Evaluating the Effectiveness of Flood Mitigation Strategies

How Much Could We Save?

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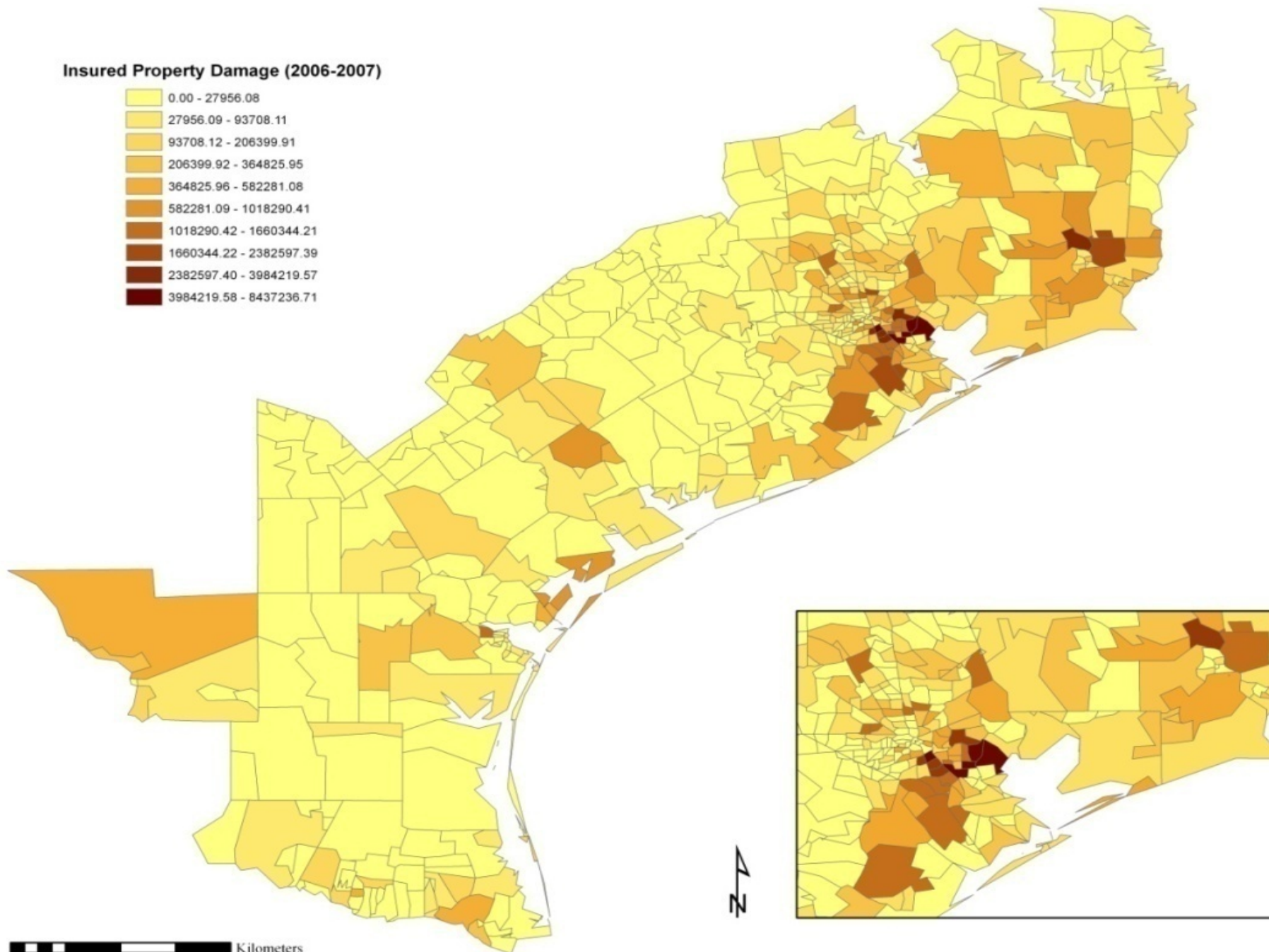Department of Urban Planning – College Station
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Rising Cost of Floods

- Remain the costliest of all hazards in U.S.
  - $1.16 billion dollars of property damage every year, on average, from 1960 to 2005 (in 2000 US dollars).
  - 2,353 persons were killed and 17,129 people injured by flood events from 1960 to 2005.
  - $41.7 million per year in flood losses 1960s in the U.S. compared to $378 million in 1990s (in 1960 US dollars).

Flooding in Texas

- 8,000 flood casualties in Texas from 1960 to 2008 is 2.5 times the second state on the list.
- Houston largest number flood fatalities over last 50 years.
- TX 4th in the country in flood losses.
- $2.6 billion of damages since 1960, mostly on coast.
- Harris County most losses with $1.1 billion insured; $286 million in repetitive losses.
- 6 of top 10 flood-damaged zip codes in Houston.

Insured Property Damage (2006-2007)

0.00 - 27956.08
27956.09 - 93708.11
93708.12 - 206399.91
206399.92 - 364825.95
364825.96 - 582281.08
582281.09 - 1018290.41
1018290.42 - 1660344.21
1660344.22 - 2382597.39
2382597.40 - 3984219.57
3984219.58 - 8437236.71

Kilometers

0   12.5 25   50   75   100

Local Flood Mitigation Survey

- All of FL and TX coastal watersheds sampled
- Restricted to communities ≥ 5,000
- Sample of 471 jurisdictions: 264 in Florida; 207 in Texas
- 173 local jurisdictions responded to survey
- 5 structural, 14 non-structural mitigation techniques assessed
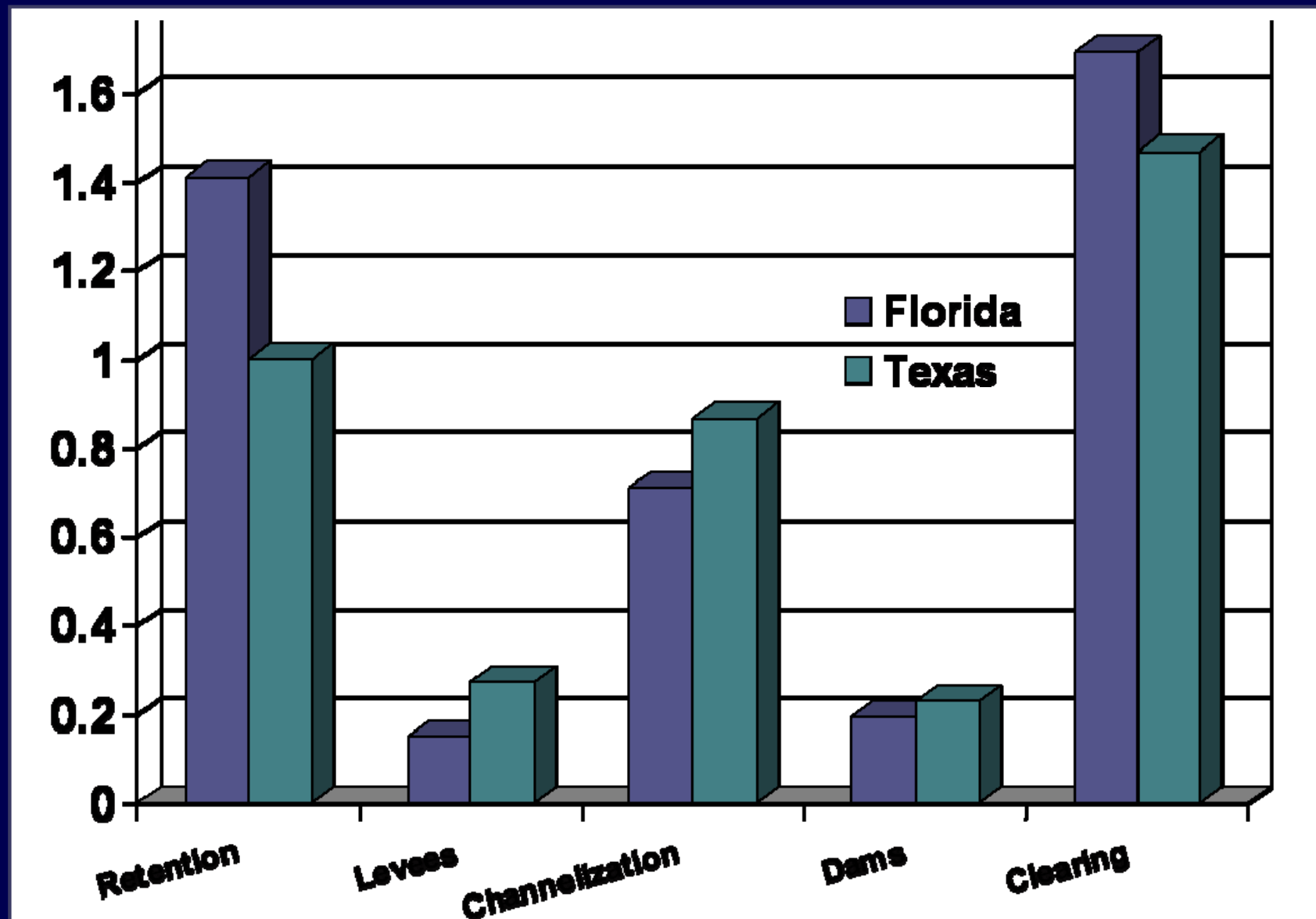
Structural Mitigation Strategies

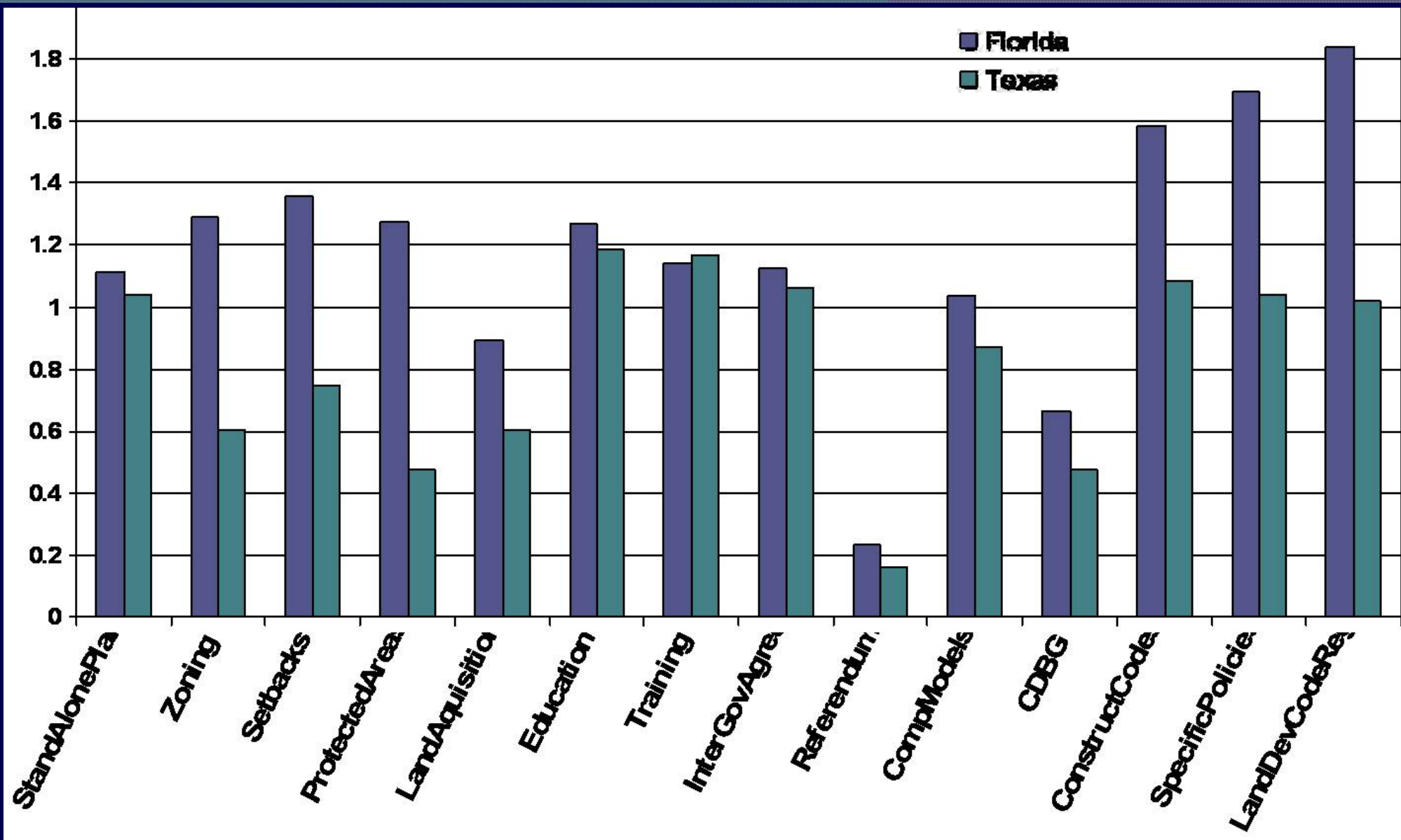- Retention/Detention
- Levees
- Channelization
- Dams
- Debris clearing

Non-Structural Mitigation Strategies

- Standalone Flood plans
- Zoning & land use restrictions
- Setbacks & Buffers
- Protected areas
- Land acquisition
- Education
- Training/technical assistance
- Intergovernmental agreements

- Referendums
- Computer models/forecasting
- Community block grants
- Specific Policies in Comp. Plan
- Construction codes
- Land development codes

Structural Mitigation Techniques

Non-Structural Mitigation Strategies

Structural Mitigation Strategies

Mitigation Strategy	Flood Damage (2006-2007)*
Overall Index	-.078
Retention/Detention	-.150*
Levees	.156
Channelization	.062
Dams	-.072
Debris clearing	-.105

*Logged per capita

Non-Structural Mitigation Strategies

Mitigation Strategy	Flood Damage (2006-2007)*
Overall Index	**-.271**
Standalone Flood plans	.078
Zoning & Land Use Restriction	**-.189**
Setbacks and Buffers	**-.273**
Protected Areas	**-.346**
Land Acquisition	-.159*
Education Programs	-.099
Training/Technical Assistance	.039

*Logged per capita

Non-Structural Mitigation Strategies

Mitigation Strategy	Flood Damage (2006-2007)*
Intergovernmental Agreements	.121
Referendums	-.042
Computer Modeling	-.118
Community Block Grants	-.044
Construction Codes	**-.272****
Specific Policy in Plan	**-.379****
Land Development Codes	**-.316****
Organizational Capacity	-.131*

*Logged per capita

Contextual Controls

- Precipitation Amount
- Floodplain Area
- Stream Density
- Median Income
- Number of housing units
- Population
- Organizational Capacity
- State

Estimated Average Reduction in Damages

Mitigation Strategy	Flood Damage Savings
Specific Policy in Plan	$324,772
Protected Areas	$298,965
Construction Codes	$277,541
Land Development Codes	$276,567
Setbacks and Buffers	$199,148

Policy Implications

- Non-structural flood mitigation strategies are a viable alternative
- Go beyond NFIP requirements (e.g. CRS)
- Avoidance strategies most effective
- No single strategy can stand alone
- Hybrid approach to flood mitigation necessary in HGA
- Organizational Capacity also key component

Future Research

- More detailed analysis of mitigation strategies in TX
- Spatial analysis of individual losses over time
- Examine repetitive loss data
- Case studies of localities engaging in best practices

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