Wharton
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ZURICH

Beyond Katrina

Lessons in creating resilient communities

Foreword

By Mike Foley

In 2004, the insurance industry experienced the worst hurricane season in U.S. history – eight different storms made landfall, including the powerful Charley and Ivan.[1] Little did we imagine that 2005 would deliver an even more devastating blow in the form of Hurricane Katrina on August 29, causing severe destruction throughout six states along the Gulf Coast, most significantly in the city of New Orleans.

Natural disasters of this magnitude are emotionally, physically and financially disruptive for years to come. For many of the people arriving on the ground within hours after Katrina hit, the devastation and chaos were beyond anything they had ever witnessed. Zurich claims professionals were hampered in attempts to reach our customers as the majority of cell towers were destroyed and the power necessary for Internet service was out for days. Many times they drove to a customer's business address, only to find little remained of the building or inventory.

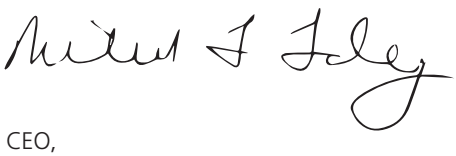
Yet out of this unspeakable adversity came the opportunity to improve how we manage natural disaster risks for our customers, reduce losses from future disasters, and support the creation of more resilient communities worldwide. One of our big lessons was that traditional methods of disaster preparedness and recovery needed to be re-examined and reshaped. The improvements in our processes and programs after Katrina have made significant differences in how we have responded to natural disasters in the years since, both around the country and across the globe.

This paper—produced in conjunction with the Wharton Risk Management and Decision Processes Center at the University of Pennsylvania—explores the lessons learned from Katrina in many areas, and how the recovery and rebuilding in New Orleans inspired other governments, local and national not-for-profits and Zurich to create new methods of building resilience. **But there's one overarching lesson for all: recovery is much more difficult, lengthy and expensive when there is not a robust pre-disaster plan in place**. In fact, based on an average across a large number of studies, it is estimated that every dollar spent on disaster risk reduction saves five dollars in future losses.[10]

The frequency and cost of these natural disasters are increasing. Four of the top five costliest hurricanes in the U.S. have occurred within the past decade.[11] Close to 40 percent of the U.S. population now lives along coastal areas with the greatest risk for these disasters, and more people continue to move there every day.[12]

Due to these trends, it's estimated that federal expenditures related to disaster relief could be $20 billion a year on average for the next 75 years, with the long-term cost being essentially the same as the unfunded trillions for Social Security.[13]

Without creating resilience—the ability to anticipate, protect against, and mitigate the damage from these natural disasters—future recoveries could become too unmanageable and too expensive—something none of us can afford to let happen.



CEO,
Zurich North America Commercial

A few quick reminders on the historic impact of Katrina:

- More than 1,800 people lost their lives[2]
- Nearly 90,000 square miles of the U.S. were affected[3]
- The federal government spent $105 billion on repairs and reconstruction, making it the costliest disaster in U.S. history[4]
- The storm generated the largest aggregate loss in the history of insurance—$41.1 billion and more than 1.7 million claims[5]
- Katrina hit the coast with winds of 127 mph, only two other U.S. storms have ever made landfall with sustained winds of 125 mph[6]
- Katrina-related losses for Zurich stand at $600 million after tax[7]
- Zurich paid out 26 claims of more than $10 million each, with the highest being $75 million to a university in New Orleans[8]
- The federal National Flood Insurance Program is approximately $25 billion in debt stemming from losses primarily related to Hurricane Katrina and Superstorm Sandy[9]

Executive summary

As the United States reflects on the decade since Katrina, there are many lessons learned that enable us to create a more resilient future, which are detailed in this paper. Through Zurich's risk management work across the U.S. and around the world, coupled with Wharton's analysis of the decision processes, economic, financial and insurance features of natural disasters, it is our jointly held view that too many communities, too many sectors of society, and too many individuals have not embraced the difficult truth of Katrina—that the time is now to prepare for the next disaster. The lack of preparation leaves many vulnerable to the potential of financially devastating losses from future hurricanes, floods and other natural disasters. Steps must be taken now to reduce our exposure through investing in cost-effective measures and improving our capacity to bounce back after a catastrophe.

The purpose of this paper is both to highlight the larger policy issues around resilience and to propose specific risk management programs based on forward-thinking models of resilience currently underway. The topic of building resilience is complex for many reasons, as it encompasses actions required by governmental bodies, business owners, NGOs (non-governmental organizations) and individuals themselves. All have choices and decisions to make, and often in collaboration with each other. To keep all the resilience "stakeholders" on the same page, Zurich and Wharton believe it is critical to align on the following goals:

- **Overcome the extreme weather resilience gap:** Katrina brought to the forefront the infrastructure vulnerability that exists in the United States. Many buildings, bridges, dams and levees are incapable of withstanding severe windstorms and flooding, putting both people and property at high risk.
- **Prioritize flooding as the highest risk:** Wind wasn't the major factor in the Katrina devastation—it was the flooding from the massive rain and storm surge. Flooding affects more people globally than any other natural hazard, and flood-related losses are increasing because of population shifts to the coasts.
- **Devote more resources to pre-event risk reduction rather than post-event disaster relief:** The high costs of recovery are unsustainable. Neither governments nor the private sector can afford to keep funding the financial losses that occur as a result of the nation's businesses, homes and critical infrastructure being unprepared. Making the right investments today can lessen the severe losses of tomorrow's weather hazards.
- **Measure resilience to guide an investment strategy:** The ability to measure resilience is critical in determining the effectiveness of investments by public entities, private companies and NGOs, as well as determining progress over time. The initiative by Zurich and Wharton to create a community-based flood resilience measurement tool is a first step in this direction.
- **Design more effective disaster financing solutions and address the affordability gap:** The question of how to pay for pre-disaster preparation and post-disaster recovery must be addressed in order to provide the most effective and efficient resilience programs.[14] Studies by the Wharton Risk Management and Decision Processes Center offer insights into how innovative solutions, such as risk-based insurance premiums and means-tested insurance vouchers, can take advantage of market signals and yet address an important public policy issue—affordability of risk-based disaster insurance.

Significant investments have been made since Katrina to address resiliency goals, but much remains to be done. The analysis further emphasizes the need for a commitment among all sectors of society to "build it forward," making the investments that will help reduce natural disaster risks and create a more resilient future for all communities.

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Catalyzing long-term investments to enhance resilience is very much becoming one of the top issues for any Finance Minister and large asset manager, as we have started to discuss at recent G20 and Davos summits.”

Erwann Michel-Kerjan,
Executive Director,
Wharton Risk Management and
Decision Processes Center

Four days out from the storm: On-the-ground consulting

Watching and waiting for a hurricane to make landfall is among the most stressful situations for a business owner. To help improve resilience for organizations, even in the last few days before the storm hits, Zurich has created a Pre-Emergency Response Team to provide last-minute risk assessment and fast fixes. The response team addresses these severe risks through:

- Assessment of the need to relocate/ elevate stock, records and equipment in below-grade areas and other areas likely to flood.
- Review of in-transit shipments for possible diversion to facilities not in the path of the storm.
- Assessment of generator needs and susceptibility of high-value, temperature-sensitive stock or stock susceptible to water damage.
- Inspection of roof areas for blocked drains, properly secured roof-top equipment and the condition of flashing, as well as identification of repair work that can be completed in the time available.
- Discussion of floodgates, flood barriers and sand-bag staging.
- Survey of the property surrounding the building, looking for loose equipment, signs, outdoor furniture, landscaping, etc., that could become airborne, and secure or move indoors.
- Review of the supplies, safety equipment and procedures for any staff that are expected to remain on-site during the emergency.

Katrina: The catalyst for change

The magnitude of physical devastation and human tragedy that Katrina inflicted upon the citizens of the Gulf Coast left a profound and long-lasting effect on the insurance industry, governments, academic researchers, major NGOs and local community organizations both in that region and around the country.

Axel Lehmann, who was CEO of Zurich North America Commercial when Katrina hit, recalls the chaos and confusion that occurred once the storm surge caused the severe flooding and the levees to break in New Orleans. "Even our most experienced claims professionals and underwriters could barely describe the unimaginable conditions they soon discovered," Lehmann recounts. Of his ensuing trip to the region several weeks later, Lehmann says, "The sheer shock of seeing miles and miles of devastation in person is something I was unprepared for, despite the pictures I had received from the Zurich people on the ground there."

For Zurich, whose business mission is to help customers understand and protect themselves from risk, the shock of Katrina's devastation made it unthinkable not to closely re-examine its programs and processes for both preparedness and post-storm recovery. Improved CAT (catastrophe) modeling, the establishment of a Flood Resilience Program, the development of an Emergency Response Plan for businesses, and financial, in-kind and volunteer support for the St. Bernard Project in New Orleans are just some of the examples found in this paper that demonstrate the need for investment in professional and financial resources to help create better resilience for communities.

The Risk Management and Decision Processes Center at the Wharton School of the University of Pennsylvania has been conducting pioneering work on the economic and psychological aspects of extreme events for more than 30 years. Co-Director Howard Kunreuther and Executive Director Erwann Michel-Kerjan say Katrina elevated the importance of their ongoing analysis of behavioral economics and decision-making under uncertainty in planning for natural disasters, especially for low-probability, high-consequence events like Katrina. Katrina also brought to the forefront the question of who should pay for the losses stemming from a natural disaster of this scale.

For The Rockefeller Foundation, the impact of Katrina set the stage for a new approach that would come to define its second century of philanthropy. "We couldn't just send aid and then get out," explains Judith Rodin, president of the Foundation. "New Orleans was in many ways the canary in the coal mine. It set the stage for the more than a half billion dollars in investments we've made to help cities, communities and organizations build resilience against the shocks and stresses that are increasing in the 21st century."

"Katrina was a wake-up call for America," says Zack Rosenburg, CEO and co-founder of the St. Bernard Project, the New Orleans-based organization that focuses on rebuilding homes for greater infrastructure resilience both in that city and in other disaster-prone areas around the country. "Katrina taught us that post-disaster recovery doesn't work—our philosophy is that the most efficient recovery is to be more resilient from the start."

> **"We saw over and over again that the entities that were most resilient were the ones that are best at preparing for the worst."**
>
> Judith Rodin, President,
> The Rockefeller Foundation

Lessons learned: Katrina impact and recovery

> **“Enhanced Commercial CAT modeling creates the right incentives for customers and contributes to a more resilient future.”**
>
> Iwan Stalder, Head of Global CAT Management, Zurich

Katrina, like most hurricanes, came with several days of advance warning. Computer weather modeling provides a relatively accurate prediction of where a storm will make landfall. This allows first responders—whether EMTs, firefighters, NGOs or insurance companies like Zurich —to plan their ground operations post-disaster.

“We plan and train for the hurricane season all year long, both with our internal team and our independent contractors,” explains Steve Hatch, chief claims officer at Zurich North America. “But the enormity and intensity of storms such as Katrina require a complex level of pre-disaster, during storm and post-disaster coordination.”

Lesson 1: Create a global resource model

Once it became apparent that Katrina had the potential to be a Category 5 storm (although it was downgraded to 3 pre-landfall), Zurich mobilized resources from across the U.S. and the globe, and coordinated the team through a crisis management center run out of its North American headquarters in Schaumburg, Illinois. This global resource model, pioneered with Katrina, is now a well-established model that was used by Zurich in the massive 8.8 Chilean earthquake in 2010, the 2013-2014 United Kingdom floods and other powerful natural disasters around the world since 2005.

Lesson 2: Improve CAT modeling

Because of its complexity and landfall near major population centers, Katrina also provided Zurich the opportunity to improve its Commercial CAT modeling. Improvements to Zurich modeling from Katrina and the subsequent Superstorm Sandy included:

- Accounting for the effects of mega-catastrophes affecting major urban and economic centers
- Capturing flood defenses and flood protection measures
- Enhancing vulnerability and risk assessment
- Upgrading storm surge models for building content and basements
- Calibrating models with Zurich claims loss data from storms

This improved modeling has helped Zurich refine and optimize the structure, coverage and pricing of its insurance to benefit its customers both in terms of property protection and cost.

Lesson 3: Develop customer-specific emergency response planning

The experience of Katrina also revealed that businesses are more resilient when they have a formal plan in place pre-storm to prevent bodily injury, property damage and other losses. Zurich now offers customers help in creating an Emergency Response Plan, which includes modeling the worst-case scenario for their facility and reviewing their insurance policies to ensure the right coverage is in place.

Lesson 4: Upgrade response approach

Katrina enhanced many steps in Zurich’s three-phased approach to disaster preparedness and post-storm recovery.

Pre-disaster:

- **Customer-location modeling**
  Zurich uses models to identify the trajectory of a storm and then overlays information about where its customers are located. This provides a view of customers most likely to be impacted.

- **Personal customer communications**
  The modeling information enables Zurich to contact customers in high-impact areas, as well as their insurance brokers, with specific actions to take in preparation, and instructions on loss mitigation and reporting. Zurich also introduced web portals to provide customers with the latest data and insights, including storm warnings to which they can subscribe, to better prepare for the storm.
- **Risk mitigation guidance**
  Based on the insights of its experienced risk engineers, Zurich provides guidance on how to help protect businesses, people and property.
- **Claims staging areas**
  Since Katrina, Zurich has deployed a resource calculator that estimates the number of staff it is likely to need in the local area based on the size of the storm. Specialized personnel, from Zurich and its vendors, are positioned nearby, safely out of harm's way, ready to move into the area and begin helping customers as soon as the storm passes.
- **Risk engineering response team**
  This team was formed after Katrina, and is comprised of risk engineers who are specialists at helping customers reduce their overall business risk. These engineers will travel to areas close to those projected to be impacted by the storm and provide guidance on imminent preparation steps.

During the storm:

- **First-response adjusters**
  Zurich's main goal is to pay the claims of customers who have suffered insured losses in order to get them up and running as soon as possible. Claims adjusters are positioned as close as safely possible to the impacted area so they are ready to respond when the storm has passed.
- **Triaged claims process**
  Since Katrina, Zurich has refined its claim assignment process by ranking claims by severity in order to assign them to the appropriate personnel for better handling.
- **Claim filing communications**
  Social media is used to communicate with customers and brokers during the storm, posting reminders on where and how to file a claim.

Post-disaster:

- **Estimate financial impact**
  Within the first weeks following an event and before claims data is available, the CAT modeling allows Zurich to estimate the potential range of the financial impact and to identify severely affected customers.
- **Quick, fair claims processing**
  More than 11,000 claims were handled post-Katrina by Zurich. With the severe impact of Katrina on many of its customers (see sidebar on claims payments to major Zurich customers during Katrina), Zurich found that damage extended not only to the building itself, but often to the building's contents such as equipment, inventory and supplies. In many cases, Zurich provided advance payments long before final claims resolution in order to expedite the re-opening of these businesses.
- **Alternative Dispute Resolution Program (ADR)**
  During the post-Katrina recovery period, Zurich and Liberty Mutual were the only commercial insurers to set up a private, independent process to deal with disputed claims. The ADR program was developed and managed by Kenneth R. Feinberg, who served as the Special Master of the September 11th Victim Compensation Fund of 2001. The Zurich program provided its policyholders a fair, voluntary and cost-effective way to resolve disputed claims without costly and time-consuming litigation. Over 1,000 claims were placed in the ADR program following Katrina, and most were resolved early in the process, never advancing to binding arbitration.

Zurich had the highest percentage, 98.8 percent, of resolved claims for a single insurer after Hurricane Katrina.[14]

ADR also was used post-recovery for hurricanes Ike and Gustav in 2008 to help Zurich customers get back in business as quickly as possible.

Severity of Katrina damage reflected in Zurich claims

Zurich paid $10 million or more in Katrina claims to each of 26 businesses and organizations, including national retailers and regional institutions. The highest claim amount of $75 million was paid to a university in New Orleans.

Five pre-disaster best practices

Less than six months after Katrina hit, a leading New Orleans university was able to reopen for classes, due in large part because of the pre-disaster best practices adopted in 2002. These five pre-disaster planning steps can be adopted by other organizations that seek to create a disaster-resilient building and operations:

1. Create a comprehensive emergency manual that includes support and strong leadership from senior management to ensure proper execution.
2. Retain an internal professional emergency planner to coordinate all aspects of the continuity plan.
3. Develop a strong relationship with FEMA and Homeland Security to obtain updated guidance on resilience best practices and post-disaster recovery assistance.
4. Establish lines of credit in order to provide a financial bridge during the recovery process.
5. Build forward 50 years by constructing new buildings and upgrading existing ones above and beyond current minimal codes and standards that will likely be strengthened in the future.

“Katrina was a very rare occurrence in the litigation world as well. It was the first time that two private companies —Zurich and Liberty Mutual— voluntarily and without orders from the government or courts instituted a fair, quick and cost-effective way to resolve disputed claims.”

Kenneth R. Feinberg, former Special Master of the September 11th Victim Compensation Fund of 2001 and developer of Zurich’s Alternative Dispute Resolution Program

Building it forward: Creating resilient communities

Since Katrina, progress has been made in creating more resilient communities, in large part because of resilience-focused partnerships between businesses, communities, governments, foundations and NGOs. Outlined below are three examples of these types of programs—The Rockefeller Foundation's 100 Resilient Cities, the National Academy of Sciences' Resilient America and the St. Bernard Project's Disaster Resilience and Recovery Lab. Other examples can be found in the Appendix.

The Rockefeller Foundation's 100 Resilient Cities

As part of its centennial in 2013, The Rockefeller Foundation launched 100 Resilient Cities, a global initiative to help cities build resilience to the social, economic and physical challenges they face. One of the pillars of this program is to fund a new position in city government called a Chief Resilience Officer. New Orleans was among the first group of cities selected.

"One of the goals of 100 Resilient Cities is to have key stakeholders in each community—private, public, not-for-profit—design solutions together," explains Michael Berkowitz, president of 100 Resilient Cities. "Each community is a complex canvas of potential shocks and stresses that require synergies among the community members, especially with the private sector, which typically owns 80 to 90 percent of community land and can do the most to enhance the resilience."

A city selected to be one of the 100 Resilient Cities receives four key offerings:

1. Financial support to hire and empower a city Chief Resilience Officer, a central point of contact within each city to coordinate, oversee and prioritize resilience-building activities.
2. Support in empowering the Chief Resilience Officer to lead stakeholders in the development of a resilience strategy. This strategy, developed over the course of six to nine months, will serve as the city's roadmap to resilience.
3. Access to a platform of services leveraging resources significantly beyond The Rockefeller Foundation's $170 million effort to assist the implementation of the resilience strategy, including solutions that integrate big data, analytics, technology, resilience land-use planning, infrastructure design, and new financing and insurance products.
4. Membership in the 100 Resilient Cities network, which provides support to member cities and opportunities to share new knowledge and best practices.

U.S. National Academy of Sciences' Resilient America Roundtable

The U.S. National Academy of Sciences is at the forefront of resilience research and is currently putting their research into action through the Resilient America Roundtable. It is organized around understanding and communicating risk, measuring resilience, creating multi-stakeholder partnerships and sharing lessons learned. "Each community is very different in terms of its natural environment," explains Lauren Augustine, Director of the Resilient America Roundtable that works with both Zurich and the Wharton Risk Management and Decision Processes Center. "Our goal is to bring science and technical understanding into the community context to be used in local decision making for enhanced resilience."

Zurich is supporting two pilot projects for Resilient America in Cedar Rapids, Iowa, and Charleston, South Carolina, through the application of its resilience measurement framework for flooding. "Through the collaborative efforts of a diverse set of active players in each community, the Roundtable works with local decision-makers to find new ways to talk about risk and identify options that avoid losses over the long term and mitigate impacts to communities should a natural disaster occur," Augustine explains. For a city like Charleston, resilience decision-making is critical due to its growing population and its low-lying land prone to nuisance flooding and coastal surge. "NOAA's maps show us areas prone

to flooding now and under conditions of sea level rise. If you overlay those maps with other information, like cultural icons, industrial areas or low-income areas, we can begin to understand ways that flood resilience could affect social, economic, or human resilience, beyond impacts on just the physical infrastructure," Augustine notes.

St. Bernard Project's Disaster Resilience and Recovery Lab

The St. Bernard Project (SBP) was founded by two people who came down to New Orleans to help after the storm: Zack Rosenberg and Liz McCartney. What they saw was a chaotic environment where so many people needed help. Rather than put in their two weeks of volunteering and return home though, they dedicated their lives to rebuilding the city's hardest hit communities. In the process, they revolutionized how post-disaster rebuilding can be done.

The SBP's unique model blends full-time staff with Americorps personnel and volunteers to assemble the manpower needed to rebuild homes. In addition, it incorporates best-in-class corporate operational models—including practices from Toyota and UPS—to ensure the most efficient and effective home-rebuilding techniques. As a result of these unique approaches to people and process, SBP has reduced by half the time and expense needed to return families to their homes following a major disaster. In fact, the SBP model has proven so effective that it has now rebuilt over 900 homes with the help of over 100,000 volunteers in New Orleans; Joplin, Missouri; Rockaway, New York; and Monmouth County, New Jersey.

The lessons learned during that process will now be shared with communities across America through the SBP's Disaster Recovery and Resilience Lab, which was established through a $3 million grant from Zurich. The lab will help at-risk communities better understand and protect themselves from risk. The perils in scope include hurricanes, tornadoes, severe storms, floods and fires.

The Disaster Resilience and Recovery Lab is a model for increasing the resilience of individuals, families and businesses that potentially face or are recovering from natural disasters. Within each community, the Lab focuses on three target constituencies—homeowners, small and mid-sized businesses and municipalities—to work with each to understand and mitigate risk. SBP will then measure success based on changed behavior.

Building economic resilience in New Orleans: The Zurich Classic

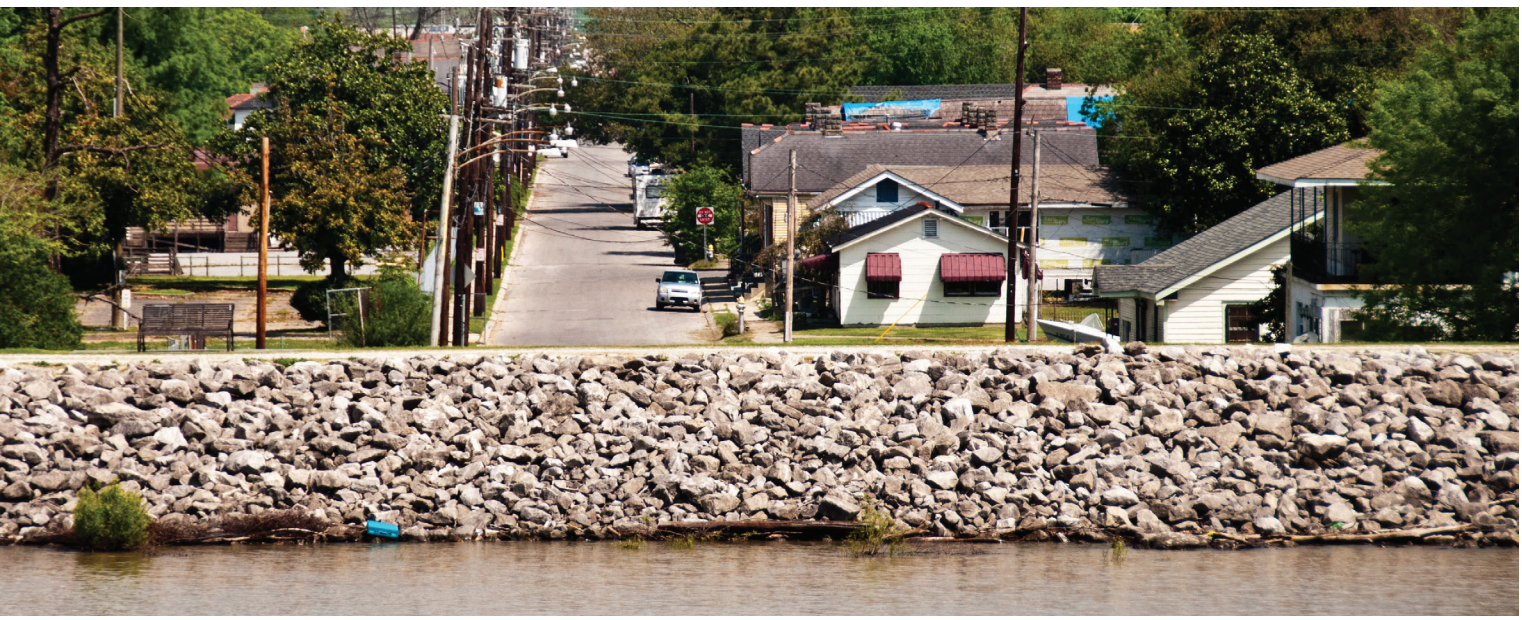
Just before Katrina hit, Zurich began its sponsorship of a PGA Tour golf tournament in New Orleans. Known as the Zurich Classic of New Orleans, it was the first major sporting event to return to the city after Katrina and has been held every year since. The Zurich Classic generates $40 million annually in economic activity throughout the greater NOLA area, helping businesses thrive and improving employment opportunities for the city's residents. Since Zurich became title sponsor in 2005, the tournament has contributed more than $13 million to more than 100 charities. This is a lesson for all communities across the country: an economically resilient city is key to building resilience across its infrastructure as well.

Applying learnings around the globe: Zurich Flood Resilience Program

Floods affect more people globally (roughly 250 million each year[15]) than any other natural hazard and are responsible for some of the largest economic, social and humanitarian losses. Nearly two-thirds of U.S. presidential disaster declarations over the past 50 years have been associated with flooding. Flood-related losses are increasing because more people are living in harm's way and more expensive homes are being built in the floodplain[16], in addition to a recent increase in the frequency of severe storms.

In 2013, Zurich entered into an innovative, multi-year alliance with humanitarian organizations and academic institutions to improve communities' understanding of and resilience to flood risks. The alliance includes the International Federation of Red Cross and Red Crescent Societies (IFRC), the International Institute for Applied Systems Analysis (IIASA), the Wharton Business School's Risk Management and Decision Processes Center at the University of Pennsylvania, and the international development non-governmental organization, Practical Action. This Flood Resilience Program is funded through an initial investment of $35 million by Zurich targeted at enhancing community resilience through pre-event risk reduction actions.

The Flood Resilience Program is based on a new approach to cross-sector collaboration. The program brings together flood risk research, community-based programs and risk expertise. It looks for and shares ways that community flood resilience can be measured and improved. One of the key deliverables of the program is to offer practical ways to improve flood risk management because traditional risk financing solutions often are not the best solution. The program is directly helping about 125,000 people through projects in flood-prone communities in Bangladesh, Indonesia, Mexico, Nepal and Peru, as well as in the United States with the National Academy of Sciences.



Measuring resilience to make better investments

The ability to measure resilience is critical in determining the effectiveness of investments by private and public sectors. As the adage goes, "what gets measured gets done." Yet moving from proposing a conceptual framework to actually testing it on the ground with communities and developing a resilience measurement tool is challenging.

The Zurich Flood Resilience Program has developed a framework and a methodology to measure community flood resilience that is publicly accessible and will be tested by the National Academy of Sciences' Resilient Roundtable and the Wharton Risk Management Center in the coming two years. This new approach allows for comparisons within and across communities to measure in clear, concise terms a community's resilience to floods and how it can be improved by raising risk awareness, as well as investing in both individual and community-based protection measures.

This approach produces a community rating based on four properties of resilience (the Four Rs) and five types of sustainable capital (the Five Cs), as outlined in the sidebar. Starting in 2014, the Zurich Flood Resilience Program has been testing iterations of this tool to empirically measure community resilience to flooding, with the result of this eventually forming the basis of a comprehensive resilience measurement approach for all communities around the globe.

A holistic framework to measure community resilience

The Zurich Flood Resilience Program is developing a community resilience rating system based on these indicators of resilience and sustainable capital:

The Four Rs of Resilience

- **Robustness**: Strength to withstand a shock
- **Redundancy**: Diversity among functions
- **Resourcefulness**: Ability to mobilize
- **Rapidity**: Managing recovery expediently

The Five Cs of Sustainable Capital

- **Physical capital**: Infrastructure, equipment, crops, etc.
- **Financial capital**: Income sources and access to other financial resources
- **Human capital**: People's education, skills and health
- **Social capital**: Relationships and networks for joint action and exchange of resources
- **Natural capital**: All natural resources that enable productivity and livelihoods

Effective disaster financing solutions and the affordability gap

The estimated $127 billion (in 2015 dollars)[17] price tag for Katrina was the most costly disaster in recent U.S. history. The federally run National Flood Insurance Program (NFIP) did not have enough financial reserves to handle its claims from Katrina. As a result of this and other flood-related losses in 2004 and 2005, the NFIP was forced to borrow $18 billion from the U.S. Treasury.[18]

The Wharton Risk Center notes that despite this historical level of insured losses, most people affected by the flood in New Orleans were uninsured. For instance, a study published by the New York Times right after the levees failed showed that only 40 percent of homeowners in Orleans Parish had flood insurance. In the Louisiana parishes affected by Katrina, the percentage of homeowners with flood insurance ranged from 58 percent in St. Bernard to 7 percent in Tangipahoa.[19] Few homes were elevated or designed to deal with storm surges following hurricanes. Katrina also destroyed a number of public buildings and infrastructure that were uninsured. When insurance is highly subsidized for those residing in hazard-prone areas, many homeowners feel they are much safer than they actually are by assuming that the low premium implies a low risk.[20]

The lessons of Katrina call for a better balance between pre- and post-disaster spending to help reduce the devastating impact of severe storms. There is growing momentum across the United States to address the weather resilience gap. Yet the pressing question remains: What is the best formula to pay for these resilience initiatives?

Risk-based insurance can play an important role in fostering community resilience. It informs residents and businesses in disaster-prone areas of the risk their property and assets face from future hurricanes like Katrina or Sandy, while at the same time reduces premiums for those who invest in loss-reduction measures, due to lower expected claims in the future. Although risk-based insurance can be a powerful tool to encourage good behavior, equity and affordability are issues to be addressed. Many residents in high-risk areas face an affordability gap (see sidebar) as premiums reflecting risk can become too expensive for low-income populations.

Insurance could be coupled with long-term loans tied to the property to enhance community resilience. To illustrate this point, suppose that homeowners and businesses in hurricane-prone areas could obtain property improvement loans to reduce wind and storm surge-related losses from hurricanes. If the loss-reduction measure is cost-effective, and if insurance premiums are risk-based, then the reduction in the price of coverage to reflect the lower claims payments might, over time, fund the entire cost of the loan. Property owners, insurers and the federal government could all see financial savings under such a program.

To reduce the voluntary cancellation of policies over time, insurance could be required and linked to the mortgage. This strategy can be complemented by well-enforced building codes that require cost-effective loss reduction measures on new property. Real estate agents could point to the short- and long-term benefits of having these measures in place. Making the community more resilient to disasters will increase property values over time.

How means-tested vouchers can reduce demand for government relief

Individuals in communities that receive free government assistance tend to have lower demand for insurance. Less private insurance leads to even higher demand for government relief when the next disaster strikes. Means-tested vouchers can address the insurance take-up and affordability issue. These vouchers would cover part of the risk-based insurance premium as well as the annual cost of a multi-year loan. In addition, if the property owners were offered a multi-year loan to invest in mitigation measures, the voucher would cover a portion of both the risk-based insurance premium and the annual loan cost. Existing programs such as food stamps and the Low Income Home Energy Assistance Program could serve as models.[21]

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One way to reduce the costs to both the homeowner and the federal government is to provide a means-tested voucher to cover a portion of the cost of insurance and a property improvement loan if the homeowner agrees to invest in cost-effective loss reduction measures.”

Howard Kunreuther, Co-Director, Wharton Risk Management and Decision Processes Center

Another program aimed at encouraging investment in community resilience behavior is the NFIP Community Rating System (CRS) established in 1990. When communities join the program and undertake a series of flood risk awareness and protection measures, they receive points; the more points collected, the higher the reduction in flood insurance premiums for residents. Today, more than 1,200 U.S. communities—representing two-thirds of the NFIP policies-in-force across the country—are active in the CRS program, and there are lessons to be learned from the risk-reducing measures they have undertaken.

Communities also can invest in measures that protect a set of properties, such as well-designed dams, levees and other barricades. At the same time, communities can restrict development in hazard-prone areas through zoning ordinances and land-use regulations. Physical investments can be funded by general taxes or through dedicated programs that can involve public and private sectors working together to protect a specific area. Insurance premiums for all protected homes could be reduced to reflect the lower risk.

Resilience for the next decade and beyond

The need to build resilient communities is an issue that is of critical importance in the coming decade. More people are moving to high-risk coastal areas, so the value of assets at risk is growing. Insured property values for coastal exposures now total more than $16 trillion in the U.S. alone.[22]

Consider the Great Miami Hurricane of 1926. It was estimated to be a Category 4 with maximum wind speeds of 150 mph. The cost of that devastation in today's dollars is estimated at $1.2 billion. Since then, the Miami population has increased thirteen-fold. If a comparable hurricane hit today, the losses would be close to $164 billion. Miami is ranked the 11th most affected city by hurricanes and tropical storms and has been impacted 71 times since 1871, including 31 hurricanes. Despite these risks, Miami Beach is the fourth-largest urbanized area in the U.S.[23]

While we can't stop Mother Nature, it is clear that pre-disaster investment is the key to helping reduce future losses. Katrina has been the driving force in many of the changes to date. Yet there is much to be done, especially in regard to protecting property against storm surge damage. According to Dr. Timothy A. Reinhold, senior vice president and chief engineer of the Insurance Institute for Business & Home Safety (IBHS), Katrina's storm surge caused much more damage than the high winds. The level of flooding and storm surge of a hurricane appears to be set at sea, while the winds can die down quickly as the storm approaches land. This illustrates the importance of protecting buildings from floodwaters.

Along the Gulf Coast, many jurisdictions in Louisiana and Alabama have made it a priority to encourage resilient building practices by adopting superior building codes and providing tax breaks and other incentives. Louisiana, for example, passed a statewide building code in 2007 to enforce a higher level of protection. Reinhold notes that a building's roof is a first line of defense, so it is critical to secure it with the proper type and number of fasteners to keep the roof intact and protect against wind and wind-driven rain damage.

Two IBHS programs—FORTIFIED Commercial and FORTIFIED Home™—provide standards to address specific natural hazard risks and make new and existing commercial buildings and homes more disaster-resistant. These programs look at buildings as systems and offer incremental, yet synergistic, mitigation measures for property owners. The IBHS FORTIFIED program is also the basis for a new U.S. Department of Homeland Security (DHS) initiative known as Resilience STAR™, which is designed to recognize more resilient construction and encourage people in vulnerable locations to choose stronger, safer homes.

For a community in a high-risk area, IBHS recommends that pre-disaster planning include broad implementation of actionable business continuity plans and —for both home and business owners— compiling key documents in a manner that facilitates compliance with FEMA requirements. In addition, a complete understanding of how to comply with the application processes for FEMA, HUD and SBA disaster funds is recommended.

The growing importance of public-private partnerships

Hurricane Katrina forced all sectors of society to face the following truth: The United States does not have a comprehensive and systematic approach for mitigating and managing large-scale natural disasters. "Katrina raised multiple questions regarding not only the specific role insurance can play in addressing these types of events, but also what role the public sector should embrace in partnering with the private sector and NGOs," says Sean Kevelighan, Group Head of Public Affairs, Zurich Insurance Group. "Only by leveraging the collective strengths, expertise and financial capacity of all these players can we really impact the potential losses of future natural disasters and increase the speed and efficiency of recovery from them."

Both Zurich and Wharton have been actively engaged with the public sector and NGOs in developing resilience strategies and programs, including climate resilience discussions with the White House, Department of Homeland Security, FEMA and the National Oceanic and Atmospheric Administration (NOAA). Through ongoing participation in the Administration's Climate Action Plan, Zurich is involved in an initiative that provides natural disaster data and information sharing between the federal government and the insurance industry. Bringing together the expertise and resources of the federal government and private industry can help reduce risks and costs of extreme weather events and climate-related impacts.

"Policymakers at every level need to consider these types of initiatives within their own communities to build a more resilient future," Kevelighan explains. "The considerations over how best to protect a community can be complex, involving many stakeholders with very different priorities."

Insurers play a key role in this process, he adds, because "the fundamental functions of insurance—underwriting, risk engineering, claims management and asset management—are some of the greatest economic tools we have to encourage individuals, businesses and communities to understand, prepare for and mitigate risks."

Superstorm Sandy emphasizes need for resilience partnerships

Unfortunately, Superstorm Sandy, which hit the Northeast in October 2012, demonstrated again how our cities, infrastructure and homes are vulnerable to the effects of major wind and rain. Sandy created massive storm surge damage along the coastlines of New York and New Jersey. Power failures left most of lower Manhattan in the dark. Back-up generators housed in building basements failed due to the storm surge, putting hospital patients and many others at risk. Flooded subway tunnels made commuting a hardship for months.

As with Katrina, the National Flood Insurance Program could not cover Sandy claims, requiring a $10 billion loan from the U.S. Treasury.[24] Additionally, 80 percent of residents in the inundated areas had no flood insurance, nor did 90 percent of small businesses.[25] In total, Congress appropriated $50 billion to pay for uninsured Sandy losses, and insurers paid more than $20 billion.

Rockefeller Foundation President Judith Rodin, who chaired the 2100 New York State Commission appointed by Governor Cuomo to make recommendations for how to build back more resiliently in the region, says the group determined that "building urban resilience is not something local governments or philanthropy can do alone. We need the partnership of the private sector. A centralized approach to infrastructure-related decision making, rather than a project-by-project, agency-specific process, would go a long way to catalyze and maximize private sector investment."

Final lesson: Striking a better balance with pre-event investments

A decade later, references to Katrina still evoke highly charged emotions surrounding the property devastation, personal harm and financial loss of this event. Yet bright spots have emerged: New Orleans is more resilient today, and the rebuilding efforts have in many ways improved the economic stability, educational opportunities and personal safety of the residents of that city.

On a national scope, Katrina positively changed the conversation in terms of how businesses, communities and governments think about resilience—stressing the investments needed to proactively and systematically anticipate, protect against and mitigate the damage from these natural disasters.

The Appendix shows examples of where pockets of resilience are being created throughout the Unted States. But more needs to be done, especially in creating a better balance of investment between pre-disaster planning and post-disaster recovery.

How can businesses, government and communities strike a more effective balance of investment?

- Community leaders—such as mayors and governors—need to take charge and make resilience a key priority; it is good both for the economic competitiveness and stability of their community.
- More local and regional public/private partnerships must be developed to improve flood risk awareness and management.
- Communities should create their own resilience strategy led by a Chief Resilience Officer (modeled on the 100 Resilient Cities approach).
- Resilience cannot be achieved based on a single dimension. A more comprehensive view based on the 5-Capital approach discussed earlier is key.
- Communities need to build to resilient standards using guidelines outlined by organizations such as IBHS.
- Collaboration must expand between public/private sectors in sharing data and expertise, especially among FEMA, NOAA and the insurance industry.
- All levels of government must address the balance of traditional vs. alternative funding for disaster preparedness and recovery, including means-based vouchers for flood insurance and tax incentives for resilience investments in infrastructure.

Given the difficult yet empowering lessons learned from Katrina, no community should ever face such devastation following future storms. Increased resilience is within our control. Katrina spurred the collective efforts of the private and public sectors to build more resilient communities. The momentum is well underway, so it's up to all of us to carry it forward into the next decade.

Appendix

Resilience in action: New Orleans and beyond

The following projects are examples of the types of progress that can be achieved through resilience-focused partnerships between business, communities, NGOs and government entities:

Bayou District Foundation's resilient structures

Bayou District Foundation in New Orleans was founded in 2005 and modeled after the East Lake Community redevelopment initiative in Atlanta. In 2006, funds generated by the Zurich Classic of New Orleans served as the seed money to plan a mixed-income residential community on the site of the former St. Bernard Public Housing Development destroyed by Katrina, an area that realized eight to 10 feet of standing water after the storm. The initial $250,000 donation has been leveraged into more than $280 million dollars of mixed income residential housing serving 685 families; a $9 million nationally recognized early childhood education center; three playgrounds; a community health clinic; a community garden; and five single-family homes.

The new community, Columbia Parc at the Bayou District, includes structures built to withstand hurricane-force winds, housing built above the required flood elevation and programs to educate residents on how to stay safe in severe storms. "Katrina gave us the opportunity to start clean and use best practices in building more resiliency in the community in all aspects—housing, the educational system, employment and safety," says Gerard W. Barousse Jr., Chairman of the Bayou District Foundation Board.

The buildings are four feet above street grade and built to withstand winds of 180 mph. There is ongoing outreach on pre-disaster preparedness for each resident, especially in regard to evacuation planning since only half own cars. In addition, the Bayou District Foundation worked with the Greater New Orleans Urban Water Plan to ensure good perimeter defense, not only in terms of the levees, but also in quickly moving water out of the neighborhood in times of major rain events, whether a tropical storm or hurricane. The adjacent golf course to Columbia Parc allows for the efficient drainage of rainwater.

The Dryline in Manhattan

As one of the winners of the Rebuild by Design competition, which was funded by The Rockefeller Foundation, The Dryline in Manhattan is 10 continuous miles of low-lying geography that was reworked to create a flood barrier. This dense, vibrant and vulnerable urban area stretches from West 57th Street south to Battery Park and up to East 42th Street. The project is actually a series of urban designs, uniquely developed in concert with the communities it protects. Each community has championed a design that would enable it to reap its own dividends. In one community, plans call for walls to attach underneath the FDR highway along the east side of Manhattan. The walls can be easily deployed for flood events but also provide lighting at night, increasing safety along this pathway. The panels will also be deployed to create a seasonal market during wintertime, bringing new economic activity to the neighborhood. As Rodin states, "This is a powerful symbol of what good design and planning can achieve when viewed through a resilience-building lens."

Hoboken flood-enhanced parking garage

Hoboken is susceptible to both flash flooding and storm surges. It also suffers from too little parking and a lack of recreational green space. Based on a winning design through the Rebuild by Design competition, the city is building a new parking garage that addresses all three issues: an underground parking garage with a park above so that in times of potential flooding, the empty garage has the capacity to take in water overflow. This project is capitalizing on a combination of political, ecological and economic factors to create a comprehensive flood strategy that both defends the entire city and enables commercial, civic and recreational amenities to take shape. "That's three wins with one investment; that's the resilience dividend," Rodin says.

Norfolk data-based resilience planning

Norfolk is a coastal city in southeastern Virginia with a population of about 250,000. The city has experienced 14 inches of sea level rise since 1940—the greatest along the Atlantic seaboard. One year after partnering with The Rockefeller Foundation, Norfolk, one of the 100 Resilient Cities, has not only broadened its view of resilience, but also has completely transformed and re-oriented its thinking and city planning around resilience. Norfolk's Chief Resilience Officer, Christine Morris, is working on the long-term goal of having all parts of the municipal government focused on resilience. Norfolk is the first member city to work with Palantir Technologies, which provides data integration and analysis. Palantir is integrating multiple existing city datasets (311 calls for service, census track data, real estate data, building code violations, live weather data, etc.) into a streamlined view.

Additional natural disaster risk reduction information

Zurich North America's Risk Engineering Team

The team provides long-term, strategic guidance on how to help protect buildings, assets and people, as well as practical guidance when a storm is imminent. More about Zurich's risk management services can be found on its website including:

- Windstorm Risk Reduction: www.zurichna.com/zna/windstorm
- Hurricane Information Center: www.zurichna.com/zna/media/hurricaneinfo.htm
- Catastrophe Response: www.zurichna.com/zna/claims/catastropheresponse.htm

Wharton Risk Management and Decision Processes Center

http://riskcenter.wharton.upenn.edu/

For three decades, the Risk Management and Decision Processes Center at the Wharton School of the University of Pennsylvania has been at the forefront of basic and applied research to promote effective corporate and public policies for low-probability events with potentially catastrophic consequences. The Wharton Risk Center has focused on natural and technological hazards through the integration of risk assessment and risk perception with risk management strategies. After the attacks of September 11, 2001, research activities were extended to include national security issues (e.g., terrorism risk insurance, protection of critical infrastructure). Building on the disciplines of economics, finance, insurance, marketing, psychology and decision sciences, the Center's research program is oriented around both descriptive and prescriptive analyses. Descriptive research focuses on how individuals and organizations interact and make decisions regarding the management of risk under existing institutional arrangements. Prescriptive analyses propose ways that individuals and organizations, both private and governmental, can make better decisions regarding risk.

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