Can we measure the Resilience of Coastal Urban Form to Climate Change using a design tool? A Jamaican Case Study

Resilience and its contemporary discourse

Resilience refers to a system’s capacity to absorb disturbance and restructure while undergoing change (Li et al., 2011). The underlying idea of most definitions, including in climate change and urban planning, is that a system is resilient if it can return to a stable state after a disturbance. Holling (1996) defined resilience as “the capacity of a system to absorb disturbance and reorganize while maintaining its essential structure” (p. 19). This capacity includes the ability of a system to return to a more or less original state after a disturbance or change (Adger et al., 2011).

Case study and methods

Negril, a small city on Jamaica’s west coast, is a popular Caribbean tourist destination that contributes over 5% to the national GDP. In particular, the study focuses on Long Bay, a seven-mile transect of Negril’s most dense and low-lying area experiencing climatic impacts.

Nineteen semi-structured interviews were conducted with planning, design, and environmental professionals of different agencies involved in physical development of the island using both purposeful and snowball sampling approaches during August 2015 (Table 2). Direct participatory observation focused on urban morphological components documenting and analysing the data gathered. Urban morphology includes the “physiognomy or landscape” which combines the town plan, pattern of building forms (including street networks, blocks, and building footprints), the pattern of land use and their changes over time (Conzen, 1989).

Long Bay’s built environments and threats

Long Bay’s linear development is highly restricted by topographic features, including the Great Morass (Fig. 6). Beach erosion, the major threat, ranges between 0.2 and 0.4 m/year with 43% to 91% a result of sea-level rise and associated increased storm events (Fig. 5). This bay’s rate is higher than its neighbors.

Long Bay’s small building footprints and spot size (4000 sq. m – 70 hectares) offers the chance of future infrastructure and mitigation potential for high-density development without any adaptive design measures might hinder this potential.

Long Bay’s adaptive planning and design to deal with current threats and prevailing morphological patterns primarily consider the impacts of rapid-onset events (Fig. 7). Their objective is to retain the status quo as in a business-as-usual model. However, Long Bay still lacks disaster plans, including for emergency evacuation, to deal with rapid-onset events.

Local professionals suggested that alternative retrofit plans seem necessary for relocating at least part of current development and its land-use (e.g., buried occupancy could move to uphill near Shefford’s) as in a new run, projected sea-levels would wash away most habitable zones. Current development has yet to support or start incrementally changing towards this target.

Future potential

Negril Planning Authority’s community hall serves as the only community building of the 7-mile beach, but is insufficient. Every resort might eventually be able to use its own suitability designed space (e.g., lobby) alternatively during disasters. Such spaces should be above the surge level (i.e., 3.2 m), structurally protected, and well-connected through alternative pathways parallel to the highway so that they can also contribute to Long Bay’s evacuation planning.

Conclusion

The climate change challenges of coastal areas like Long Bay are multifaceted, thus their solutions need integrated approaches. To meet the long-term and short-term uncertainty posed by climate change, the design of coastal built environments need to be flexible, resilient, and integrated with other measures so as to be transformative incrementally. Resilience, as a design tool, can be applied to measure the current resilience of urban forms and improve them while considering local consent and the social, cultural, economic, environmental features of a particular context, as context is key to climate change adaptation. Accordingly, the tool could contribute to advancing adaptation research while bridging resilience, adaptation, and urban design and planning.