Drawing a New Roadmap: The Resilient by Design Bay Area Challenge

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This article discusses how the 2017-18 Resilient by Design Bay Area Challenge (RBD Challenge) galvanized creative, silo-crossing, multi-benefit thinking concerning how best to prepare for sea level rise along California's low-lying San Francisco Bay shoreline. In the process, this international, Rockefeller-funded design challenge confronted key questions in the community development field, ranging from how to engage at-risk populations in critical decisions concerning their future safety to why municipalities should consider resilience and adaptation when planning infrastructure upgrades and where to get the money to be proactive, rather than reactive, about climate change.

These kinds of challenges and questions rose dramatically to the surface with the Camp Fire of 2018 in Paradise, CA as they did after Hurricanes Michael, Harvey, Sandy and Katrina. Our increasing experiences with extreme weather events–more wind, water, heat, and fire than ever before–call on us to accelerate our response and to plan ahead with agility and flexibility in mind. This is exactly what the RBD Challenge provided–an opportunity to accelerate the development of a platform and process for the San Francisco Bay Area to proactively manage climate change impacts now and into the future.

Extreme Danger

While climate change is often relegated to the category of "future threat," it is worth noting that much of the writing of this article occurred during a very present-day cloud of wildfire-fueled smoke that was impossible to ignore. Over two weeks in November 2018, toxic smoke and particulate matter darkened the skies of the Bay Area. The dark cloud drifted 190 miles southwest from the deadliest and costliest fire in the state of California's history–the Camp Fire in the town of Paradise in the Sierra foothills. With 85 lives lost, 13,972 residences destroyed, and 52,000 people evacuated, the Camp Fire was an alarming and now seemingly annual reminder of the vulnerability of California communities to multiple hazards exacerbated by climate change. These are immediate hazards to human safety and public assets created by fires, flooding, sea level rise, drought or extreme heat[1]–on top of the ever-present danger posed by living in earthquake country.

Devastating events like the Camp Fire illustrate how unprepared our governance and financial systems are to tackle the extreme climate challenges of the 21st century, let alone deal with near-term challenges such as access to affordable housing and limited mobility.

1 California Department of Forestry and Fire. "Camp Fire Incident Information" (2018).

Coined "the new abnormal" by former California Governor Jerry Brown, extreme events like the Camp Fire call for new approaches to community development that proactively prepare communities, particularly the most vulnerable low- and moderate-income communities at the frontlines of risk, for an uncertain future.[2]

To that end, the RBD Challenge focused on fostering a new model of collaborative, multi-disciplinary problem solving before, not after, the disaster strikes. The challenge tapped into the creative power of design thinking to help Bay Area residents visualize and realize a region more resilient to climate-related flood issues. In the process, the project shed light on how traditional models of infrastructure and community development financing are insufficient to the task ahead and offers up some ways in which that deficit can be overcome.

Connecting People to Climate Risks

As a diverse metropolitan region with low-lying shorelines susceptible to flooding, rising sea levels, and active earthquake faults, the San Francisco Bay Area is a prime candidate for proactive action to reduce local- and regional-scale risks from climate change impacts. Much of the Bay Area's urban development, including housing, job centers, roads, bridges, airports, rail lines, and wastewater treatment plants, have been built along the shoreline of the bay. This shoreline is more vulnerable to sea level rise than previously thought according to a recent evaluation identifying severe land subsidence issues in areas sitting on top of artificial landfill.[3]

Addressing some of this vulnerability through a year-long design challenge was a primary focus of the RBD Challenge, which was funded largely through a significant Rockefeller Foundation grant. The challenge brought together teams of designers, architects, landscape architects, engineers, economists, educators and planners, and asked them to work with community organizations, local governments, and residents of all ages to develop innovative, community-based solutions to strengthen the region's resilience.

The RBD Challenge was modeled after a project called Rebuild by Design, started by the U.S. Department of Housing (HUD) in response to the devastation experienced in New York, New Jersey, and Connecticut from Superstorm Sandy. In contrast, the RBD Challenge was pre-emptive, offering an opportunity to accelerate the regional conversation about climate adaptation, identify the types of multi-benefit strategies that could be implemented to address flood and sea level rise vulnerabilities, and explore new models of finance and governance better matched with the scale of potential impacts.

While HUD made one billion dollars available post-Sandy to help fund the conceptual designs that emerged out of the East Coast's Rebuild by Design, the West Coast did not

2 Birnbaum, E. "California Governor on Wildfires: 'this is the new abnormal,'" *The Hill* (November 11, 2018), available at https://thehill.com/homenews/state-watch/416167-california-governor-on-wildfires-this-is-the-new-abnormal.

3 Shirzaei, M. and Burgmann, R. "Global climate change and local land subsidence exacerbate inundation risk to the San Francisco Bay Area," *Science Advances*, 4(3) (2018). doi: 10.1126/sciadv.aap9234

have the benefit of a similar pot of gold at the end of the process. What intrigued the Rockefeller Foundation, however, and what ultimately inspired them to invest significantly in the RBD Challenge, was the region's prior approval of a groundbreaking ballot initiative in June 2016. The Clean Water, Pollution Prevention and Habitat Restoration Measure (Measure AA) will generate hundreds of millions of dollars over the next 20 years for wetland and habitat restoration, flood control, and public access along the shoreline. One might argue that Measure AA is the first regional-scale climate change ballot measure in the U.S. It signaled to the Rockefeller Foundation that the Bay Area is willing to put our money where our risk is.

Drawing a New Roadmap

Over the last 30 years, the climate change field has largely been the domain of scientists, academic institutions, and environmental groups raising the alarm about the contribution of fossil fuels to greenhouse gas emissions and climate change. However, as the frequency of extreme storms and hazardous events across the U.S. has increased in the last five years–devastating cities, displacing communities, and costing billions of dollars in recovery–there has been a discernible shift in those making the case about climate change. Scientists, academics, and environmentalists are now joined by a much broader set of constituents, such as those that came together during the RBD Challenge effort. Indeed, there is now growing recognition of the need for multi-disciplinary networks of partners to work together to adapt to the changing climate. This shift has expanded the scope of climate adaptation into other sectors such as community development and transportation planning, sectors not yet oriented towards the scale of the challenge.

What is becoming increasingly evident, as we work to adapt to the latest floods or fires, is that government systems, from local to regional to state and federal, are set up to respond to the immediate impacts of disasters but not to the long-term land use and public investment questions raised by them. Government systems are not set up to work proactively and collaboratively across disciplines to make the large-scale investments necessary to adapt to climate instability, to mitigate risk, and to thereby reduce the cost and impact of extreme storms, sea level rise and other shocks and stressors.

That said, the severity of the risk has not gone unnoticed by bonding agencies such as Moody's Investors Services. In November 2017, Moody's announced that states and local governments that fail to implement sufficient adaptation and resilience strategies to address longer-term shifts in the climate will face negative credit ratings. In their announcement, Moody's informed municipal governments that not taking the appropriate measures now to reduce their climate-related risk will impact their ability to generate the resources needed for recovery or to meet demands for other infrastructure needs.[4]

4 Kurtz, K. and Wetz, M. "Climate change is forecast to heighten US exposure loss placing short and long-term credit pressure on US states and local governments," Moody's Investors Service (November 28, 2017), available at https://www.moodys.com/research/Moodys-Climate-change-is-forecast-to-heighten-US-exposure-to--PR_376056.

Though bond rating agencies and insurance companies are paying close attention to the cost of doing nothing in the face of climate instability, the banks and lending institutions that make up the community development landscape have not yet stepped up to the plate in terms of helping the public sector respond to complex climate risks. Municipalities need funding partners to provide resources necessary to conduct the early assessments, planning, and design required to make sound decisions about investments in more resilient housing, infrastructure, and natural systems. The silo-busting nature of extreme climate events requires a systems-based approach to climate adaptation that moves far beyond those currently exercised by the community development field, which has largely narrowly focused on affordable housing.

Devastating events like the Camp Fire or Hurricane Michael in Florida that wipe out entire communities raise major questions that should be of concern to the banks and lending institutions brought in to help with recovery:

- How should we go about rebuilding a community in a way that makes it more adaptive to the scale of risks caused by the changing climate?
- Should we be rebuilding at all in a location highly vulnerable to climate risks?
- Who decides how, where, and if the rebuilding happens? Local government, state agencies, financial institutions?
- Isn't there more that can be done to adapt our communities, infrastructure, and natural systems to the impacts of climate change we know are coming?

The new abnormal caused by climate change calls for an agility in financing that doesn't currently exist, tapping into ways in which investors can capture returns on investment by calculating the costs that result from doing nothing.

A Collaborative, Systems Approach

Philanthropic and public sector grants are typically the sources of funding available for predevelopment costs associated with getting a project off the ground. The conceptual designs that emerged out of the RBD Challenge in nine diverse locations around the San Francisco Bay shoreline, however, indicate that climate change offers a new set of opportunities for banks and lending institutions to invest in more resilient housing, infrastructure, schools, and commercial development. These investments, in turn, can be and were designed to produce multiple benefits at a community and neighborhood scale. Banks and lending institutions have an important role to play in supporting the types of organizations able to shepherd multi-benefit projects through each stage of development. These organizations require expertise in managing complex streams of funding and financing to support different aspects of projects at different phases, as well as in supporting the network of partners essential to sustained success.

An agile and creative mindset is required for multi-benefit, adaptive infrastructure investments. Whereas traditional infrastructure projects are planned and implemented based on singular goals such as moving people and goods through a region, managing stormwater or wastewater, or providing recreational opportunities, adaptive infrastructure projects are aimed at squeezing the most benefits as possible out of a pool of different funding and financing sources. One example of a multi-benefit project that emerged from the RBD Challenge, as profiled in *Estuary News*, was the Colma Creek "Collect and Connect" project in South San Francisco led by the Hassell+ team:

> In places like South San Francisco, seawater will push inland and exacerbate flooding during rainstorms. To allow the earth to sponge up surplus water, Hassell+ has proposed replacing paved surfaces with more permeable ones–think soccer fields, baseball diamonds and playgrounds–in the floodplain of the creek. They also hope to line the creek–currently contained in concrete bed like a canal–with native vegetation and a cycling-walking path, all the way from Orange Memorial Park to the Bay.
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> To complement this linear park system and corridor, Hassell+ envisions connecting local schools to the streamside parkway via direct bike-friendly travel routes. By this arrangement … the schools would serve as "resilience hubs" or gathering points during disaster events. On a day to day basis, too, the project could make South San Francisco–already a compact place where distances are small, but vehicle traffic is thick–into a much more bikeable, walkable place.[5]

To accomplish the ambitious degree of adaptation to climate change described above, government agencies, community development professionals, and lending institutions would clearly be required to think in much broader and more integrated terms than ever before.

Starting with Community Knowledge First

The RBD Challenge also highlighted how resiliency strategies must be borne out of local expertise and knowledge, with community residents helping to lead efforts around collaborative problem-solving. Marin City's "The People's Plan" that emerged out of a partnership between the Permaculture and Social Equity Team (P-SET) and the community-based organization Shore-Up Marin is an important model of community-based planning focused on capacity building and collaborative problem-solving.

A predominantly African-American shoreline community that sprung up as a result of World War II shipbuilding efforts, Marin City faces current flooding challenges due to its bowl-like setting with water running down steep mountain slopes on three sides. A history of

5 San Francisco Estuary Partnership. "Nine Teams Design for Rising Sea Levels in Nine Places; A Special Section Reveals Resilient Design in Action," *Estuary News* (June 2018), available at http://www.sfestuary.org/wp-content/uploads/2018/06/EstuaryNewsJune2018-v7pages-web.pdf.

redlining, systemic racism, and subsequent disinvestment has also led to poor health and socio-economic outcomes for local residents, a community located in an otherwise predominantly white, affluent county. Working with Shore-Up Marin, the P+SET team set out to model a community-led design process for resiliency planning that got people to "just get up out of their comfort zone, do something different, embrace the communities like ours in Marin City" as stated by Terrie Green, the co-director of Shore-Up Main, again in *Estuary News*:

> P+SET held a community course that covered permaculture design and advocacy literacy. The permaculture course taught locals to assess flood risks and then apply natural strategies to prevent floods…certain natural strategies, if applied and kept up by the community, could help with flooding problems. Class participants considered everything spanning brush plugs, rain gardens, rain cisterns, curb cuts, and more. All of the strategies help to slow, store and sink water, which diverts it from flooding.
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> [The People's Plan for Marin City] is a living document that outlines community-designed solutions to local issues. Currently, it includes six intervention sites, but it will evolve as the city changes and solutions get implemented. Marin City aims to get the People's Plan officially incorporated into standard planning process, which would give local residents a voice in any major project from the beginning.[6]

As evidenced by The People's Plan and the other collaborative problem solving that emerged out of the RBD Challenge, achieving greater resiliency involves a multi-dimensional approach. However, an essential element to any approach requires building meaningful relationships and trust with local resident experts, the people living at the frontlines of risk and who are essential to carrying out resilience strategies long into the future.

The Realities of Financing Resilient Infrastructure

The first instinct of communities devastated by floods or fires is to replace what was lost, or rebuild in place, but climate change requires communities and those engaged in helping them to think about larger safety and infrastructure investments. Finding the resources for any large infrastructure project is challenging, and that challenge has only increased in this era of declining public budgets. Historically, major infrastructure projects, ranging from coastal protection projects to large economic redevelopment plans, were revenue producing or exclusively publicly funded. As public funds have grown scarcer, however, so have project implementation options. At the same time, as our understanding of the climate related threats to our communities grows, we need to not only address our current crumbling infrastructure, but also build to higher safety standards. That means we no longer have the luxury of staying in our silos. While big public infrastructure was once the role of utilities, water districts, and transportation agencies, with housing and commercial development left to the

6 San Francisco Estuary Partnership. "Nine Teams Design for Rising Sea Levels in Nine Places" (June 2018).

private sector and community development field, we must now come together to ensure that every scarce dollar invested in our built environment plays dual or triple roles.

Climate resilient projects are even more complicated than traditional development or infrastructure projects for a few key reasons:

- ***Systems not projects:*** Most resilience projects are large collections of interventions, such as green storm water infrastructure systems, rather than individual assets, like a water treatment plant. As a result, these projects can take longer to design, pose unique technical challenges, and have higher predevelopment costs.
- ***Diffuse benefits:*** A successful resilience solution will often generate benefits across broad areas and populations, such as improvements to ecosystem services and public health. However, diffuse benefits can be difficult to monetize relative to conventional single-function projects, such as a wastewater treatment plant or toll road. The key funding take-away here is that diffuse benefits mean potential access to multiple revenue sources.
- ***Immediate success isn't the usual result:*** Traditional infrastructure projects like roadways address immediate problems such as traffic congestion. In contrast, the benefits of most resilience projects are avoided costs or reduced losses that can be hard to capture and convert into revenues.[7]

Despite these challenges, as highlighted in the earlier South San Francisco example, well-designed resilient infrastructure systems have an advantage over traditional projects because they often generate multiple, cross-sector benefits. Each type of benefit may have its own funding source, allowing projects to tap a greater variety of transportation, water, or community development grants. Investment in infrastructure along with community development can leverage and enhance both efforts.

Strategically aligning different funding requirements and application cycles can involve significant effort. While this level of coordination can add challenges to an already complex effort, it can also make the difference between effective, large-scale, long-term mitigation of risks to a vulnerable community, and incremental quick fixes.

Conclusions

The RBD Challenge brought together hundreds of organizations, thousands of individuals, and some of the leading designers in the world to tackle flooding, sea level rise and seismic risks in the Bay Area region. The exchange of knowledge, relationships built, and ideas generated have inspired individuals and institutions throughout the region to take the threat of climate change seriously and to plan concrete steps to address risks and prepare communities.

7 Northcross, M. et al. "Finance Guide for Resilient by Design Bay Area Challenge Design Teams Final Version 2.0," NHA Advisors and Resilient by Design Challenge (August 1, 2018), available at https://static1.squarespace.com/static/579d1c16b3db2bfbd646bb4a/t/5b5f4da288251b0f228a990e/1532972477684/RBD+Financing+Guide+%28NHA+Advisors%29+Final+Version+2a.pdf.

As the RBD Challenge partners work together to advance the best of the multi-benefit projects that emerged from the effort, we look to funding and financing partners to join us in charting a path forward that serves Bay Area residents and also reduces the financial, social and environmental risks of climate instability. We hope this is a model that can contribute to the community development field of practice and inform other important efforts across the U.S. and internationally.

Now, more than ever, the most vulnerable and least affluent places in the Bay Area and across the globe are looking to those with more resources and authority to not only own their contribution to the problem but also help ease a difficult future. As witnessed at the 2018 Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 24) talks in Poland, the real point of contention remains who should pay to help the communities and countries with limited resources and capacity to adapt? This will be a central question for climate planners and community developers in the decades ahead, and the answers won't be simple or easy–just urgent.

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