Approaches to Participatory Decision-Making for Multidimensional Adaptation Projects in Dhaka, Bangladesh

By Allan Kapoor
UC Berkeley Master of City Planning | Spring 2016 | Planning Sustainable Communities | Professor Charisma Acey

Introduction

Rapid urbanization, massive infrastructure deficiencies, socioeconomic inequalities, and the increasing frequency and unpredictability of climate-changed induced extreme weather events are setting the stage for crisis in the cities of the Global South. According to the United Nations Population Division, during the first half of the 21st century, the urban population of low and middle-income countries will increase by 3.3 billion (United Nations, 2014). In addition, there has been both an increase and an acceleration in the frequency of natural disasters, such as flooding, caused by climate change since 1950 (UN-Habitat, 2007). This is especially worrying given the potential for natural disasters to indirectly cause violent conflict by contributing extreme poverty and mass migration (Field et al., 2014). Even though their per capita share of greenhouse gas emissions is much lower than that of the developed world, cities in the Global South are more vulnerable to flooding due to a lack of adaptive capacity brought on by a variety of factors (Moser & Satterthwaite, 2008). Rapid unplanned growth has covered natural drainage systems with impermeable surfaces, outpacing piped drainage infrastructure build out, and the lack of solid waste disposal services means these systems are easily clogged during heavy rains (Balk et al., 2009). A large proportion of the projected increases in urban poor are in cities that are of especially high risk of natural disasters (Balk et al., 2009), and due to land scarcity, informal settlers tend to occupy the most hazardous regions of each city, such as low-lying areas and floodplains. This is compounded by the fact that many municipal governments refuse to work with or recognize the plight of informal settlers, even when they make up a third or more of a city's population (Moser & Satterthwaite, 2008). The Asian Development Bank projects massive returns on investments in adaptive capacity within the next half century (ADB, 2009) and the International Panel on Climate Change recommends that all development projects in least development countries undergo mandatory adaptation assessment (Field et al., 2014). Unfortunately, many municipal governments in the Global South lack the technical and institutional capacity to carry out adaptation projects that are both financially efficient and that address the needs of their most vulnerable populations, often resorting to large scale grey infrastructure projects that do little to address the underlying causes of vulnerability. By

excluding the urban poor from meaningful participation, institutions miss out on the opportunity to support, coordinate, and harness their individual adaptive efforts.

This paper proposes a multidimensional approach to adaptation projects and decision-making that seeks to increase both institutional capacity and community assets through decentralized, participatory infrastructure decisions. The best adaptations are those that address the local context while simultaneously increasing infrastructural, institutional, and community/individual adaptive capacity. Dhaka, a city that is particularly vulnerable to increased flooding resulting from climate change, is used as a case study to explore the vulnerabilities, priorities, and coping strategies of the residents of informal settlements. A promising multi criteria analysis method for adaptation decisions is assessed and critiqued, followed by policy recommendations that exemplify the suggested multidimensional and participatory approach.

A Multidimensional Approach to Adaptation

In the climate change context, adaptation can be defined as "any action undertaken to reduce the vulnerability of a system, population, or individual" (Alam & Rabbani, 2007) and vulnerability is the degree to which a system, population, or individual is "susceptible or unable to cope with the adverse effects of climate change" (Field et al., 2014). Moser & Satterthwaite argue that deficits in infrastructure and institutional capacity in the Global South necessitate an asset-based approach to climate change adaptation. Residents of cities in developed countries "take for granted that a web of institutions, infrastructure, services, and regulations protects them from extreme weather" (Moser & Satterthwaite, 2008) but for the urban poor in low-income countries, their ability to cope with natural disasters is much more dependent on their individual or household assets. Assets may be physical or financial, but they also include education, social capital, and political voice. Moser & Satterthwaite caution that asset-based adaptation should not be seen as independent from government, or forcing households to shoulder the responsibilities of the institutions that fail them. Supporting asset-based adaptation in turn supports "citizen capacity to negotiate and work with government wherever possible" (Moser & Satterthwaite, 2008). Individual and household adaptive capacity is increased when communities have the ability to make demands on their government.

While this is certainly true, a truly multidimensional approach to adaptation strategies would also seek to improve institutional capacity to work productively with communities.

Savacool et al's study of over 100 interviews with a wide range of stakeholders working on adaptation projects in seven least developed countries in Asia (including Bangladesh) found that in order for adaptation projects to be effective, improved "knowledge and assets must be coupled with capacity and improved governance" (Sovacool et al., 2012). The authors focused on projects that sought to simultaneously increase infrastructural, institutional, and community capacity. Adaptation efforts employed in the Maldives were particularly instructive. After erecting a $54 million seawall to protect Malé, their capital city, officials realized that with over two thousand kilometers of coastline, a $12.4 million per kilometer grey infrastructure solution was not feasible (Sovacool et al., 2012). Instead, the Maldives is moving towards green infrastructure projects, such as planting coastal mangrove forests, which are much cheaper, longer lasting, and environmentally sustainable. Rather than making infrastructure decisions from the top down, officials in the Maldives are educating communities about adaptation options and then "decentralizing adaptation investment planning so that each island decides what to spend its own budget on" (Sovacool et al., 2012). At the same time, officials are investigating local informal soft adaptation measures and then spreading the best practices they learn to other islands. Institutional capacity is increased through decentralization of decision-making and a two-way interaction between government officials and communities.

Both Moser & Satterthwaite and Sovacool et al agree that the end goal is to increase the degree to which communities and institutions work together. However, while Moser & Satterthwaite argue that this will be achieved by focusing on increasing the capacity of communities to advocate for themselves and make demands on institutions, Sovacool et al advocate for a double prong approach, where at the same time institutions increase their own capacity through decentralizing decision making and recognizing informal technical expertise. Institutions are generally reluctant to give up authority, but given the massive deficit in adaptive capacity in the Global South and the lack of funding for large-scale infrastructure projects, there is a strong case for institutional benefits to strengthening and harnessing community adaptive assets.

Flood Vulnerability in Dhaka

Dhaka is a perfect case study to explore the potential for a multidimensional participatory approach to adaptation. The megacity, home to over 15 million people (Bureau of Statistics,

2011), is located in an extremely flood prone area, has experienced a unregulated and unplanned growth, and has an enormous slum population, which has a poor relationship with the municipal government and has repeatedly been subjected to forced evictions and relocations. In a study of eleven major Asian cities, Dhaka was found to be the most vulnerable to the impacts of climate change (UN-Habitat, 2008). Several converging factors contribute to Dhaka's extreme flood risk. Rapid population growth in an already flood prone area that will be heavily affected by climate change is creating a perfect storm that will most adversely effect the city's poor. The geographic location of the city exposes it to heavy monsoons, cyclones, and overflows from the convergence of several rivers (Haque et al., 2014). Climate change is exacerbating the situation, as the melting of glaciers north of Bangladesh and sea level rise are causing unpredictable changes in river flow (Haque et al., 2012). The city has experienced ten catastrophic floods since 1950, with the worst flood in 1988 inundating 84% of the city (Alam & Rabbani, 2007). All of Dhaka is less that 13 meters above sea level, with 170 square kilometers below 6 meters (Alam & Rabbani, 2007). East Dhaka, the lowest lying and least developed area, regularly floods when heavy rain and high river levels occur at the same time (Alam & Rabbani, 2007). Rapid urbanization is making the situation much worse. Bangladesh was only 4.3% urban in 1950, but by 2010 this number had increased to 36%, and the population is predicted to be majority urban by 2040 (United Nations, 2014). Before Dhaka's population explosion, floodwaters were stored in retention ponds and drained slowly into the rivers through canals, but as the city expanded, the natural drainage systems were paved over and land scarcity forced the poor to build informal settlements in and around the retention areas (Haque et al., 2012).

Efforts to reduce flood risk in Dhaka have met mixed success. During the 1980s several upgrades were made to the city's storm water infrastructure, including embankments along the rivers, raised roads, floodwalls, and regulators at the ends of canals. These projects were only implemented in the western portion that includes wealthier neighborhoods and the central business district (Alam & Rabbani, 2007) and even so, floods still occur when the area inside the embankments can't drain properly due to clogging. In 1992, the Japan International Cooperation Agency completed a study for the "Dhaka Integrated Flood Control Embankment East Bypass Road Multi-Purpose Project", which proposed large grey infrastructure improvements for the eastern section of the city, but since prioritization by technical capacity and financial feasibility was not part of the study, the recommendations were never implemented (Haque et al., 2012).

The Conditions and Adaptive Strategies of Dhaka's Urban Poor

Dhaka attracts between 300,000 and 400,000 new migrants every year (Banks et al., 2011). The vast majority of migrants move due to "push" factors, such as a lack of opportunity or environmental degradation in their villages, meaning that they are extremely poor and without anywhere else to go. Since the government wants to discourage rural to urban migration as much as possible, there are no social programs for the urban poor and most urban development projects are focused on infrastructure, often resulting in eviction and displacement (Banks et al., 2011). Until 1994, voting rights in Bangladesh were based on property ownership, and even today "local elected officials…have little incentive to be response, accountable, or inclusive to their poor electorate" (Banks et al., 2011).

The national government spearheaded a major slum demolition program in 1999, which was justified by portraying informal settlements as havens for violent criminals, drug dealers, and prostitutes (Paul, 2006). This initiative was opposed by aid agencies, opposition parties, and international NGOs, leading to a ruling by Bangladesh's High Court that mandated resettlement programs for evicted slum residents (Paul, 2006). All of the programs developed by the government focused on returning slum dwellers to their villages. These consisted of loans to build homes, credit to encourage self-employment, or the provision of cramped multi-unit housing made from corrugated metal (Paul, 2006). Due to the lack of employment opportunities most migrants ended up returning to Dhaka. In a quantitative survey of 300 households from informal settlements throughout Dhaka, Bimal Paul found that 41% were under "constant fear of eviction" and 24% were "somewhat fearful of eviction". The greatest influence on a household's level of fear, besides having been evicted before, was the presence of friends and close relatives in Dhaka. The longer a respondent had lived in Dhaka, the greater their social network, and the more they stood to lose by being sent back to their village (Paul, 2006). Many of those that were not fearful still acknowledged that they could easily be evicted, but figured they could escape detection in another slum. Most respondents reported that because of the ever-present threat of eviction, they were reluctant to invest in improving the quality of their housing, including flood-proofing (Paul, 2006).

Major flood events, which inundate roads, cut of electricity, block sewage systems, and close markets and businesses, affect the lives of all residents of Dhaka, but the poor are by far the

most acutely affected. During the particularly severe floods of 1988, residents of informal settlements experienced near total loss of employment coupled with increased food prices (S. F. Rashid, 2000). The lack of sewage infrastructure and piped water in informal settlements meant that residents were forced to both defecate in and drink the floodwaters. Many experienced diarrhea or developed fungal skin infections from being in constant contact with contaminated water. Women and children were the most adversely affected. With no access to bathrooms and conservative social norms regarding appearing in public, they were forced to defecate inside their homes. They were also subjected to increased domestic abuse at the hands of male heads of households, who often took out their stress stemming from unemployment and hunger on their families (S. F. Rashid, 2000).

Nevertheless, the coping strategies of slum dwellers are "ingenious and varied, particularly recognizing the severe technical, locational, and economic constraints under which these households operate (Haque et al., 2014). In Haque et al's study of responses to climate change in the slums of Khulna, the third largest city in Bangladesh, the authors identified a variety of strategies. Individual/household strategies included building houses on stilts, placing goods on shelves close to the ceiling, using stacks of bricks to elevate beds and furniture, placing plastic sheets roofs during heavy rain, and growing vegetables on the roof to provide food during crises (Haque et al., 2014). Communal responses included forming groups to build elevated bamboo walkways or remove blockage from communal drains, and using communal kitchens when individual households become waterlogged (Haque et al., 2014). Note that both the household and communal strategies are much less likely to be employed when evictions are common. Families will not flood proof their homes if they are temporary and communities cannot band together to fix common goods together if there is no social network.

Relocation schemes have failed because they assumed that housing and land are the primary concerns of residents in informal settlements, when it is actually long term employment. Rashid et al. carried out a study in two informal settlements in Dhaka that experienced regular flooding to understand the relative importance of different economic incentives for relocation and the types of trade-offs residents would be willing to make. The authors collected data from 200 households, including self-reported sociodemographic characteristics, housing conditions, and flood coping strategies. Then they played a simple card game with the head of each household, giving them a choice between one of two relocation options or staying in the same

location. Each option included trade-offs between various economic incentives, including free land, inexpensive land, rental land, grants and loans of varying amounts, land with no flooding, land with annual flooding, land with less frequent but unpredictable floods, and long term employment or short term employment. The authors then combined the results to give a preference weight for each option and looked for trends in preferences based on sociodemographic characteristics. The results showed that long-term employment was much more important to respondents than being given free land, even in a flood free area (H. Rashid et al., 2007). Residents who were members of community organizations were less willing to relocate, and membership was related to tenure. Interestingly, annual flooding was not perceived as significantly worse than living in a flood free area, while most residents had a strong aversion to living in areas with unpredictable flooding (H. Rashid et al., 2007). The implications of these results are clear—despite attempts to relocate residents of informal settlements through land and housing schemes, they would prefer to remain where they are and have access to employment and social networks, even if this means being exposed to predictable flooding.

A Participatory Approach to Adaptation

As we have seen, residents of informal settlements in Dhaka face severe asset poverty, frequent and unpredictable flooding, and a constant fear of eviction. Large, costly, infrastructure projects do little to address the underlying vulnerability of Dhaka's poorest, and relocation schemes actively interfere with their ability to implement individual, household, and community-level coping strategies. Haque et al tested a promising system for involving multiple stakeholders in the process of prioritizing adaptation projects, which although slightly problematic, successfully prioritized strategies that were financially and technically feasible and could serve as a model for participatory adaptation. The study used multi criteria analysis (MCA) to prioritize adaptation measures for Dhaka's eastern edges, which have been ignored by major infrastructure projects and experience frequent flooding. The authors opted for MCA over the more commonly used cost benefit analysis because it is extremely difficult to accurately or objectively convert climate change impacts into financial terms (Haque et al., 2012). MCA also allows for meaningful participation by multiple stakeholders at an early stage in the decision-making process.

First, the adaptation measures to be considered were selected from the previously mentioned 1992 Japan International Cooperation Agency study along with best practices from more recent projects in comparable locations. These included pumping stations, regulators/sluices, retention basins, an upgraded the road network, floodwalls, canal improvements, emergency response mechanisms, and an early warning system. Next, a focus group of stakeholders from various backgrounds determined the criteria upon which the measures would be judged. Stakeholders included politically elected community leaders from flood prone areas, community representatives by sector (farmers, small business, etc), government officials, and representatives from local NGOs. The criteria they agreed on consisted of vulnerability reduction, cost, environmental remediation, social/political feasibility, employment generation, local contribution to Millennium Development Goals, and institutional/technical capacity. Then two groups of experts, one with experience working in the study area, and the other with experience working on comparable adaptation projects, scored each adaptation measure based on the criteria developed by the stakeholder group. Meanwhile, the stakeholder focus group determined the weights that each criterion would be given. Finally, the scores from the experts were combined with the weights from the stakeholders to prioritize the adaptation measures.

The highest rated option was the protection and expansion of water retention areas, due to low cost, environmental benefits, and ease of implementation with limited technical capacity, followed by the development of early warning systems (Haque et al., 2012). Because of its high cost, upgrading the region's drainage system was rated unexpectedly low, which is especially interesting considering the fact that Dhaka's municipal government has focused on this option for years. The preoccupation with an expensive, technical strategy led to decades of inaction, when cheaper and simpler measures were feasible. Also, meeting the Millennium Development Goals, which is a concurrent goal of Bangladesh's UN-supported National Adaptation Plan of Action, scored very low (Haque et al., 2012). Local stakeholders were much more concerned with adaptation measures that fit the local context than meeting national/international benchmarks.

Although this exercise is an important step forward, there are some obvious flaws with its methodology. First off, the stakeholder group consisted of only 9 members from all of east Dhaka. Of those, the only community representatives were local elected officials and

representatives from the farming and small business sectors. The authors noted that the farmers also represented the informal settlements, but did not explain further. According to Banks et al, local elected officials in urban areas are rarely responsive to the poor. For this process to be truly participatory, representatives directly from informal settlements need to be present, and the stakeholder focus groups would need to be larger to ensure a full range of perspectives and interests. Given what we know about the priorities of informal settlers from the Haque et al study, employment generation would probably have been weighted higher had the urban poor been more directly represented. In addition, the stakeholder group was excluded from the actual scoring of each potential adaptation measure, to "ensure the inclusion of technical expertise in the assessment process" (Haque et al., 2012), but later the authors admitted that this part of the process had the strongest effect on the results. Stakeholders, especially those that already employ a variety of strategies to cope with floods in the absence of institutional or infrastructural support, have informal technical expertise that should have been recognized during the scoring process. The adaptations to be considered were also drawn from an outdated study that focused on large grey infrastructure options. A truly participatory process would have allowed stakeholders and experts to suggest additional measures, which may have included green infrastructure and smaller-scale options such as funding for the flood proofing of individual homes. With these deficiencies addressed, the MCA methodology could be successfully employed at a much more local level to help neighborhoods decide on small-scale adaptive measures. This method, if used in tandem with the Maldives' strategy of decentralizing adaptation project funding decisions, could become a model for participatory decision-making for adaptive projects in urban areas of the Global South that suffer from low technical and institutional capacity.

Conclusion

This paper has advocated for a multidimensional approach to climate change adaptation projects that increase infrastructural, institutional, and community resilience by enhancing coordination between institutions and communities. An improved participatory multi criteria analysis method based on Haque et al has the potential to encourage smarter decisions in adaptive infrastructure, but other policies must be pursued in tandem to increase institutional and community coordination. Evictions portrayed as resettlement schemes actively inhibit individual

households' ability to invest in protective infrastructure. The residents of informal settlements have the informal technical knowledge to implement small-scale adaptive strategies, but these "skills and knowledge are more likely to be used by residents if they are more confident that their efforts will not be lost through evictions" (Haque et al., 2014). When the municipal government realizes that improving coordination with the residents of informal settlements has the potential to reduce the substantial costs of implementing adaptation measures, forced evictions and resettlements schemes may seem less appealing. Additionally, providing access to credit both before crises, to encourage housing improvements, and during crises, to help low income families cope with high food prices, may be a better investment than spending millions on grey infrastructure. In short, long-term, in the absence of funding for massive infrastructure improvements, climate adaptation in the Global South will require increased coordination and support between institutions and communities, which requires the most vulnerable to have a seat at the table in participatory decision making. This can be supported by policies that decentralize infrastructure decisions and reduce the animosity between municipal governments and the residents of informal settlements.

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