CENTER FOR HOUSING POLICY

ISSUE BRIEF

Making Homes More Resistant to Natural Disasters

In the wake of Hurricane Katrina, the Iowa floods and other recent natural disasters, federal, state and local responses have been put to the test. In many cases, the agencies involved revealed their limitations. Among the many lessons learned is the need for more effective and extensive pre-disaster mitigation measures—technologies, services and practices to help reduce the likelihood of property damage and loss of human life. Government intervention is particularly needed to assist low- and moderate-income households and communities that may have difficulty paying for the necessary mitigation measures.

Why is it Important to Improve the Disaster Resistance of Housing?

Current and Future Risks of Damage to Disaster-Prone Areas

Because of changes in population and national wealth density over the last several decades, more people and infrastructure have become concentrated in disaster-prone areas, increasing the potential for loss of life and property. In 2006, 34.9 million people were seriously threatened by Atlantic hurricanes, compared with 10.2 million people in 1950. Also, the frequency of major storms has been relatively high in recent years. In 2008 alone, there were 16 named tropical storms — eight of which were hurricanes — 1,700 tornadoes, widespread flooding due to winter storms, spring melts, tropical storms and other severe weather events.

Additionally, changes in climate have increased the risk level and expanded the areas of risk. These climate changes will likely affect weather patterns and the nature of storms, increasing the potential for property damage, injuries and loss of lives. Storms are expected to become more intense, in terms of wind speeds and precipitation, increasing the potential for wind damage and flooding.

What Areas Can Benefit Most from the Increased Resistance of Homes to Disasters?

Natural disasters of one form or another occur in all parts of the country, particularly storm-related disasters. However, disaster resiliency efforts targeting areas where these storm-related disasters are most frequent and severe will likely have the greatest benefit. Most storm-related natural disasters occur in barrier islands, other coastal areas and flood plains. Regions most at-risk are the southeast Atlantic and Gulf coasts, and parts of the Great Plains and Midwest.

SOLUTIONS IN ACTION

Florida's Enhanced Standards for Hurricane-Resistant Home Construction and Increased Resilience

In response to the devastation caused by Hurricane Andrew in 1992, the state of Florida initiated a comprehensive effort to re-evaluate its building code standards and methods of enforcement. The is led to the creation and adoption of the first statewide building code in 2002.

Homes constructed to the new building code standards were soon put to the test as Hurricane Charley hit many parts of Florida in 2004. A study conducted by the Institute for Business & Home Safety (IBHS) revealed that homes built to the new standards had a 60 percent reduction in frequency of damage claims from the hurricane and on average individual claims were around 42 percent less severe when a loss did occur. In addition, homeowners were able to return to their homes more quickly, reducing the disruption of their daily lives.

Relocating Vulnerable Households

For areas that are especially vulnerable to the effects of severe storms — particularly floods — relocating or rebuilding a home in a safer location may be the only viable option. This is often the case when an existing home lies in an area that has been subject to frequent, severe storm hazards. Relocation usually involves two options — a federal, state or local government agency can either buy out a property owner and demolish the home or physically relocate the home to a safer area. After demolition or relocation, the former home site must be deeded over to the respective public entity to be converted into open space.

Several state and localities have used pre-disaster funding to institute such relocation programs. In 2003, the city of Birmingham, Alabama, received a PDM grant through the state to purchase 65 flood-vulnerable properties. The city relocated 55 families, and then redeveloped the hazardous area into permanent recreational parkland.

Local Government Support for Flood Mitigation

Localities can both require and financially support major flood mitigation techniques, such as elevation, in residential areas highly prone to major flooding. For instance, the city of Mandeville, Louisiana, a small community near New Orleans, requires homeowners who have suffered severe flood damage to elevate their homes, but provides support to do so.

Homeowners who have suffered substantial flood damage are required to elevate their homes. Through Increased Cost of Compliance coverage, part of the city's standard flood insurance policy, a homeowner can qualify to receive up to $30,000 in addition to their regular flood insurance claim to help fund the elevation and otherwise bring their home into compliance with the city's building codes.

Ways to Make Homes More Resistant to Disasters

State and local governments and other entities can improve the disaster resistance of homes in two ways. At the household level, they can educate, train and provide financial support to residents, builders and related service providers to incorporate "smarter and safer" construction and improvements to make homes more resistant to natural hazards. At the community level, the government and supporting organizations can create and enforce better building codes and implement sounder planning strategies that reduce the risk of property damage and loss of life, particularly for vulnerable populations such as lower-income residents.

Promote and Support "Smarter and Safer" Construction Practices and Home Improvements

"Smarter and safer" construction practices and home improvements incorporate building techniques and structures that make a home more resistant to disasters. For hurricanes and weather-related disasters, these practices primarily include measures that increase the structural integrity of homes and protect homes from water intrusion.

Financial support and guidance provided by state and local governments, nonprofit organizations and other entities to both builders and households to promote "smarter and safer" measures in home construction and improvements are equally important.

Technologies and Other Practices That Can Help Working Families Protect Their Lives and Homes from Disasters

For new or existing homes in areas vulnerable to weather-related hazards, sound building or rehabilitation practices and effective retrofits and upgrades can provide substantial resistance to the damaging effects of natural disasters. These practices involve measures for mitigating flood damage and severe wind.

Measures for mitigating flood damages

Flooding is often the most pervasive and damaging threat that severe storms pose. In addition to the immediate damage, flood waters often remain for extended periods of time, which often escalates the initial damage.

For areas where moderate floods occur, with low flows and no more than a few feet of water, techniques to "floodproof" a home are generally the most useful and cost-effective measures. There are two general types of floodproofing – "dry" and "wet."

Dry floodproofing involves procedures to help create waterproof or water-resistant seals around the exterior of home to prevent water from entering. These measures can include the installation of new brick veneer over asphalt coating or by applying polyethylene film over existing walls. Homeowners can also use sandbags outside their homes to divert minor storm water and debris flows.

Wet floodproofing serves to make uninhabited parts of the home (i.e., garages, unfinished basements) resistant to flood damage. These measures allow water to enter during flooding. Flood vents, which create permanent openings in foundation walls, are one example of wet floodproofing. Wet floodproofing procedures have a particular advantage in that they are often less costly than other retrofits and do not significantly affect the appearance of a home.

In areas where more serious flooding tends to occur, **elevation** is generally the most effective measure. Elevation involves raising major home appliances (washer, dryer, furnace, water heater, air conditioning fans and compressors) and the electrical system (electric panel board, service lines, wiring, outlets) to a level determined to be safe from severe floods.

Measures for mitigating severe wind and rain damage

Severe winds are another storm-related hazard that can cause significant damage to homes. The wind itself can damage components of the home, particularly roofs, porches and other structures extending from the home. High winds can transform storm debris into missiles that can damage homes. Windows are particularly vulnerable to this kind of storm hazard.

Generally, the most effective solutions to properly protecting the roof from extreme weather are expensive procedures that have to be done by professionals, including **installation and reinforcement of thicker, sturdier roof structures**, as well as the **installation of secondary water barriers** beneath the roof covering to keep rain from entering the home if the roof covering is blown off.

There are also simpler, less expensive solutions homeowners can do themselves. These procedures involve relatively inexpensive materials that can improve the connections among the roof covering, the roof framing and the walls of the home. These solutions can be especially useful for low- and moderate-income families who may not have the financial resources to pay for more expensive procedures.

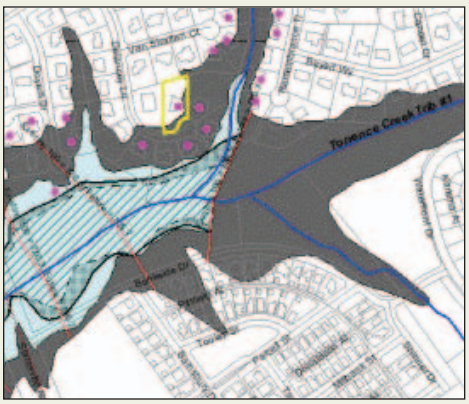
Extremely high winds and flying debris can cause damage to windows. Just as with a damaged roof, damaged windows can leave the interior of the home more susceptible to wind and water damage. This can lead to a home's destabilization and potentially total destruction.

The most common and effective protection for windows is the **installation of storm shutters**. There are multiple types of storm shutters — the appropriate type for a household depends on many factors including location of the home and available budget of the household. Another option is to **install windows with wind-resistant glass**. This solution may be done as an alternative to shutters or in addition to the use of shutters.

Improve Community Regulations and Planning Strategies to Protect Residents and Make Homes Safer

In addition to educating and encouraging builders and homeowners to employ disaster-resistant construction practices and retrofits at the household level, state and local governments also can develop and enforce better regulations and planning practices at the community level. This involves the development and enforcement of better building codes, zoning ordinances and land use planning strategies. Community-level activities benefit individual households by requiring that their homes be built to certain disaster-resistant standards and that the homes are not built in disaster-prone areas in the first place.

SOLUTIONS IN ACTION



CITY OF CHARLOTTE AND MECKLENBURG COUNTY

FEMA Floodplain map (light blue) and future Community floodplain (dark gray), Charlotte-Mecklenburg County, NC

Mecklenburg County, North Carolina — Progressive Flood Mitigation Planning

After working with FEMA to update its Flood Insurance Rate Map in 2000 based on current land use and development conditions, North Carolina's Mecklenburg County (which includes the city of Charlotte) conducted an analysis to determine maximum build-out under current land use and zoning regulations. The county then analyzed how this potential development would affect its current floodplain designations.

The county compared the potential flood damages that would likely occur under the maximum build-out scenario for both the current (2000) floodplain areas and the newly projected floodplain areas. They discovered there would be an estimated $333 million in additional damages under maximum build out when building according to the current land uses and flood plain designations. In response, the county revised its zoning code and land use regulations based on the projected change in the floodplain.

Improve residential building codes

Many localities have requirements in the building codes that mandate certain mitigation measures for both new construction and upgrades to existing homes. States can mandate requirements that all localities must adopt in their building codes. These state-level requirements can create a more consistent standard for building codes and residential construction practices across localities. When well-designed and effectively enforced, these standards can protect at-risk homeowners and lessen disaster damages.

Statewide building codes can be particularly effective in guiding and requiring localities to develop building codes that create disaster-resistant housing. Although the extent to which natural hazards affect different localities within a state may vary greatly, state governments can still ensure that localities are at least meeting minimum requirements to improve safety by enacting these statewide codes. South Carolina and Florida enacted statewide model building codes in 1998 and 2002, respectively, in response to an array of hurricanes that hit the Gulf and southeast Atlantic coasts in the early- and mid-1990s.

Improve land use planning

Local governments can use sound land use planning strategies to protect households from the hazards of natural disasters. These planning strategies include designing zoning codes and other regulations that prevent residential development in vulnerable areas, as well as strategic location of natural storm buffers and other mitigation features.

One important aspect of sound land use planning and zoning is understanding the true risk of flooding within flood plains and how that risk is affected by increased development over time. See the related box on this page for an explanation of the actual chance of flooding in the 100-year floodplain — the standard measure to gauge flood risk in a community.

The Federal Emergency Management Agency updates floodplain maps periodically. However, it may be several years between map updates. New development in and around floodplains can alter the areas at risk of flooding. Generally, as more development occurs in and around a floodplain, it creates more impervious surface in this area, which tends to expand the area at risk of flooding. Therefore, existing or new homes built near the floodplain boundaries may actually be at greater risk of flooding than is assessed in the most recent flood map.

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For more information making homes more resistant to natural disasters visit ***www.housingpolicy.org/toolbox/disaster_mitigation.html***

To discuss this topic with other policymakers, practitioners and researchers, visit the related HousingPolicy.org Forum discussion group at ***forum.housingpolicy.org/group/housinganddisasters***

Specific Ways State and Local Governments Can Provide Education and Training for Making Homes More Disaster-resistant

It is not enough for builders and homeowners to know about these building practices and measures. State and local governments must educate, encourage and set requirements for such practices among builders and homeowners. State and local entities can do so through public outreach, support of educational initiatives and development and enforcement of better building codes and zoning/planning requirements.

State and local governments can be directly involved in training and education or can fund organizations that provide home disaster mitigation training and education. The Florida Department of Community Affairs provided grants to the Federal Alliance for Safer Homes (FLASH) to develop the Blueprint for Safety program, which provides extensive online resources as well as formal training sessions for builders, contractors and other residential construction professionals.