Rebuilding Green For All: Climate Change Adaptation and Green Affordable Post-Disaster Redevelopment

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Executive Summary
As the recent National Climate Assessment makes clear, climate change is happening now. Accordingly, climate impacts are inevitable. As the earth warms, the risk of severe storms will increase. Even with wholesale reductions in GHG emissions, steps are needed to cope with increasingly intense natural disasters driven by climate change. Responding to these disasters requires creative approaches to post-disaster redevelopment. Green redevelopment can reduce the overall amount of energy used and prepare communities for climate impacts—mitigating and adapting to climate change. There is also a dearth of quality, affordable housing in the United States. Ensuring that communities who utilize green redevelopment strategies to address climate change after disaster remain affordable is an under-discussed topic. Low-income communities are frequently the hardest hit by natural disasters, and several common sense strategies can be employed to help develop resilient and affordable communities.

I. Introduction

Hurricane Sandy touched land in October 2012, leaving a trail of destruction in its path. The National Hurricane Center attributed 72 deaths in the United States to the storm, which caused nearly $50 billion in damage (Blake et al., 2013). Sandy is now known as "the largest tropical system in history in the Atlantic Basin" (Gutner, 2012). Hurricanes, forest fires, tornadoes, and increased flooding have dominated the news for the past decade. Seemingly, the scope of disaster has increased. Climate change has impacted the size and ferocity of natural disasters. In fact, climate scientists predict that, influenced by climate change, "flooding will become more common and severe as sea levels rise and hurricanes become more intense, generating more destructive storm surges" (Kaswan, 2013, p. 41). As the third National Climate Assessment makes clear, coastal regions are likely to be particularly hard hit by rising sea levels and land loss (Melillo et al., 2014, p. 11). Hurricane Katrina is still considered the most expensive natural disaster in American history, with damage estimates ranging from $100 billion to $200 billion (Burton & Hicks, 2005).

Unsurprisingly, several jurisdictions have included responding to climate change while developing their disaster response programs. This requires actions taken across various sectors to lessen the severity of the impacts of climate change and to prepare for what is inevitable (Flatt, 2012, p. 481). Devoting resources to climate change adaptation is necessary. In adaptation plans, policymakers must be cognizant that climate impacts will fall unevenly throughout society (Farber & Chen, 2006, p. 109-160). Accordingly, to ensure that adaptation policy is both effective in addressing the consequences of climate change and protective of the most vulnerable in society, green redevelopment must be included in post-disaster redevelopment plans (U.S. Dep't of Energy). Green development is a multi-faceted concept. It includes approaches that can both mitigate (i.e., reduce greenhouse gas (GHG) emissions) and adapt to climate change impacts. For example, improving inadequate stormwater management could alleviate contamination that could arise from climate-caused increases in extreme precipitation (U.S. EPA, Office of Water, 2008, p. 45-47). Green building codes can require sustainable and energy efficient construction

that is resilient to increased destructive weather events and reduces future GHG emissions (Burleson, 2011, p. 180).

There is a dearth of quality affordable housing in the United States (U.S. Dep't of Housing and Urban Development). Combined with "[t]he prospect of more frequent and more extreme exceptional weather events, engendered by climate change, [this] further exacerbates the housing affordability crisis" (McIntosh, 2013, p. 205). Thus, communities face the challenge of developing plans that both encourage energy efficient redevelopment and keep neighborhoods inclusive and affordable. This can be construed as primarily a local concern, but there is also a role for states and the federal government to play (Executive Order No. 13653, 2013). This will require creative thinking; refocusing adaptation plans account for income inequity. This essay suggests two important changes: (1) improve and expand green affordable housing in post-disaster areas, and (2) reshape the National Flood Insurance Program (NFIP) to support energy efficient and affordable communities.

II. Climate Change Adaptation and Post-Disaster Redevelopment

Since the emergence of climate change as a policy concern, much of the focus has been to mitigate—or reduce—anthropogenic impacts on the climate by reducing GHG emissions (Gerrard, 2013, p. 3). Unfortunately, due to the global nature of GHG emissions, mitigation will not yield tangible climate benefits for many years, (ibid.), and local emissions reductions will not result in fewer local climate impacts unless other jurisdictions also reduce emissions. Instead, the harmful effects of climate change will increase in the short- and potentially long-term (IPCC, 2007, p. 14). And mitigation alone will not be sufficient. It has become apparent that adaption must be an integral component of a comprehensive approach to climate change.

Adaptation is necessary to prepare for and respond to increasingly intense natural disasters. Climate change has impacted the size and ferocity of storms, with climate-change experts predicting that sea levels will rise and storms will become more intense as temperatures rise (Nolan, 2013, p. 548). In fact, "[a]ll weather events are affected by climate change because the environment in which they occur is warmer and moister than it used to be" (Trenberth, 2012, p. 289). A recent study has even suggested that, not only, will storms be more intense, but they will also be more numerous (Emanuel, 2013). Moreover, adaptation must occur at the local level. This is because "in this brave new world of climate change adaptation, there will be no panacea—'one size fits all' solutions to environmental problems" (Craig, 2010, p. 16). For example, the President's recent Executive Order 13653 ("EO 13653") seeks to marshal federal efforts in facilitate adaptation but provides little in the way of specifics. Two major elements of the order are illustrative: (1) requiring the White House Council on Environmental Quality (CEQ) and Office of Management and Budget (OMB) to access proposed and completed changes to land and water-related policies, programs, and regulations, and (2) to "work together to develop and provide authoritative, easily accessible, usable, and timely data, information, and decision-support tools on climate preparedness and resilience" (Executive Order No. 13653). With federal encouragement, localities should begin to develop and evaluate their adaptation plans.

To maximize adaptation strategies, it is essential to understand what areas and systems are most at-risk. In the context of natural disasters, the anticipated impacts of projected climate conditions are varied. While there will be major impacts across the globe, they will occur with significant variation. The Intergovernmental Panel on Climate change (IPCC) predicts that due to climate change and rising sea levels, many millions more people will experience severe flooding by the 2080s (IPCC, 2007). This heightens the risk for "those densely populated and low-lying areas where adaptive capacity is relatively low, and that already face other challenges such as tropical storms or local coastal subsidence" (Gerrard, 2013, p. 8). Additionally, infrastructure, ecological, and economic losses are likely to occur from climate change. Adaptive strategies are needed to prevent these impacts and to help rebuild after disasters.

Importantly, "long-term recovery is considered the weaker link in the recovery picture . . . and it is the most important to climate change adaptation" (Flatt, 2013, p. 491). Without advanced climate change planning, many post-disaster communities may return to pre-disaster community planning—remaining vulnerable to the next significant impact. Therefore, it is important for communities to consider what strategies are needed after disasters to rebuild more resilient and secure communities.

III. Green Redevelopment as Part of a Holistic Adaptive Strategy

There are many ways to ensure communities are prepared to cope with climate impacts. For example, sharing the loss through buying insurance and changing the development and use of vulnerable areas (Burton, 1996, p. 55). Importantly, "climate change will have a significant impact on the built environmental and will likely require major changes in the way that buildings are constructed and operated" (Howe, 2013, p. 209). An important approach to adapting to stronger natural disasters while simultaneously mitigating our climate impact is green housing development.

Requiring Effective Green Housing Development is Key

Overall, "[g]reening the housing stock combines strategies to achieve greater efficiency in the use of energy, water, and other natural resources in the building itself, but also an array of other considerations, such as the use and disposal of building materials" (Foy, 2012, p. 2). To encourage sustainable building, private-public partnerships have developed around various green standards. For example, "jurisdictions are beginning to implement the private Leadership in Energy and Environmental Design (LEED) rating system. The success of LEED could be enhanced by measures that take into account seismic resilience, regional water variability, and new efficiency/energy innovations to a greater degree" (Burleson, 2011, p. 180). Moreover, Federal, state and local governments also offer tax incentives to offset of the upfront cost associated with green development (Freilich & Popowitz, 2010, p. 23-24).

Developing green homes can directly reduce the amount of GHGs emitted—mitigating climate change—and produce homes more resilient to climate impacts—adapting to climate change. Green homes are useful because they "can save you thousands in utility bills and make your home a healthier and more comfortable place to live. Green homes save money with energy-saving features such as effective insulation, high-performance windows, tight construction, and efficient heating and cooling equipment and appliances" (U.S. Dep't of Energy).

In response to the clear need for sustainable standards, President Obama has encouraged the Federal Government to take an active role in tackling climate change by requiring Federal agencies to set 2020 GHG emissions reduction targets that include increased energy efficiency; the conservation of water, and supporting sustainable communities (Executive Order No. 13514, 2009).

Through Executive Order 13514, the President has prioritized green development (ibid). In the context of disaster relief and redevelopment, that means that localities receiving Community Development Block Grants for Disaster Recovery (CDBG-DR) are required to attain green building standards (Waivers, and Alternative Requirements for Grantees Receiving Community Development Block Grant (CDBG) Disaster Recovery Funds in Response to Hurricane Sandy, 2013). Responding to Hurricane Sandy, both New York and New Jersey have attempted to incorporate green redevelopment (New York State Homes and Community Renewal Office of Community Renewal, 2013). In New York, rehabilitated homes that have not sustained substantial damages are still required to meet the Department of Housing and Urban Development's (HUD) green retrofitting checklist (ibid, p. 40). Additionally, there is a renewed focus on hazard mitigation (a specific type of adaptation) strategies—such as increasing the elevation of units in high flood risk areas. These steps help to ensure that communities develop sustainably after disasters. Finally, as discussed above, EO 13653 directs federal agencies to both consider and prepare to implement adaptation strategies (Exec. Order No. 13514).

Green Redevelopment Must Use the Most Sustainable Designs

While the CDBG-DR program has provided states the flexibility to pursue green redevelopment, a new focus on the best design practices is essential. While not the norm in the green building community, passive survivability design presents an ideal model for post-disaster redevelopments efforts. Passive survivability is a new design criterion for buildings that can "maintain livable conditions in the event of power outages and loss of heating fuel or water" (Wilson, 2006, p. 12). Developing survivable homes is based upon decades of work on renewable energy, energy efficiency, and historical building designs such as "wide-open and well-ventilated 'dog-trot' homes of the Deep South . . . [and] the high-mass adobe buildings of the American Southwest" (ibid). Overall, requiring green redevelopment is an important first step in responding to disaster.

However, advancing our notions of survivable homes is necessary to develop resilient communities.

IV. Ensuring Climate Resilient Communities Remain Affordable

While a good deal of focus on post-disaster redevelopment has included green housing, little attention has been placed on ensuring that rebuilt communities are green and affordable. This is a significant oversight. Importantly, "[g]reen affordable housing is especially important in the context of the disproportionate effects that low-wealth households experience from environmental degradation" (Foy, 2012, p. 3). In fact, low-income communities are particularly vulnerable to natural disasters, with climate change increasing the vulnerabilities for these communities (Flatt, 2013, p.495). Many redevelopment projects in communities rebuilding from the recent storms include improving urban spaces and sustainable development as important goals (New York State Homes and Community Renewal Office of Community Renewal, 2013). However, whether the benefits of these redevelopment projects are equitably shared with the community remains to be seen. Truly coping with climate impacts requires post-disaster recovery plans to incorporate both energy efficient and affordable redevelopment tools.

As the National Research Council has observed, some "population segments are more likely to experience casualties, property damage, psychological impacts, demographic impacts, economic impacts or political impacts—as direct, indirect, or informational effects" (National Research Council, 2006, p. 73). Salkin has noted that adequate affordable housing is central to social equity and sustainable development (Salkin, 2009, p. 132). Ensuring that green development after disaster is also affordable advances a primary concern of climate adaptation—equity.

Two important policy changes are necessary to ensure affordable green housing. First, green tax credits need to be restructured to extend green standards to affordable housing units (Global Green USA, 2005, p. 13). Currently, state policies are inconsistent, with a few states establishing green building requirements. Such a change would be very achievable however. As Kevin Foy has argued, "[o]ne way this might work is to increase the credit based on the number of points a project received in the LEED rating system" (Foy, 2012, p. 54). Additionally, the federal government could require green building practices as part of receiving CDBG-DR grant funds (Burton, 1996).

Second, the burden of flood insurance on low-income communities needs to be reduced while also encouraging adaption to climate change. On March 21, 2014 President Obama signed an important modification of the flood insurance program (Homeowner Flood Insurance Affordability Act of 2014); by repealing components of the Biggert-Waters Flood Insurance Reform Act of 2012 (Reform Act) that permitted the Federal Emergency Management Agency (FEMA) can increase premiums by twenty-percent annually (Biggert-Waters Flood Insurance Reform Act of 2012, section 100205(h)(2)). While the reform act attempted to ensure that premiums truly reflect risk of loss (Hecht, 2013, p. 511), this also ensured that redeveloped green homes would *not* be affordable. The modification made three major changes to the flood insurance program. As originally created, the program subsidized rates for buildings that pre-existed the program and ultimately became covered; the Reform Act attempted to eliminate these subsidies over time. Now, many of these subsidizes have been restored (Homeowner Flood Insurance Affordability Act of 2014, section 4). Moreover, the Reform Act tried to update flood maps to actually reflect risk of flooding; if the new maps showed higher risk than the old maps, premiums would go up. The new law allows the continued use of obsolete maps to calculate premiums on existing buildings (ibid). Finally, the modifications are covered by a flat assessment against all holders of flood insurance ($25 for homeowners, $250 for others) (ibid, section 8). This arrangement weakens the incentive for homeowners to leave high-risk areas but encourages business to leave.

This arrangement is untenable. At some point, premiums will need to reflect realities; otherwise, the federal government will be subsidizing underwater homes. According to FEMA, however, approximately twenty percent NFIP policies pay subsidized rates because they pre-dated the program (FEMA, 2013). These were frequently important to low-income and middle-income families. For this reason, as homeowners across the country lost their subsidies due to the Reform Act, some seeing their rates grow by 500 percent or more or receiving a $68,000 flood insurance bill,

cries for reform linked the need to adapt to climate change as well as ensure homeowners were not priced out of their homes (Metzger, 2013).

As policymakers consider continued modifications to the flood insurance program, both to combat climate change and retain affordable housing, several changes made this year need to be reevaluated. The modifications leave intact increased premiums for non-primary residences, businesses, and severe repetitive loss properties. This is a positive step towards encouraging adaptation strategies – hopefully moving the program towards actuarial soundness. The continence of relying upon out-dated flood maps, however, undercuts these positive steps. The Reform Act had required five-year phase-in of the more accurate risk appraisals, but this has been removed by the new modifications. An appropriate way to balance the need of retaining affordable housing with the necessity to adapt to the effects of climate change is how the modifications treats properties that are newly included in the 100-year-flood zone. Specifically, the modification gradually phase in full actuarial rates (Homeowner Flood Insurance Affordability Act of 2014, section 6). A process of gradually phasing in higher rates while capping the annual percentage increase of rates should equally incentivize homeowners adapt to climate change while preventing a significant deterioration of the affordable housing stock.

The decision to increase premiums may not be necessary—if communities take active steps towards adaption. One example is the NFIP Community Rating System. This voluntary program recognizes community efforts beyond the minimum standards required by the NFIP by reducing premiums. These discounts encourage new flood protection activities that can help protect homes and reduce premium rates – ensuring these communities remain affordable. Moreover, in New York, communities are required to utilize the adaptive technique of elevation (Howe, 2013, p. 223). Other options include emergency flood and evacuation equipment, and retrofitting homes with fortified roofs and windows.

The impacts climate change are currently being felt (Melillo et al., 2014). Increasingly, communities will be challenged to respond to these changes. As they do, steps can be taken to develop affordable and sustainable communities.

V. Conclusion

Climate impacts are inevitable. Even with wholesale reductions in GHG emissions, steps are needed to cope with increasingly intense natural disasters driven by climate change. Responding to these disasters requires creative approaches to post-disaster redevelopment. Focusing on green redevelopment can reduce the overall amount of energy used and pollution emitted, and prepare communities for climate impacts—mitigating and adapting to climate change. Additionally, ensuring that green redevelopment includes rebuilding affordable communities has been overlooked. Because low-income communities are frequently hit the hardest by natural disasters, strategies are needed to ensure redevelopment communities are both resilient and affordable..

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