



Water Grand Challenges: Water Governance

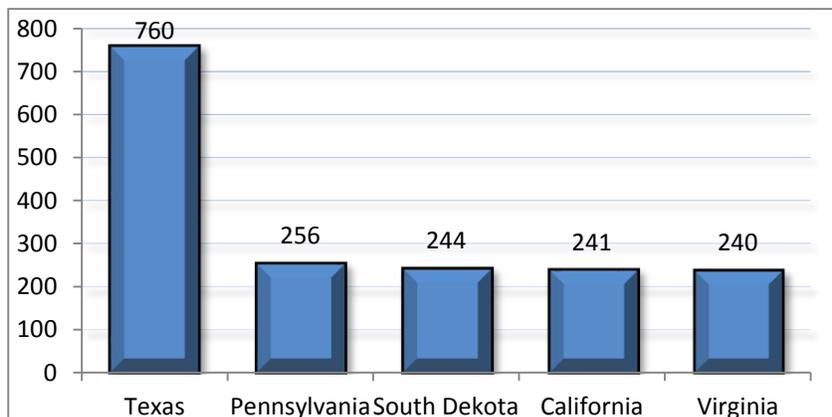
Flood and Emergency Management

Background – Nearly every year, Texas is one of the states reporting the highest number of indirectly and directly flood-related deaths and associated property damage (graph 1).¹ [Geography and climate](#) make this state highly susceptible to large-scale hydrologic events because of its coastal position and low-elevation. Texas receives Pacific moisture from the west, land-recycled moisture from the northeast, and subtropical moisture from the Gulf of Mexico and the Atlantic Ocean.¹ Due to the ecological variability of the State there are many types of storms, like heavy rainstorms in the west and hurricanes in the south that can cause severe and flash flooding. Emergency Management for any type of flooding is the function of creating a framework within communities to reduce the vulnerability to flooding hazards and reduce resulting suffering and economic damages.

History of Major Floods – – [Historical flood records](#) and evaluations are limited to the early 1900's when the collection of systematic stream flow records was created. The first major river flood was recorded in 1913 when the Brazos River basin flooded, cutting off populated properties, killing 177 individuals, and causing \$8.5 million in damages. Less than ten years later the Brazos flooded again, as along with the San Gabriel River basins, resulting in at least 215 deaths and \$19 million in the City of San Antonio. In 1976 the Trinity and San Jacinto River basins bulged following intense rains in the Houston area causing 8 deaths and \$25 million in damages.² Gulf Coast floods, caused by hurricanes and intense rainfall in 1900 claimed over 6,000 lives Galveston alone.³ In 2008, devastation and floods associated with Hurricane Ike resulted in 74 deaths.⁴

5

Graph 1: Top Five U.S. Flood Fatalities from 1959-2005 by State



Federal Emergency Management – There are several federal approaches to ameliorate the effects of flooding and most are housed through The Federal Emergency Management Agency (FEMA). Flood zones created by FEMA are established from an assessment of the risk that



each location in the State is under. Current and existing flood risk is determined by looking to past flood events in specific geographic region. This allows individuals to discover if they are in a low to high-risk area or an undetermined risk area. Furthermore FEMA uses the flood zones to enact the Flood Insurance Program (NFIP), a federal program allowing property owners in participating communities to purchase insurance to protect against financial losses due to floods.⁶

The NFIP was established in 1968 with passage of the National Flood Insurance Act. Participation in NFIP is an agreement between local communities and the Federal Government that states they must adopt and enforce floodplain management ordinances and strategies to reduce the risks of damages from future flooding. Once the community designates the Special Flood Hazard areas, they are eligible to receive the insurance to protect against losses. The floodplain management requirements are specific to each region, but typically include zoning, subdivision, or building requirements, and special-purpose floodplain ordinances.⁶

State Emergency Management – The Texas Water Development Board (TWDB) administers the federal grant program for flood protection and flood mitigation projects. This includes assuring compliance with the NFIP as well as state requirements. In this way, the TWDB acts as a liaison between the federal government and state agencies.⁷

There are also various state entities that offer a variety of assistance for individuals and communities. The Texas Floodplain Management Association (TFMA) is an organization of professionals involved with floodplain management, flood hazard mitigation, and flood preparedness. It offers community outreach and education to help reduce the risks associated with floods.⁸ There are also a variety of small and large scale projects, such as strategic dam building, waterway divergence, and monitoring that help save Texan's lives and reduce suffering. It is a continuous and joint effort that allows for improvements to be made toward reducing suffering when natural disasters inevitably hit.

¹ The Flood Safety Education Project. "The Texas Challenge." <http://floodsafety.com/media/interactives/texaschallenge/index.htm> (accessed June 6, 2013).

² Jones, B.D. Texas Floods and Droughts. National Water Summary 1988-89, USGS, 1990

³ Bellis, P. Hayes, E. Galveston and the 1900 Storm. University of Texas Press. 2000

⁴ Zane DF, Bayleyegn TM, Hellsten J, Beal R, Beasley C, Haywood T, Wiltz-Beckham D, Wolkin AF. Tracking deaths related to Hurricane Ike, Texas, 2008. *Disaster Med Public Health Prep.* 2011 Mar;5(1):23-8.

⁵ Ashley, T. Ashley, W. Flood Fatalities in the United States. Meteorology Program, Department of Geography, Northern Illinois University, 2007.

⁶ Federal Emergency Management Agency. "The National Flood Insurance Program."

<http://www.fema.gov/national-flood-insurance-program> (Accessed May, 2013).

⁷ Texas Water Development Board. "Flood Mitigation Planning." <http://www.twdb.state.tx.us/flood/> (Accessed May, 2013).

⁸ Texas Floodplain Management Association. "Floodsmart" www.tfma.org/ (Accessed May, 2013)