

Incentivizing Inaction?  
Federal Aid, the Local Economy, and Floodplain Development

by

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## **Abstract**

*Purpose.* Scholars have suggested that federal disaster relief in the U.S. may have the unintended consequence of incentivizing the neglect of hazard mitigation at the local level by allowing local jurisdictions to shift the costs of disaster to the federal government. The purpose of this study is to evaluate the impact of federal aid on the local implementation of restrictions on development in hazardous areas, while controlling for other key local economic barriers to this mitigation type.

*Method.* Forty-seven cities in Texas participating in the Community Rating System program were selected for this study. Data on land area outside of the floodplain, receipt of federal public assistance aid, and reliance on property tax revenue was collected for each city and analyzed using multiple regression.

*Results.* The findings did not support an impact on local floodplain development restrictions as a result of federal aid, reliance on property tax revenue, or land outside the floodplain.

*Comments.* In contrast with findings by other scholars, Texas cities did not appear to base their decisions to restrict development in hazardous areas on availability of federal aid. This suggests that federal aid is not causing local governments to balance cost and risk in a way that would lead them to ignore mitigation aimed at restricting development of the floodplain.

**Keywords:** land management, local government, hazard mitigation, plan implementation, flood mitigation, federal incentives, Texas

In the years 2005-2014, the U.S. government spent almost \$45 billion dollars on public assistance grants to local governments as a result of disasters (Federal Emergency Management Agency, 2015a). Moreover, the National Flood Insurance Program (NFIP) has paid out over \$51 billion in losses since 1978 (National Flood Insurance Program, 2015). Scholars claim that federal disaster aid incentivizes local governments to shift the costs of disaster to the federal government, yet federal disaster aid is meant operate as a last resort when state and local governments exceed their capacity to respond (Burby & Dalton, 1994; Berke et al., 2008). It is therefore imperative that local governments give adequate attention to disaster mitigation, yet this is not always the case (Pasterick, 1998; Prater and Lindell, 2000). Local hazard mitigation is crucial to protecting lives and property and may ease the tension on all other phases of disaster relief by reducing the negative effects of natural disasters (Burby, 1991; Schneider, 1995; Platt, 1999; Birkland et al., 2003; Rubin, 2012). Despite its importance, there has not yet been an empirical study of the factors that may be influencing local implementation of restrictions on the development of hazardous areas.

Even when local governments include mitigation in their plans, research findings related to the direct impact of plans on implementation have been disappointing and too often there is a gap between the content of plans and the implementation of policy (Berke & Beatley, 1992; Burby & May, 1998; Anderson, 2000; Norris-Raynbird, 2005; Brody et al., 2009b). While plans may encourage implementation, on their own plans may be insufficient to ensure successful action. Generous federal aid, coupled with pressure to develop attractive land in proximity to amenities often found near water, could be causing the gap by making implementation of mitigation methods an unfavorable economic choice for local governments. The purpose of this study is to evaluate the impact of federal aid on the local implementation of restrictions on development in hazardous areas, while controlling for other key local economic barriers to this mitigation type. First, there is a brief discussion of mitigation techniques. Then the impact of federal aid and local economic barriers to the mitigation decisions of local governments is tested and concludes with a discussion of the results.

## **Structural and Non-Structural Mitigation Techniques**

There are two types of mitigation techniques from which local planners may choose. Structural mitigation techniques aim to make hazardous areas safer, while non-structural techniques typically focus on the maintenance of natural systems and keeping structures out of hazardous areas. When mitigation plans are implemented, the techniques utilized by local governments to implement the plans play a large part in the resulting outcome. There is much discussion in the natural hazard literature on the benefits of non-structural mitigation techniques over structural techniques. Structural mitigation techniques, such as dams or levees, tend to carry much higher price tags than non-structural techniques, such as public information campaigns or zoning. In two studies comparing the economic benefits of flood mitigation alternatives, wetland preservation was found to reduce the dollar value of property loss significantly more than dams (Brody et al., 2007a; Brody et al., 2007b, 342). However, it is important to note the benefits of structural techniques for protecting existing development in hazardous areas. In one study, dams in Texas were found to decrease average property damage per flood by \$27,290. Furthermore, dams have been associated with as much as a 21.6% decrease in the odds of death or injury due to floods (as cited in Brody et al. 2007b, 333).

Despite their ability to protect existing development, structural techniques have been found to encourage development in hazardous areas (Burby & Dalton, 1994; Burby et. al, 1999; Stein et al., 2000; Birkland et al., 2003; Brody et al., 2007b). In 1965, the Jefferson and Orleans parishes of Louisiana suffered heavy losses as a result of Hurricane Betsy's landfall. In response, Congress authorized a structural mitigation project capable of protecting the area from a Category 3 hurricane. However, the project encouraged development of the parishes' hazardous areas. In fact, newly possible development accounted for 79% of the project's justification, while protection of existing development accounted for only 21% (Burby 2006, 174). In 2005, Hurricane Katrina caused a devastating loss of life and property when the structural mitigation system failed. A connection can be made between structural techniques,

which encouraged habitation of Louisiana's hazardous areas, and the level of damage and death resulting from the natural disaster.

Structural failure resulting from extreme disaster is a very real problem for hazardous areas that are developed under the assumption of protection by dams, levees, and building codes. In 1987, the Federal Emergency Management Agency (FEMA) estimated that one-third of flood disasters occur as a result of levee failure or overtopping of dams (as cited in Burby 2006, 176). Damages due to low probability natural disasters have been increasing "substantially" (Birkland et al. 2003, 46). Structures have not been designed to handle these less likely events, with one study finding that sixty-six percent of flood losses have been from flood events with recurrence intervals higher than the one-hundred year flood (as cited in Burby et al., 1999). Additionally, hurricanes falling into categories 3-5 account for twenty-one percent of the hurricanes that make landfall, but were found to be responsible for eighty-three percent of hurricane losses (Pielke & Landsea 1998, 269). Often development is encouraged in hazardous areas that are protected by structures that cannot withstand these less probable but more catastrophic events. Land use management that directs development away from hazardous areas, such as restrictions on floodplain development, benefits from more predictable results with the obvious advantage of removing people and property from the places where significant loss may occur. Despite this predictability, use of land management mitigation methods is less popular than other types of mitigation, such as building codes and public information campaigns, which are far more common. Further supporting the limited use of land management mitigation methods, a finding has shown the more a local jurisdiction experiences major disaster, the less likely it will be to utilize land use management mitigation techniques (Lyles et al., 2014). If land management could halt development in hazardous areas and stem the increasing trend of loss due to disaster, why are such policies not being implemented?

## **Federal Aid**

When state and local governments suffer massive loss from natural disasters, a Presidential Disaster Declaration triggers the availability of federal disaster aid. While the purpose of this federal aid is to assist local governments when they lack resources and the capacity to respond, Bagstad et al. (2006) argue that federal disaster relief acts as a “perverse incentive” to ignore mitigation on the local level. While the federal government’s share following a presidential disaster declaration is seventy-five percent, state and local governments are not always required to pay the full twenty-five percent of their share. While the responsibility to implement hazard mitigation plans lies with local governments, the current system allows them to shift the costs of disaster to the federal government (Burby & Dalton, 1994; Berke et al., 2008). Burby (2006) asserts that the current disaster relief structure creates a “safe government paradox”, in which attempts to “...make hazardous areas safe for development... instead have made them targets for catastrophe (p. 172).” This sentiment is echoed throughout the literature on disaster relief (Schneider, 1995; Platt, 1999; Berke et al., 2008; Rubin, 2012). The paradox may create economic incentive to prioritize other items in local budgets, as the costs of failing to mitigate may be covered by federal aid.

Further complicating local economic choice, the regular availability of federal disaster aid has been cited as a factor in choosing not to purchase insurance from the National Flood Insurance Program (NFIP) (Pasterick, 1998; Hauck, 1998). The NFIP was created as a result of increasing flood losses, with the goal of making development in the floodplain uneconomical and to cover the loss of structures already in the floodplain. At the time the program was created, Congress believed that property owners were not responsible for the location of their property prior to the existence of the Flood Insurance Rate Maps (FIRM). Without subsidized rates, Congress felt it would be unable to compel local governments to participate in the program (Burby 2002, 112-114). Structures built prior to the existence of FIRM (pre-FIRM structures) were given lower rates with the expectation that property damage and relocation would eventually reduce the number of structures receiving lower than actuarial rates (Anderson, 2000). However, pre-FIRM properties were not required to relocate unless they suffered more than 50% damage

to the insured property (Pasterick, 1998). While intending to protect property owners who were uninformed of the danger prior to development of the FIRMs, these policies have created some unintended consequences, including incentivizing properties to remain in hazardous areas.

Repetitive loss properties have been frequently reported by scholars to account for an unbalanced percentage of NFIP payouts (Pasterick, 1998; Anderson, 2000; Burby, 2002; Birkland et al., 2003; Bagstad et al., 2006). Furthermore, many studies have noted that the lack of actuarial rates diverts the real risk of living and developing in the floodplain to the federal government (Pasterick, 1998; Burby, 2002; Bagstad et al., 2006). While the NFIP subsidizes the risk of developing in hazardous areas, generous federal aid may be displacing the true cost of development in these areas. The result of this generous federal policy may be reflected in local policymaker's cost-benefit equation; encouraging local governments to divert their limited resources to matters other than hazard mitigation.

When considering the costs and benefits of mitigation, it is questionable whether it makes economic sense for local governments to implement controversial land use management methods, given the availability of federal aid. Texas is one of the highest recipients of federal disaster aid and avoids coercing local governments to develop hazard mitigation policies (May, 1994; Burby, 2005). Texas also has a substantial number of cities and counties located in flood hazard and coastal high hazard areas. Texas ranks second in the nation for dollar amount of insured repetitive flood losses (King, 2005). Both vulnerability to hazard and high levels of local control make Texas a good subject for the evaluation of the impact of federal disaster policy on local restriction of development in hazardous areas. Therefore, the following hypothesis is suggested:

H1: The more disaster aid paid to local jurisdictions, the less likely local jurisdictions will be to restrict development in hazardous areas.

However, to more fully answer whether federal policy is creating an economic incentive to avoid restricting development in hazardous areas, local economic climate must also be addressed. The following section will review local economic climate and development pressures.

### **Local Economic Barriers to Mitigation**

Despite widespread recognition of the need for improved mitigation at the local level, studies continue to show implementation of mitigation measures to be inadequate. Local communities as well as individuals have a tendency to misperceive the risks of hazards and discount those risks as having a low probability of materializing (Brody et al., 2009a). This misperception in combination with the future orientation of risks and the costs of hazard mitigation often makes disaster planning a low priority when compared with other local issues (Berke, 1998; Burby, 2006; Brody et al., 2009a; Berke & Godschalk, 2009).

Development and implementation of land use regulation by local planners is significantly hampered by property rights movements (Platt, 1999; Mileti, 1999; Birkland et al., 2003). An aversion to angering local business interests and the existence of property rights protections which compensate burdened property owners serve as an additional source of local hesitation (Mileti, 1999; Burby & May, 1998). In fact, a study by Brody et al. (2009a) found land acquisition by local governments to be one of the least used of mitigation techniques.

Existing local policy and land use entitlements have been shown to hamper states' efforts to change "existing development patterns" through state policies. Vesting provisions and laws requiring compensation for land owners who are burdened by land use changes may stand in the way of effective implementation of state mandates (Deyle et al., 2008). Some states even have laws protecting property owners from "loss of views". In such cases, the loss can legally obligate the government to compensate the owner of the land (Peloso & Caldwell, 2011). In Texas, May (1994) found a consistent avoidance of coercive state policies with its local governments.



Sometimes, restricting development of hazardous areas may drastically reduce development in a locality that has little land outside hazardous areas. Property tax revenue is based on the value of developed land, making development highly important for local governments. Although the impacts varied by income level, Filatova (2011) found that adding a small environmental tax to development in hazardous coastal areas would cause individuals to move to another jurisdiction, which could result in loss of property tax revenue. Although regulation and tax are different coercive tactics, both add costs to development of hazardous areas with the result of reducing demand for land development in those areas. For a growing community, loss of potential revenue from development may be an insurmountable barrier to the imposition of restrictions on development of hazardous areas. Supporting this, the percentage of a jurisdiction inside the floodplain has also been found to have a significant negative effect on the implementation of mitigation techniques (Brody et al., 2009b; Brody et al., 2009c). Norris-Raynbird's (2005) study of two Texas coastal cities, Galveston and Corpus Christi, suggest that Texas is not immune to this pressure. While debt has put pressure on the city of Galveston, upscale condo developments and seasonal homes have sprung up all along the city's coastline.

On their own or in combination, development pressure and land scarcity can lead to development of the 100-year floodplain (Birkland et al. 2003, 52). Density has been found to be a strong, significant factor in plan recommendations. Areas with higher densities are less likely to limit development (Burby & Dalton, 1994; Lyles et al., 2014). A high demand for development in hazardous areas, and particularly coastal zones, has been found to put pressure on city planners to allow for development in these areas and significantly reduce the quality of hazard mitigation planning (Prater & Lindell, 2000; Brody 2003, 197; Filatova, 2011). In a study of plan implementation by the coastal local governments of Florida, growth densities inside coastal high hazard areas (CHHAs) were found to be higher than outside CHHAs. In this case, having "nowhere else to go" did not seem to play a part. Despite higher growth densities (less available land) inside CHHAs, substantial growth in development occurred relative to areas outside CHHAs (Deyle et al. 2008, 355-356). While this result is surprising, Burby et al. (1999, 249) sums up the

possible reasons for such an outcome: "When hazardous areas are viewed by landowners and developers as reasonably safe, profitable places for development, land use approaches to hazard mitigation can be viewed by economic interests and local governments pursuing economic growth as a threat to be avoided rather than a good to be fostered."

Norris-Raynbird (2005) asserts that growth continues in some of the most vulnerable areas in Texas and in these cities planning is "driven by development". Local governments in Texas receive the lion's share of their revenues from property taxes. In 2013, 45.21% of revenue to Texas local governments came from property taxes. Restricting development in this sense is restricting the growth of city coffers. When coupled with property rights issues, limited room for growth, a desire to satisfy local business interests, and the future orientation of natural hazard risk, it may not make sense for local governments to risk reduced revenues by restricting development. While the impact of federal aid is the focus, it is important to consider these local economic factors in conjunction with federal aid incentives. Therefore, the following hypotheses are suggested:

H2: The more a local government relies on property tax revenue, the less likely a local government will be to implement restrictions on the development of hazardous areas.

H3: The more land a local government has outside the floodplain, the more likely a local government will be to implement restrictions of the development of hazardous areas.

## **Data & Methods**

Almost all of the Texas cities that participated in the NFIP's Community Rating System (CRS) program as of May 2013 were included in the study. Cities in Texas were chosen for this study because the state government has imposed very limited restrictions on local development decisions (May, 1994; Burby, 2005). The cities included in the study are limited by the data available for the study. Of the 53 Texas

cities participating in the CRS, 5 were eliminated because they did not have complete shapefile data of their flood zones available from FEMA's website and one was eliminated because of inadequate availability of financial data. Although the NFIP discourages building in flood zones with a 1% annual chance of flood, communities can grant variances for developers and existing properties are allowed to remain. The NFIP has been found to utilize its strongest enforcement measures- probation and suspension- only a few times and is widely perceived to be unlikely to impose sanctions. Even communities in the CRS program, which are held to higher standards than the requirements of the NFIP, have been found to have compliance issues (Monday 2006, p. xii-xiv). Such compliance issues suggest these communities may be granting variances in the areas with 1% annual flood chance and may not even be regulating development in areas with a 0.2% annual chance of flood, despite higher standards for these CRS program communities. For that reason, both the land area of cities with a 1% annual chance of flood and the land areas with a 0.2% annual chance of flood were included.

The method of statistical analysis for this research is multiple regression. The dependent variable for all hypotheses tested with this study is a measure of a local government's implementation of development restrictions in hazardous areas. The hypotheses seek to analyze the impact of federal disaster aid and local economic barriers on local governments' decisions to restrict development of hazardous areas. Therefore, the independent variables included in this model are *federal disaster aid*, *reliance on property tax revenue*, and *total land outside the floodplain*. *Growth density* in each city will be used as a control variable. Two measures of *growth density* were calculated to account for the two measures of land outside the floodplain. The first measure was calculated by dividing population by the land outside the 1% annual flood chance for each jurisdiction. The second measure was calculated by dividing population by the total land outside the 1% and 0.2% annual flood chance for each jurisdiction. City population figures were gathered from the 2010 U.S. Census Redistricting Data Summary File.

To measure the dependent variable the community rating system (CRS) points awarded from time of entry as of May 2013 were summed for each city for point categories which measured implementation

of restrictions on development of hazardous areas. The CRS program is a voluntary program that provides incentives for mitigation activities that go beyond what is required by the NFIP. Communities that opt to participate in the program are awarded points based on the validated implementation of certain mitigation activities. The communities receive increasing reductions on their NFIP insurance rates as they acquire points (FEMA 2015c). The benefit of utilizing CRS points is that implementation must occur for the community to receive points, which eliminates the problems inherent in reviewing mitigation plans which may not ever be implemented.

The CRS points were found on the CRS State Profile for Texas released in January 2014. Category 420 was selected because points are awarded in this category for the implementation of policies aimed at open space preservation. The 2013 Edition of the CRS Coordinator's Manual states that one objective of open space preservation is to "...prevent flood damage by keeping flood-prone land free of development..." (p. 420-2). Points are awarded in this category for implementing zoning restrictions, keeping vacant land undeveloped, and limiting density, among other related policies. Category 520 was selected because points are awarded in this category for the implementation of policies that remove existing buildings from the flood zone, including repetitive loss properties. The 2013 Edition of the CRS Coordinator's Manual states that the objective of this category is to "... encourage communities to acquire, relocate, or otherwise clear existing buildings out of the flood hazard area" (p. 520-1).

The total land outside the floodplain was measured in two ways, and two different models are developed to analyze the impact of each measure. The FEMA flood zone shapefiles were obtained for all of the counties that contained the 47 Texas cities that were participants in the CRS program and that had shapefile data available. Geographic Information Software (GIS) was used to compute the total square miles of each city, the 1% annual chance of flood area within each city, the area of the city's exposure to a 0.2% annual chance of flooding. The total square miles that had a 1% annual chance of flooding in a city were subtracted from the total square miles of that city's jurisdiction to yield the total square miles of land in a city's jurisdiction which lies outside of the zones of 1% annual flood chance. Similarly, the sum

of area exposed to 1% and 0.2% annual flood chance was subtracted from the total square miles of the cities to include the area just outside the 1% annual flood chance.

As some studies have found that areas with lower chances of flooding are actually flooding more often than expected, a second regression model that expands the flood area was also analyzed (Birkland et al., 2003). The configuration of the FEMA shapefile data required adding the square miles for each zone type which has a 1% annual flood chance and each zone type which has a 0.2% annual flood chance to yield the total land area which has at least a 0.2% annual chance of flood for each city. This result was subtracted from the total square miles of that city's jurisdiction to yield the total square miles of land in a city's jurisdiction which lies outside of the 0.2% annual flood chance.

Federal public assistance aid was used to measure the federal disaster aid received by each city. Data on federal Public Assistance aid was collected from the Texas Department of Public Safety's biennial budgets for fiscal year 2007 through 2013. The department lists the actual amount of federal public assistance aid distributed to each city for the past two fiscal years in their biennial budget. Public assistance aid was selected because it is made available following a presidential disaster declaration and is given to state, tribal, non-profits and local governments for the purpose of repairing public infrastructure, removing debris, and providing "emergency protective measures" (Federal Emergency Management Agency, 2015b). These items may impact local decision making because they could directly impact the bottom line of local budget decisions.

To measure reliance on property tax revenue, the interest and sinking (I&S) tax rates and the maintenance and operations (M&O) tax rates were collected for each city from the Texas Comptroller's compilation of City Rates and Levies for 2013. The I&S tax rate is the rate that a city must charge in property taxes in order to collect enough revenue to keep up with principal and interest on debt obligations for that year. The I&S rate serves as a measure of the pressure of debt obligations in a city. The need for property tax revenue to fund such obligations may impact that city's decisions to restrict development in hazardous areas. An additional regression model is analyzed to review the added impact

of the M&O rate. The M&O is the property tax rate needed to fund annual operations and maintenance costs in a city. The M&O rate will be added to the I&S rate to see if the total tax rate needed to fund debt obligations and the general operation and maintenance for a city has a different impact on that city's decisions to restrict development in hazardous areas. The two different measures will create the need for two additional models, for a total of four regression models, which are outlined in Figure 1.

### **FIGURE 1: Regression Models**

#### *Model #1:*

Development Restriction = Public Assistance + Land Outside 1% Annual Flood + I&S + Growth Density

#### *Model #2:*

Development Restriction = Public Assistance + Land Outside 0.2% Annual Flood + I&S + Growth Density

#### *Model #3:*

Development Restriction = Public Assistance + Land Outside 1% Annual Flood + (I&S+M&O) + Growth Density

#### *Model #4:*

Development Restriction = Public Assistance + Land Outside 0.2% Annual Flood + (I&S+M&O) + Growth Density

### **Results**

Each model contained the same sample, with 47 total Texas cities in the sample. Based on the results of the multiple regressions for each model (Table 1), there was no statistically significant relationship between federal public assistance received by a city and a city's implementation of restrictions on development in hazardous areas. For total land area in a jurisdiction outside the hazardous area, Model 1 and Model 3 found no statistically significant relationship between the percent of land area in a jurisdiction outside the 1% annual flood chance and a city's implementation of restrictions on development in hazardous areas. Model 2 and Model 4 found no statistically significant relationship between the percent of land area in a jurisdiction outside the 0.2% annual flood chance and a city's implementation of restrictions on development in hazardous areas. A city's reliance on property tax

revenue, both for funding debt alone and funding debt plus maintenance and operations, was found by each model to have no significant impact on a city's implementation of restrictions on development in hazardous areas.

**TABLE 1: Results**

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>
Percent Land Area Outside 1%	314.749		329.800	
Percent Land Area Outside 1% + .2%		-134.993		-112.627
FEMA Public Assistance	.000	.000	.000	.000
I&S Rate			-362.092	-342.010
I&S + M&O Rate	-65.137	-46.056		
Growth Density 1%	-.000		-.000	
Growth Density 1% + .2%		-.003		-.003
Constant	104.466	456.562*	114.604	470.850*
R <sup>2</sup>	.071	.061	.082	.071
F	.804	.668	.933	.779

N= 47

## Discussion and Conclusion

This study looked at the impact of certain economic factors on the implementation of restrictions on development in hazardous areas in 47 Texas cities. The study found no relationship between federal Public Assistance aid to a city, a city's reliance on property tax revenue, a city's available land outside the floodplain, and the implementation of restrictions on development of hazardous areas. There are myriad possible reasons for this result, such as the nature of the sample, political interests, and demand for certain property. The following is a discussion of these reasons.

The selection of Texas cities as a sample seem to be an ideal choice as the state government has taken a relative laissez faire approach to the issue of local government management of hazardous areas. Other studies have used samples that include a mixture of states with strong state influence and others with weaker state influence. Differences in state influence could impact anything from a local government's decision to participation in the Community Rating System, to the actual decisions to

implement certain types of mitigation methods. Differing state property rights laws could also impact certain land use decisions, as previously discussed. The selection of Texas cities removes more of the impact of state level influence from the decision-making process of local governments, which may enhance the validity of our findings.

In the relative absence of state mandates, we see that Texas cities are not making decisions to restrict development in hazardous areas based on the expectation of federal Public Assistance, nor are they basing these decisions on the pressure of limited non-hazardous land and a need for property tax revenue to fund debt and daily operations. The primary question in this study was to evaluate the impact that federal aid had on local decisions to restrict development of hazardous areas. The findings clearly do not suggest that there is such an impact. Furthermore, the fact that Texas cities did not make decisions based on limited land area outside the floodplain is consistent with findings by Deyle et al. (2008), which found higher growth within CHHAs despite limited availability of land in those areas and a higher risk for natural hazards. These results suggest factors other than economic calculus are playing a larger role in local government decisions to restrict development of hazardous areas.

Demand for development may create a political environment which makes it far more difficult to restrict development in hazardous areas. In a study comparing implementation of flood mitigation techniques in Texas and in Florida, the latter was found to have public participation that was significantly greater than Texas. Of the two states, Florida has a far higher degree of state mandated hazard mitigation. Interestingly, Florida also implemented significantly more land use techniques than Texas (Brody et al. 2009a, 503-504). Berke (1998) suggests that state planning mandates may take some of the political pressure off of elected officials. This may be particularly important in instances where local governments face strong opposition to limiting development. For example, communities participating in the CRS program consistently opt for less costly and more “politically viable” techniques to earn points (Brody 2009c, 925). When local politicians do not have the shield of state mandates to justify development



restrictions, this may be a far more powerful influence on their decision making. The immediacy of political pressure would likely trump any expectation of federal aid.

In order to leave the reader with more substantive possibilities for the results of this research, city managers and/or floodplain managers from the cities within the sample were interviewed. Several interviewees claimed they typically do not grant variances for the development of the 100-year flood zones and would only do so if a hardship could be demonstrated. However, several also saw no problem with development in the 100-year flood zone as long as the structure's lowest floor was brought up to the base flood elevation. Finally, even fewer stated that there was a process to ensure that there would be no increase in the base flood elevation elsewhere as a result of such development. None of the cities had restricted development in the areas near the 100-year flood zones, lying just outside in the 500-year flood zones. However, one city did state that certain public buildings could not be built in the 500-year flood zone. Perhaps most interesting, several interviewees mentioned the primary impetus for development decisions was their ability to maintain NFIP insurance by complying with the program's regulations. It could be that this study's findings were the result of including only CRS communities, all of which may be incredibly motivated by NFIP status and less so by property tax revenue and federal disaster aid.

There are many possible factors impacting local decisions to restrict development in hazardous areas. This study attempted to hold constant the state level impacts by selecting Texas cities and factoring in the economic calculus of local governments given certain federal policy and local economic conditions. Most strikingly, federal Public Assistance aid does not appear to influence local decision making in Texas cities, despite current literature suggesting otherwise. This research has provided a framework for the future study of the impact of federal policies and local politics on the implementation of certain hazard mitigation techniques. The lack of a significant relationship between available land outside the floodplain and implementation of restrictions was also notable. Further research must be done to draw a link between demand for land in hazardous areas and local decisions to restrict development in the floodplain,

but the premise is intriguing. Finally, future research might also consider the influence of the NFIP program on local mitigation decisions as suggested by some of the interviewees included in this study.

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