Insurance Innovation and Community-Based Adaptation Finance

Shalini Vajjhala and James Rhodes

Governments traditionally act as "insurers of last resort." When disaster strikes, vulnerable communities turn to local, state, and federal government agencies for support and recovery assistance. More recently, as the frequency and severity of various disasters–from severe storms and floods to wildfires–have grown,[1] the gap between who has financial protection in the form of insurance and who does not has also grown. For example, in California, only 13 percent of homeowners carry earthquake insurance,[2] and after recent wildfires, other homeowners' properties could become entirely uninsurable in the future.[3]

This "protection gap" is particularly challenging to address in low-income and marginalized communities, where risk awareness and insurance affordability can be major barriers.[4] As a result, many government agencies have found themselves being expected to act as insurers of *first* resort. This is an unsustainable situation for both budget-constrained public entities and vulnerable communities and residents who face years of delays in getting assistance to get back on their feet after a disaster.

This article highlights how insurance can be a catalyst for implementing both engineering and social-ecological adaptation measures.[5] The following sections describe why insurance innovation is unlikely to occur on its own and offer three ideas for how local governments can work with the insurance industry to craft integrated resilience solutions that promote community-scale adaptation, measurably reduce risk, and improve long-term physical and financial protection for at-risk communities.

Insurance as a Catalyst for Climate Adaptation: Barriers

Insurers have long championed investments in physical risk reduction. Examples include seat belts to reduce the human and economic costs of automotive accidents, fire codes for

1 Walsh, J. et al. "Ch. 2: Our Changing Climate," *Climate Change Impacts in the United States: The Third National Climate Assessment* (Melillo, J.M., Terese, R. [T.C.], and Yohe, G.W. [eds.]), U.S. Global Change Research Program (2014), pp. 19-67. doi: 10.7930/J0KW5CXT

2 Fuller, T. "In Quake-Prone California, Alarm at Scant Insurance Coverage," *The New York Times* (August 31, 2018).

3 Walsh, M.W. "How Wildfires Are Making Some California Homes Uninsurable," *The New York Times* (November 20, 2018).

4 Calvesbert, G. "Why does the protection gap exist?" AIR Worldwide (2016), available at https://www.air-worldwide.com/Blog/Why-Does-the-Protection-Gap-Exist-/.

5 Davidson, J.L. et al. "Interrogating resilience: toward a typology to improve its operationalization," *Ecology and Society*, 21(2):27 (2016). doi: 10.5751/ES-08450-210227

urban buildings, and workplace safety standards, among other measures.[6] Common features of these cases are that clear and effective measures were available to reduce risk (and rising insurance industry losses), the measures were affordable for consumers and property owners, and advancing these measures aligned well with the established business models and financial interests of insurance industry firms.

The insurance industry has recognized that climate change poses similar industry-wide challenges. Many insurance companies have become active participants and leaders in global discussions and initiatives on building resilience, promoting adaptation, and reducing the protection gap in recent years.[7] However, advancing projects on the ground that deliver meaningful risk reductions has been elusive, for a number of reasons.

First, the terms adaptation and resilience encompass an enormous diversity of potential activities and risk-reducing measures, and there is no clear consensus on which solutions to implement. Projects range from hard engineering solutions–such as seawalls and flood barriers–to ecological interventions, like protecting and expanding wetlands and mangroves, to planning exercises and social capacity building.[8] The effectiveness of many of these measures for delivering quantifiable risk reductions has yet to be demonstrated for insurance purposes. For example, life-insurers have copious amounts of data available on the effect of smoking on life expectancy and can adjust premiums accordingly. The same is not yet true of green infrastructure measures designed to reduce flood risk. This challenge is made even more complex with climate change, since historical data is not a reliable predictor of future impacts. There are some emerging firms, such as MyStrongHome,[9] that are filling these types of data gaps and standardizing the process of capturing insurance savings to support resilience measures; however, the market is far from developed.

Second, many resilience projects have distributed beneficiaries and few existing mechanisms for coordinating the kinds of collective action required for effective implementation. Consider a coastal protection project that reduces surge and flood risk for hundreds of property owners in a protected area. Individual property owners generally don't have the capacity or authority to develop such large-scale projects on their own, and from an insurance perspective, property-level policies are generally provided by many different carriers. No single insurer has the incentive to invest time and resources in finding collective solutions when the benefits would also accrue to its competitors. Further, individual insurers often have a hard time setting premiums that reflect the full value of risk reduction measures due to a lack of visibility on projects, lack of standards for implementation, and lack of data on the resulting benefits (reductions in expected losses).

6 Ben-Shahar, O. and Logue, K.D. "Outsourcing Regulation: How Insurance Reduces Moral Hazard," *Michigan Law Review*, 111, 197 (2012), available at http://repository.law.umich.edu/mlr/vol111/iss2/2.

7 InsuResilience Global Partnership (2018), available at https://www.insuresilience.org/.

8 Davidson, J.L. et al. "Interrogating resilience" (2016); Meerow, S., Newell, J.P., and Stults, M. "Defining urban resilience: A review," *Landscape and Urban Planning*, 147 (2016), pp. 38–49.

9 MyStrongHome (2018), available at https://www.mystronghome.net/.

Cases where the insurance industry has effectively championed risk reductions for distributed beneficiaries have focused on sector-wide codes and standards rather than local projects or protection measures.[10] Risk modelers can help bridge the gap between insurers and project developers to quantify the (financial) benefits of resilience projects using industry-trusted models, but data alone is not enough to enable the coordinated investments required to deliver projected benefits. New business models are required to coordinate beneficiaries and consolidate benefits if they are going to help advance project implementation.[11]

Third, there is a mismatch in timing where adaptation is long-term and insurance is short-term. Most insurance contracts are renewed annually, while most risk reduction projects have far longer lifetimes and payback periods. This makes it difficult for insurers to amortize upfront costs even when risk reduction measures can help them meet their own longer-term financial objectives, such as reducing potential losses or diversifying their portfolio. This is an area ripe for new product development in the insurance industry. In 2015 the Canadian insurance firm, The Co-operators, created a new retail insurance policy called "Comprehensive Water" to provide coverage for climate change-related storm surge and riverine flooding, as well as more standard types of water damage.[12]

Fourth, the market structure of the insurance industry poses particular challenges for innovation. Complex regulatory obligations and large capital requirements make it difficult for innovative start-ups to enter the market, and the insurance sector doesn't benefit from the intellectual property protections available in other industries. As a result, insurance companies have limited incentives to pioneer new financial mechanisms that can take significant time and resources to develop when competitors can easily copy the resulting products.

Fifth, and finally, insurers do not have incentives to reduce premiums. Stated another way, every private insurer's profit motive creates a natural disincentive for them to advance initiatives that reduce their top-line revenue. Fostering competition across the whole industry is the only way to overcome these last two disincentives.

The result of these barriers to insurance innovation is that local governments and at-risk communities face significant challenges in aligning physical protections, like resilient infrastructure, with financial protection, including private insurance. Investing in cost-effective adaptation and economic development projects is hard. In most of these projects success is something that does not happen–a storm hits, but the community isn't flooded. The lack of transparency in insurance pricing and the uncertainties created by annual changes in

10 Ben-Shahar, O. and Logue, K.D. "Outsourcing Regulation" (2012).

11 Kahn, M.E., Casey, B., and Jones, N. "How the Insurance Industry Can Push Us to Prepare for Climate Change," *Harvard Business Review* (August 28, 2017), available at https://hbr.org/2017/08/how-the-insurance-industry-can-push-us-to-prepare-for-climate-change.

12 Staff Report. "The Co-operators Offers Storm Surge Insurance to Homeowners in Atlantic Canada," *The Insurance Journal* (August 27, 2018), available at https://www.insurancejournal.com/news/international/2018/08/27/499165.htm.

pricing for policy renewals makes it challenging for any individual policyholder to negotiate to reduce premiums and capture insurance benefits. (Picture calling your health insurance company to negotiate a premium discount for going to the gym more often.) Despite the many obstacles above, insurance is one of the best ways to monetize benefits that are realized in the form of "avoided losses." So how can local governments work with the insurance industry to improve physical and financial protection for at-risk communities?

Opportunities for Insurance-linked Finance for Community-Based Adaptation

Resilience Bonds are a new mechanism to link catastrophe insurance with infrastructure projects–serving both engineered and socio-ecological resilience functionality–that are designed to measurably reduce expected losses.[13] The aim is to translate insurance savings into a revenue stream that helps communities tap new sources of project capital for adaptation and economic development and get major resilient infrastructure projects off the drawing board and into the ground. This insurance product works best when there is a large risk (high expected losses), existing insurance coverage (from which to capture savings), and a significant risk reduction solution–like seat belts. These are ideal conditions for monetizing and capturing insurance benefits. But most communities across the U.S. are not dealing with ideal conditions, so this article offers three complementary ways that communities can take a proactive approach to using insurance-linked finance for adaptation.

Financing Large-Scale Protection Projects

In January 2016, the U.S. Department of Housing and Urban Development (HUD) awarded nearly one billion dollars for resilience projects in 13 communities across the country as part of the National Disaster Resilience Competition.[14] Most of these communities' proposals included large-scale engineering solutions to protect areas that were previously devastated by disasters. Although a billion dollars is an enormous sum, many communities still need to fill significant project funding gaps. One example is the city of Minot, ND.

In 2011, the Souris River flooded at unprecedented levels, leading to evacuations of approximately 11,000 residents and causing hundreds of millions of dollars in infrastructure damage in Minot. Since then, the city has developed plans for a comprehensive $800 million flood protection project. Funding from HUD and other federal sources is expected to cover part of the total project cost, but the city and state are working with FEMA, the Army Corps of Engineers, and others to explore options for financing the remainder.

13 Vajjhala, S.P. and Rhodes, J.S. "Leveraging Catastrophe Bonds as a Mechanism for Resilient Infrastructure Project Finance," re:focus partners (2015), available at http://www.refocuspartners.com/wp-content/uploads/2017/02/RE.bound-Program-Report-December-2015.pdf; Kahn, M.E., Casey, B., and Jones, N. "How the Insurance Industry Can Push Us to Prepare for Climate Change" (August 28, 2017); and Vajjhala, S.P. and Rhodes, J.S. "A Guide for Public-Sector Resilience Bond Sponsorship," re:focus partners (2017), available at http://www.refocuspartners.com/wp-content/uploads/pdf/RE.bound-Program-Report-September-2017.pdf.

14 U.S. Department of Housing and Urban Development. "National Disaster Resilience Competition" (2018), available at https://www.hud.gov/program_offices/economic_development/resilience/competition.

Insurance-linked finance offers a pathway to help smaller communities like Minot that have spent years designing comprehensive protection projects to get those projects financed and built. The key steps include:

- Design a large-scale resilient infrastructure project to optimize reductions in expected losses and deliver insurance benefits. Project developers should engage risk modelers and analysts early in the design process to help set design criteria (minimum thresholds) based on the optimal level of financial protection.
- Establish contractual or administrative mechanisms to consolidate and transfer risk, such as:
    (i) Develop risk pooling agreements to bring together large asset holders with shared insurance coverage and loss mitigation priorities;
    (ii) Create a new special district to pool distributed property risks by requiring property owners to purchase specified insurance coverage or pay an assessment to cover the cost of a new protection project; and
    (iii) Establish a pooled reinsurance program that requires property insurers providing coverage in a designated area to purchase reinsurance linked to specific risk reduction projects.
- Engage private finance partners and structure the project finance based on the projected future insurance savings captured through the loss mitigation project. Just as private investors in a toll road use forecasted toll revenue as the basis for investing in the project, investors in a protection project would provide the upfront capital to implement a protection project based on the forecasted insurance savings.
- Build the project and capture the insurance benefits over time to cover finance payments.

Aggregating Distributed Property-Level Interventions

Unlike Minot, many small- and medium-sized communities do not have the option to design and build comprehensive engineering projects to protect a single at-risk area. In these communities, coordinated action by individual property owners that opt-in to programs to meet higher levels protection can deliver more scalable and replicable community-wide resilience benefits.

Communities that could benefit from this approach include California residential communities devastated by wildfire, cities like Houston with large-scale residential flood damages from events like Hurricane Harvey, and smaller West Coast cities facing serious earthquake risks. Examples of administrative approaches that can help motivate, align, and capture the benefits of distributed household and property-level resilience retrofits and improvements include:

- Develop a program modeled on Property Assessed Clean Energy (PACE) programs for residential and small commercial adaptation measures and resilience upgrades. Capital for property-level interventions could be provided from public or private sources and payments could be coupled to property insurance and property taxes similar to PACE.
- Establish a special district with finance and taxing authority to implement area-wide risk reduction in collaboration with a private loss mitigation partner (such as MyStrongHome). Payment shortfalls from insurance savings (e.g., due to failure of property owner to renew coverage with participating carrier) can be added to property taxes/assessment reflecting the "special benefit" for each participating property-owner.

Capturing Network Benefits of Resilience Upgrades

A third area where local governments and authorities can work with the insurance industry to enable community-scale adaptation is by focusing on network improvements, such as transit, transportation infrastructure, and water system upgrades. Weather-related events (such as heavy rainfall and heat waves) can both disrupt daily system operations and pose major long-term financial liabilities. For example, heat has been attributed as a cause in major train derailments and service disruptions from Washington, DC and Chicago to Los Angeles.[15] Because transit disruptions have the greatest impact on low- to moderate-income (LMI) riders with limited alternatives, engineering adaptation projects to improve system performance can have the greatest benefits for LMI communities.

Designing projects that can reduce climate- and weather-related revenue and cost impacts can also help create new sources of project funding for risk-reduction and resilience projects and facilitate reinvestment in a virtuous cycle of adaptations and system improvements. Some steps that transit and utility leaders can take include:

- Conduct a rapid assessment of recent budget documents to identify key downstream costs created by weather and climate risks, such as extreme temperature and rainfall. Examples include increased operations and maintenance costs, business disruption, asset depreciation, and reduced revenue. Benchmark the potential for savings and value capture.
- Identify relevant ongoing, planned, and underfunded projects and programs in current capital plans, strategic plans, and resilience strategies that have the potential to significant address the risks identified above.

15 Schwartz, H.G. et al. "Ch. 5: Transportation, Climate Change Impacts in the United States: The Third National Climate Assessment" (Melillo, J.M., Terese, R. [T.C.], and Yohe, G.W. [eds.]), U.S. Global Change Research Program (2014), pp. 130-149. doi: 10.7930/J06Q1V53

- Develop an insurance-linked project finance and risk transfer program to make payouts to the relevant authority when pre-designated events or system failures occur and capture value from ongoing and planned projects that measurably reduce risks (in a revolving fund) and fill funding shortfalls for other priority projects.

Conclusion

Often the most cost-effective solutions to reducing disaster risk are the ones available to communities prior to a disaster that protect against a loss occurring in the first place. Yet cities are struggling to fund even basic infrastructure projects, let alone more complex investments in resilient systems. Public cash reserves and budgets for insurance are increasingly constrained, and the capital cost of large-scale resilient infrastructure, such as coastal protection projects or flood barriers, is often too high to be absorbed by local governments or utilities. Too often the benefits are diverse, diffuse, long-term, and non-monetary, making the same types of infrastructure investments unattractive to private investors.

Local governments have both the means and the opportunity to redefine how communities invest in adaptation and engage with the insurance industry to reduce risk, make resilient economic development investments, accelerate recovery–if and when disaster strikes–and more effectively manage the volatility and uncertainty associated with our evolving exposure to both natural hazards and the broader financial risks of climate change. This article offers three new ways of approaching the problem to empower local governments and communities to tap into innovative insurance solutions for adaptation finance. None of the pathways in this article are simple or easy. But together they offer new solutions that can help local governments bring in experts, including risk modelers and project finance firms, to deliver adaptation projects that would otherwise remain on the drawing board.

Shalini Vajjhala is founder and CEO of re:focus partners and James Rhodes is director of insurance-linked finance at re:focus partners.