ORIGINAL ARTICLES

The Responsibility of Community Sustainability from the Frontlines of Climate Change

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Abstract

Bahamian communities are vulnerably positioned on the frontlines of climate change due to global warming. Small Island Developing States in the Global South, including The Bahamas, have been identified as especially vulnerable to the impacts of climate change due to their unique characteristics. There is now a pressing need for sustainable community development that involves a cross-disciplinary, climate change adaptation approach that promotes resilience strengthening. This type of planning strategy was needed in the preparation and implementation of emergency shelters before the passing of Hurricane Dorian and in the ongoing rebuilding efforts of communities post-Hurricane Dorian. Further, the way in which key stakeholders engage with these activities has implications on The Bahamas' capacity for climate change resilience. This paper will identify gaps in adaptation processes within Hurricane Dorian-hit redevelopment and the national system of sheltering and evacuation. It goes on to argue the need for social equity in planning for the protection of vulnerable communities, inclusive of informal settlements like those destroyed by Hurricane Dorian in North Abaco. Lastly, this paper will make recommendations toward Bahamian climate change resilience.

Introduction

Hurricane Dorian caused unprecedented destruction and loss of life in The Bahamas, and, as the country continues to rebuild and recover from its impact, the process has underscored the nation's lack of preparedness for its new reality of being a hurricane hotspot. The United Nations Framework Convention for Climate Change (UNFCCC) has identified Small Island Developing States (SIDS), including The Bahamas, as particularly vulnerable to climate change (United Nations, 1992). The UNFCCC has also highlighted the importance of adaptation to climate change and mitigating its negative effects on vulnerable regions (United Nations, 1992). Further, the Intergovernmental Panel on Climate Change (IPCC) defines adaptation as "the process of adjustment to actual or expected climate change and its effects" (IPCC, 2014, p. 5). Scientists, urban planners, architects, and psychologists agree that collaborative adaptation planning and implementation are crucial now in this changing world, especially when married with persistence and transformation, to create capacity for weathering the impacts of climate change (Khirfan & El-Shayeb, 2019; Butcher-Gollach, 2015; Thomas et al., 2020).

The Abaco and Grand Bahama cays and settlements in the northern Bahamas most impacted by Hurricane Dorian vary in their form and social structure pre-Hurricane

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Dorian and will likely experience different microcosms of impacts in future natural disasters. This is one reason why climate change adaptation processes should be developed that are not static, one-time solutions. The reason for this is found in the term *climate change*; the key word is change. These processes should be iterative and inclusive, especially of the feedback from community members directly impacted by storms. This ensures that the best strategies for building capacity for climate change resilience are being implemented. Thus, this paper will take a closer look at the pressing need for resilience strengthening capacity in The Bahamas in three key areas: gaps in adaptation capacity relating to post-Hurricane Dorian redevelopment, the national system of sheltering and evacuation, and implications of climate change resilience and equity on vulnerable communities. I will review literature and articles discussing resilience and climate change in the region. Additionally, I will discuss report findings from the Bahamian government, international institutions and international inter-governmental institutions as they pertain to climate change and Hurricane Dorian-specific impacts. In the conclusion, recommendations will be made to encourage more robust Bahamian climate change resilience.

The Situation:

Climate Change and Unprecedented Hurricane Dorian Impacts

From 2016 to 2019, each year there was a Category 5 hurricane in the Caribbean region; three of those hurricanes travelled over The Bahamas, causing extensive damage. These storms were Hurricane Matthew in 2016, Hurricane Irma in 2017, and, most recently, Hurricane Dorian, which caused unprecedented loss of life and damage after stalling over the northern Bahamas on September 1, 2019 ("A look at," 2019). Hurricane Dorian has since been considered a super-hurricane, characterized by its stronger than average intensity (Inter-American Development Bank et al., 2020, p. 14; Hilotin, 2019; Masters, 2019). Researchers have linked the intensification of these storms and their increased frequency to global warming and have raised the alarm about this being a direct result of anthropogenic climate change. These changes are due significantly to increased emissions of greenhouse gases that are well above pre-industrial levels (IPCC, 2018, p. 5).

The maximum sustained winds of Hurricane Dorian upon landfall on Abaco Island and cays was 185 mph (280 km/h) with gusts of 220 mph (354 km/h; Inter-American Development Bank et al., 2020). The Inter-American Development Bank reported that the storm produced rains over The Bahamas that totalled 3 ft (0.91 m) and tidal waves from storm surges that reached a maximum of 20–25 ft (7.6 m) with Grand Bahama and Abaco experiencing the brunt of Hurricane Dorian's destruction (2020, p. 14). The Inter-American Development Bank estimated $2.5 billion in damages with losses estimated at $717.3 million, and, of these damages, it's estimated that 9% are public and 91% private (2020, p. 15). Damage and loss have been identified in the housing sector, public infrastructure and facilities, electrical and water supply, and medical supplies. The housing sector experienced the greatest damage due to storm surges, high winds, and impact from debris and fallen trees. The losses from disruptions in tourism, agricultural, and fisheries industries are also counted in the millions (Inter-American Development Bank et al., 2020, p. 16). A closer look at the residential rebuilding efforts post-Hurricane Dorian helps to paint a clearer picture of an area in need of capacity resilience strengthening.

Gaps in Adaptation: The Housing Sector:

Damage vs. Redevelopment

Abaco and Grand Bahama experienced damage to approximately 9,000 homes, and it is estimated that only 38% of these homes were insured (Inter-American Development Bank et al., 2020, pp. 18, 21). Damages to the housing sector are estimated at $1.48 billion, and the newly formed Disaster Reconstruction Authority (DRA), which was tasked with managing rebuilding efforts, has been budgeted $10 million dollars for these efforts as of August 20, 2020 ("A reconstruction overview," 2020). In a *Nassau Guardian* news article, the managing director of the DRA, Katherine Forbes-Smith, reminded the Bahamian public that rebuilding efforts would be long-term and require a series of public-private partnerships that were started at the United Nations Development Programme pledge conference in January 2020 ("A reconstruction overview," 2020; United Nations Development Programme, 2020). Though these financial resources offered some short term hope for many households in dire need, there are long-term, Bahamian climate change impacts that are arguably as important that also require financing. Some of these should be investments into deepening climate change scientific research, zone buffering of vulnerable coastal areas, and viable mitigation plans.

In an interview with the National Emergency Management Agency (NEMA) director, Captain Stephen Russell revealed that an estimated 70% of the capital would be underwater in the event of a direct hit from a Category 5 hurricane (Scott, 2020). This new knowledge presents both an immediate and a long-term climate change challenge for the nation. Balancing short-term rebuilding efforts should ideally happen in tandem with long-term mitigation efforts. In that spirit, the DRA and its efforts should be viewed as part of a larger body of members moving toward rebuilding efforts and resilience strengthening.

The IPCC describes resilience as "being the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance" and doing this without changing the very essence that defines it "while also maintaining the capacity for adaptation, learning, and transformation" (2014, p. 5). By focusing financial resources primarily on immediate rebuilding efforts, the region risks losing focus on the long-term influences of climate change. The IPCC acknowledges that these future impacts are challenging to quantify due to numerous knowledge gaps and lack of governmental buy-in which threatens *agency* concerning climate change (where agency is an intervention or action to induce a specific effect; IPCC, 2018, p. 21). Though agency from government may be a long-term goal, climate change intervention on the community level may be more immediately reachable through the concept of local inclusion.

Agency Through Local Inclusion and Community Engagement

Encouraging agency with homeowners who are rebuilding or relocating to new, and hopefully resilient, communities in the Abacos and Grand Bahama is an important part of the adaptation process. While looking at urban climate resilience through socio-ecological planning on the coastal Canadian town Charlottetown, Prince Edward Island, Khirfan and El-Shayeb (2019) note that local inclusion emphasizes community-based knowledge as an important tool for resilience strengthening (p. 8). This knowledge is more deeply rooted and encourages not only the professional dialogue in climate change

planning but also the local or layman contribution from community members who can offer a more context-specific understanding of the nuances of their surroundings (Khirfan & El-Shayeb, 2019, p. 10). If adopted into the Caribbean context, this understanding can have major positive adaptation results when combined with community development processes such as individual applications of the *Bahamas Building Code* (2003), revisions and updates to the building code, decisions in architectural building materials, lobbying for public services, engagement with community design, and overall community planning policy. As the DRA continues to engage in planning the development of two new subdivisions in Central Abaco, within Spring City and Wilson City, these new developments present an ideal opportunity for stakeholder engagement that is inclusive of future residents, public services representatives, government agencies, urban planners, non-governmental organizations, and architects, to name a few. Engaging with stakeholders, including the aforementioned, through the lenses of adaptation and resilience strengthening encourages the most appropriate community development and/or transformation.

It cannot be reiterated enough how important it is that Hurricane Dorian-impacted residents from an array of socioeconomic backgrounds have a seat at the table at every level of this ongoing resettlement planning process. Inclusive town hall meetings and dialogue can and should continue to happen well into the future of community (re)building. A *Nassau Guardian* news report notes that the DRA intends to engage with "all other stakeholders in the long-term development and reconstruction of these properties," and there is a useful tool that can be utilized for this purpose ("A reconstruction overview," 2020). An instrument of local inclusion is the *charette*, a participatory planning process that tackles spatial problems using visual tools, such as mapping, with an interdisciplinary team approach (World Bank, 2015). Planners and designers have been experiencing positive results in the use of charettes for collaborative stakeholder engagement. Khirfan and El-Shayeb (2019) observe that the charette process helped to construe a "unified vision of best interventions" (p. 12). Spokane et al. (2012) have recommended that the charrette be an engagement tool that should become a "routine part of disaster planning" and redevelopment projects to assist with carefully and equitably identifying vulnerable communities (p. 905). The development of sustainable communities will require the knowledge of many and will also require returning to what the late Bahamian architect Jackson Burnside III called common sense architecture ("Jackson Burnside III," 2016). A common sense approach to the design and construction of buildings and public infrastructure in this age of climate change requires a commitment to constructing structures that are harmonious with their natural environment.

Mitigating through Design and Building Code Application

Bahamian communities need architecture that changes with the climate and is executed through resilient strategies (Cramer, 2017, p. 143). Described by Cramer as the "fundamental design problem of our time" (2017, p. 139), climate change adaptation will unquestionably need to be significantly driven by architects and designers as they are key stakeholders in the development process. Cramer speaks to the inherent responsibility of architects to design and construct buildings that are in and of themselves climate change mitigation tools and congruous with their natural environment (2017, p. 142). Architectural interventions such as passive design, net-zero energy

design, engagement with sustainable rating systems, and proactive infrastructural buffering are only a few tools Bahamians can re-engage with, adopt, and repurpose for the Caribbean context. Sustainable rating systems such as Green Globes and Living Building Challenge are two of the North American assessment initiatives that can assist homeowners, developers, designers, and builders understand the impacts design decisions have on the environment (sustainable rating systems, also known as green building rating systems, assess the environmental impacts of built environments). These are areas where architects and designers can have a larger impact, not only through the resiliency of Bahamian architecture but also on the appropriateness of present building processes and policy, an example of which is the *Bahamas Building Code*. The more design professionals voice their concerns about the need for resilient design, sustainable construction processes, and responsive climate change policy in The Bahamas, the more likely communities like hard-hit Marsh Harbour, Abaco will withstand another natural disaster.

An iterative process that is overdue is the revision and/or amendment to the *Bahamas Building Code*, 3rd edition which was published in 2003 by the Bahamas Ministry of Works & Utilities. Since its publication, The Bahamas has experienced nine hurricanes with a gradual intensification of these storms ("A look at," 2019). Hurricane intensification leads to an increase in damages and destruction and requires changes to building policy that directly inform building practices. Much needed revisions have not been made to the *Bahamas Building Code* since its 2003 publication, and this is a problem of many SIDS (Zegarra et al., 2020, p. 234). Similarly, in her article examining the urban poor in SIDS, Butcher-Gollach (2015, p. 234) notes that many SIDS do not enforce the application of national building codes which can then lead to lax building practices that are blind to climate change. Neglecting this critical building policy that professionals and laymen should be referencing, whether through its revision or enforcement, is a roadblock to creating a resilient built environment. Unfortunately, these are times when the nation needs every available policy to work properly and be in the process of continual improvement, and this includes the *Bahamas Building Code.*

A National System of Emergency Shelters and Evacuation:

Planning to Shelter

Housing is a particularly important area in an archipelagic nation like The Bahamas where islands are so widely separated and inter-island transportation is an expensive challenge. Moving people out of dangerous and physically vulnerable areas to safe shelter well in advance of a hurricane is key and will likely be a complicated undertaking. Where persons cannot be relocated to safer areas, having a robust sheltering system that can house a significant proportion of residents is more important than ever. The provision of emergency shelters (or temporary housing) was noted as crucial enough to be included in the Disaster Preparedness and Response Act (2006) as a responsibility of the director of the National Emergency Management Agency (NEMA) (Disaster Preparedness and Response Act, 2006, p. iv). Therefore, the lack of forethought and intentionality around safely sheltering communities in the path of increasingly destructive and life-threatening storms is troubling.

There is no consistent system of civic buildings that could make up a network of emergency hurricane shelters, and this should be required for the simple fact that these

buildings are likely constructed to code and have a higher probability of weathering hurricane conditions. There remains no evacuation plan for islands where severe storm conditions would require mass evacuation. Attorney General Carl Bethel announced the ongoing drafting of a new "Mandatory Evacuation Bill" (Ward, 2019), but there remains no clear plan for where mass evacuees will be sheltered. The 2018 - 2020 National Disaster Plan & Instructions for Emergency includes "mass island evacuation plans to be refined" which is a good starting point, the identification of this key disaster response need (NEMA, 2018). However, this area of the National Disaster Plan will require immediate attention because of the inadequate sheltering system in The Bahamas.

Gaps in Shelter Preparedness post-Hurricane Dorian

When a storm is approaching, shelter listings and their capacities are made available to NEMA by the Ministry of Social Services and Urban Development and, subsequently, to the public. However, one could argue that the public requires shelter capacity at the start of the hurricane season to ensure preparedness and appropriate emergency response well in advance of a hurricane's landfall. Blaikie et al.'s (2004, p. 51) disasters Pressure and Release model identifies "lack of disaster preparedness" as a possible factor to creating "unsafe conditions" and therefore intensifying human vulnerability.

The 2019 shelter listing was released on August 1, 2019 (NEMA, 2019). However, this listing did not include shelter capacity, which is important information for family disaster planning (NEMA, 2019). To quantify approximate shelter capacities in North Abaco, Central Abaco and Grand Bahama Island before Hurricane Dorian's landfall in 2019, the 2019 shelter listing was compared to the 2017 NEMA shelter listing that included capacities (NEMA, 2017). Though both listings differed in shelter type (i.e. high school gyms being replaced by churches) both lists had the same quantity of shelters listed. A closer look revealed that Central Abaco's 2019 listing did not change from those listed in 2017; North Abaco's 2019 listing replaced a church with a school; and Grand Bahama's 2019 listing replaced three school gyms with churches and one church with another (NEMA, 2017, NEMA, 2019). It should be noted that in 2017, Grand Bahama gym capacities were 400 persons per gym and churches had an average capacity of 138 persons (NEMA, 2017). However, for the sake of clarity, this paper will use the higher capacities from the 2017 shelter listing to gauge the overall shelter capacity within Dorian-impacted regions.

Hurricane Dorian-ravaged North Abaco had five shelters listed on the pre-Dorian 2017 shelter list, and these shelters had a total capacity of 300 persons (NEMA, 2017). Central Abaco had five shelters listed pre-Dorian that had a total capacity of 925 persons. As of the 2010 Census, the population of North Abaco is 9,578 (with Central Abaco divided into northern and southern regions that are included in the 2010 Census boundary descriptions of both North and South Abaco respectively; Bahamas Department of Statistics, 2012a, p. 113). Therefore, pre-Hurricane Dorian North Abaco had the capacity to shelter approximately 10% of its population (Bahamas Department of Statistics, 2012a, p. 12). Meanwhile, Grand Bahama had nine shelters listed pre-Dorian that had a total capacity of 2,251, none of which were civic buildings (NEMA, 2017). As of the 2010 Census, the total population of Grand Bahama stood at 51,368; therefore, pre-Dorian Grand Bahama was prepared to shelter approximately 5% of its residents

(Bahamas Department of Statistics, 2012b, p. 12). In the absence of a national mass evacuation plan, a 10% and 5% shelter capacity further exposed these Bahamian communities to the negative impacts of Hurricane Dorian.

The most recent figures note that Central Abaco has one shelter listed, and there is presently one shelter listed in North Abaco, neither of which are civic buildings (NEMA, 2020). Similarly, Grand Bahama's shelters remain at nine post-Hurricane Dorian, and none of these are civic buildings (NEMA, 2020). It should be noted that a 2020 Inter-American Development Bank report found that, though there were damages to public buildings post-Hurricane Dorian, there were no public building losses reported on the Abacos or Grand Bahama Island (Inter-American Development Bank et al., 2020, p. 57). Therefore, developing a network of shelters constructed with the rigour of public buildings, along with appropriate site planning, is the foundation of developing emergency sheltering that works for its community. The numbers and infrastructure clearly point to a dire need to develop a more robust shelter network and a need for disaster preparedness policies that promote accessibility to emergency shelters. In the context of disaster preparedness, access to safe and appropriate shelter—whether temporary or transitional—is a basic human need and encourages more sustainable communities.

Social Equity in Sheltering Vulnerable Communities

The American Planning Association has adopted the definition of social equity as "just and fair inclusion into a society in which all can participate, prosper, and reach their full potential" (American Planning Association, 2021). Furthermore, it explains equitable policies as "actively mitigat[ing] the disproportionate harm faced by certain communities" (American Planning Association, 2021). The United Nations has recommended that to participate in sustainable development, planners must engage with four key areas in tandem: society, environment, culture, and economy ("Sustainable Development", 2019.). Protecting communities most vulnerable to climate change is a task that is concerned with social equity and sustainable development. The Mudd and Pigeon Peas communities, once located in Marsh Harbour, Abaco, were demolished by Hurricane Dorian, and the remains were bulldozed afterwards. These were sprawling and impoverished communities known through media accounts as shanty towns and were predominantly populated by persons of Haitian ancestry. This type of "informal settlement" in SIDS is an example of what Butcher-Gollach notes is an indicator of physical vulnerability (2015, p. 13). The interaction of similar settlements with extreme weather forms develop what Butcher-Gollach terms "a cycle of decline" (2015, p. 13). There are other informal communities throughout the Bahamian archipelago today that are vulnerable and in need of proactive protection and planning to reduce the negative effects of climate change on them. Sandoval and Sarmiento's (2020, p. 742) review of Habitat III national reports from Latin America and the Caribbean reveals that regional governmental focus on vulnerable communities absorbing shocks distracts from addressing the deeper root causes of marginalization in these communities. Additionally, vulnerability is not only created by statelessness; it can also be generated by proximity to coastal areas, limited access to resources (such as knowledge and information), low quality construction practices and those in floodplain zones (Etkin, 2016, p. 120; Blaikie, et. al., 2014, pp. 51-52).

Admittedly a complex national challenge, planning for vulnerable communities is a task that requires a long-term vision of community resilience. This challenge also does not rest solely on the shoulders of the government, though the government ideally should be leading the charge. Many members of these vulnerable communities are employed by the private sector. This, perhaps, shifts a generous portion of the responsibility to that sector to ensure that all members of their extended communities are afforded safety during natural disasters. Oftentimes, the private sector has a capacity for incredible proactive response and action, such as more readily available capital as well as influential community members who can attract development partners. On speaking about equity in contemporary urban planning in Toronto, Canada, Viswanathan (2009) concluded that "the governing body—alongside civil society—is implicated in the challenge of equity" (p. 179). This process is a challenge that will require radical interdisciplinary and community engagement. The hope is to create resilient communities for all; therefore, a pragmatic approach is needed for keeping all residents safe in the event of another hurricane.

Conclusion

Resilience Recommendations and Hope

No matter the amount of international aid offered, our communities can only thrive post-natural disasters when the government becomes a willing partner in championing sustainable community development through engaging with equitable adaptation processes. On that note, a few areas that need immediate attention are as follows. Firstly, communities should know real-time numbers of emergency provisions, inclusive of shelters, so that individuals can make informed decisions about their safety. Secondly, every person should have access to safe emergency shelter during a national emergency. The national shelter system needs to be expanded with increased capacity and robust structures. A significant increase in super-hurricane rated, civic infrastructure is needed to form a base of the nation's network of hurricane shelters. Thirdly, the *Bahamas Building Code* requires immediate revision and/or amendment. The construction integrity of the pre-2003 Bahamian built environment under the stressors and forces of hurricanes is very different from those of 2021 as storms in the region have since intensified and increased in frequency (IPCC, 2018, p. 5; Centre for Research on the Epidemiology of Disasters, 2021, p. 2). The building code directly impacts current and future building practices, therefore immediate review of this policy is needed to ensure that Bahamian structures can withstand these intensified storms. Likewise, its application should be aggressively enforced and, where required, such as within informal settlements, applied as best as it can to reduce physical vulnerabilities (Butcher-Gollach, 2015, p. 238). A revised building code can directly and immediately contribute to increased resilience strengthening of our communities and reduced damages to the built environment.

The cost of damages and destruction post-hurricanes continues to outnumber readily available financial resources needed for timely repairs and rebuilding efforts. Therefore, mitigating the impacts of climate change in The Bahamas, from micro to macro levels, is an area deserving of further investment, research, and engagement. Super-hurricanes show no sign of disappearing, and the way in which communities are protected, especially the most vulnerable subsects, reflects the nation's commitment to resilient community development. In addition, engagement using ongoing local inclusion strategies such as

mapping and vulnerability assessments can be an important tool to help create agency with community members toward mitigating the negative effects of climate change (Etkin, 2016, p. 119).

If Hurricane Dorian has taught any lessons, one of them is that The Bahamas is paying an extremely high cost for climate change even though the nation's total carbon dioxide emissions are negligible. This does not negate the fact that adopting adaptation-focused, climate change development processes are necessary and can lead to resilience strengthening. It will be important that the community members impacted by disasters are active participants in redevelopment dialogue at all levels of development decision-making, as their unique experiences can help bridge knowledge gaps between physical and social rebuilding efforts (Spokane et al., 2012, p. 890). The facilitation of the timely protection, recovery, and redevelopment of communities ravaged by Hurricane Dorian will continue to require government leadership, and this must be a flexible, iterative process. The more flexible and responsive the nation's redevelopment processes, the more capacity is created for climate change adaptation, and this will bring The Bahamas that much closer to resilience.

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