



Benefits of Disaster Mitigation Projects

An evaluation of mitigation projects across the United States and the impact on reducing damage from future natural disasters

Disaster Mitigation Saves Lives, Property and Taxpayer Money

When discussing any natural disaster, it is hard to argue against taking action before the catastrophe occurs, rather than waiting until costly damage has affected homes, businesses, and critical infrastructure. The Pre-Disaster Mitigation Program (PDM), administered by FEMA, is authorized by section 203 of the Robert T. Stafford Disaster Relief and Emergency Management Act which was authorized by the Disaster Management Act of 2000. Since that time, the PDM program has provided financial and technical assistance to State and local government to pre-empt damages and distress that result from a natural disaster such as flood, hurricane, tornado, or blizzard. Additionally, states are able to utilize the Hazard Mitigation Grant Program (HMGP) to implement lessons learned after a disaster occurs. HMGP provides states up to 15 percent of disaster costs for mitigation activities, and up to 20 percent in cases where the state has pursued a more robust Enhanced State Hazard Mitigation Plan approved by the Federal Emergency Management Agency.

Mitigation activities can take many forms, and their uses differ by region. What does not differ, however, is the value these initiatives can hold. In today's economic times, the prevention of high disaster recovery costs incurred by the federal government, states or localities should be achieved. FEMA's mitigation programs, including the Post-Disaster Mitigation and Hazard Mitigation Grant Programs have been effective in reducing the possibility of property damage, personal and commercial hardship, as well as long lasting monetary burdens.



Mitigated homes survive Hurricane Ike (FEMA News Photo)

Congress Sought Quantified Values for Mitigation

To quantify the effectiveness of mitigation projects, Congress commissioned two studies. One study, conducted by the National Institute of Building Sciences in 2005 reported that for every \$1 spent on various mitigation activities, \$4 in response and recovery costs are saved. In September 2007, the Congressional Budget Office evaluated the PDM program in a report titled "Potential Cost Savings from the Pre-Disaster Mitigation Program." In the report, compiled disaster data suggests that for every \$1 spent on mitigation projects, losses from future disasters are reduced by \$3. While comprehensive studies are valuable and very effective in accurately analyzing facts and figures, the success of mitigation projects are often best seen in pictures of property improvements, and in personal stories of community survival. The National Emergency Management Association, with the help of State Emergency Management Offices from Maine to Hawaii, compiled numerous first hand examples of how vital mitigation funds have been making communities safer in the face of natural disasters.

Disaster Mitigation Success Stories

Flood Mitigation-While there are many types of eligible programs that qualify for pre and post disaster mitigation funding, acquisition of at-risk property, and elevation of property in high-risk floodplains are two visible and effective mitigation projects tackled by States and localities.

The State of Iowa experienced devastating flooding in 2008. After the 2008 flood damage was assessed, analysis began regarding the success of disaster mitigation funds spent in the years after flood events throughout the 1990s and early 2000s. Iowa, with the cooperation of numerous counties and cities, acquired flood-prone property in an effort to prevent losses during future disasters. Evaluations were made of properties that were at the highest risk for flood related damage, and mitigation funding for the acquisition included FEMA's Hazard Mitigation Grant Program, Flood Mitigation Assistance, and Pre-Disaster Mitigation Programs as well as additional State and local funds. By the State's account, over \$50 million dollars in flood related damages were avoided as a result of the vacant lot buyout. Over time, the cost-benefit ratio will rise, as every new flood brings more losses avoided and when floods occur with the frequency that has been shown in Iowa, the return on investment is hard to deny.

2008 Iowa Mitigation Success Story

Flood-prone Property Acquisition Projects - Avoided Losses

2008 Flood	Iowa Location	County	Flood Event	Number of Properties Acquired	2008* Damages Avoided
YES	City of Cedar Falls	Black Hawk	'93+'99	162	162
YES	City of Dunkerton	Black Hawk	1999	28	28
YES	City of Waverly	Bremer	1999	12	12
YES	Buchanan County	Buchanan	1993	14	14
YES	City of Independence	Buchanan	1999	81	81
YES	City of Shell Rock	Butler	1999	11	11
no	City of Atlantic	Cass	1999	10	-
no	City of Cherokee	Cherokee	1993	193	-
no	City of Littleport (total citywide buyout)	Clayton	1999	21	-
no	City of Elkport	Clayton	2004	33	-
no	City of Volga	Clayton	1999	34	-
YES	City of Dyersville	Dubuque	99+02	18	18
YES	City of Charles City	Floyd	1999	10	10
YES	City of Marion	Linn	93+02	15	15
no	City of Des Moines	Polk	1993	109	109
YES	City of Davenport	Scott	93+02	57	57
YES	City of Ames	Story	1993	26	26
YES	City of Chelsea	Tama	1993	47	47
YES	Louisa County		1993	167	167
no	Mills County		1993	31	-
YES	Wapello County		1993	20	20
no	Woodbury County		1993	27	-
no	Audubon County		1993	23	-
YES	Des Moines County		93+01	57	57
TOTAL vacant buyout home sites flooded in 2008					834

Iowa Flood Mitigation Success Chart

(Courtesy of Iowa State Office of Emergency Management)

1973 and 1993 brought devastating flooding to many areas of Illinois, and as a result of those disasters, the state initiated many buyouts of floodplain property. Illinois has purchased 3,266 homes since 1993 using disaster mitigation funds, and continues to improve the preparedness of its citizens in the face of future flood activity. Besides the substantial benefits that homeowners receive from government buyout of flood-prone property, the entire jurisdiction benefits from the elimination of a

large drain on local resources. By allowing State and local officials to concentrate on flood battles that they can potentially win, everyone benefits from the quick recovery and lessened economic burden. In 2008, Illinois battled flood conditions again but with very different results from the 1973 and 1993 storms. While extensive damage still occurred in many communities across the state, hazard mitigation projects that were implemented in previous years reduced the amount of damage to homes, farmland, and critical infrastructure and residents will continue to experience long-term benefits in the future.



Missouri flood waters fill land that was a residential neighborhood that was bought out with mitigation funds. (FEMA News Photo)

In Charlotte, North Carolina, a grouping of apartments built in 1971 were identified as residing in a floodplain that experienced significant flood related losses in 1995, 1997, and 2003. In 2006, a Pre-Disaster Mitigation Grant was pursued to acquire the Cavalier Apartment complex. The funding was secured and the final stages of demolition are scheduled for Spring

2009. While the immediate effect of mitigation programs are hard to illustrate, the massive flooding that was caused by Tropical Storm Faye in 2008, and the damage that rendered a large number of ground floor apartments uninhabitable with up to 50 inches of water, is clear proof that the apartments should not be located on this floodplain. With the support of the PDM program, properties like the Cavalier apartments will no longer be in danger and the recovery costs can be avoided.

The damage from floods not only affects homeowners and commercial property, it has the potential to greatly hinder relief efforts. The proof of mitigation success is not only reflected in monetary terms, but in the ability of emergency responders to maintain high levels of service when it matters most. In Crawford County, Wisconsin, the County Highway Shop and its employees are vital in providing emergency services during disasters. Some of the duties Crawford County Highway Shop performs during major storms include closing roads, floodwater rescues, erecting safety devices, providing a physical presence, and building temporary dikes. Instead of providing services to county residents during a flood, employees would have to spend huge amounts of time preparing the shop for damage. After back to back flooding events in 2000 and 2001, HMGP grants were used to acquire the land, demolish the property, and rebuild the shop outside of the floodplain. During two flood events in 2007, the Highway Shop remained open and was able to provide essential emergency response services without compromising its own safety.



*Elevation Project, Tillamook, Oregon
(Courtesy of the Oregon State Office of Emergency Management)*

Building elevation can be a viable option for property that already exists in flood zones. Tillamook, Oregon experiences annual flooding that until 2006, used to seriously damage the Northport Commercial Plaza along Highway 101. Continued flood damage, however, prompted local officials to secure HMGP and Flood Mitigation Assistance funds to elevate the plaza above 100-year flood levels, assuring that the location would remain safe in all but the worst flooding scenario. Stairs were built for access to the elevated platforms the businesses now reside on. In December 2007, the Plaza once again saw the water levels rise but the elevation provided them with security from the storm, and allowed them to reopen as soon as the water receded.



*Flood barrier project along the Napa River protects a nearby mobile home during floods in 2005.
(Courtesy of California Emergency Management Agency)*

Earthquake Mitigation- Residents of both Hawaii and Alaska constantly live under the threat of earthquakes and other seismic activity. Starting in 2004, Alaska commissioned a seismic engineering assessment of public school structures throughout the Kodiak Island Borough. During their assessment, five schools were identified as needing significant work in order to make them structurally sound in the event of an earthquake. Utilizing a combination of State and FEMA mitigation grants, work on the schools is near completion, and the Borough was chosen to receive the 2009 Western States Seismic Policy Council (WSSPC) award for overall excellence in mitigation. By taking action early, significant losses as a result of seismic activity can be avoided and any cost associated should be seen as an investment in the future.

Prior to the 2006 earthquake that shook Oahu, Hawaii, HMGP grants were utilized by the State to harden operations and facilities located in and around Honolulu Harbor. By purchasing and installing large generators, as well as installing transfer and switching equipment in the Matson Lines sector of the harbor, the State took precautions in the event massive power outages disrupt the critical enterprise. The 2006 earthquake and its accompanying aftershocks cut power on the Island of Oahu entirely, but thanks to the generators and equipment purchased with mitigation funds, critical goods and supplies were able to flow efficiently and the Harbor remained operational during this disaster.



Washington State home elevation (FEMA News Photo)

Utah, while not an obvious earthquake hazard location, has also taken steps to address seismic hazards. PDM funds have become essential to Utah's efforts to protect its citizens from a variety of disasters. Between 2003 and 2008, the State received \$11 million in PDM project grants for seismic retrofit and wildfire mitigation efforts. The University of Utah library, four fire stations, and three critical water treatment facilities were recipients of the seismic retrofitting along with the flood damaged Weber State University building. The building was damaged in a flood and instead of just repairing the building, officials used PDM funding to retrofit the building to be prepared for seismic activity as well.



Earthquake mitigation generator inspection, Hawaii (FEMA News Photo)

Snow, Ice, and Wind Damage Mitigation- Many regions across the United States are affected by debilitating snow, ice and wind storms that can isolate residents, snap power lines, and push icy rivers over their banks into residential or commercial areas. The State of Nebraska experiences extremely high winds and chilling ice storms. When ice blankets the region, power lines, telephone poles, and trees can topple like dominos in a process referred to as "cascading." To prevent this possibility from becoming reality, HMGP funds were utilized by the State of Nebraska to install "dead end" structures which act as anchors for the long lines of wires and poles that traverse the Nebraska landscape. While not eliminating damage to transmission lines across the state, the process significantly reduces the time it takes to get power, heat, and other vital services back to residents.

In Nevada and Maine, the danger exists for large rainfall to follow blizzard conditions. In Nevada, the phenomenon known as "Pineapple Express" occurs when warm currents from the South Pacific Ocean bring rain on top of the winter snow. Along the Truckee River in Washoe County, this weather caused massive flooding of a mobile home park in 1996. After the devastation, work was done to acquire all the property in the floodway, and all residents were relocated. When another storm brought similar flooding to the area nine years later, no property losses were reported as the land was transformed for non-residential uses. In December 2003, Maine experienced two blizzards that blanketed the region only to be followed by heavy rain. A disaster declaration was made as ice jams and flooding forced residents out of their homes only days before Christmas. To reduce and eliminate the effect of future disasters, the town of Canton used HMGP funds to acquire and demolish over 40 homes that were in high-risk areas.



"Dead-end" Structure in Nebraska. (Courtesy of the Nebraska State Emergency Management Agency)



*Sand dunes helped protect Texas residents during Hurricane Arlene.
(FEMA News Photo)*

Multi-Hazard Mitigation Plans- Washington State is often identified as one of the leaders in multi-hazard disaster mitigation and, in the face of the numerous different types of natural disaster, continues to take preemptive action to avoid devastating losses. Flooding continues to be a very dangerous threat to many counties throughout the state and the Federal Emergency Management Agency has highlighted their mitigation practices as innovative and effective. Using varying hazard mitigation funds, Washington has implemented Public Outreach activities aimed at equipping residents with flood mitigation information, as well as elevation certificates for homeowners to utilize in flood-proofing their property. Pierce and King County are examples of counties that have successfully communicated with both current residents and developers to assure that all existing and future structures conform to flood-proof standards to avoid huge losses later.

The Northern Middlesex Council of Governments (NMCOG) in Massachusetts also developed a multi-jurisdictional, multi-hazard mitigation plan as a result of funds secured through a Predisaster Mitigation Grant in 2005. Representatives from numerous area stakeholders including first responders, emergency managers, elected officials, and health and conservation agents worked with the NMCOG to develop a hazard vulnerability and overall risk assessment for the area. The assessments conducted helped to develop specific strategies for mitigation projects that utilize all funding, planning, and operational tools available. In 2006, NMCOG's Multi-Jurisdictional, Multi-Hazard Mitigation Plan set in motion mitigation projects totaling over a half a billion dollars that may not have been accomplished without the PDM grant funds.

Additional Benefits of Disaster Mitigation

Community Enhancing Land Use Changes- When disaster mitigation funds are used to acquire and demolish homes that reside in high-risk areas, the land can transform into low-maintenance and low-risk recreational areas, sand dunes, wetlands, and community centers. Darlington, Wisconsin is evidence of aggressive disaster mitigation action. Almost entirely surrounded by the Pecatonica River during flood disasters, the city worked to transform the flood-prone areas and transformed one section of vacated land into a riverside park, where campgrounds, green space, and a lighted trail enhance the community's value. In Washoe County, Nevada, where the "Pineapple Express" weather patterns abound (as described above), the Washoe County Parks Department is working with the State of Nevada Wildlife Conservancy to create an open space area addressing flood control, wildlife, and community use.



Mitigation construction on the Dock Side Theater, Charleston, South Carolina. (FEMA News Photo)

Surrounding Area Flood Reduction Measures- While disaster mitigation is often tackled community by community, mitigation activities often result in residual

benefits for surrounding areas. When demolition of personal or commercial property occurs, the change in land use can be beneficial for neighboring communities. The creation of wetlands and other water drainage facilities in the floodplain reduces the potential for flooding in nearby localities. When the Cavalier apartments in Charlotte, North Carolina were acquired, plans were put into place to open up 13 acres of the floodplain in an attempt to reduce property damage and personal losses in nearby locations. The impact of the cost of property acquisition and demolition goes down significantly when the potential for social and economic costs throughout Mecklenburg County is eliminated. In Washoe County, Nevada, the opened land near the Truckee River is now open space and wetlands that will be able to drain water during similar high water events, and in the future, the land is under federal protection and cannot be used for any other use.

Preservation of Historic Buildings- While preservation of historic property does not often receive due recognition in times of immediate crisis, pre-disaster mitigation is the more effective way to identify, assess, and harden these priceless structures. These protected locations serve both the local historical legacy as well as help attract tourist dollars for local business. Darlington, Wisconsin relies on their 'small town charm' to attract visitors and in flood situations, those historic properties are ground zero for water damage. Using disaster mitigation funds, the city has flood proofed 19 commercial properties, while still preserving their historic store fronts. South Carolina also relies on tourism as a main source of local income. Threats from high winds, and seismic activity could be devastating to properties that still rely on weathered material for their foundation and support. In Charleston, HMGP funds totaling around \$3.7 million are being used to retrofit the Dock Street Theater with steel-enforced granite interior support, steel window-frame straps, and modern roof components.

Conclusion

The Disaster Management Act of 2000 will sunset on September 30, 2009. If this act expires, communities across the country would remain vulnerable to disaster damage that could have been avoided with the completion of vital mitigation projects. Sheila Huddleston, State Hazard Mitigation Officer for Missouri notes, "We are seeing that it pays to break the repetitive cycle of flooding and rebuilding. It saves money, but just as important, it eliminates the misery and despair families experience when they are flooded time and time again." The value placed on hazard mitigation projects differ from state to state, and are certainly considered more vital in areas of the country where disaster relief dominates State and local spending, but the understanding that prevention is more effective and responsible than reacting after a catastrophic event, is universal.

What has been compiled in this report is only a small sample of the projects accomplished with the use of disaster mitigation funds and although natural disasters receive the most press when they create the most damage, successful mitigation projects by definition create non-events. The value of mitigation funds are judged by what does not happen, rather than what did. While comprehensive estimated cost-benefit examples are important figures to consider when deciding the relevance and effectiveness of mitigation programs, more telling are the dramatic real life stories of mitigation projects fulfilling their purpose and truly changing how States and localities are affected by disaster.