Tulsa . . . with not strong bureaucratic or political presence. . . this is due in part to state constitutional constraints on local government credit initiatives, unstable political leadership in recent years and a level of federal programme activity which is insufficient to generate public bureaucratic capacity. . . In both Tulsa and Oklahoma City, the energy crisis and recession prompted the exit of some old, monied families. . . These shakeups in

the business leadership were a catalyst for the reorganization of the Chamber of Commerce; the recent initiatives for public-private partnerships emerged from this more coherent business community (Clarke 1995, 526-27).

In her analysis of eight U.S. cities, Clarke (2005) found that the federal government is the major source of local institutional transformation. In particular, she found “the vacuum created by federal funding cuts is prompting renewed efforts at democratic policy control through city councils in some cities but is also leaving cities vulnerable to organizational steering by business interests” (527).

2.4.7. Policy Reform

A large part of Stone’s and others’ research has focused on the sustainability or lack thereof, of ideas or policy goals, as organizing factors in both forming and maintaining regime arrangements. “Arrangements both constrain and enable- thus, some purposes are in conflict with each other.” What makes a (policy) goal sustainable as an organizing factor?

- 1) Consistency with established practices and established lines of communication
- 2) Goals that allocate a limited amount of new costs and benefits is less unsettling than redistributive measures. A sustained effort is more likely if it can be made piece by piece
- 3) Planned physical change is more successful than social change because “physical change lends itself more readily to a step-by-step process.”

2.5. Hypothesis

Given the discussion above, the following hypothesis will be tested:

H: Tulsa’s flood hazard mitigation objectives reinforce Tulsa’s other established development goals and priorities.

Chapter 3: Study Area: Tulsa, Oklahoma

As a self-described iconic and prototypical American city of its size with a nationally recognized model for urban flood control, Tulsa makes a natural choice for this study. This chapter is broken into four main sections. The first section describes the physical geography of Oklahoma and Tulsa, specifically the climate, topography and stream networks of the Tulsa region. The second section describes the human settlement patterns of Tulsa beginning with the discovery of oil in 1905. The third section describes the political geography and land-use authority structure of the Tulsa metropolitan region. This is necessary context for an analysis and discussion of urban planning and land-use decision-making in Chapters 5 and 6 of the dissertation. Finally, the chapter summarizes accounts of Tulsa's history of flooding and flood control.

3.1. Physical Geography

Tulsa sits near the heart of tornado alley and the convergence of three climate

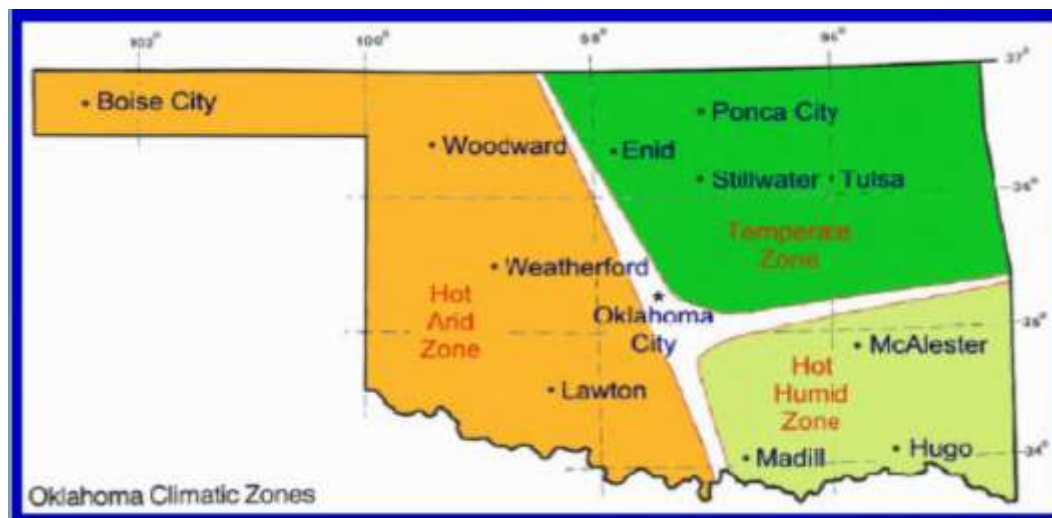


Figure 3.1. Climate Zones of Oklahoma. Source: Flanagan (2009)

zones: a hot, dry zone to the west; a temperate climate to the north; and a humid zone to the south (see **Figure 3.1**). At Tulsa, cool high pressure fronts from the north can collide with rising warm air from the south to produce violent tornadoes and heavy precipitation. The average annual precipitation is 39 inches, but “successive waves of thunderstorms occasionally can dump nearly half that in a few hours, with little warning” (Patton 1994, 2). The heaviest precipitation occurs around Memorial Day and Labor Day (see **Table 3.1**).

Tulsa sits at the base of the Ozark Mountains on the banks of the Arkansas River in the area known as “Green Country”. The area is so named for the gently

Table 3.1 Average monthly precipitation and extremes in inches from National Weather Service airport rain gauge in northeast Tulsa

Month	Normal Monthly Precip	Monthly Extremes		Daily Extreme	
		Greatest	Year	Greatest	Year
Jan	1.6	6.65	1949	2.13	1983
Feb	1.95	5.73	1985	2.99	1985
Mar	3.57	11.94	1973	3.05	2004
Apr	3.95	9.33	2008	4.4	1964
May	6.11	18	1943	6.95	1984
Jun	4.72	11.17	1948	4.9	1974
Jul	2.96	11.41	1994	7.54	1963
Aug	2.85	8.78	2003	5.37	1989
Sep	4.76	18.81	1971	6.39	1940
Oct	4.05	16.51	1941	5.45	1959
Nov	3.47	8.29	1931	4.59	1979
Dec	2.43	8.7	1984	4.23	1932

Source : Southern Regional Headquarters, National Weather Service

rolling green hills and lakes which distinguish this area from the flatter, drier section of Oklahoma that makes up part of the central United States Great Plains region. Tulsa experiences high temperatures and lots of humidity in the summer months.

The Arkansas River starts in the mountains of west-central Colorado and empties into the Mississippi River in west-central Arkansas. The drainage area of

the river at Tulsa is 74,615 square miles of mostly unsettled expanses and rural farmland. Sediment washed from upstream land, and more recently, waste discharged from concentrated animal feeding operations (CAFOs), have made the Arkansas unpalatable and unsafe as a source of drinking water. Tulsa's water comes from the Ozark streams and reservoir to the northeast.

Tulsa is situated within a vast, dense network of streams and tributaries. The stream network can be seen in the elevation figure (**Figure 3.2**) below. The bottom map of the Tulsa Metropolitan Statistical Area shows the general NW to SE slope of the land and the extent of lowland areas.

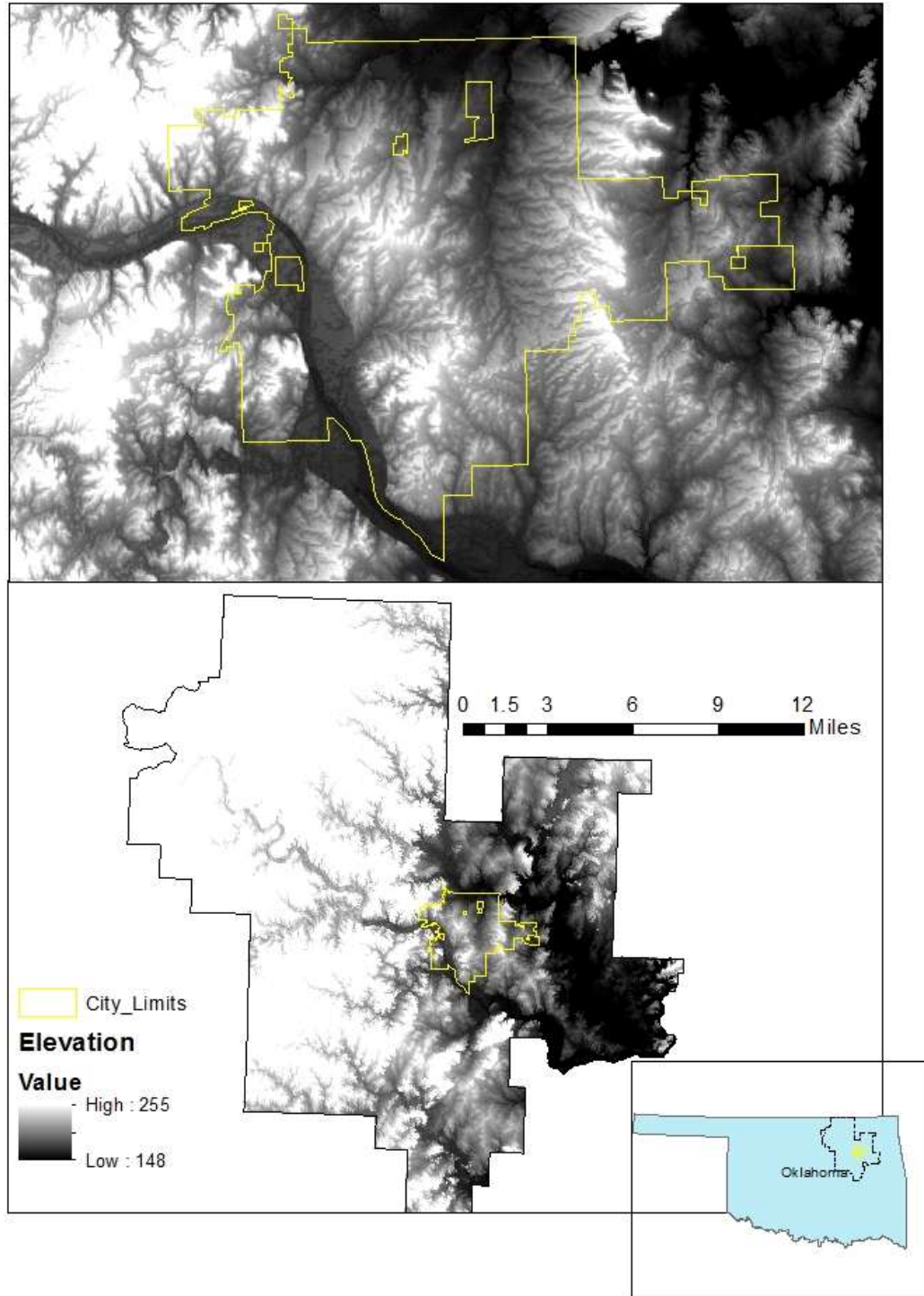


Figure 3.2. Elevation and Stream Network for Tulsa Metropolitan Statistical Area (bottom) and the city of Tulsa (top). Data Source: County Digital Elevation Models acquired from USDA NRCS Geospatial Data Gateway <http://datagateway.nrcs.usda.gov/GDGOrder.aspx>

3.2. Human Settlement and the Cultural Landscape

Tulsa is a place intimately connected to natural resources, in particular oil and



Figure 3.3 Tulsa City Seal
<http://cityoftulsa.org>

water. Both are prominent on the City's seal as shown in **Figure 3.3**. The settlement of non-Native people in Tulsa and the subsequent design of the city has almost everything to do with the presence of both oil and water.

Oil was found on Creek Indian territory to the south-west of the Arkansas River in Tulsa County in 1905. The oil found at Glenn Pool, Oklahoma was refined into gasoline and kerosene, and the city prospered from it for many years. "Since the opening at Glenn Pool, every major oil development in Oklahoma has been operated wholly or partly by Tulsa men and capital" (Debo 1943, 88). In the years following Oklahoma's admittance into the union in 1907, Tulsa's population grew 100 percent per year. Patton (1994, 2) explains, "The city gained worldwide prominence as a petroleum center and dubbed itself the *Oil Capital of the World*." The rapid development of the oil industry was accompanied by large-scale civic planning projects. In the 1920s, historian Angie Debo points out, "Tulsans used their money as dramatically as they had acquired it . . . when they struck it rich the reckless, lavish spirit of the oil

industry entered into their civic planning” (102). The University of Tulsa was built along with the now famous Art Deco edifices during this time.



Figure 3.4 Tulsa refineries as seen from west side of Arkansas River looking northeast to downtown. Source: www.southwesttulsa.org

The furious pace of oil money backed development and growth came to a halt in the 1980s with the oil bust.

Water has also been a dominant force in the early development of the city of Tulsa and the surrounding metropolitan area. The city itself is divided into two main watersheds by a central ridgeline, the Arkansas to the south west and the Verdigris, to the north east. The Arkansas River played a role in the spatial organization of the city. Tulsa’s oil prospectors and financiers settled on higher ground on the north-east side of the river. The Arkansas “with its wide, sandy bed and its sudden freshets, lay between [the oil men] and the field” (Debo 1943, 87). The refinery workers, on the other hand lived along the Arkansas flats close to the refineries on the west side (see

Figure 3.4). Historian Danny Goble (1997) explains:

The River naturally divided Tulsa into two parts. Originally, the two were separate municipalities. Even after they merged, each retained its separate flavor, almost its separate identity. Tulsa's oil men helped that along considerably when they placed their refineries along the Arkansas' west bank. Thereafter, the west side was destined to grow as a distinctive working-class area (250).

The establishment of a drinking water supply also impacted Tulsa's spatial layout. The Arkansas River had been a source of drinking water until silt and oil residue made it unpalatable. In the 1920s, when Tulsa was "not much more than a really big boomtown" (ibid., 251), city leaders built the Spavinaw water system 60 miles to the northeast to allow the city to "develop without any real fear that it would reach limits imposed by thirst" (ibid.). The dam, reservoir and gravity-based conduit system brought and continue to bring a seemingly endless supply of pure water from the Ozark Mountains to the city. Of the land that was purchased to develop this project, a section on the north side of the city became a sprawling open space known as Mohawk Park. This along with the construction of the airport limited residential and commercial expansion to the north (ibid., 252).

The post WWII building boom saw significant expansion of residential areas to the south and east. This is a trend that continues to this day and resonates with almost every urban policy decision. Often in the past, development occurred before the city could put in proper infrastructure, such as water and sewerage. The city annexed the Mingo Creek area in 1966 where some homes were already built and new ones followed into the Mingo Creek floodplain.

Building continued through the seventies and then began to drop off in the 1980s and 1990s. Tulsans site the oil bust of the 1980s as the reason for this decline

in development (Flanagan 2009). Housing construction data reflect Tulsa’s boom and bust eras (**Figure 3.5**). The majority of Tulsa housing is single-family homes.

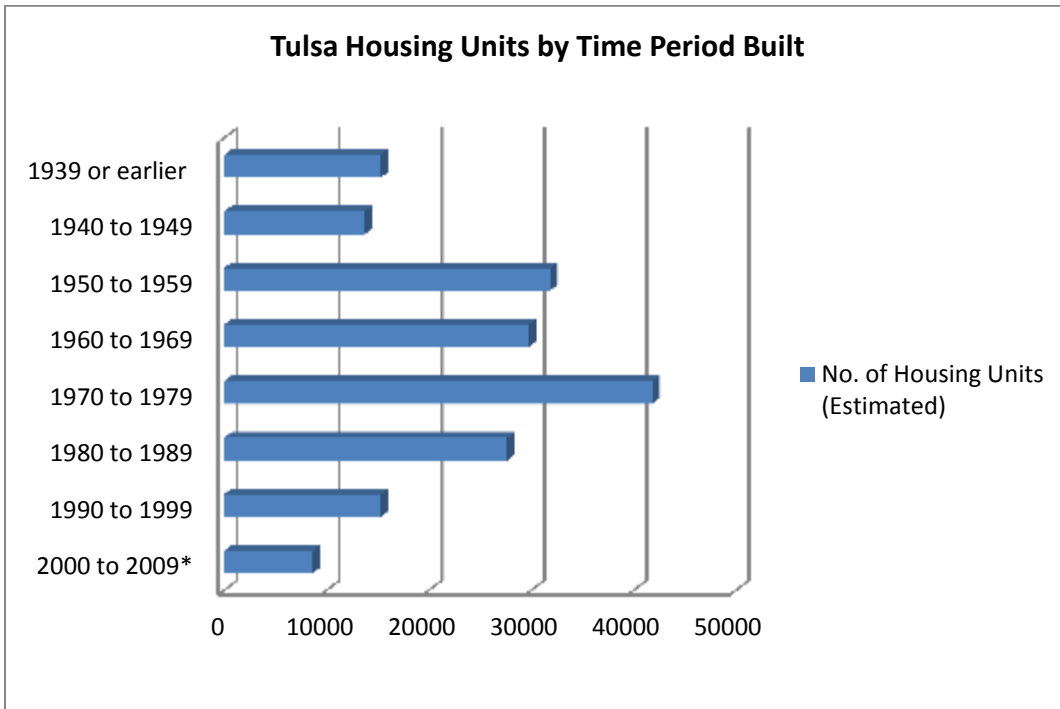


Figure 2.5 Housing Units by Time Period. Data Source: US Census, 2005-2009 American Community Survey 5- year estimates

Table 3.2 describes the ethnic make-up of Tulsa’s population over the last twenty years.

Table 3.1 Tulsa Population by Ethnicity Data Source: Tulsa Metro Chamber (2011) *2011 Tulsa Demographics* <http://www.growmetrotulsa.com/general/496/demographics>

Tulsa Population Characteristics						
	1990	% Total	2000	% Total	2010	% Total
White	290,248	79.4	275,398	70.2	270,401	68.0
Black	49,421	13.5	60,462	15.4	60,852	15.3
American Indian or Native Alaskan	17,116	4.7	18,616	4.7	12,019	3.0
Asian or Pacific Islander	5,115	1.4	7,335	1.9	8,708	2.2
Other*	3,785	1.0	13,530	3.5	19,393	4.9

*Includes those of Hispanic Ethnicity

While the majority of Tulsa is white, Tulsa's black and Native American populations are a significant part of Tulsa's past and present. The Greenwood District north of downtown Tulsa had the highest concentration of wealthy African Americans until a riot leveled this neighborhood in 1921 in the single worst case of racial violence in American history (Tulsa Historical Society). This area of north Tulsa had several black-owned businesses, a library, several churches, a hospital, two schools, and two newspapers. At this time, Tulsa also had a growing Ku Klux Klan and vigilante movement. The Riot erupted when an armed white mob seeking to lynch a black man accused of rape attacked an armed black mob determined to protect him. The next morning the white mob descended on the Greenwood neighborhood, burning structures and killing many residents in a matter of hours.

There was no consolation for black Tulsans after the event. Many families were unable to recover and even though the area was rebuilt it never regained its vibrancy. The event was taboo for years in Tulsa and was not formally investigated until a state commission was formed in 1997. A recent report by this Oklahoma Commission to Study the Race Riot of 1921 (2001) found that the city was complicit in the event by not diffusing the violence and by deputizing many armed white citizens who participated in the violence. No white Tulsan ever went to jail for riot actions. Property claims by North Tulsa residents were denied by the city commission and dismissed in court. In addition, residents had to rebuild with the largest KKK edifice in the country within walking distance. A zoning ordinance requiring fireproof building materials in reconstruction, which was successfully fought by

Greenwood residents, would have made it nearly impossible for many families to rebuild at all. The community was largely left to its own devices in the reconstruction process.

According to Goble, school integration and zoning policies in the 1960s led to almost a total physical separation of blacks and whites in Tulsa, with blacks living in the north and whites living in the other quadrants of the city. 'North Tulsa' has become laden with connotations about race, poverty and 'blight'. **Figure 3.6** shows the results of a spatial 'Hot Spot' analysis using median household values. The analysis shows "Two Tulsas" that have not changed significantly in spatial extent from 1970 to 2000.

'North' and 'South' Tulsa: Spatial Clustering* of Low and High Median Home Values by Census Tract 1970-2000



Figure 3.6 “Two Tulsas” based on property value distribution. Data Source: US Census Housing Data 1970- 2000; Spatial Data from University of Minnesota National Historic Geographic Information System Project

Native American tribes, including the Muscogee (Creek), Cherokee, and Choctaw, were settled in and around Tulsa after being forcefully removed from areas in the Southern U.S. in the 1800s. This land was acquired by whites in the oil boom era. Natives can be found living in all areas of the city today, and tribes have slowly been acquiring land for commercial enterprises such as gaming. Creek principal Chief Ellis (2010 personal communication) expressed the desire to tie commercial and residential development to the river as an important anchor for economic development vital to the tribe's welfare. This has recently been met with opposition from Tulsa city officials. At issue is whether the tribe should put land into trust, thereby protecting it from local taxes even as it would draw on municipal infrastructure.

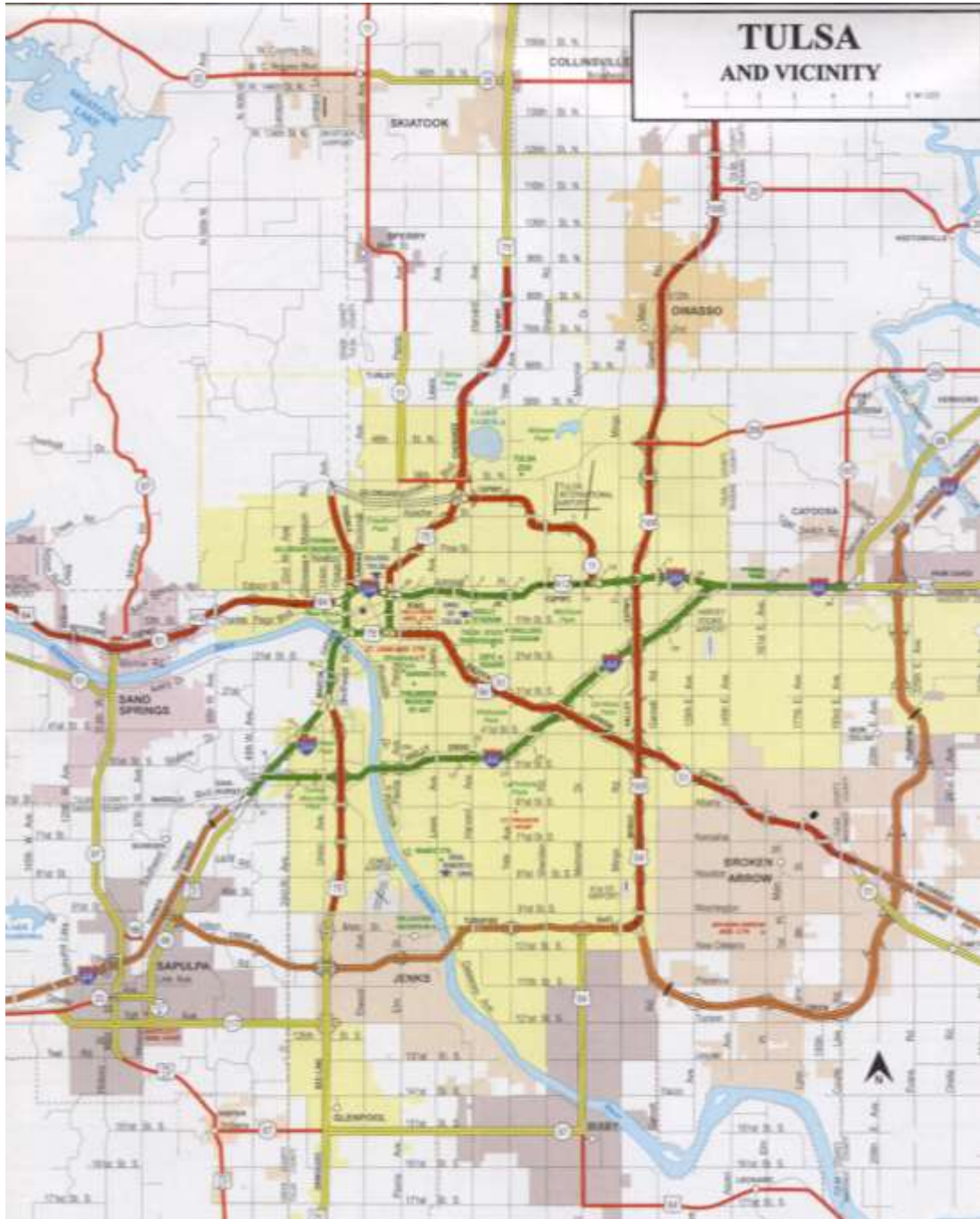


Figure 3.7 Tulsa and Vicinity
Source: <http://www.charlestonhomeowners.org>

3.2. Political Geography and Land-Use Authority

Tulsa was traditionally governed by a small group of “City Fathers” as they are often called, although Tulsa’s citizens have elected several female leaders. Until 1990, the city elected a mayor and four city commissioners, many of whom came from or were connected to the city’s business community. In 1990, Tulsa transitioned to a mayor – council model as a result of a court ruling on behalf of north Tulsans

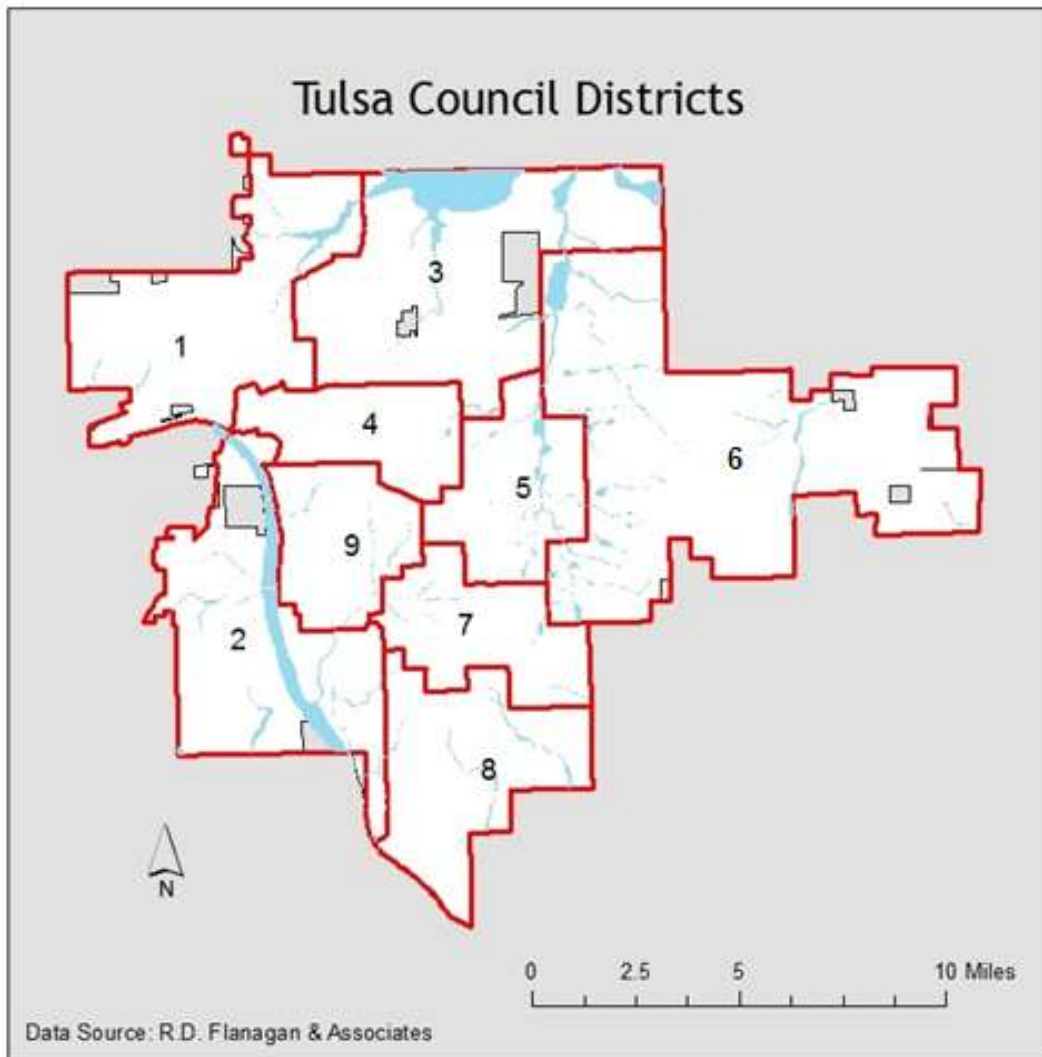


Figure 3.8 Map of Tulsa’s nine Council Districts and stream network

who claimed they were not adequately represented in city government. The city is now divided into nine council districts (see **Figure 3.8**). One councilor from each district is elected to serve on this legislative body. The new political organization of Tulsa was intended to give more Tulsans a voice, through an elected representative, in how the city budget is allocated.

Development in the Tulsa metropolitan area is managed by the various incorporated jurisdictions and the counties, which manage development in unincorporated areas. The Tulsa Metropolitan Area Planning Commission (TMAPC), established in 1953, is a combined Tulsa City and Tulsa County planning authority. The TMAPC is responsible for administering the Zoning Codes of both City and County, reviewing subdivision regulations, establishing building lines and setback requirements, and conducting long-range planning (TMAPC 2004). The Planning Commission is now an arm of the Indian Nation Council of Governments (INCOG), a regional advisory body. INCOG was created with federal funding to help address regional problems such as air quality and public health. Over the years, the city's relationship with TMAPC has been strained and Tulsa is wary of INCOG making policy recommendations which could undermine its authority.

A city's Comprehensive Plan is a public policy which "expresses the existing and projected development patterns of the community. The zoning ordinance and related land development regulations and codes implement the comprehensive plan" (TMAPC 2004, 1) Tulsa City and County administer separate zoning codes through the activities of Boards of Adjustment (BOA). The BOAs are responsible for hearing the appeals of an administrative official, interpreting the zoning map and text and

granting variances and special exceptions for land uses. The Tulsa BOA is a made up of laypersons who have been appointed by the Mayor. They have quasi-judicial powers and their decisions carry the weight of law (TMAPC 2004).

Zoning changes and exceptions were once so common in Tulsa that Tulsan's questioned the credibility of the system. One early test for the new city council was to establish and stick to land-use policies.

In terms of flood control, the city's regulations go beyond those of Tulsa County and most of the surrounding jurisdictions (refer to **Figure 3.8**). The city has much more stringent ordinances and permitting processes for development in watersheds and floodplains. These are addressed in Tulsa's City Code- Title 11-A: Stormwater Management and Hazard Mitigation Program and in Tulsa's *Infrastructure Development Process Manual* (City of Tulsa 2008). Chapter 5 below addresses the challenges of regional cooperation given varying degrees of commitment to managing flood hazards.

3.3. Tulsa Flooding History and Flood Management

Tulsa's flood control policies evolved over years of experience with flooding and with flood control methods (Patton 1993, 1994 and 2008). Tulsa's experience can be characterized broadly by repeated flood events, grassroots agitation, and a strong relationship with the U.S. Army Corps of Engineers, which has a regional office in the city.

Tulsa's most devastating flood occurred over Memorial Day weekend in 1984. Fifteen inches of rain fell overnight causing flash floods which resulted in 14

deaths, over 200 injuries and the destruction of nearly 7,000 buildings. The damage was \$180 million in 1984 dollars.² The infamous Memorial Day Flood of 1984 was a turning point for Tulsa and motivated political will to formalize flood control as a city priority.

Tulsa's history of flooding and flood intervention is often told following Patton (1994) as a series of flood control 'eras' which correspond to major trends in federal flood policy. These eras are summarized in **Table 3.3** below. Eras are purposely given no end dates here as will be explained below. The major policy elements of these eras provide context for how Tulsa constructed its understanding of flooding and flood control.

In 1928, the nation was embarking on the so-called Structural Era of Flood Control (1928-). As a response to the Mississippi River flood of 1927, Congress passed the Lower Mississippi Flood Control Act (1928), which authorized the Army Corps of Engineers to construct dams and levees. Tulsa benefitted from federal involvement in flood control in 1943 when the Corps built levees around Tulsa's oil refineries as part of an emergency national defense project. Tulsa benefitted again when the Army Corps completed the Keystone Dam in 1964 to protect residential development that had sprung up during the 1950s and 1960s. The Arkansas River development plan, authorized by the River and Harbor Act of 1946 and completed by the Army Corps of Engineers, provides four main benefits to the Tulsa area: 1) navigation; 2) hydropower; 3) flood control; and 4) recreation. The major dams create reservoirs which store water during periods of high volume and release water

² ~ \$372 million in 2010 dollars

during dry periods to produce a more constant flow of water. Patton explains, “For years to come, Tulsans would believe that the Arkansas River was forever tamed” (Patton 1994, 3). As mentioned above, the population was also expanding to the south and east invading the Mingo Creek watershed and forever altering the watershed drainage patterns. This area would continue to flood every couple of years.

Table 3.3 Eras of Flood Control

Era (Time Period)	Description	Major Federal Legislation/Policy	Local Manifestation of Policy
Structural Era of Flood Control (1928 -)	Federal funding is allocated for construction of dams, levees and other projects such as stream channeling	Lower Mississippi Flood Control Act (1928)	Levees along Arkansas River at Tulsa; Construction of dams including Keystone Dam upriver of Tulsa
		Flood Control Act of 1936; 1938; 1944	
Regulatory Era of Flood Control (1966 -)	Adoption of regulations to prevent new development in floodplains	House document 465 <i>A Unified National Program for Managing Floods</i> (1966)	"Drainage Wars" between city and developers over development in floodplains; city begins removal of some homes in floodplain
		Executive Order 11296	
		National Flood Insurance Act of	
Hazard Mitigation Era (1978-)	Federal government encourages behavioral adjustments and pre-emptive planning for hazards	Federal Interagency Floodplain Management Task Force Est. 1975	Tulsa assembles a Hazard Mitigation Team; a stormwater management plan was created including the institution of a stormwater utility fee;
		Executive Order 12127 (FEMA)	
		Disaster Relief Act of 1974 retitled the Stafford Act of 1988 and amended to guide disaster recovery and mitigation	
		Clean Water Act 1987 - National Pollution Discharge Elimination System	
Watershed Era of Flood Management (1990 -)	Regional cooperation and planning for land use within watersheds	<i>Sharing the Challenge: Floodplain Management into the 21st Century</i> (Galloway 1994)	Tulsa synthesizes smaller watershed drainage plans into one Master Drainage Plan which is used to guide capital projects; plans for regional detention basins are realized
Era of Community Sustainability (1998 -)	Hazard mitigation is factored into overall sustainability of community- federal government encourages local-scale decision-making and public-private partnerships	Project Impact Program	Tulsa version of Project Impact is successful but defunded in 2000; Tulsa Hazard Mitigation Plan is updated periodically to retain federal funding.
		Disaster Mitigation Act of 2000	

Sources: Patton (1994); Philipi (1996); Wright (2000); FEMA. Dates are approximate.

In the early 1970s, members of the Tulsa Geological Society assembled a volume intended to educate the local population about the area's geologic features and provide some guidance for planning future development. The author's of *Tulsa's Physical Environment* wanted to: 1) "demonstrate the means that Tulsa can use in avoiding or ameliorating environmental degradation"; and 2) not incidentally, "suggest how the earth scientist can contribute to community planning and development" (Bennison 1973, iv). Building in floodplains continued, however.

Following the 'Structural Era' was the Regulatory Era of Floodplain Management (1968-). During this period, the Federal government attempted to address the limitations of structural flood control. Namely, structural flood control created a false sense of security and encouraged development in areas that would be devastated if dams or levees broke. Policies stressed the need for local decision-makers to take responsibility for land use by regulating floodplain development. The landmark legislation of this era was the National Flood Insurance Act of 1968, which provided federally-subsidized flood insurance to communities in exchange for the adoption of local floodplain regulations. While Tulsa took advantage of this program, it did not succeed in enforcing regulations until after major flooding of 1976.

During this period the Tulsa area's congressional representatives secured a future allocation for U.S. Army Corps assistance in the Mingo Creek area. In the meantime, the city began to fund its own local capital projects in the Mingo area from 1976-1984. Agitated homeowners – sufferers of repeated flooding- had united to a) force the city to do something about flooding, and b) stop developers from altering the landscape even further. The bitter "Drainage Wars" raged for several years pitting

homeowners against developers (Patton 2008). During this time the city began forcing developers to create onsite drainage for stormwater runoff. Eventually, the city realized that this piecemeal approach was ineffective and started collecting fees in lieu of detention. These fees went into a city fund for creating and maintaining regional stormwater detention facilities.

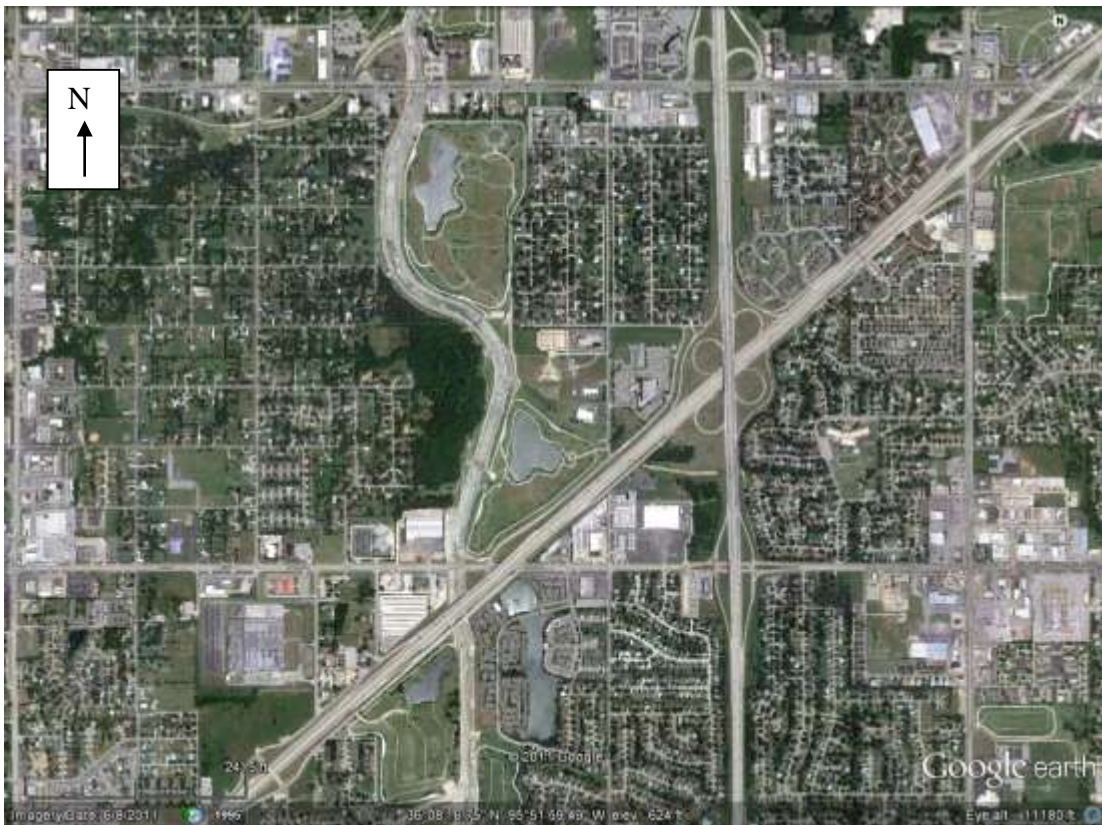


Figure 3.9 Segment of Mingo Creek (north to south) channelized with detention ponds and open space where homes have been located.

The Non-Structural Era of Stormwater Management started officially in 1978. During this stage the federal government sought to place more value on non-structural methods of flood control such as land-use planning, relocation of structures in floodplains, building codes, insurance and other measures to make people and property more resistant to the impact of hazardous events. Thus, the era of Natural

Hazard Mitigation was born. Tulsa was one of the first jurisdictions, and the first urban area, to use buyouts and voluntary relocations to deal with flooded structures in already established areas (**Figure 3.9**). Using local resources (refer to **Table 2.2**), Tulsa was able to purchase, raze and/or relocate 300 homes during this time period and roughly 1000 structures from the period of 1978 to the present.

In addition to relocation, Tulsa designated stormwater management as a public utility and started collecting a fee from all residents to cover the costs of maintaining this infrastructure, thereby dispersing responsibility for flood control. At this time, the federal government also sponsored several pilot ‘Project Impact’ model projects which were designed to generate public-private cooperation with flood control, mitigation and disaster response.

The Era of Comprehensive Watershed Management is the latest era to be defined in Tulsa’s government documentation (Patton 1994). This period of reflection and policy-making was triggered by the Midwest floods of the upper Mississippi basin in 1993. Discussions centered on the upstream/downstream dynamics of structural flood control measures and the need for regional cooperation in managing land use throughout a watershed. Tulsa had been developing plans for each of its 39 watersheds and at this time merged them all into one Stormwater Management Plan.

The current era – the Era of Sustainable Hazard Mitigation (see Mileti 1999; Beatley 1998) – may be starting to manifest in Tulsa presently. The current discourse about how hazard mitigation fits into community decision-making is the object of this study.

A discussion of eras is somewhat misleading, as this study will highlight below, because it implies a historical progression and/or evolution. In reality, flood control strategies overlap locally to varying degrees. For example, Tulsa, and places across the United States generally, still manage most flooding with structural flood control measures. On the other hand, overlap is expected; Tulsa is known for its *comprehensive* strategy as discussed in Chapter 2.

Chapter 4: Research Design and Methodology

4.1. Urban Regime Analysis- Case Study Design

In order to assess whether or not urban hazards policies are sustainable, we have to examine the overlap of this set of policies with the agenda, resources, and relationships that formally and informally serve to govern land and natural resource use in general in a particular location. Tulsa has been chosen as an instrumental case, i.e., one that leads to a deeper understanding of an issue or problem (Berg 2007; Stake 1995). The framework for this study was the urban regime analysis framework which has three separate yet interconnected parts: the regime agenda, the regime actors and the relationships between them; and the human, technical, time and financial resources at the regime's disposal.

4.2. Data Sources and Methods of Analysis

Appropriate data for this study are those that shed light on processes that occur in the normal course of events in Tulsa. The primary source of data for this study is newspaper articles published by the *Tulsa World* from 1988 to 2010. The time boundary represents the period after Tulsa's model of flood mitigation was established until the present and includes the implementation phase of major components including: planning and digging stormwater detention sites; permitting and regulation of floodplain development and combining all watershed plans into a single Master Stormwater Drainage Plan. The city had begun voluntary buyouts and relocations of repeatedly flooded property in the 1970s and was continuing to do so during this period.

This dataset was chosen for two reasons. First, the regime is best understood in the words and actions of its members. The most accessible source of these data is statements made in print media. Urban studies researchers have used published print news sources as a way to ‘observe’ urban power dynamics, particularly in the study of collective action (Earl, Martin, McCarthy & Soule 2004). The *World* is Tulsa’s main daily newspaper. It was founded in 1905. Individual articles were purposefully sampled from a 10,000-article database procured from a former *Tulsa World* journalist. In addition, articles were purposely chosen through an online search mechanism using the following key words and their derivations: *development, policy, flooding, planning, and water*. Approximately 500 articles were used for the analysis. In addition, another 500 articles from pre-1988 were examined for historical reference and perspective.

Analysis of the data occurred on two levels. In the first two readings, a content analysis was performed on all of the text. Content analysis is a way of turning qualitative data into measurable quantitative data, providing a level of objectivity and a sense of the volume of certain words and phrases. Content Analysis is a suitable method for interrogative hypothesis testing in the social sciences (Berg 2007; Kolbe and Burnett 1991). Prior to analysis, preliminary codes were established based on the study framework and research question. A few codes were added as new insights were gained in the process. Codes are labels for assigning meaning to the information compiled during the study. They are usually attached to units of varying sizes and can be words, phrases, sentences, or whole paragraphs (Miles and Huberman 1994).

Codes follow from both the hazards and regime theory literature. A list of all codes can be found in **Appendix A**. The first set of codes (subcategories) addresses the components of a regime agenda. These components include broad vision statements, policies, planning goals, implementation processes and statements about land use. This section also includes codes related to natural hazards, natural processes, and natural resources. The expectation was that natural processes, especially flooding and other hazards would be observable themes in broader vision and policy statements.

The second set of codes deals with resources and includes: extent of authority over decisions, financial resources, technical and knowledge-based resources and time. Policy-making is a way of deliberating over finite resources. The collection and allocation of resources was expected to give some indication of the importance of hazards policies. Planning for hazards requires a greater level of technical knowledge than other urban projects (Burby 1998). A regime's ability to carry out its agenda ebbs and flows with the financial resources available and the time needed to build up to a project or vision and to sustain it. Time is an especially interesting element in this study because an assumption is that passage of time after a disaster impacts disaster policies.

The third set of codes applies to evidence of relationship. Codes note affiliation of an 'informant' and any conflict or solidarity with other 'informants' or groups. The expectation for sustainable hazards mitigation is that informants with access to hazards knowledge and decision-making will be prominent figures in urban land-use decision-making.

A final code for place/location was used to keep track of locations for reference and for examining how place and location factor into policy-making.

In addition to counting observations of single codes, patterns were noted in the combination of codes. In the pattern coding stage, fresh eyes were applied to articles to identify any additional units of interests and all identified units were re-examined to identify recognizable patterns and themes. Following Miles and Huberman (1994), pattern codes have the following purposes: 1) to reduce the amount of data; 2) to focus the researcher early in the data collection process; 3) to help the researcher build a cognitive map; and 4) in the case of a multiple-case study, to lay the groundwork for cross-case analysis.

Another level of analysis- a discourse analysis- was conducted on a third and fourth reading of the articles. This involved more closely examining quotations in order add context to the first layer of data. Discourse is a systematic ordering of language involving certain rules, terminology and conventions (Seale 2006, 373). Discourse analysis is inherently constructivist. That is, it is an approach that sees language as a way of constructing and organizing the terms in which we understand reality (ibid.). Reading data in this way allows the researcher to capture nuanced meanings that are generated by key actors as they interpret events in their daily lives (Manzi and Jacobs 2008).

Additional data was similarly coded and analyzed including: planning documents and policy statements, city financial reports and interviews.

Interviews were solicited and conducted per the Institutional Review Board Protocol. A list of stakeholders was initially drawn from names that appeared in the

Tulsa World from January 2008 to January 2009. These were grouped according to affiliation. A total sample set of 30 was randomly chosen from among these groups and were sent a letter and consent form.

4.3. Reliability

Applying codes to textual documentation can be an inconsistent process, especially at the beginning of the research. In a typical study conducted by a team of researchers, coders would establish an acceptable level of intercoder reliability. Since this study was conducted entirely by one coder, a measure of intracoder reliability was calculated between two time periods.

A reliability sample of 20 articles was identified through random sampling of the 178 that had already been coded at this stage of the research process. Every sixth page of the electronic collection of articles was chosen for this sample. Randomness

ensures that the article could be about any topic and written by any author. It ensures that articles are taken from multiple months and years. Articles were originally

Table 4.1 Simple Percent Agreement T_1 and T_2

	Value
Total Units	0.80
Variable 1	1.00
Variable 2	0.76
Variable 3	0.53
Sample size = 20	

coded 3-4 four months prior to the reliability coding exercise. Reliability for the single coder was measured by comparing coding patterns for two time periods, T_1 and T_2 . Two indices were chosen to measure reliability. The first index- the percent agreement (**Table 4.1**) was calculated for each variable. The three variables represent the three main categories of agenda, resources and relationship. Between the initial coding and the second reliability coding- approximately 60 hours of coding had been

conducted. Raw data for this exercise can be found in **Appendix B**. These data show that almost without fail, more units were coded during the reliability coding exercise than were coded during the initial round. This could be for several reasons, but most likely was a result of greater familiarity with the codes and/or greater awareness of the historical events and people involved.

Percent agreement, supported by Miles and Huberman (1994), is not considered an adequate measure by itself (Wood 2007; Lombard, Snyder-Duch and Bracken 2010). A second index, Cohen’s kappa, was chosen to draw out more information. Kappa is a measurement of agreement between coders or in this case between two coding periods. Kappa was calculated four times to describe agreement among T₁ and T₂ in regard to: 1) total units counted; 2) variable 1 (agenda); 3) variable 2 (resources); and 4) variable 3 (relationship). Results are shown in the **Tables 4.2** below.

Table 4.2 Kappa Measures of Agreement

	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Total Units	0.148	0.099	1.967	0.049
Variable 1	0.381	0.129	3.795	0.000
Variable 2	-0.053	0.124	-0.526	0.599
Variable 3	0.007	0.112	0.057	0.955
Number of Valid Cases	20			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

A kappa of 1.0 shows perfect agreement. A kappa of -1.0 shows perfect disagreement and a kappa of 0.0 indicates a random level of agreement. A kappa score of 0.6 or greater is considered acceptable for research purposes (Wood 2007). Kappa scores were low in all cases above. The results show some challenges with the coding scheme, most notably that units of data can be coded in more than one category.

Triangulation of data sources helps to improve the overall reliability of the study. In addition to the newspaper dataset, Tulsa's latest planning and procedural documents were analyzed for evidence of commitment to minimizing and/or preventing the threat of flooding and other hazards. In addition, hazard-policy specific documents were analyzed to understand how growth patterns and development trends factor into decisions of the flood hazard and stormwater management community. The dual analyses offer a picture of what should be happening versus what is actually happening.

4.4. Limitations

There are limitations to doing a regime analysis. First and foremost, it can be difficult to investigate the inner workings and dynamics of a group without being a part of it. A large part of the agenda setting and discussions may occur behind closed doors. The outsider/researcher is limited by her access to information and must be wary of drawing conclusions based on incomplete datasets. On the other hand, being a disinterested, uninvolved party in the investigation ensures a level of objectivity in data collection, analysis and interpretation.

The attempt to solicit informants for interviews was not successful. Out of thirty letters sent, only four returned the signed interview consent form. One of those persons fell ill and was unable to complete the interview. This is telling for at least one reason which is explored further in the findings: there simply is very little interest among potential participants in talking about flooding and flood control in Tulsa. The only developer who did agree to be interviewed talked about flood control only after I initiated.

Geographer Anne Whyte (1986) speaks to the challenge of soliciting data from informants while conducting hazards research specifically. She points out:

The problem of salience of hazards in the lives of ordinary people . . . was recognized in the earliest work on floods. Since then, it has largely been buried as an issue and has not deterred researchers from framing questionnaires as though even the most unlikely natural hazards were part of every family's breakfast table conversation. Salience cannot be deduced from measures of perception and response. Anyone with experience interviewing will know that respondents will obligingly provide, in response to questions that they may have never considered before, answers that do not match their own views of the world (256).

Additionally, the lack of success in soliciting informants could be related to approach. Survey methodology research suggests that informants may have responded had there been more of an incentive for them to (Singer 2002). The mode of interviewing could have also been a factor in motivation to participate (Groves and Kahn 1979).

Chapter 5: Findings and Analysis

Chapter 5 lays out the major findings of this research project. Five interrelated themes are extracted from the data and analyzed: 1) prioritizing flood hazard mitigation; 2) communicating flood control successes and risk; 3) collecting and allocating resources for flood control; 4) location and the spatial dimensions of flooding and flood control; and 5) urban growth policies and the politics of flood control.

5.1. Prioritizing Flood Hazard Mitigation

This section answers the question: where does flood control rank as a priority for Tulsans. A formal statement of goals and priorities was assembled by Tulsa city planners in 2010 after an extensive 3-year participatory planning process. Tulsa's most recent comprehensive planning document describes it as a livable city with strong potential to attract new industry and a young workforce. It is a city with desirable amenities and assets including an extensive network of parks and trails, relatively inexpensive developable land, updated infrastructure, an affordable housing stock, and a supportive environment for entrepreneurs and small businesses (City of Tulsa Department of Planning 2010). The document also indicates the city's commitment to floodplain and stormwater management. Planners continue the themes of 'innovation' and integrating quality of life aspects with environmental sustainability as described in Chapter 2.

Tulsa's natural environments- waterways, floodplains and open space- provide a break from the hustle and bustle of living in an urban environment. Tulsans are proud of our natural landscapes, and in the future we will have even more to celebrate. . . Instead of cordoning off natural areas, Tulsa will integrate them into the fabric of city life and

urban design. Developers will recognize that their projects are more valuable when people can reach open spaces from home or work.

Floodplain and stormwater management will also continue to be an important tool for creating and preserving natural resources in the city. Tulsa will continue to be a leader in this field and will also develop further innovations. (City of Tulsa Department of Planning 2010, pp. 36-37)

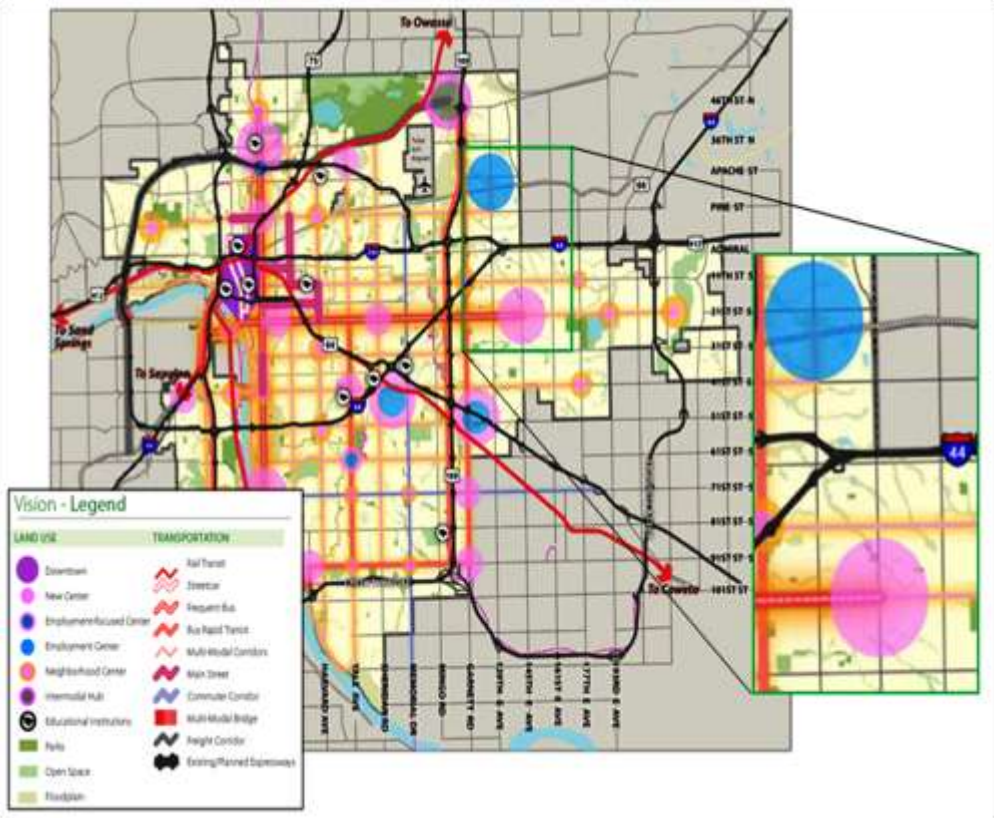


Figure 5.1. 'Tulsa Vision Map'; inset has been added
 Source: Tulsa Department of Planning, *Our Vision for Tulsa* June 2010, p.12

What is not clear in this plan is how flood control will be specifically addressed in relation to stated development goals including concentrated development of new commercial and residential centers and transportation nodes. The map used to describe the overall vision for the city includes floodplains as seen in **Figure 5.1** above. While this is encouraging, the connection between potential flooding and the higher-density development is not discussed. The blown-up section shows that high-

density centers are planned for areas that overlap with floodplains and upstream land area. Both of these particular centers are part of the Mingo Creek watershed which sustained the greatest flood damage in the 1970s and 1980s. Also, the map shows no elevation, thereby giving the false impression that the development canvas is a flat surface.

While an analysis of Tulsa's comprehensive plan document is necessary for understanding formalized goals and priorities, this research uncovered a caveat. Tulsa has undergone several rounds of urban planning, but evidently, due to past experience there is a lack of faith in the city's ability to follow through on plans. The following editorial is just one example of frustration over the lack of follow-through:

The more common fate of master plans . . . is not adherence to the recommendations or even alterations to fit changing times. Mostly, they are just ignored; they end up as expensive dust collectors on the shelves of public officials. The park, recreation, and open space master plan submitted to the council last week is an updated 1981 plan, which was preceded by plans from the '70s. One segment of that plan- open space preservation- might have saved the city millions of dollars if it had been taken seriously, because it advocated minimal development in floodplains . . . once a plan is approved, they should concentrate on making sure it is followed. If they don't take the city master plans seriously, who will? (*Tulsa World*, 16 July 1990)

Equally, if not more helpful than the finished plan product, is the data collected by the Tulsa Department of Planning throughout the planning process. **Table 5.1** shows the results of an individual survey of 1003 Tulsa citizens in 2007. Planners divided the results based on respondents' area of residence, age, length of residence

Table 5.1 Results of individual survey Source: Tulsa Department of Planning (2008) : <http://www.planitulsa.org/node/78>

Participant Response	City Leaders Understand My Needs																				
	Geography			Gender		Age		Ethnicity/Race			Income		Lived in Tulsa								
	North	East	South West	Male	Female	<35	35-44	45+	White	Afr.Amer	Other	A.A. + Other	\$50K+	<\$50K	<10yrs	10yrs +	Agree	Disagree			
Total	1003	216	202	258	128	199	434	569	178	180	636	606	121	159	280	368	519	194	798	389	575
High Priority	477	109	109	117	64	78	183	294	90	89	291	297	67	69	136	144	281	108	363	178	280
	48%	50%	54%	45%	50%	39%	42%	52%	51%	49%	46%	43%	55%	60%	58%	39%	54%	56%	45%	46%	49%
Medium Priority	356	69	60	92	47	88	159	197	62	61	233	263	38	44	82	152	166	63	291	145	193
	35%	32%	30%	36%	37%	44%	37%	35%	35%	34%	37%	38%	31%	28%	29%	41%	32%	32%	36%	37%	34%
Low Priority	170	38	33	49	17	33	92	78	26	30	112	126	16	19	35	72	72	23	144	66	102
	17%	18%	16%	19%	13%	17%	21%	14%	15%	17%	18%	18%	13%	12%	13%	20%	14%	12%	18%	17%	18%

in Tulsa, ethnicity, gender, income, and a category which describes whether or not a respondent feels his/her needs are understood by city leaders. The question posed was: How do you rank flood control as a priority for the city? Almost half (48 percent) of all respondents thought flood control should be a high priority. More telling is that only 17 percent said it should be a low priority.

Age is an interesting factor for flood control in this study because the impact of time on policies is an important consideration. One might expect that people who lived through the development and implementation of Tulsa’s flood management program would be more aware of and concerned with planning for future flood control. In this case, citizens over 45 are less likely to agree that flood control should be a high priority. Not surprisingly, Tulsans who reside in once- heavily-flooded east Tulsa are more likely to consider flood control a high priority. According to the news data, however, little has been reported in East Tulsa since the mid-1990s (**Figure 5.2**).

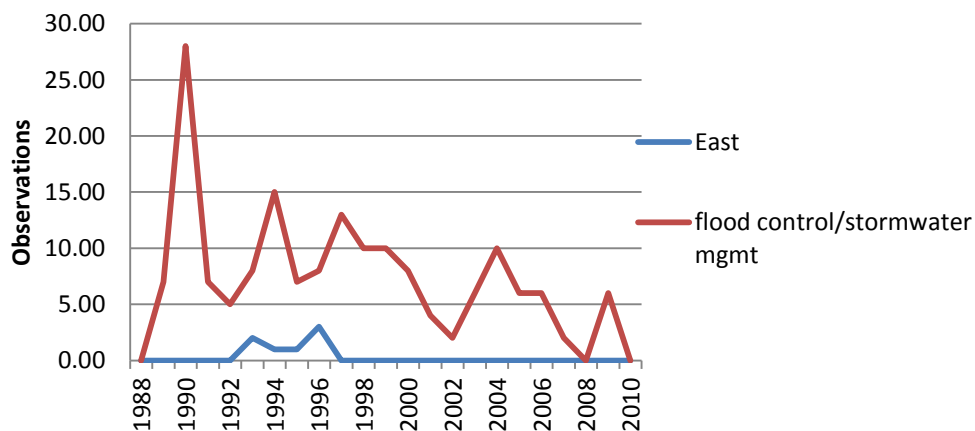


Figure 5.2. Observations of ‘flood control’ and ‘stormwater management’ derived from content analysis 1988-2010.

Manage Stormwater/Flood Control			
Participant Group	Total Observations	No. Subgroups Interviewed	Percent of Total Subgroups
Realtors/Realtor Association	0.00	2.00	0.00
Builder/Developer/Arch Association	1.00	5.00	20.00
Council District (voters)	3.00	9.00	33.33
Neighborhood Associations/Task Forces	3.00	10.00	30.00
Municipal Agencies or Authorities	1.00	6.00	16.67
Other Professional Association	0.00	3.00	0.00
Cultural/Population Interest Group	1.00	2.00	50.00
Total	9.00	37.00	

Table 5.2. Breakdown of participant groups which have indicated flood control as a priority Source: Tulsa Department of Planning: <http://www.planitulsa.org/node/78>

To best answer the question of where flood control ranks as a local priority one must examine it in comparison with other expressed priorities. **Table 5.2** describes who is talking about flood control more specifically, and **Table 5.3** shows the overall ranking of priorities mentioned in open-ended interviews with only three pre-set questions: what does Tulsa need most to achieve; what are Tulsa’s most valuable or important assets; and what are Tulsa’s most critical issues, problems or concerns. These data are based on a content analysis of the interview transcripts. One-third of Tulsa neighborhood groups and voter groups identified flood control and stormwater management as a priority concern. It is not surprising that homeowners would be concerned about personal property investments and safety. Homeowners and residents of flood-prone areas have the most to lose directly in the event of a flood.

Table 5.3. Identified planning priorities
 Source: Tulsa Department of Planning: <http://www.planitulsa.org/node/78>

Planning Priorities for Tulsa, Oklahoma		
Priority	Total Observations	% of Participant Groups
Connectivity/Transportation	28.00	75.68
Economic/Financial Sustainability	27.00	75.00
Stop Sprawl/Infill/Downtown	27.00	75.00
Creation/Preservation/Maintenance of Parks	23.00	63.89
Highlight Arkansas River	23.00	63.89
Learn from other cities/be competitive	22.00	61.11
Relationship/Diversity	21.00	58.33
Image	19.00	52.78
Schools/Education	19.00	52.78
Crime/Security	19.00	52.78
Environmental Quality	17.00	47.22
Follow-through on plans	16.00	44.44
Infrastructure	15.00	41.67
Balanced Growth	12.00	33.33
Social Services	11.00	30.56
Livability/Quality of Life	10.00	27.78
Manage Stormwater/Flood Control	9.00	25.00

As seen in **Table 5.3.**, when participants are not prompted about flood control, it does come up as a concern, but it ranks last. Preservation and maintenance of parks is ranked fourth, however, which reinforces the commitment to preserve open spaces for flood control.

Looking at the last 22 years of print media, we can get a sense of the connection between flood control and land-use. **Figure 5.3** shows a 22-year trend in public mentions of flood control as compared to statements about a vision for Tulsa. While this does not describe a correlation of terms within particular articles, the data suggest that visioning and flood control are not explicitly connected, especially from 2002 to 2010. The data also show that reporting about flood control has decreased with time.

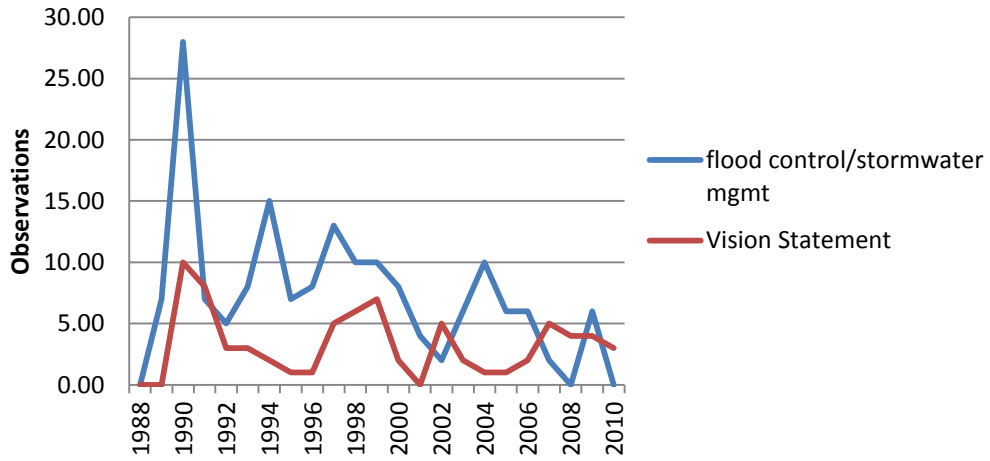


Figure 5.3 Graph comparing observations of ‘flood control/stormwater management’ and vision statements 1988-2010.

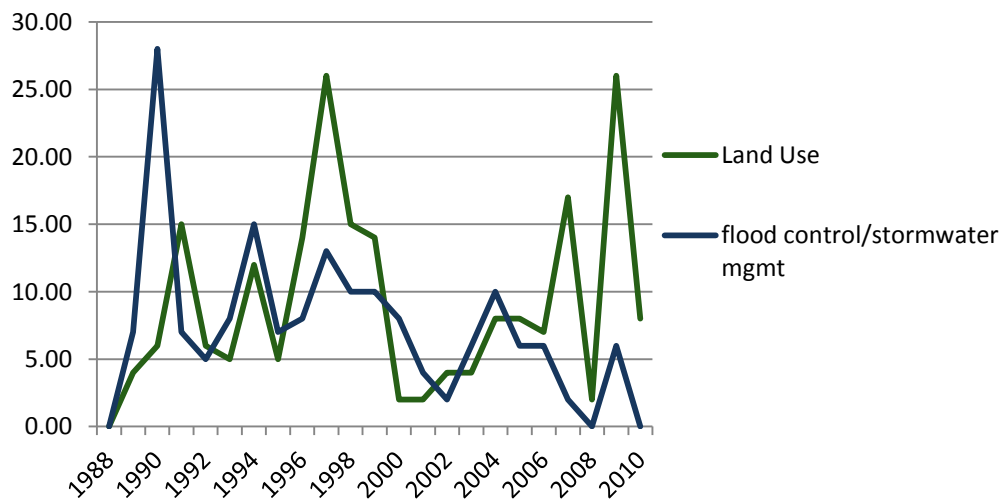


Figure 5.4 Observations of ‘flood control/stormwater management’ as compared to observations of terms related to land-use 1988-2010.

Major discussions of land use between 1996 and 1998 and again from 2007 to 2009 are about initiatives- infill development and river development, respectively- that have the potential to overcome previous flood control efforts and/or require renewed stormwater planning and resources. We see warnings of the potential impacts of infill development in Tulsa's Stormwater Plan 1990-2005. Higher density infill development is associated with increased runoff in downstream areas. In the early 2000s, city officials warned about the impact of higher-density land use on Tulsa's hydrology:

Tulsa Public Works: The more development we see, the more the pattern changes . . . As people have moved in, the creek channel has been changed. . . As erosion takes place, if we don't take steps in the next few years, people will lose their homes. (Graham, 11 June 2003)

Figure 5.5 shows an inverse trend in the volume of articles related to flood control versus those related to river development. Any substantial commercial and residential development of the river front is almost entirely dependent on the structural soundness of a 48-year old dam and 60-year old levee system. A Tulsa state representative citing the need for federal funding for Arkansas River levees reminded readers in 1991: the levees "are the only thing standing between the river and more than \$1.2 billion worth of homes, businesses, and other property in the Tulsa area." (Pearson, 22 December 1991)

This was echoed in 2005 by a Tulsa County levee commissioner especially concerned about the Sand Springs riverfront concept of the Arkansas River Corridor Master Plan (INCOG 2005):

Levee Commissioner: Sometimes politicians use their authority to override regulations. There are about 800 acres in the levee system—that’s a lot of temptation by industry and others to use that land. But they forget- that’s flood control. (Hylton, 25 September 2005)

Tulsa County and the Indian Nation Council of Governments have developed a region-wide plan for Arkansas River development. The 40 miles of planned mixed-use development and beautification is billed as a boon for the economic interest of the entire region.

The Greater Tulsa Area communities recognize the Arkansas River Corridor is an important natural resource that could be developed to stimulate immense private development and greatly improve the quality of life for current and future generations. (INCOG 2005)

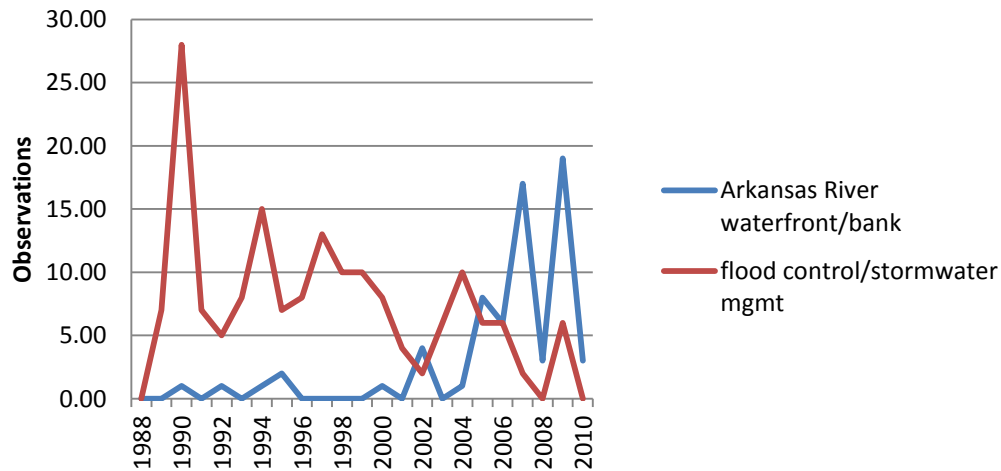


Figure 5.5. Observations of Arkansas River development compared with flood control 1988-2010.

Tulsa City interests seem divided among those who want to do ‘improvements’ to the public spaces and those who promote more residential and commercial private spaces. Tulsa’s mayor took the lead on suggesting a zoning scheme for riverfront development which may or may not be related to flood control.

Ultimately, the county's recent Arkansas River flood development sales tax package did not succeed at the voting booth (see **Figure 5.6** below). Note the spatial pattern of 'passed' and proximity to the river.

Despite the setback, the county was adamant about seeing some of the projects through, including the construction of low-water dams. The dams are deemed necessary for keeping a steady flow of water through the river, thereby increasing its attractiveness. Said a county commissioner, "While the voters have spoken, our vision is not dead. If it's not this plan, maybe another" (Canfield, 10 October 2007).

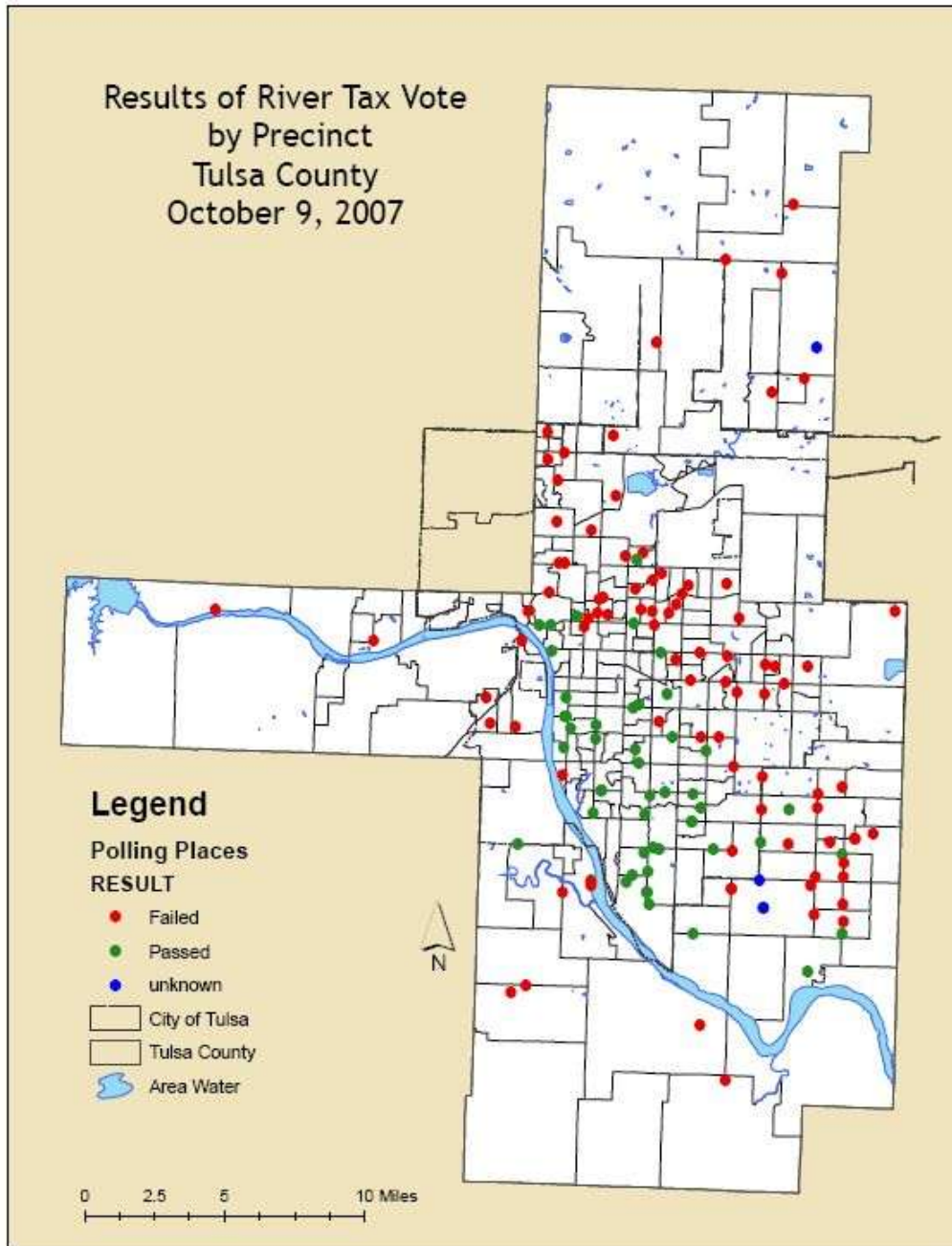


Figure 5.6 Results of River Tax Vote. Data source: (Canfield, 10 October 2007)

5.2. Communicating Success and Risk

The section explores the extent to which flood control success and risk factors are publically discussed. Tulsa’s commitment to keeping people and property out of

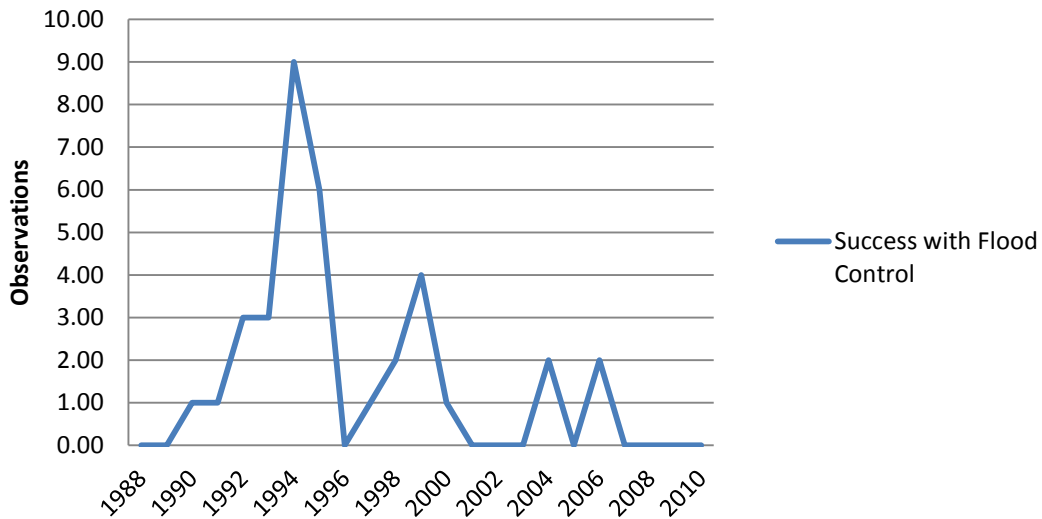


Figure 5.7 Observations of success with flood control 1988-2010.

harm’s way is rarely mentioned as a reason for establishing a business or residence in Tulsa. The lack of local enthusiasm for promoting Tulsa’s model of flood control is captured as early as 1990 in a *Tulsa World* editorial. Here the program is described as “like the biblical prophet without honor is his own land” even as it is “respected among flood control experts nationally.” There have been, however, specific times in the last 22 years when Tulsans were reminded of past tragedy and success. **Figure 5.7** above shows observations of “success” as a reported topic over a 22-year period.

Discussion about Tulsa’s success with flood control has coincided with particular events including: heavy rainstorms and major flooding elsewhere; dedication ceremonies and awards; funerals of flood management advocates and leaders; and the anniversaries of Tulsa’s 1984 flood. The peak year for observations is 1994. Memorial Day 1994 marked the 10-year anniversary of Tulsa’s most

devastating flood. Also in 1994, experts and municipal representatives were still analyzing the disastrous flooding on the upper Mississippi River the previous year and they looked to Tulsa for guidance. Gilbert F. White comments:

If you had talked with people in those Midwestern communities two years ago, they would have told you that they had seen the worst of their flooding. I think it behooves all communities to be prepared for a less permissive federal policy. . . There is also a movement with respect to communities doing more. Tulsa is distinctive in that it has gone farther and more aggressively. By contrast, some cities depend only on an upstream reservoir or only on levees. (Holland, 12 May 1994)

Several themes are observable in the messages about Tulsa's success with flood control including: 'the common good'; protection of lives and property; minimizing fear; and reclamation of land for development. Another noticeable pattern is that stories of success are almost always tempered with statements about risk.

Tulsa leaders credit the success with flood control to the fact that the majority of Tulsans accepted the premise that the responsibility for mitigating flood hazards was universal. An editorialist in 1994 asks: "Why should everyone have to pay to keep the homes and businesses of the few from flooding?" He/she responds:

Even though direct victims are relatively few in number helping them is the humane thing to do. Much of the dollar cost of a major flood is for emergency services, which are paid for by all. So, it is in the public interest to act to lesson or head off these costs. And those who live on high ground must remember that rain that runs off their roofs, driveways, and patios end up in others' living rooms. . . Reducing the threat of disastrous flooding in Tulsa is in everybody's best interest. (Averill, 26 June 1994)

Another editorialist states: “The key to the flood control effort was that city officials convinced Tulsans that flooding was the concern of every tax payer, not just those directly affected. . .” (*Tulsa World*, 13 May 1994)

During the 1990s, flood control in Tulsa was considered to be a successful yet on-going process. In 1991 the city’s citizen Stormwater Drainage Advisory Board warned:

If a 100-year flood hit throughout Tulsa tonight, it would cause more than \$100 million in damage to more than 4,000 properties. More than 550 street locations would be flooded so deeply they would be hazardous. At least 40 public buildings, including hospitals and senior citizen centers, could be flooded or at least cut off from safe access. (Aydelott, April 1991)

Statements by Tulsa Public Works officials in subsequent years mix confidence with warning:

You can’t solve flooding problems, but you can reduce flooding problems. You can either move the water away from the people, or move the people away from the water. (Basore Elliott, 15 May 1992)

I think the best is yet to come. But it will flood again. (Colberg, 22 May 1994)

I think those changes helped significantly to make May 1995 different from May 1984. But the gains we made should not give people a false sense of security, because it will happen again. (Sidibe, 1 June 1995)

We’re very happy about the results, and we’re looking forward to the complete project being done and several more homes and businesses being taken out of the regulatory floodplain. It’s important for these people to know that, while their chances of flooding have been reduced, floods can occur that are larger than the projected 100-year mapping standard, so they are not entirely free from future flood risk. (Branstetter, 21 April 1996)

The reality is that the streams in our major system worked well. In the past, a 2-inch rain would have produced panic of residents along

Mingo Creek. We're not by any means saying we've solved our problems. (Pingry, 7 October 1998)

Reflecting on the 20th anniversary (Brown, 23 May 2004):

Public Works: In any kind of public agency, you are balancing public needs and there are schools and highways too. And prevention is not as compelling. It's hard to measure.

Flood Control Advocate: We learned hard lessons and turned it into something positive. We can take this anniversary and use it to look back and remember what happened, but if we're worth our salt, we'll use it to look forward.

The cautionary tale of flood control did two things: 1) it acknowledged the uncertainty in predicting flood frequency and magnitude and in the delineation of floodplains; and 2) it bought the city time and resources to continue implementing flood control projects.

5.3. Resources and Flood Control Sustainability

Tulsa has a history of being locally self-sufficient. This is made possible by a tradition of public-private collaboration. Therefore, it is not surprising that Tulsa taxpayers, investors, and philanthropists have carried most of the burden of Tulsa's flood control program. **Figure 5.8** provides a breakdown of observations of financial sources for all projects listed over a 20-year period.

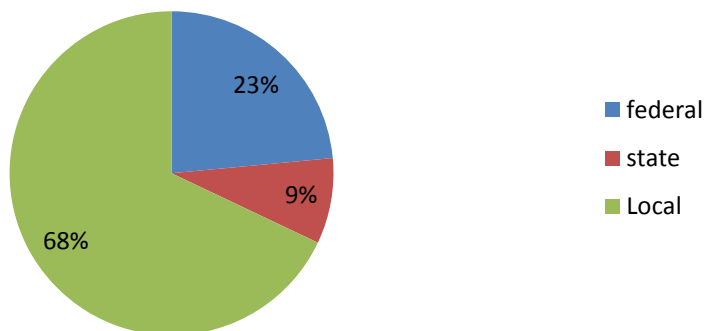


Figure 5.8 Breakdown of funding sources mentioned 1988-2010

Because flood management is linked to Tulsa’s physical infrastructure (stormwater drainage networks, park maintenance, channel widening), the public sector is responsible for the bulk of the funding. In 1980, Tulsa’s then mayor and city commissioners approved an additional one-cent local sales tax to help fund needed infrastructure, including capital flood control projects. Tulsa residents have approved an extension of this ‘third-penny’ sales tax five times (1985, 1991, 1996, 2001, and 2006). As the mayor of Tulsa expressed in May of 2001:

This third penny is the single most important infrastructure investment for our city. Our financial director’s biggest fear was that he was going to have to rewrite a new budget. (*Tulsa World*, 9 May 2001)

Figure 5.9 shows the recent annual changes in spending for Public Works projects including flood control. Data show that the city has decreased spending for public works in recent years. This may be more a reflection of the health of the economy than a statement about the need for infrastructure projects. The same trend is shown for city spending on parks in **Figure 5.10**. While Tulsans have expressed support for parks, the city has had insufficient funds to keep up with “best practice” in park maintenance (Tulsa Parks and Recreation 2010, p. 86). The Parks Department generates revenue from golf fees and concessions and is considering other sources of revenue such as service fees, rental fees for private events, municipal bonds, and the use of volunteers to help with park maintenance.

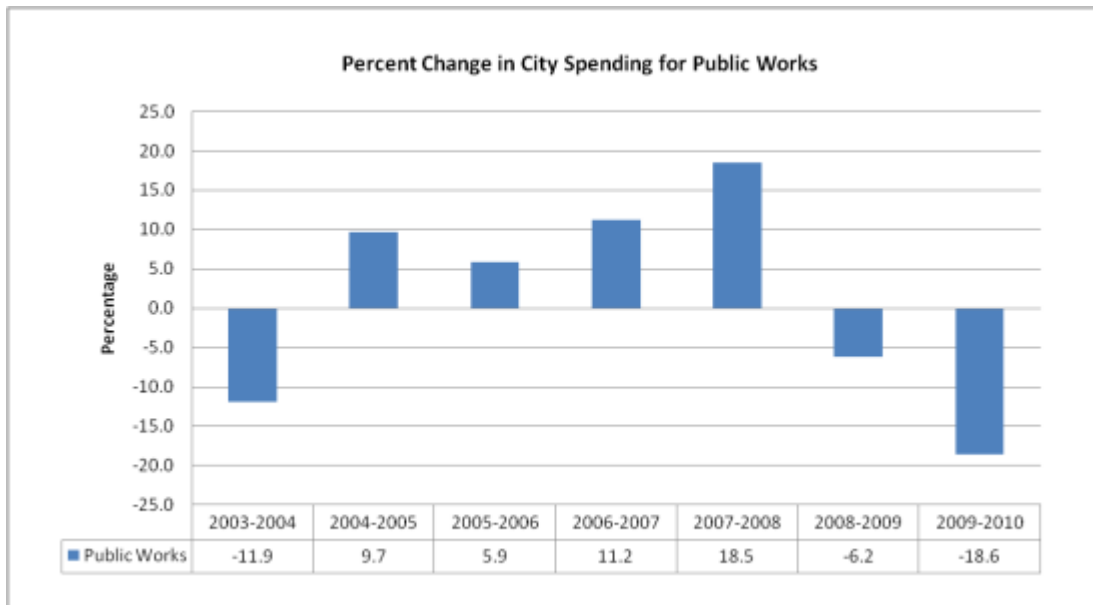


Figure 5.9 Percent change in spending for Public Works.
 Source: Calculated from City of Tulsa Annual Financial Reports 2003-2010
<http://www.cityoftulsa.org/our-city/financial-reports/comprehensive-annual-financial-reports.aspx>

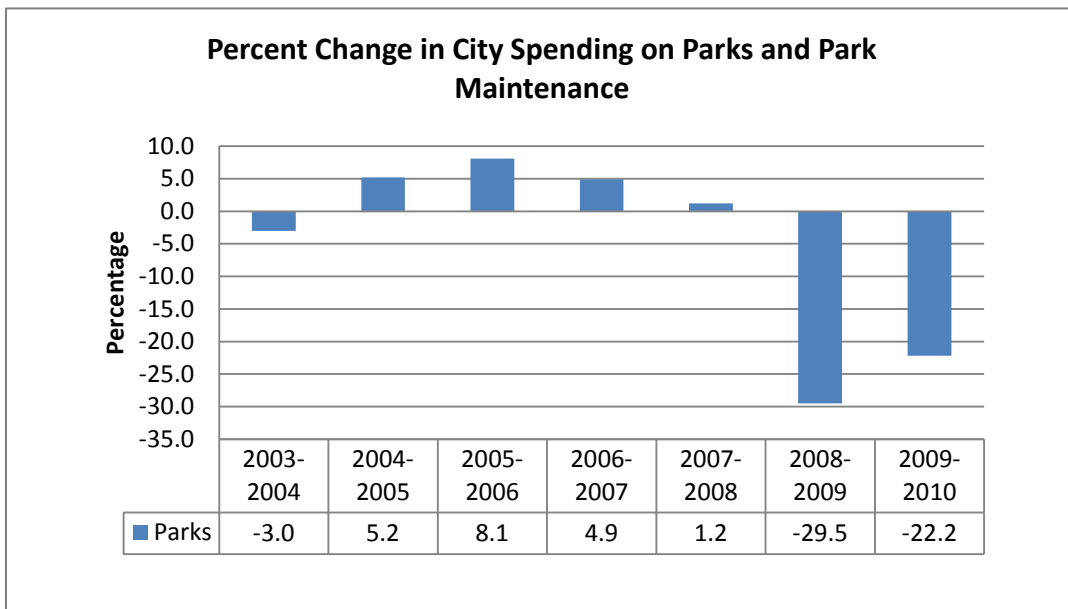


Figure 5.10 Percent change in city spending on city parks.
 Source: City of Tulsa Annual Financial Reports (2003-2010)
<http://www.cityoftulsa.org/our-city/financial-reports/comprehensive-annual-financial-reports.aspx>

A bond issue for infrastructure passed in 2004 with dedicated funding for flood control and stormwater drainage in Districts 2, 5 and 9. It was also used for other infrastructure projects such as road repair.

Mayor: This package is for basic needs and addresses . . . priorities for our citizens, the things that affect you and you are most concerned with on an everyday basis. This is a very important package for the city. (Lassek, 3 October 2004)

City Council: This is about enhancing our quality of life . . . Bottom line is this is funding the kinds of projects that nobody disagrees government should be doing. It's the bread and butter of city government. Without these types of bond issues, the city's infrastructure will deteriorate. (Lassek, 3 October 2004)

In addition to the third-penny tax and bonds, the financial responsibility for stormwater drainage is spread through a stormwater utility fee. The fee is calculated based on property size and is intended to pay for maintenance of existing infrastructure. **Figure 5.11** describes how the program has fared since 2003. In most years, expenses have outpaced revenue. The fare has been increased several times since it was implemented. *Public Works News Service* (Kumar 2010) reports that nationally only one-third of municipalities with stormwater utilities recover mitigation costs through user fees. Results of their latest biennial survey show that Tulsa currently has only enough funding to meet the 'most urgent' needs.

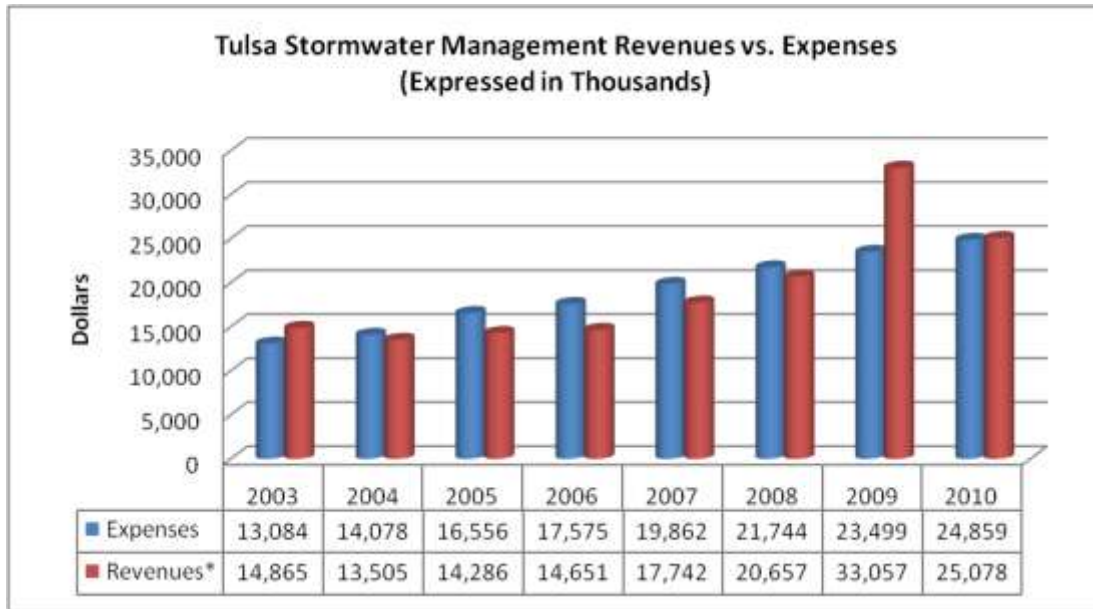


Figure 5.11 Comparison of Stormwater Management fee revenues and program
 Source: City of Tulsa Annual Financial Reports 2003-2010.
<http://www.cityoftulsa.org/our-city/financial-reports/comprehensive-annual-financial-reports.aspx>

Stormwater in lieu (of detention) fees are also collected from developers for watershed-wide stormwater management. This fee is based on construction costs needed to mitigate additional units of impervious surface runoff. These fees have historically not been adequate to cover actual costs of construction (Robison, Meshak and Hill, no date).

While not explicitly connected to flood control in the public discourse, Tulsa’s hazard mitigation planners cite the creation and expansion of River Parks as a triumph for flood control. Private investment from philanthropists in the business community allowed the city to purchase land along the Arkansas River, thereby preserving a large chunk of river lowlands as public open space. Tulsa World editorialists and Tulsa officials lauded the River Parks (seen in **Figure 5.12**) expansion in the early 1990s as a civic triumph.



Figure 5.12 Concert at River Parks
Source: City of Tulsa Department of Planning (2010, p.36)

Mayor's Office: The opportunity to purchase a large tract of undeveloped land is without precedent in the city's recent history. (Kimbrell, 17 May 1991)

City Parks Director: We have the opportunity here to look at some special facilities, possibly financed through revenue bonds, for a city-wide facility, not just something for District 8. . . We're talking community-wide development that could be financed in a tremendous number of ways. (Kimbrell, 17 May 1991)

City Councilor: It would be irresponsible to allow private development of the land on the Arkansas River bank. (Kimbrell, 17 May 1991)

Editorialist: A wise plan for maximum public use of the land south of 71st street will be recorded in Tulsa's history to the everlasting credit of the present mayor and city council. (*Tulsa World*; 20 May 1991)

Editorialist: The reason this plan is drawing support is severalfold. It addresses the desire of Tulsans to, first of all, preserve and enhance one of the most beautiful areas of the city, the still-developing parks along the Arkansas River. It also meets the need to move automobiles along the parkway in ever-increasing numbers. . . The final result, admittedly several years off, will be one of the finest civic projects in Tulsa. It will meet the traffic needs and it will add to and preserve the parks while protecting neighborhoods from encroachment. (*Tulsa World*; 24 September 1993)

To implement flood mitigation projects Tulsa has relied on federal funding sources to match, and in some cases exceed, local contributions. Specific mitigation projects have been explained in Chapter 3 above. The last major federal mitigation initiative was the Project Impact (PI) program. PI brought together local public and private interests to plan for and reduce the possibility of future disasters.

When the Bush Administration ceased funding Project Impact, Tulsa's chapter devolved into the mayor's Citizen Corps and a 501(c)(3) non-profit organization called Tulsa Partners. Tulsa Partners program leaders have worked hard on limited means to engage the business and building community in collaborative disaster prevention projects. Tulsa Partners is also dedicated to making sure potentially vulnerable populations of immigrants have access to information about hazards and emergency services.

State of Oklahoma funding sources are conspicuously absent in discussions about flood control (refer to **Figure 5.8**). State resources may actually be involved in undermining Tulsa's flood control. In one particular case, state highway funding and construction threatened to supersede Tulsa's floodplain regulations and land-use authority. Construction of Creek Turnpike in the 1990s was an early test for the Tulsa Public Works director.

Recently the Oklahoma legislature has been keen to provide state funding for Arkansas River development. Oklahoma's governor summarized the reason for investing in Tulsa riverfront development:

Governor: I think the development of the Arkansas is critical to the prosperity of Tulsa and Oklahoma, and the low-water dams are a key

component of the development effort. It's a great investment for Tulsa and what's good for Tulsa is good for the state (Hoferock, 27 April 2009).

Figure 5.13 describes observations of federal, state and local resources for local projects.

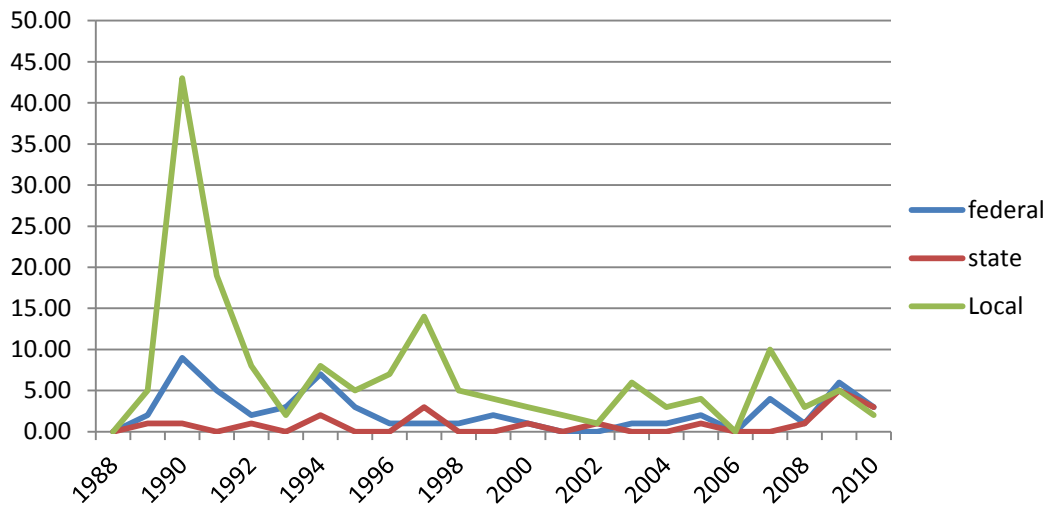


Figure 5.13 Funding sources for local projects 1988-2010

Another important resource for flood control sustainability is time. **Figure 5.14** gives the breakdown of observations related to time commitment. The majority of statements identified- for all types of city projects- described an expected commitment of 5-10 years. This seems to hold true for commitments to flood control.

As one editorialist put it in September of 1992:

A 14-inch rain would cause far less damage than occurred in 1984, but Tulsa still isn't flood-proof. More detention ponds must be built, more creekbeds cleared and channeled and what has been done must be maintained. Ten years from now, I want to be able to say I remember this: that Tulsa continued strengthening its flood control efforts with

the same dedication developed since 1984. (Sellers, 29 September 1992)

The data imply that continuous updates, additions, or innovations should occur every five to ten years.

Percentage of observations describing time commitment

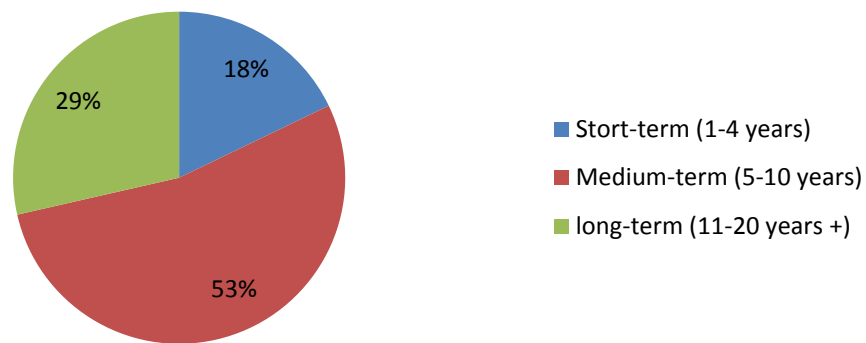


Figure 5.14 Time Commitment observations 1988-2010

5.4. Location and Spatial Dimensions

Newspaper articles almost always use locations to describe reported events. This research was designed in part to take advantage of that convention. **Table 5.4** lists the rank order of how locations are described in connection with reported events. These data were collected from a content analysis of the same set of *Tulsa World* articles. The location identifiers observed the most were ‘proximity to stream’ and ‘Arkansas River waterfront’. This suggests that the reported event is related to the stream/river and also that Tulsans are generally familiar with the city’s physical geography. ‘Floodplain’ also ranks high on the list.

Table 5.4 Location identifiers ranked by number of observations

Location Identifier	No. of Observations
proximity to creeks/streams	184
Arkansas River waterfront	67
Council District	58
floodplain	57
park/proximity to park	48
neighborhood	43
street/ intersection	35
CBD/urban core/downtown	32
west	26
Tulsa County	22
south	16
watershed/drainage basin	16
north	15
another city	8
east	7
Oklahoma	6
southeast	3
northwest	2

Figures 5.15 and 5.16 show additional comparisons. Looking at terms related to land use in the 1990s we see that streams may not be directly related to land use policy-making.

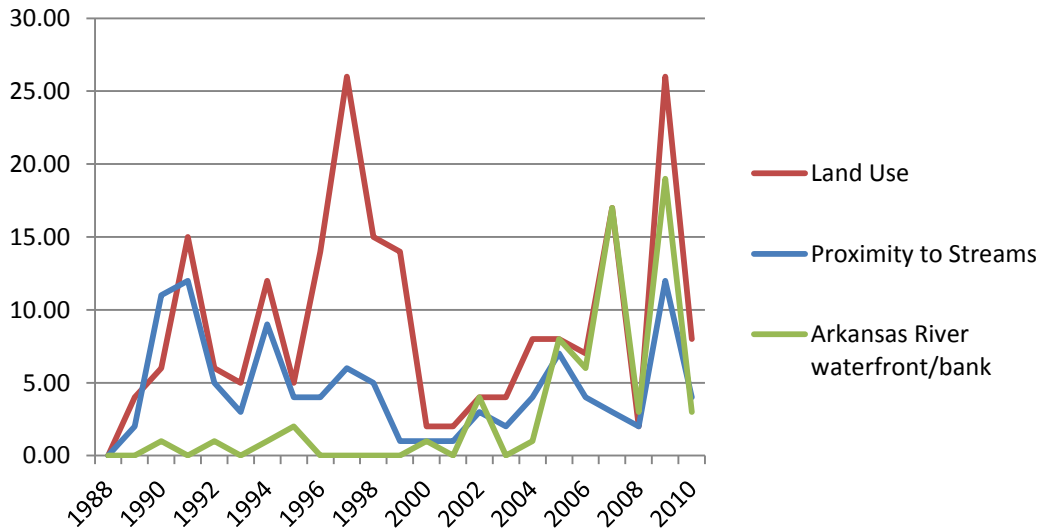


Figure 5.15 Comparing observations of land use terms to proximity to streams and ‘Arkansas River’ 1988-2010.

In Figure 5.16 we see more of a connection between ‘flood control’ and ‘streams’.

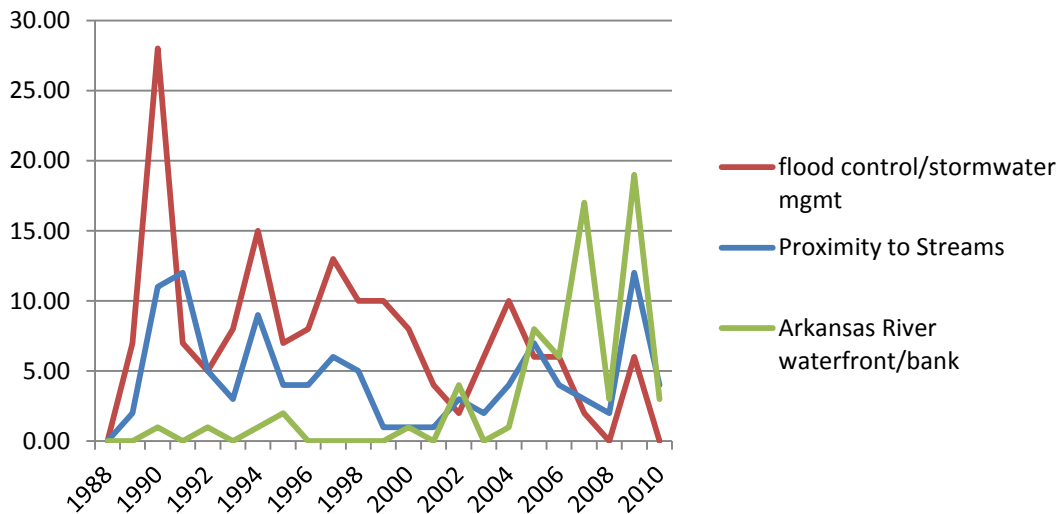


Figure 5.16 Comparing observations of ‘flood control’ to ‘proximity to streams’ and ‘Arkansas River’ 1988- 2010

Flooding and flood control are spatial phenomena. Flood waters can be described in terms of upstream and downstream dynamics, basin-wide drainage and floodplain delineation. A major problem of managing flood control in the Tulsa metropolitan area is the simple fact that streams and watersheds do not conform to political boundaries. Tulsa has been able to regulate development within smaller city watersheds, but does not have jurisdiction to dictate what happens within the boundaries of surrounding incorporated towns. Communities near Tulsa do not uniformly apply the same flood control standards as Tulsa. The city of Jenks sanctions development in flood-prone areas and behind levees and is the most aggressive regional developer of the Arkansas River waterfront.

Jenks Mayor: We're going to be the first ones to develop, and hopefully, the excitement in Jenks will spread all up and down the river. The river is the greatest asset we have. It's the thread that links us all together. (Hylton, 13 November 2005)

Jenks has recently encouraged Creek Nation development partially within the river floodplain on the west bank by offering to pay for infrastructure that Tulsa has said it cannot afford and does not support.

Mayor of Tulsa: [In letter to Bureau of Indian Affairs about some of Creek Property being in a floodplain and without access to infrastructure] These facts make flooding a very real issue and implicate jurisdictional and zoning issues if and when that flooding occurs. (Adcock, 4 June 2009)

Mayor of Jenks: If we can work something out, I don't know why we wouldn't. If they've got a piece of properties that needs utilities to it, we're the closest. . . I would think it's a long-term investment for them. I think one of those days as the development continues north, one of these days it would get to this property, but it's not there yet. (Adcock, 4 June 2009)

At the same time, the city of Bixby has confronted Tulsa about flooding caused by upstream development in east Tulsa. According to Bixby city manager, an agreement was made “in lieu of litigation” (Killman, 8 January 1996). Sixty percent of Bixby is in the floodplain and the city has trouble affording the necessary flood control measures.

Bixby City Council Member: It’s hard to keep the water off you when you’re located at the bottom of the hill. (Lassek, 10 March 1991)

County Commissioner: The County tries to get cities to do their own work inside of their city limits, ‘but Bixby is strapped financially and these projects need to be done.’ (Lassek, 10 March 1991)

5.5. Urban growth policies and the politics of flood control

What is the relationship between flood control and Tulsa’s development objectives? Figuring out the flood-control concerns of various land-use policies is easier than understanding how other policies have been impacted by flood control.

Table 5.5 describes the major development eras in Tulsa and the flood-control concerns and solutions.

Table 5.5 Description of major development eras, growth patterns, and flood concerns

‘Development Eras’	Purpose	Major Growth Patterns	Major Flood Concerns
Post WWII-1970s Low-Density	Creation of suburban lifestyle	Unplanned growth to south and east of Tulsa’s downtown	Growth into hazardous low-lying areas; homes in these areas flood repeatedly
1970s- 1990s- ‘Balanced Growth’	Reaction to emptying of Tulsa’s urban core and degradation of Tulsa’s northern	Redevelopment/renewal is initiated in north, especially	Same concerns as above in addition to upstream-downstream effects; need for

	and western neighborhoods;		watershed-wide drainage plans and infrastructure; removing structures from floodplains
1990s- 2008 Infill Development	Reuse and update urban infrastructure; slow outward migration of population and decline of city's tax base	Downtown development projects and revitalization of neighborhoods	Watershed-wide drainage within Tulsa; maintenance of open space catchment areas; coordination with drainage and land use upstream and downstream of Tulsa
'Sustainable Development'	Creation of a 'livable' city and a 'destination' city	Growth along main streets, updates to downtown; mixed, high-density land use	Increased impervious surface; new land-use patterns require new modeling and updated floodplain designation ³

What impact did the implementation of Tulsa's flood control program have on Tulsa's growth and development? This section looks closer at the political economy and ecology of balancing flood control with growth objectives and competing priorities. Three dichotomous themes run through the discourse: 1) restraining and encouraging growth; 2) neglect and revitalization; and 3) destruction and protection of natural resources.

Restraining and Encouraging Growth

In the 1970s, Tulsa's official growth policy became 'Balanced Growth'. The intention of this policy was to encourage development in north and west Tulsa and

³ Tulsa Stormwater Management Plan 1990-2005

manage the sprawl to south and east. The rapid expansion to the east and south led to more flooding and to a hollowed-out central city, and was costing the city in new, unplanned infrastructure projects. As described in Chapter 3, the decades leading up to the adoption of Tulsa's flood control program was a contentious battle between developers and homeowners with the City in the middle and ultimately on the side of homeowners. The oil market crash in the 1980s also took a toll on investment and development. By 1990, developers had had enough. In response to the city collecting developer fees for flood control:

Developer: Most of the people left in our business are survivors. They've been through about as tough a time anyone could go through and still be in business. We don't need any more problems at this time. We're very sympathetic to what's good for the city, but the main thing is we've got to have a product that is affordable. . . I think the real point to make is the developer never really pays anything. It's the new home buyer who does. I think we need to think about that. (Pearson, 29 April 1990)

An opinion writer in 1991, describing the lack of growth Tulsa blames it on flood control:

Anonymous: . . . The balanced approach came out of the go-go days of the '70s when development was booming and two monster floods fueled the idea that growth is bad and something to be controlled. (Neal, 19 May 1991)

The era of infill development was another attempt to 'balance' or control growth by directing it to already established areas.

Mayor: I see this as the next wave of development. Otherwise, the only place we have to go for development is out away from the city. . . This type of development not only encourages redevelopment of areas, but environmental cleanup of brownfield sites, the creation of jobs in areas that are underemployed, plus it revitalizes deteriorating neighborhoods. (Dudley, 14 March 1999)

Architect: It's a matter of whether we grow with or without direction.
(Dudley, 14 March 1999)

By 1999 attitudes were changing between residents and developers as the infill development movement caught on. Mixed-use development became more palatable to residents who had previously cherished their isolation from commercial activity. An architect explains:

Architect: There is a symbiotic relationship between residential and commercial development. If you have a healthy economic venture at the corner it improves the value of the neighborhood and vice-versa. . . I think the greatest thing that will come out of this report is a shared language and understanding on both sides. I'm not naïve enough to think that you are going to have a love fest between the two sides, but at least there will be mutual understanding of viewpoints. (Lassek, 15 March 1999)

The data show Tulsans' sophistication with using flooding and flood control as a way to influence development decisions. Homeowners and neighborhood associations are empowered to talk about the threat of flooding as a reason to oppose or delay projects they may deem unacceptable.

Regarding an application to the City Council to construct new homes:

Homeowner: We're in a world of trouble over there. Water runs through peoples' yards and it's washing people's homes away. We commonly refer to this as Atlanta Place River. (Brantstetter, 24 May 26, 1990)

Regarding the Creek Turnpike, a state highway that runs through south Tulsa:

Polecat Creek flows behind many neighborhoods in Jenks. The creek is going to be blocked off, stopping its natural flow. It will create a stagnant slough which will breed snakes and mosquitoes. The turnpike will be built in the Polecat floodplain. The creek will flood for miles. . . (Migliore, 29 January 1990)

In 1994, residents of the wealthy Oakview Estates area of southern Tulsa banded together to resist a change of zoning which would allow smaller homes to be built on smaller lots. The homeowners worried that this would increase traffic and drainage problems. One can only surmise what is was not said, but publically the message was:

Greater Oakview Estates Homeowners' Association: We don't think that the report (on stormwater) answers the problem. If (the developer) would meet the (estate) zoning and take care of the problems, we'd be happy to help him paint his houses. (Colberg, 1 September 1994)

Regarding a home for the elderly in District 2:

Homeowner: Another concern I have is the water flow into Mooser Creek. I'm worried that it might not be able to hold any more. . . These owners seem to be all right, but what if it changes ownership. It could go to Section 8 and that is why I oppose it. I fear it may turn into substandard housing and I'm also worried about the flooding that may occur. (Gay, 9 October 1996)

Builder: To get a building permit, we must be committed to doing stormwater detention so there is no added water flowing into Mooser Creek from our property. (Gay, 9 October 1996)

Regarding a request for rezoning a section of West Tulsa from agricultural to commercial and residential:

Homeowner: I have not found one area resident in favor of this proposal. Let [the developer] take it to an area where it needs to be developed. . . Our schools are already packed to the seams. The traffic is already congested on 41st street. . . This is a flood zone already and the water runoff would get even worse. He's trying to build too much on that land. This is a big example of disappearing agricultural land. People come in and buy up land and then want to put a shopping center on it. We don't need one here. This is a nice rural community. . . The people that live here are elderly and live in nice houses on nice lots. We have a right to defend our neighborhood and we don't want it commercial. (Ashley, 3 September 1997)

Developer: These people took it upon themselves to circulate a petition saying this was going to be low-income or Section 8 housing. Anyone who knows anything about developing knows that Tulsa County will just not let you do that. I told the lawyer to have that stricken from the proposal. (Ashley, 3 September 1997)

In 1997 road construction caused flooding on one women's south home. The city installed a pipe to help with drainage in hers and others' yards. She surmised:

Homeowner: [City employees] started jumping all over themselves when they found out there was going to be media coverage on my problem. . . I told them they could do whatever was necessary to my back yard as long as they did something to help me. . . I can't live with mud and debris in my home each time it rains hard for a short period of time. (Lassek, 17 July 1997)

In 2002 citizen 'experts' offer unsolicited advice to the city.

Resident: When you remove trees and shrubs and replace it with concrete, the water that would have been absorbed by grass and trees goes elsewhere . . . We're very worried. We're watching it coming closer and closer. We need the city to take responsibility. (Dudley, 17 July 2002)

Public Works: Their contention, in their mind, is upstream development has increased the stormwater runoff, which has increased stream bank erosion with the potential of damaging a couple of their condos. (Dudley, 17 July 2002)

A bold and ambitious project to build civic, commercial and residential spaces in the middle of the river never got off the ground in 2006, (**Figure 5.17**) despite some significant private investment.



Figure 5.17 Artist's rendition of Tulsa Channel's Project showing artificial islands in the Arkansas River at Tulsa. Source: www.brandavenuetypepad.com

The Army Corps of Engineers Tulsa District agreed to collect data about how the area's levee system would hold up under such a scenario and make recommendations. The Corps did not squelch enthusiasm for the project:

Corps Spokesperson: The Corps thinks this is an aggressive and innovative project, and we're looking forward to learning more about the technical details. . . You can engineer anything to work. It's just a matter of what can be implemented. . . It isn't our call, whether this project goes or not. All we do is tell them what is required. (Lassek, 3 September 2006)

Two residents were more cautious and outspoken about flooding:

Resident 1: He [speaker's father] had a pet peeve about the idiots that built in the floodplain below Keystone Dam. He used to say, 'The 100-year flood is a 100-year guess. A 500-year flood is a real big guess.' We don't know what can happen with this river; it is a humongous river basin. (Lassek, 4 October 2006)

Resident 2: What happens when you have to release water [from the dam] and you have an 18-foot wall of water going down the river? (Lassek, 4 October 2006)

Some of the most vocal supporters for flood control are Tulsa's citizens. Evidence suggests that many are willing to stay engaged and vigilant.

Neglect and Revitalization

Findings from this research suggest that by the early 1990s, flood control measures in east and south Tulsa added to the frustration of north and west Tulsans who already believed that those areas of the city were neglected. We know that property values increased, flood insurance decreased, and land was reclaimed for development in east Tulsa while north Tulsa languished and declined.

The attorney representing north Tulsans in the landmark case that led to Tulsa's new mayor-council form of government calculated that less than 9 percent of 1980 and 1985 sales tax packages was spent in north Tulsa, "The north side always seems to get the short side." (*Tulsa World*; September 21, 1990)

Regarding detention ponds:

District 2 resident: They're taking these federal funds and building these Cadillac detention ponds. We need to sit on City Hall until they find there's [sic] other parts besides Mingo Creek. (Colberg, 10 July 1990)

Regarding the third-penny tax extension of 1991:

District 2 resident₁: You're going to get people out campaigning against it because they've been ignored by the city. (Zubeck, 18 September 1990)

District 2 resident₂: (regarding absence of west side drainage projects): I'm saying you've got a credibility problem when you look at the projects in the last five years and then you ask for a sales tax extension. (Zubeck, 18 September 1990)

City officials reassured north and west Tulsans of the city's commitment to Balanced Growth. In March of 1990 the Tulsa World reported that since 1981 the city had spent or committed to spend \$119 million in north and west Tulsa to attract development 'eventually'.

Mayor: I think we're at a point where we're going to start seeing the rewards of that policy. Economics are going to make balanced growth more of a reality in the next decade.

Developer and former planner: It takes a long time for a response to develop. My guess is the infrastructure to the north has just been put in, and we just haven't responded yet. (Pearson, 18 March 1990)

Regarding small-scale revitalization in north Tulsa:

NAACP Representative: . . .the jury is still out. We're waiting to see if this is for real. For the common good as a whole, sometimes we just have to accept things and hope they turn out for the best. I think what the city has done to this point and what it is indicating it is willing to do is just a friendly gesture to say 'ok, we're not going to forget you. (Branstetter, 30 July 1995)

The expansion of River Parks in south Tulsa was initially a blow to north Tulsa residents who saw it as another example of neglect.

District 1 Councilmember: It's the same old story. They just keep making improvements on the south side. We can't get industry to nest in north Tulsa when Tulsa itself has mistreated north Tulsa. (Colberg, 29 March 1991).

North Tulsa Resident₁: The Mayor and the City Council need to focus on an area of the city that has been ignored too long. We will no longer remain dormant because we are tired of being ignored. . . I'm not here to deny there is a need for a park in south Tulsa. If you think a place to job and relax is more important than jobs, then I disagree with you. (Aydelott, 22 May 1991)

North Tulsa Resident₂: If we can spend \$2,225,000 on a park, allow something for jobs. Please, promise us something. (Colberg, 31 May 1991)

Evidence suggests that the city responded to north and west Tulsans' protests by including flood control as an important component of urban renewal, participatory planning and infill development.

Regarding the redevelopment of Charles Page Blvd, an industrial, working class area of West Tulsa:

Community Planner: Our working group is in no way opposed to the future plans of extended stormwater retention facilities. Much of the blighted housing in the area is due to previous flooding. Pedestrians, traffic, and overcoming flood problems will also play vital roles in these neighborhoods. (Zulpo, 9 February 1994)

That same year, another flood retention project in and around McClure Park in east-central Tulsa was under way. This project was instrumental in showing that detention pond projects could provide recreational benefits to a neighborhood.

City Park Planner: We'd like to take advantage of this chance to provide greater recreation opportunities to people in that area. The east side of town doesn't currently have a heavy concentration of park facilities.

Resident: I think it would improve the area. I think most people are interested in seeing changes for the better in the area.

Neighborhood church representative: Back in 1991, we were thinking of acquiring some of that land and building some auxiliary structures. No sooner did we start talking about it that we found out it was in the city of Tulsa's 500-year floodplain. We want to see something out there that will benefit the whole community. We're willing to bend over backwards to make things work. We just need to sit down with the park department and work on some details on planning and road access. For instance, the pond near Warren Clinic at South Yale serves its function and looks nice. I think ponds can also be incorporated into the overall recreational concept. (Harper, 4 May 1994)

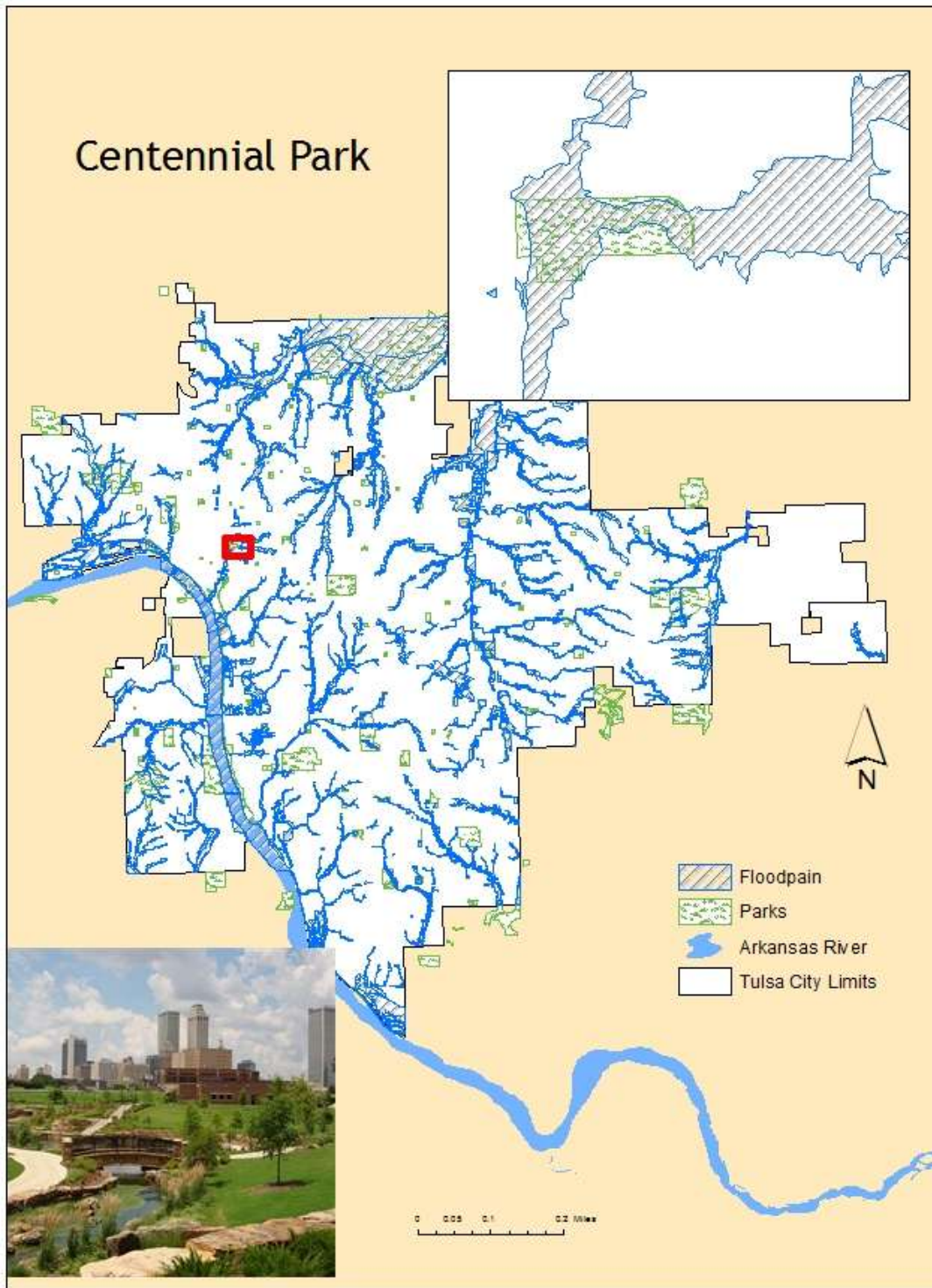


Figure 5.18 Tulsa park system in relation to floodplains. Centennial Park is shown in insets.

Centennial Park, (**Figure 5.18**) just east of downtown, is the city's most prized project (Robison, 2011 personal communication). It includes a pond, a recreational center and a senior center.

City Planning Task Force Member: This is truly a community effort and just part of our long-term vision for the area. The park is the heart of the area, but when we complete the remaining flooding projects to the north and east of the park, the community will see a total renaissance of an area that is the eastern gateway into the downtown area. . (Lassek, 9 March 2003)

Minister at neighborhood church: This project is one step in a bigger plan that will return city life back to an entire area that has been forlorned. . (Lassek, 9 March 2003)

City Planner: The people here recognized the need for flood control and need to repopulate this declined neighborhood. You can't do redevelopment without flood control, and flood control isn't necessary without redevelopment. This is the beginning to addressing many problems at once. (Lassek, 9 March 2003)

Another success story of flood control, revitalization and citizen planning is the Mooser Creek Greenway project in West Tulsa. The Mooser Creek project was established by area residents to combine flood control, wetland habitat conservation and development. This was a unique program because it involved participants with different interests and different backgrounds, who nevertheless came together to do watershed-wide planning. The plan allowed for a number of stakeholders to weigh in on "decisions that used to be made by a banker, a developer, and perhaps a politician" (Flanagan 2004).

SW Tulsa Historical Society: This is the first time I've been involved in a planning process where citizens are involved up front before the plans are put on paper. (Gay, 5 February 1997)

Resident: I think this plan is wonderful. The west side has always been perceived as nothing but railroads and refineries. The area has changed

over the years, and it's nice to see the city take an interest in cleaning up the creek and giving us trails. (Lassek, 17 April 1998)

Mayor: We chose Mooser Creek as a candidate for this intensive community involvement because southwest Tulsa is primed for development. (Lassek, 17 April 1998)

Regarding west side development:

Southwest Tulsa Chamber of Commerce: We are not in the floodplain and we have a great transportation system here. We have heavy industry and 900 businesses. There is great investment potential in southwest Tulsa. (Zulpo, 29 September 1993)

The Charles Page Boulevard area of west Tulsa, "sits partly on gently rolling uplands, but lies in what was once the Arkansas River floodplain, now protected by a levee system" (Braudrick, 24 July 1996).

Representatives of the West O'Main neighborhood association describe the revitalization effort (Braudrick, 24 July 1996):

Representative₁: It has to be a coordinated revitalization effort. We took a more holistic approach to revitalization. It's not that it has a bad reputation. It's just that it has no reputation. . . It will never be the employment center it once was, but we'd like for Tulsa to fully utilize an area that is really a resource for Tulsa. We'd like to see the area progress toward this plan.

Representative₂: It seems we're just the forgotten area out here . . . We used to be quite a thriving community and had lots of industry out here. The area is kind of declining because there's no work. You can't take that many jobs out of an area without hurting it.

Some counter examples to the cooperative enthusiasm should be pointed out. In some cases, flood control is a reason to condemn land in areas where residents may not be empowered to resist or cooperate in revitalization efforts. In 1997, the City

condemned properties in North Tulsa for redevelopment and floodplain improvements.

Tulsa Development Authority: The majority of the dwelling units occupied by the displaced are not considered to meet the minimum requirements for decent safe and sanitary housing due to a variety of reasons. (Killman, 20 February 1997)

Attorney for residents: [The City] has used north Tulsa to acquire millions of dollars in economic aid from the federal government. And of those 30 years there has been little or no improvement in the north Tulsa community. (Killman, 7 March 1997)

City Councilor: It certainly in my opinion needs to move forward. It represents a very positive opportunity for redevelopment in that part of the city. (Killman, 7 March 1997)

Another dispute between a family and the City was also settled in court with the City paying more than it had planned to acquire property for a detention pond.

Attorney for family: It's the last tract of any size with frontage on I-44 [that has not been developed] . . . The area is just beginning to grow now. The family has held on to it since 1918 and now all the pieces are in place for growth to occur in this area and the city comes and takes 75 acres of their frontage on I-44. (Killman, 12 April 1997)

Regarding addressing flooding in the Elm Creek basin with a canal connected to downtown:

City Planner: We're talking about a complete reinvention of the neighborhood. (Hylton, 12 October 2004)

City Planning Task Force Member: Creating that canal will take all of Sixth Street out of the floodplain so new development can happen and property owners can safely invest in their buildings and fix them up. (Hylton, 12 October 2004)

Neighborhood Association President: No one has worked with us to come up with a plan for what's best for us. (Hylton, 12 October 2004)

City Planner: This is a particularly ambitious plan because it involves flood control. If we are going to do flood control, how can we do it as a catalyst for revitalization? These are some pretty radical ideas because we are reshaping the landscape. (Droege, 6 March 2005)

Most plans are successful because they combine flood control with participatory planning and some new neighborhood asset. Often this is a new recreational facility, park or other open space area.

Natural Resources

One of the most surprising findings of this research was that implementation of a major component of Tulsa's flood control program was almost obstructed, and certainly impacted by some who lived in the most flooded area of the city. The city wanted to use already established parks and open spaces for flood water detention basins, but Tulsans living near parks in East Tulsa vehemently protested. A not-in-my-park or NIMP campaign was waged by residents resulting in a new city ordinance. The protestors cited a spiritual connection to the park as well as concern for the loss of virgin forest being sacrificed to make way for floodwater detention ponds.

June 9, 1989

Norberg Park Association: We don't want to make some kind of deal. We don't want even one blade of grass moved . . . Why should we have to do something that nobody here wants? There is no way they could get it back the way it is . . . It would be a desert. (America, 9 June 1989)

July 10, 1990

Mayor: The more Tulsa grows, the more important flood protection becomes . . . There is a danger that if we take the attitude that we want someone else's neighborhood to be a part of the system but not ours. We run the risk of having no flood protection. (Zubeck, 10 July 1990)

District 7 Councilor: There has not been any pressure on Stormwater Management to consider any alternatives except detention ponds. . . The park system in Tulsa is one of the strongest selling points on an economic development basis. If there's any possibility that the beauty and integrity of parks will be affected, we should take a look at it. (Zubeck, 10 July 1990)

Stormwater Management: The people of Tulsa made a commitment. Now it's just a question of the level of commitment. (Zubeck, 10 July 1990)

July 19, 1990

District 6⁴ Councilor: The problem is you have people in other neighborhoods who aren't so influential and affluent [sic] and the city's rolling over them like a steamroller. If there's a way to stop that, that's what I'm trying to do. (Colberg, 19 July 1990)

Mayor: The difficulty is, how would it be determined who makes up the neighborhood? And what difficulties does it create for us in terms of citywide flood control? Everybody wants flood control for their neighborhood, but not in their neighborhood. Where does that leave citywide flood control? (Colberg, 19 July 1990)

July 25, 1990

Resident₁ (in favor of detention ponds): We who live in this area need the protection this will afford us. I'm not talking about destroying Whiteside Park; I love this park. By the same token, I don't want to see my home destroyed. (Aydelott, 25 July 1990)

Resident₂: I've been through four floods myself, and they were pretty nerve-wracking. I think I'd tolerate four more floods if I could leave my park the way it is. (Aydelott, 25 July 1990)

⁴ Refer to Council District Map – Figure 3.8

Public Works: We want a solution that is acceptable to the public in order to gain funding. (Aydelott, 25 July 1990)

July 26, 1990 Editorial

The rejected plan to lower the level of Whiteside Park to form a detention pond could have prevented future grief. Instead flood control has become an exercise in which the upstream majority rules. This may be democracy in action, but it is bad stormwater management policy. (*Tulsa World*, 26 July 1990)

July 27, 1990

Norberg Park Association: The people in the area need to know what's going on. They know more about their backyards than you do. (Colberg, 27 July 1990)

Resident: Six years after the flood of May 1984, most citizens of Tulsa have forgotten the devastation and loss of life. . . Detention ponds are a key ingredient in flood control. Are we to ignore expert advice? (Colberg, 27 July 1990)

July 30, 1990 Letter to the Editor:

Our parks are sacred ground and to use them for water runoff would be desecration of the only original landscape left in our neighborhoods. (*Tulsa World*, 20 July 1990)

July 30, 1990 Editorial:

As they grapple over stormwater detention ponds and whether to build them in city parks, city councilors must keep in mind that these issues are citywide and affect all citizens of Tulsa. Tulsa's park system traditionally has been supported through bond issues and city taxes paid by all Tulsans . . . Flooding too is a city-wide issue, not just in those neighborhoods prone to flooding. All Tulsans have an interest in preventing the kinds of property damage and loss of life that occurred in the last major flood, Memorial Day 1984. (*Tulsa World*, 20 July 1990)

August 19, 1990 Editorial:

The question is not whether to build stormwater detention facilities, but where. The answer in many cases- and continues to be- in city parks. Using park land means there is no need for expensive purchases or condemnation of new land. . . What city councilors, park neighbors and others involved must remember is that parks are logical sites for much-needed flood-control projects. Such facilities can be built without long-term ill effects. More important, while immediate neighbors may receive the greatest benefit from a park, parks belong to all Tulsa citizens, including many whose homes and lives are periodically ravaged by flood waters. Narrow neighborhood interest must bow to the greater good of the city. (Averill, 19 August 1990)

October 29, 1990 Opinion

The City of Tulsa, in the name of flood control, is removing prodigious numbers of urban trees. These valuable woodlands are being taken to make way for detention ponds, which theoretically will abate flooding. Tulsa must apply economic logic as well as a conservation rationale to the problem of solving 100-year natural disasters. The millions of tax dollars we're spending digging holes and removing trees could be taking us further from our goal. (*Tulsa World*, 29 October 1990)

August 29, 1991:

Homeowners in Mingo Valley: We're talking about 100- to 150- year old trees. It is a totally natural forest. It's not landscaped; we don't wish it to be. We need that area for school children and groups who study nature at its best. We're overburdened with ponds, underburdened with trees. (Colberg, 29 August 1991)

Tulsa Public Works: It could come out, and we sure hope it doesn't that there is no alternative to provide flood control than to cut down the trees. However, we definitely want to preserve the trees and we're going to look at the all the options that do that. (Colberg, 29 August 1991)

The ordinance made it mandatory for the city to notify residents living near parks before any construction could begin. Residents were given time to comment on

the proposed project. The debate brought Tulsa World editorialists to the defense of the city's flood control efforts arguing that a minority of upstream interests should not outweigh the interests of downstream residents. The author of the ordinance expresses a commitment to the flood control plan:

District 7 Councilor: The total flood-control plan cannot be completely understood at the neighborhood level. Just because there's an appeal process does not mean neighbors will get their wishes. (Zubeck, 3 August 1990)

In addition to parks and natural landscapes, wildlife stocks were and are a concern with Arkansas River development. The Indian Nation Council of Governments (INCOG) received several comments from recreational fishermen during the Arkansas River Corridor planning process concerned about the negative impact of the low-water dams on fishing (INCOG 2005, Appendix L). Concerns for other wildlife habitat were expressed.

Fisherman₁: I'm not an 'extremist', I am a 'conservationist' and a life-long fisherman that values the Oklahoma Department of Wildlife's striped bass hatchery.

Fisherman₂: While I'd love to see some of this development, the building of low-water dams is an environmental issue that needs to be seriously addressed with the Oklahoma Department of Wildlife Conservation . . . Mention was made at the meetings that there would be that there would be times when the low-water dam's gates would have to remain open and the lakes drained for fish migration up the rivers to spawn. I have great fear that this won't happen. City leaders would fight draining these lakes during these time periods. The fish spawn would be in May-June, right in the middle of primetime outdoor activities: festivals, concerts, etc.

Chapter 6: Lessons from the Tulsa Story

The practical question posed in this case study of Tulsa, Oklahoma was: what is the relationship between urban development goals and priorities and flood hazard mitigation objectives in Tulsa. This project was especially concerned with how this relationship may have changed in the last 20 years. The major theoretical contribution of this research is an evaluation of the urban regime framework as applied to this question and possibly other major questions posed by hazards researchers.

6.1. Conclusions

6.1.1. Integration of Interests (Agenda)

While the overwhelming sense is that flood control is low on the agenda for Tulsa's planners and developers, Tulsa's program of flood hazard mitigation is somewhat integrated into development goals and it is one of several competing priorities. Hazard mitigation is most closely connected with protecting natural resources and infrastructure. In Tulsa, flood control was ultimately adopted because it is a means for generating conditions that are conducive to growth and development. This has both generated opportunities and potential problems. Before flood mitigation in Tulsa, development occurred with little consideration to drainage until it was too late. Since the program, the city has had more control over development and has been able to keep structures and people out of the most obviously hazardous areas- the regulatory floodplain. Tulsa's infill development policy of reusing urban infrastructure, creating clusters of denser development and revitalizing older neighborhoods would not be possible without the capital dedicated to increasing drainage and floodwater detention capabilities. For the most part, development in

Tulsa is still heavily reliant on structural mitigation strategies: channelled streams, levees, dams, and extensive drainage networks. Experts concede that structural strategies for already established areas, such as our urban environments, are necessary and reasonable solutions. Is there a danger in having structural means of flood control serve development so efficiently? There has already been a shift from ‘structural controls as a corrective measure’ (Patton 1994; Flanagan 2004) to having structural controls as a main objective for flood hazard mitigation (Flanagan 2009). What other compromises will be made in the future?

Tulsa’s commitment to protecting natural resources, open spaces and recreation areas may be the best weapon the city has for hazard mitigation sustainability. Because the city has committed to buying and/or maintaining land within floodplains, there is a guarantee that areas will be available for stormwater storage. A commitment to protecting natural resources was not always on the agenda for Tulsa’s hazards professionals. The battle with neighborhood associations about parks and urban forests brought up several issues, including the importance of parks to segments of Tulsa’s population. Today, Tulsa’s current public works department is as much involved in monitoring water quality, planting trees, and preserving wetland habitat, as it is in building infrastructure and working on capital flood control projects. Tulsa’s developers buy in to the need for parks and trails as a way to increase property values and therefore, profits.

6.1.2. Sustainability of Resources- Money and Time

Tulsa’s recurring elections to extend the 3rd penny sales tax are both a challenge and an opportunity for flood hazard mitigation. Allowing the electorate to

decide the fate of the city's infrastructure and flood control budget is a risky process and one that puts a great deal of faith in Tulsans' understanding of the flood problem and desire to act for the 'common good'. At the same time, each election allows for the city and in particular, the Public Works department, to retell the story of flooding in Tulsa, to demonstrate the success of Tulsa's flood control program, and to offer a new list of capital projects to complete. As evidenced by the Tulsa Public Works website, however, the information available is the same information that was published in 1994. What is missing is a creative way to update and broadly share the story so that it is relevant to today's conditions and speaks to Tulsans who are new to the area, too young to remember the floods, or who believe the problem is 'in the past.'

6.1.3. Relationships- Participation and Partnership

Leadership for hazards objectives has come mainly from hazards professionals. This is consistent with Mitchell's contention that it up to hazards professionals to convince the rest of us to pay attention, if not use hazards information to make important land use decisions. In Tulsa, however, citizen input in the form of homeowners and neighborhood associations has proved to be invaluable. Tulsa would not have been in the business of flood control had it not been for the agitation of citizen leaders and groups confronting the city after their homes had repeatedly flooded in the 60s, 70s and 80s. Since then, input from concerned citizens has both challenged Tulsa's flood program and sustained it. They have also brought up some important questions of urban governance and economic sustainability.

Council representatives in Tulsa's under-served areas used debates over flood control funding to call attention to their economic situation and to challenge the local government to live up to its policy of 'Balanced Growth'. Neither parks nor flood control was much on the agenda for many north Tulsans who were desperate for jobs and better schools.

The city's growth policies and flood control went hand-in-hand in some respects. Flooding in east Tulsa called attention to the cost of advancing into potentially hazardous lowland areas. With the advent of the 'infill development' era, flood control could be used as an economic development catalyst in parts of the city that had experienced decline.

Flood control has the capacity to divide people based on allocation of resources, but also unite them, such as in the case of watershed planning. What cannot be overlooked is that flood control in Tulsa brought more people into the conversation about development, land use, and natural resource use than possibly any other project in the city's history. And it needs the buy-in of existing and new groups to survive.

6.2. Value of Regime Framework

Regime analysis gives us the tools to look at three basic elements of urban political-economic organization: agenda, capacity and relationships. As Hewitt (1983) tells us, most of what should be a concern of hazards work is found in the mundane realities of life. This framework provided a window into what forces may be inhibiting or reinforcing hazard mitigation objectives that may not be revealed in an investigation of hazard mitigation policy only. Beyond providing the big "boxes" for

information storage and analysis, what theoretical explanations are offered by regime theory for what has been observed in the Tulsa case?

Several of Stone's predictions are observable this study. As outlined in Chapter 2, Stone writes about regime sustainability as a process of continually defining and communicating legitimate goals. If the goals are legitimate, members will be willing to work together and pool resources to achieve those goals. Once goals are achieved, or once they are perceived as no longer relevant or valuable, the regime itself may dissolve or change. If mitigating flood hazards is no longer seen as valuable, or is perceived as a problem solved, it will no longer serve to unite advocates and resources. Despite limited discussions about flood control, the program appears to support more than hinder urban economic growth.

Stone also talks about policy reform and how this is best achieved through incremental steps. Radical change is more difficult to implement than small changes that fit with established arrangements and align with, or do not depart drastically from, established goals. Merging flood control with parks and recreation facilities was one strategy that ultimately won over Tulsans. Including flood control among a list of basic infrastructure projects was also a way to integrate public funding schemes such as taxes and bond issues. While the utility fee was unpopular at first, it was not the first utility fee imposed on Tulsans and was ultimately considered a matter of necessity.

Short-term, successful projects keep the momentum going forward. A running list of 5- to 10- year capital projects keeps the momentum for flood control going

forward as well. Heavy bouts of precipitation in May and September, while not major causes for alarm, are nonetheless important reminders of Tulsa's situation.

It is helpful to revisit Gibbs, Jonas and While's (2002, 125) three questions here: 1) Does 'the environment' lend to local politics distinctive material and discursive practices; 2) Can 'policy regimes' or 'governing coalitions' for the environment exist and operate separately from, for example, 'entrepreneurial' or 'pro-development' regimes; and 3) Do 'pro-growth' regimes seek to circumvent local environmental policies?

In the Tulsa case, 'the environment' and in particular, flooding, led to some important new discursive concepts such as: *floodplain*, *flood control*, and *watershed*. This research suggests that Tulsans who had knowledge or perceived authority on these concepts would receive attention from media and governing authorities. These concepts also have or have had different meanings. For example, 'flood control,' has meant a method for protecting property, a means for revitalizing a neighborhood, a threat to local parks, a drain on resources that could be better spent elsewhere, and a method for reclaiming more developable land. All of these definitions are important to the story of hazard mitigation sustainability.

Do hazards policy coalitions exist separately from 'entrepreneurial' or 'pro-development' regimes? This seems to be a logical explanation for what is happening in Tulsa. While the benefits of flood control seem to have been accepted by major business and development interests, the business of flood control, measuring flood-control success and publically addressing risk is the realm of hazards professionals and concerned citizens of Tulsa.

The third question - do 'pro-growth' regimes seek to circumvent local environmental policies - cannot be determined from this analysis. Additional investigations into specific examples of how developers apply for permits, conduct impact studies and report mitigation strategies would be necessary.

Limitations of urban regime theory (as described in Chapter 2) are also apparent in the Tulsa case in relation to urban hazard mitigation. Outside resources, relationships and policy mandates are certainly a factor in Tulsa's mitigation program and perhaps not thoroughly accounted for by focusing on narrow, local scale processes. At the same time, the urban scale is an appropriate scale of observation because Tulsa has initiated so much of its own program and because the current national trend is to pass on responsibility for hazard mitigation, disaster-preparedness, and disaster recovery to local governments and states.

6.3. Questions for Future Research

One future project would be to conduct a cross-case analysis of hazard mitigation sustainability in several urban areas. The researcher could ask and answer additional questions including:

- 1) Is there a relationship between certain visions of urban form (agenda) and hazard mitigation strategies?
- 2) Are there models where hazard mitigation is achieved in sustained conflict with business and development interests?
- 3) What local variations in policies exist?

The hazards research agenda has several broad questions including: why do people settle in hazardous areas or not; how do human systems respond to/adapt to

hazards and extreme events; who or what segments of society are most affected by disaster and why; how is human transformation of the landscape impacting the frequency of disasters; why are some places more hazardous than others. One key area of hazards/disaster research that is not addressed in this study is vulnerability and its conceptual opposite, resilience. That is, who, specifically, is vulnerable to disaster in Tulsa and what, if anything, is happening to build resistance within these populations and in the community as a whole? How has this vulnerability changed during the same time period? Would regime theory adequately address these social processes?

Most of what is discussed in this research project deals with the physical processes of planning and altering landscapes. As Stone predicts, regimes are more concerned with physical processes because they are concerned with questions that require more straightforward answers and solutions. Indeed, much of the print media and documents related to land-use and flood control do not mention social policies or institutions directly. The one exception is the work of Tulsa Partners who are trying to raise awareness of disaster vulnerability by creating a cadre of volunteers with language skills to help recent immigrants in the event of a disaster. The realm of social vulnerability and social policy could, however, be analyzed with the same general framework, i.e., focusing on agenda, resources, and relationship. A study of social vulnerability to hazards and hazard resiliency might require looking more deeply at how other social issues such as poverty, education and public health are addressed in Tulsa. It would also require investigating the problem from the point of view of people who are considered or consider themselves vulnerable.

Appendix A- Coding Scheme

Description	Code	Numerical Code
Regime Agenda	RA	1.
<ul style="list-style-type: none"> • Vision Statement • Planning • Policy • Implementation • Land Use (Describe) <ul style="list-style-type: none"> ○ A ○ B ○ C • Natural Processes/Environment <ul style="list-style-type: none"> ○ River Flow ○ Floodplain ○ Ecosystem ○ Hazard Frequency ○ Hazard magnitude ○ Natural Resource Use • Social Vulnerability/resistance 	VS PL POL IM LU LU (TBD) LU (TBD) LU (TBD) NP/E RIVFL FLDPL ECO HAZFR HAZMAG NR SV/R	1.1 1.2 1.3 1.4 1.5 1.5.1 1.5.2 1.5.3 1.5 1.5.1 1.5.2 1.5.3 1.5.4 1.5.5 1.5.6 1.6
Regime Capacity	RC	2.
Authority for land-use decision <ul style="list-style-type: none"> • Federal • State • Local • County • Tribal • Individual • Other Financial Resources <ul style="list-style-type: none"> • Public <ul style="list-style-type: none"> ○ Federal ○ State ○ Local ○ County ○ Tribal ○ Other • Private <ul style="list-style-type: none"> ○ Developer ○ Business 	AUTH AUTH-FED AUTH-STA AUTH-LOC AUTH-CO AUTH-TRIB AUTH- IND AUTH-OTH FINREC REC-PUB REC- PUB-FED REC-PUB-STA REC-PUB-LOC REC-PUB-CO REC-PUB-TR REC-PUB-OTH REC-PRI REC-PRI-DEV REC-PRI-BUS REC-PRI-BK	2.1 2. 1.1 2.1.2 2.1.3 2.1.4 2.1.5 2.1.6 2.1.7 2.2 2.2.1 2.2.1.1 2.2.1.2 2.2.1.3 2.2.1.4 2.2.1.5 2.2.1.6 2.2.2 2.2.2.1 2.2.2.2 2.2.2.3

<ul style="list-style-type: none"> ○ Bank ○ Other 	REC-PRI-OTH	2.2.2.4
Technical/Knowledge-based resources	T/K	2.3
Time Commitment	TCOM	2.4
<ul style="list-style-type: none"> ● 1-2 Years (Short- term) ● 2-10 Years (Medium- term) ● 10-20+ years (Long-term) 	TCOM-SH	2.4.1
	TCOM-M	2.4.2
	TCOM-L	2.4.3
Regime Membership/Relationship	RM/R	3.
Affiliation of Participant	AFF	3.1
<ul style="list-style-type: none"> ● Public <ul style="list-style-type: none"> ○ Federal ○ State ○ Local ○ County ○ Tribal ○ Other ● Private <ul style="list-style-type: none"> ○ Developer ○ Business ○ Bank ○ Other ● Other <ul style="list-style-type: none"> ○ Media ○ Non-profit ○ Academic ○ Citizen/Citizen Group 	AFF-PUB	3.1.1
	AFF-PUB-FED	3.1.1.1
	AFF-PUB-STA	3.1.1.2
	AFF-PUB-LOC	3.1.1.3
	AFF-PUB-CO	3.1.1.4
	AFF-PUB-TR	3.1.1.5
	AFF-PUB-OTH	3.1.1.6
	AFF-PRI	3.1.2
	AFF-PRI-DEV	3.1.2.1
	AFF-PRI-BUS	3.1.2.2
	AFF-PRI-BK	3.1.2.3
	AFF-PRI-OTH	3.1.2.4
	AFF-OTH	3.1.3
	AFF-OTH-MED	3.1.3.1
	AFF-OTH-NP	3.1.3.2
	AFF-OTH-ACAD	3.1.3.3
	AFF-OTH-CIT	3.1.3.4
Degree of Solidarity	DS	3.2
<ul style="list-style-type: none"> ● Conflict ● Agreement 	DS-CON	3.2.1
	DS-AGR	3.2.2
Location/ Place-Specific	P/L	4.

Appendix B- Input Data for Crosstabulation Analysis

SAMPLE	#UNITST1	#UNITST2	VAR1T1	VAR1T2	VAR2T1	VAR2T2	VAR3T1	VAR3T2
Case 1	2.00	2.00	0.00	0.00	0.00	1.00	1.00	2.00
Case 2	4.00	2.00	2.00	0.00	1.00	0.00	1.00	2.00
Case 3	4.00	4.00	2.00	1.00	2.00	1.00	0.00	2.00
Case 4	9.00	10.00	6.00	3.00	1.00	2.00	2.00	5.00
Case 5	3.00	4.00	2.00	2.00	1.00	0.00	0.00	2.00
Case 6	3.00	3.00	3.00	3.00	0.00	0.00	0.00	0.00
Case 7	6.00	10.00	4.00	6.00	0.00	2.00	2.00	2.00
Case 8	5.00	13.00	2.00	8.00	2.00	5.00	1.00	0.00
Case 9	4.00	6.00	3.00	2.00	1.00	2.00	0.00	2.00
Case 10	11.00	8.00	5.00	2.00	4.00	4.00	2.00	2.00
Case 11	4.00	6.00	2.00	2.00	1.00	2.00	1.00	2.00
Case 12	4.00	2.00	1.00	1.00	2.00	0.00	1.00	1.00
Case 13	6.00	7.00	5.00	5.00	0.00	1.00	1.00	1.00
Case 14	3.00	3.00	1.00	1.00	1.00	2.00	1.00	0.00
Case 15	4.00	6.00	2.00	2.00	1.00	2.00	1.00	2.00
Case 16	4.00	4.00	1.00	1.00	3.00	2.00	0.00	1.00
Case 17	5.00	9.00	2.00	2.00	1.00	4.00	2.00	3.00
Case 18	4.00	8.00	4.00	5.00	0.00	2.00	0.00	1.00
Case 19	6.00	5.00	3.00	1.00	3.00	3.00	0.00	1.00
Case 20	8.00	11.00	1.00	4.00	4.00	2.00	3.00	5.00
Total	99.00	123.00	51.00	51.00	28.00	37.00	19.00	36.00

Glossary

Balanced Growth- Tulsa's two pronged official development policy that sought to discourage unplanned sprawl to the east and south and encourage investment to the north and west areas of the city

Disaster- The overlap of a hazard and vulnerability

Disaster Resistance- Refers to the ability to prevent a disaster from occurring

Disaster Resilience- Adapted from biological sciences and climate change community; refers to the ability to absorb the impact of a disaster and recover

Floodplain- "recognizable topographical features . . . which represent the transition between watershed uplands and stream and river channels" (Philippi 1996)

Flood-Proofing- Actions taken to protect property when abandoning the floodplain is not an option. This can include installing pumps, making sure runoff is directed away from home foundations, and making living space above flood height.

Hazard- A hazard is a potential threat to a human or environmental system. Hazards can be natural or technological.

Hazard Mitigation- Actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects (FEMA 2000a, 13).

Hazard Mitigation Planning- Hazard mitigation planning can be defined as a coordinated series of structural and non-structural actions and processes designed to reduce the likelihood of future damages to property, while minimizing the health and safety-related impacts associated with natural hazards and disasters. (Berke and Smith 2001)

Infill Development- Used in Tulsa to describe development that encourages the use of brown fields, cleared land, and older buildings and reuses established urban infrastructure.

Non-Structural Approaches to flood control- approaches that encourage behavioral action such as removing buildings from flood plains, limiting new floodplain development, purchasing flood insurance, and choosing to live on higher ground.

One-Hundred-Year Flood-a flood with a 1% chance of occurring every year

Regulatory Floodplain- the floodplain standard that is delineated for enforcing regulations such as building codes, permits for construction, and insurance requirements.

Stormwater Management- In regard to flood control, this means managing rain water, especially peak flows, so that it is stored and/or quickly conveyed out of occupied areas. The EPA treats stormwater management as a means for capturing and/or treating water so that pollutants do not impair a body of water.

Structural Approaches to flood control- Strategies that modify the natural environment such as channeling streams with concrete and building dams and levees.

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