

# The Zurich flood resilience alliance: A new approach to partnership for effective disaster risk reduction

Michael Szoenyi, MAS NatHaz, MSc<sup>1</sup>; Linda Freiner<sup>2</sup>

## ABSTRACT

An introduction to the Zurich flood resilience alliance. This paper provides an overview of the global challenges caused by flooding and how we are tackling them through the work of the Zurich flood resilience alliance. Risks of floods are increasing because of population growth, more people living near water and growing prosperity. There are several ways to enhance flood resilience. We believe preventive action results in benefits far in excess of those recovery can provide. Flood risks are increasingly interconnected and interdependent. A holistic approach is needed to address them. We have created a pioneering collaboration through which we can tackle the challenges communities face. We work as an alliance bringing together organizations with complementary skills, launched by Zurich Insurance Group in 2013. The alliance includes two humanitarian organizations - the Red Cross and Practical Action - and two leading research institutions - Wharton and IIASA. The program is based on a new approach to cross-sector collaboration. It brings together flood risk research, community-based programs and risk expertise.

## KEYWORDS

flood; resilience; measurement; alliance; partnership

## INTRODUCTION

Floods affect more people globally than any other natural hazard. They cause some of the largest economic, social and humanitarian losses, involving on average some 250 million people per year (UNISDR 2013). While floods are natural, their disastrous consequences are not. Often the poorest and least-prepared communities suffer most. Evidence shows that repeated disasters like floods undermine societies' and economies' potential to develop and trap them in a poverty cycle. We tend to think of these events as happening in other places to other people, but floods also cause devastation in developed countries. The reasons are surprisingly similar in both developing and developed countries. To address the need for a proactive approach to flood risks, Zurich Insurance Group (Zurich) launched a dedicated flood resilience program in 2013. It includes two humanitarian organizations – the International Federation of Red Cross and Red Crescent Societies (IFRC), and Practical Action – and two leading research institutions: the Wharton School of the University of Pennsylvania (Wharton), and the International Institute of Applied Systems Analysis (IIASA) in Austria. The program is based on a new approach to cross-sector collaboration. It brings together flood

1 Zurich Insurance Group, Zurich, SWITZERLAND, michael.szoenyi@zurich.com

2 Zurich Insurance Company, SWITZERLAND

risk research, community-based programs and hazard and risk assessment expertise. It looks for, and shares ways that community flood resilience can be measured and improved. We define resilience as the ability to continue to thrive in the face of disasters. The program directly helps about 125,000 people through projects in flood-prone communities in Bangladesh, Indonesia, Mexico, Nepal, Peru and the U.S.

Risks of floods are increasing. By some estimates, river flooding alone (not counting other floods such as surface water, ocean flooding, storm surge etc.) could annually affect 54 million people worldwide by 2030, more than double the number currently affected (Scientific American, 2015). There are several reasons why floods are having a greater impact:

Growing populations, more people living in cities. The world's urban population increased fivefold from 700 million in 1950 to 3.9 billion in 2014 (United Nations, 2014). Urban growth is particularly strong in developing countries, where cities' disaster plans and emergency facilities are often unable to cope with major floods. Constructing buildings on flood plains, paving over land that provided drainage and lack of waste infrastructure all add to the risks. More people living near water: Where land is at a premium, developers may ignore warnings and build in places exposed to river floods and storm surges. Cities in coastal regions or near rivers such as Jakarta, Lima, Shanghai, Dhaka, and Manila are highly vulnerable. But floods can also shut down a metropolis like New York City, as Superstorm Sandy showed in 2012.

Greater prosperity – more to lose: Development of countries depending on agriculture is more vulnerable to drought, while countries reliant on industrial development for growth suffer more from floods (Collier et al, 2013). A higher standard of living that brings with it more manufacturing and production increases the value of property at risk. Such risk might be alleviated by protection measures (for example, raising buildings). Even so, a catastrophic flood can threaten not only the economy of a region, but entire global supply chains: severe flooding in manufacturing sites in Thailand in 2011 led to global shortages of components needed by major car makers and severely hit electronics production.

Climate change: Flood risk could continue to increase significantly in many parts of the world due to expected changes in climate patterns. Warmer temperatures affect weather patterns and sea levels. Tropical cyclones common in the northwest Pacific included Typhoon Haiyan in 2013, perhaps the strongest tropical cyclone in recorded history to make landfall, which killed over 7,000 people.

## METHODS

We have thus taken the following approach to increasing flood resilience:

### **Understanding flood resilience**

It is hard to change habits or convince people to move out of harm's way. Improving resilience is doubly important because it helps people to anticipate and cope with floods. It not only allows them to reduce the flood exposure to lives and property. Resilience also helps them

recover more quickly. It keeps people's lives intact before, during and after floods. It helps communities become more prosperous and stable. Resilience is frequently described as a system or even a system of systems, one that is holistic in nature. "A system-wide approach to resilience needs to capture a range of activities, actors and processes that are part of a resilience building system," according to a UN study (Winderl, 2014).

### **Ways resilience can be increased**

There are several different ways we can enhance flood resilience: through better assessment of flood hazards and communicating the risk to residents; taking measures to lessen the severity of floods and mitigate their impact, including first-aid and health training, community planning, and setting up emergency shelters; gaining a better understanding of how decisions are made in the face of risks and uncertainty to make the most effective solutions easier to find; improving warning systems and helping communities adopt emergency protocols; supporting efforts to rebuild better, to safer standards, after floods; ensuring people have opportunities to secure an income during floods, for example, by providing skills training so farmers have alternative revenues when cropland is under water; developing ways to safeguard assets exposed to flood risk at an individual or community level; and working with local officials and other policymakers and the private sector to help make communities more flood resilient.

### **Increasing resilience makes economic sense**

We believe proactive action, reducing flood risk before an event, brings benefits far in excess of those recovery can provide. On average, for every dollar spent on targeted flood-risk reduction measures, five dollars can be saved by avoiding and reducing losses (Mechler et al, 2014). Despite the advantages of acting before floods happen to improve resilience, over the past two decades, only 13 percent of aid went to reducing and eliminating risks. The remaining 87 percent were used for emergency response, reconstruction and post-disaster rehabilitation (Kellett and Caravani 2013). This emphasis on relief as opposed to resilience is neither logical nor efficient. Psychology plays a major role in flood resilience. By better understanding how people think, we can address the reasons why, despite its high cost-effectiveness, some communities and even international donors do not invest enough in pre-flood mitigation. One common misconception is the 'it will never happen to us' syndrome: decision-makers underestimate flood risk, preferring to see floods as an unlikely event. There is also the 'there is nothing we can do, anyway' syndrome – people become fatalistic when they feel powerless to control the outcome of events. People also procrastinate: even when they know that investing in flood protection is necessary, they avoid making decisions. They might fall into the trap of refusing to invest in flood protection because they assume the government or donors will step in. There is also a 'gambler' mentality: people believe that because a flood recently occurred, there won't be another one any time soon, forgetting that disasters occur independent of one another. There are very real budget constraints that must be overcome to convince people to take action.

## Creating a flood resilience alliance

Flood risks are increasingly interconnected and interdependent. Through our pioneering collaboration (Figure 1), we can tackle the challenges communities face. This effort works as an alliance that brings together organizations with complementary skills and expertise. We are seeing the advantages of a combined approach in community programs where the IFRC and Practical Action use their extensive experience working with communities to identify and implement solutions. Programming is an iterative process typically starting by assessing and analyzing the situation; innovative solutions are devised, and then work begins with communities to assess, select and implement the best solutions. The impact of the actions implemented is then evaluated. Research by Wharton and IIASA confirms the advantages of investing in pre-event mitigation as opposed to post-event relief. The research also provides objective evidence that can influence policymakers' decisions. Further, it can create an environment in which insurance and other risk transfer mechanisms can be part of the solution. As an insurer, Zurich acts as a catalyst in providing human, technical and financial resources. The Z Zurich Foundation has made an initial five-year commitment of USD 35.6 million to the alliance. This is in addition to contributions of time, expertise and resources of Zurich employees around the world.

## The Zurich Flood Resilience Alliance

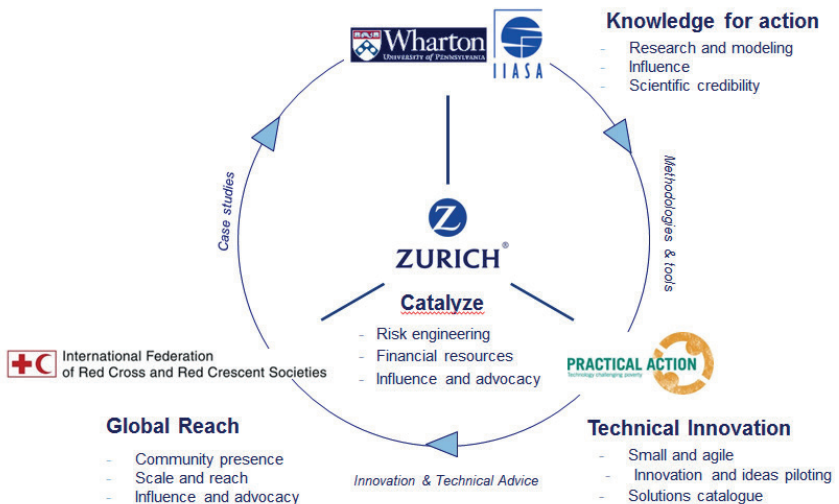


Figure 1: Overview of the five organizations forming the Zurich flood resilience alliance.

## RESULTS

### **How we improve flood resilience**

Buildings can be rebuilt after a flood. It is harder to rebuild many aspects of life, especially when dealing with repeated floods. With each flood, social bonds are tested, people lose income, family ties strained. Increasing a community's resilience to floods is the best way to counter these destructive forces. We can improve resilience, even when the task is sometimes difficult. Below, we show some examples of the specific challenges that we face and how we have addressed them.

### **We need to invest more in flood resilience**

Images of flood disasters in the media resonate with the public. People respond, and at least for a time, give generously. But such aid, while invaluable for the recovery phase, may fail to provide long-term solutions. Therefore, we need to direct investments toward increasing communities' flood resilience for the long term, not just when disaster strikes. In Mexico, we provide better facilities and alternative livelihoods: Work led by the IFRC and the Mexican Red Cross began in 2014 in 11 communities around Jonuta, a municipality in the state of Tabasco. Tabasco includes one of the world's largest wetlands through which the Usumacinta River flows. The river can rise as much as 3 meters during the rainy season. The people in these communities must live with floods several months out of the year and therefore need innovative solutions to earn a living, even during periods of high water. Work is underway to build multi-purpose community buildings that can double as school rooms or medical facilities if necessary. Work is also being done to train communities on how to catch and prepare the invasive devil fish, benefiting not only the environment, but possibly also providing them with a sustainable food source and a new source of income.

In Nepal, we improve early warning systems: Nepal is still recovering from the devastating earthquake in April 2015. But even as recovery begins, some communities in Nepal face a new threat: the onset of the monsoon season. Monsoon rains often trigger flash floods and mudslides, posing significant risks. Timely warnings about imminent floods can save lives and help people protect their possessions. Under the lead of Practical Action, we are working in the Karnali River basin which begins in the southern slopes of the Himalayas and flows through Nepal to India. A major focus is on improving early warning systems implemented in 2010. In particular, this includes improving weather forecasting, keeping live-saving technology working even under extreme conditions, and training communities to act on the information received from measuring stations along the Karnali River.

In Indonesia, we are connecting upstream and downstream communities. Bukit Duri in the southern part of Jakarta city is bordered on one side by the Ciliwung River. When it floods, garbage and sewage block the river and end up flowing into the community. Much of this waste comes from upstream communities such as Tugu Utara. The IFRC and the Red Cross society in Indonesia, PMI, are leading our work with both Bukit Duri and Tugu Utara to improve waste management practices. By helping remove the waste from the river, the impact of periodic flooding is reduced. Not only that, but the waste management process

also provides a valuable chance for these communities to add paying jobs, as the waste can be converted to compost and sold locally.

### **How to measure flood resilience**

Good data and statistics tell us if an approach works, and also let us know if one approach works better than another. The information derived from measurements lets us identify successful actions. It tells us why measures succeed. It allows us to better understand which particular actions work not just in one community, but in others as well. There is no one-size-fits-all solution or tool to measure resilience. Any system used to measure resilience should find answers to specific questions, in our case related to an individual community, and in the face of a specific peril, in this case flooding. Useful, empirical measures of flood resilience offer clear, unbiased insights, and eliminate the need to make decisions based solely on subjective impressions or anecdotal evidence. However, a recent survey conducted for the United Nations Development Programme concluded that “no general measurement framework for disaster resilience has been empirically verified yet” (Winderl, 2014). We understand resilience as an outcome that ensures a community can continue to thrive and develop in face of a shock. However, resilience can come from many sources. We are developing a community-based flood resilience measurement tool based on the five categories (financial, physical, human, social and natural) of sustainable livelihoods (the ‘Five Cs’) framework established by the UK’s Department for International Development (DFID, 1999), and the four properties (robustness, redundancy, rapidity and resourcefulness) of resilience (the 4R) formulated by MCEER (Renschler et al, 2010). We will produce community resilience measurements based on a set of factors falling into a capital and one or several properties of the 4R. These sources of resilience allow us to assess the level of resilience, using Zurich Risk Engineering’s Risk Grading approach to combine them into a joint framework. If resilience cannot be empirically verified, how do you empirically measure whether a community is more resilient as a result of your work? The approach brings together quantitative and qualitative data about the sources contributing to resilience, allowing us not only to assess them but also to use the measurement results as a support for decision making to identify actions for enhancing resilience. By combining the expertise of all our members of the Zurich alliance, this challenge is what we have set out to address.

### **Enabling communities to control their own future**

For communities that must regularly deal with floods, change seems particularly daunting. Very often these communities struggle to think beyond the immediate present. To keep people engaged in finding long-term solutions, community members must be part of the dialogue and the solution. Communities need structures that support dialogue: every member of a community must be part of discussions when looking for solutions. Following Superstorm Sandy, a survey of over 1,000 New York City residents showed that people often tend to misjudge the risks floods pose to their own lives and property. A survey (Botzen et al, 2015) found that homeowners may generally be aware of flood risks, but they often fail to

recognize the risks they face as individuals. People tend to underestimate potential losses. This might explain why 80 percent of residents in the area inundated by Sandy's storm surge had no flood insurance, and 90 percent of small business had no flood protection, either – despite the fact that flood insurance is highly subsidized by the U.S. federal government. If people had a clearer understanding of what they stood to lose, they would be more likely to take protective measures. Based on these findings, the alliance has recommended that the U.S. Federal Emergency Management Agency (FEMA) provide flood maps showing not just where floods might occur, but also the damage floods could cause.

### **Policymakers need information and insights**

Limiting development in areas with flood hazards is difficult. People want to – or must – live and work near water. But they can still be alerted to the risks of building on a flood plain. Policymakers and local officials should encourage better planning. Wherever possible, this should be done without compromising development that could benefit a community's long-term well-being and prosperity. We are engaging with the government in Peru. The El Niño phenomenon occasionally leads to heavy rains that cause floods in some parts of the world. Many years may pass between floods, but when they do come, the floods can be devastating. In communities in the Piura region in northern Peru and in the Rimac River Basin northeast of Lima, our program is working to make it easier for people to be better prepared for these types of floods. One factor elevating the risk is that, because floods tend to be rare in these areas, people forget the danger, as the buildings built in risky areas since the last flood attest. A big part of the program involves working closely with local authorities. It is also important to increase confidence in the government's ability to provide assistance.

### **CONCLUSIONS**

Our flood resilience program offers a platform to advocate learning, share knowledge, and apply what we learn in individual communities to help others, while serving as a catalyst for innovation and policy dialogue. A number of activities will support this approach in the future: We are developing an 'open-source' solutions catalogue. This makes it easier to share knowledge to build flood resilience. The catalogue, drawing on the flood resilience alliance's community programs, will provide vulnerable communities with access to information on flood mitigation measures and solutions. It could also include research, processes and tools developed by the alliance. We are also testing a tool to understand the flood resilience system. The flood resilience measurement will help us assess the impact of resilience-building interventions and the community resilience development over time. We are also developing a tool to increase the understanding of the interactions between the sources of resilience and how they are driving flood risk and wellbeing. It will be tested in 2015 in pilot communities in Nepal and Peru. The tool will make it easier to identify key elements, map risk systems and sources, and spot potential problems and interdependencies. We are exploring different ways the alliance could build further resources. This might include establishing a 'Flood Resilience Academy'. The Academy would be one way to share our knowledge and support practitioners

in achieving more sustainable, replicable solutions. It could also be supporting efforts to identify and develop innovations to address flood risk. We will continue to share our insights and findings. We acknowledge that there are many different approaches to resilience. Ours includes flood resilience measurements, testing our risk approaches in different settings in both low-income and developed economies, in rural and urban settings, to make sure our approach is replicable and scalable to help enhancing flood resilience beyond our own activities.

## REFERENCES

- Botzen Walter, Kunreuther Howard and Erwann Michel-Kerjan (2015). Divergence between individual perceptions and objective indicators of tail risks: Evidence from floodplain residents in New York City. *Judgment and Decision Making*, 10, 4, 365 – 385.
- Collier Ben, Miranda Mario and Jerry Skees. Natural Disasters and Credit Supply Shocks in Developing and Emerging Economies. Wharton Working Paper 2013-03.
- DFID. Department for International Development. Sustainable Livelihoods Guidance Sheets. <http://www.eldis.org/vfile/upload/1/document/0901/section2.pdf>, last retrieved August 4, 2015.
- Kellett Jan and Alice Caravani. Financing Disaster Risk Reduction. A 20 year story of international aid. Global Facility for Disaster Reduction and Recovery (GFDRR), 2013.
- Lehmann Evan and Climatewire (2015). Extreme Rain May Flood 54 Million People by 2030. *Scientific American*, March 5, 2015.
- Mechler Reinhard and the Zurich Flood Resilience Alliance (2014). Making Communities More Flood Resilient: The Role of Cost Benefit Analysis and Other Decision-Support Tools in Disaster Risk Reduction. September 9, 2014: <http://opim.wharton.upenn.edu/risk/library/ZAlliance-decisiontools-WP.pdf>
- Renschler Chris, Frazier Amy, Arendt Lucy, Cimellaro Gian-Paolo, Reinhorn Anrei and Michel Bruneau (2010). A Framework for Defining and Measuring Resilience at the Community Scale. MCEER Technical Report 10-0006.
- United Nations Office for Disaster Risk Reduction, UNISDR (2013). [www.unisdr.org/archive/33693](http://www.unisdr.org/archive/33693) . Last retrieved Aug 4, 2015.
- United Nations (2014). Department for Economic and Social Affairs. Factsheet: Population Facts – Our Urbanizing World.
- Winderl, Thomas (2014). Disaster Resilience Measurements: Stocktaking of Ongoing Efforts in Developing Systems for Measuring Resilience, 59pp. United Nations Development Programme