



# Disaster risk reduction or disaster risk production: The role of building regulations in mainstreaming DRR



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## ABSTRACT

Whilst it has not experienced any major disasters in recent years, Barbados is prone to a number of hazards and has the highest proportion of its urban produced capital at risk in the Caribbean due largely to the island's high population density. One of the main challenges that Barbados faces in coping with the possible impacts of natural hazards is the enhancement of construction practices, and consequently, the quality of building stock. This is however hard to achieve due to the lack of enforced building codes. Using a qualitative case study methodology, that includes semi-structured interviews with a broad range of public and private stakeholders in Barbados, this paper aims to explore how the lack of such codes affects the mainstreaming of disaster risk reduction across the island. This paper demonstrates that whilst the awareness of the hazards among the population is high, the willingness to proactively deal with those hazards is low due to general complacency. The case of Barbados, despite good intentions and limited resources, is a good example of why it is essential to improve communication of DRR principles to a wider set of stakeholders including the general population and the construction sector. Such activities may positively influence the uptake of the best practices despite the lack of regulations.

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## 1. Introduction

Caribbean countries are ranked amongst the top 50 riskiest places in the world when it comes to the number of disasters per capita and per square kilometre [24,8]. The Caribbean is one of the most disaster-prone regions in the world. More than 400 hazards afflicted the region between 1950 and 2012, including 267 tropical storms and hurricanes and 113 floods; on average there is a 14% probability that a Caribbean country will be hit by a tropical storm in any given year [19].

Barbados is the most easterly of all the Caribbean countries with an area of 430 km<sup>2</sup> and a population of 280,000 people (excluding the 1.1 m tourists who visit the island each year) [34] (Fig. 1).

The island's climate is tropical with a rainy hurricane season between June and October. Despite the relatively small size, the country has good economic and social development indicators and is classed as having 'very high human development' [33]. However, due to its geographic location, Barbados is susceptible to a number of natural hazards, including hurricanes, floods, coastal erosion, landslides, and earthquakes [22,23,28]. The island's vulnerability is

high not only due to its geographical location and climatic conditions but also by factors such as [4]

- intensive use of small land space,
- upstream dumping of solid waste in watercourses/gullies,
- large percentage of impervious surface, and
- inadequate drainage exacerbated by the continuing change in land use and landform.

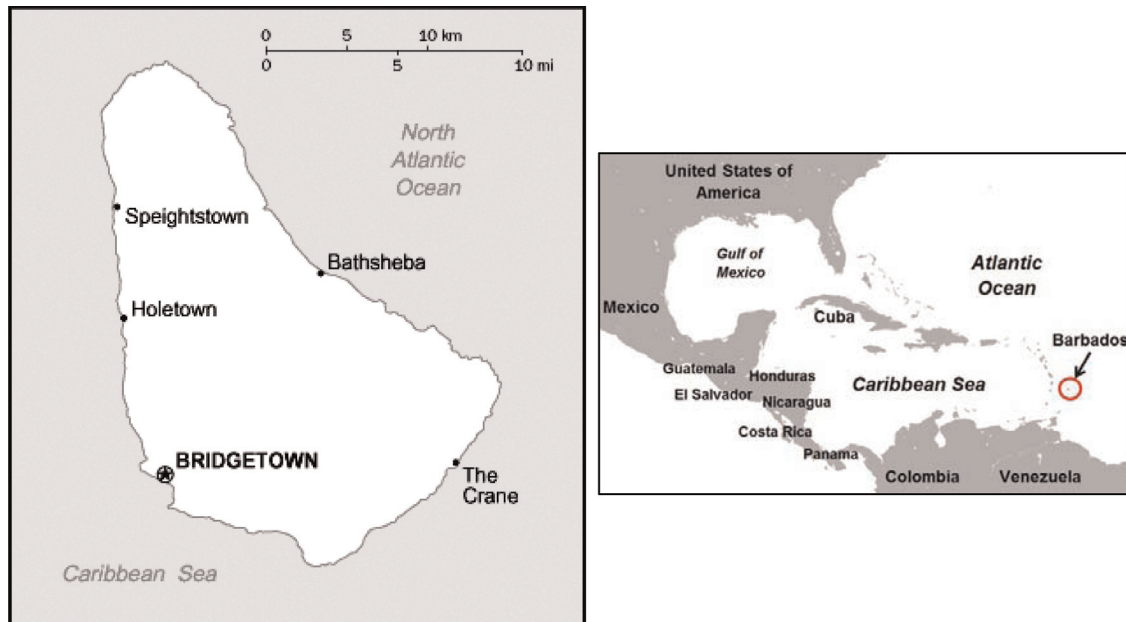
According to United Nation's 'Global Assessment Report on Disaster Risk Reduction 2013' [32], Barbados has the highest proportion of its urban produced capital at risk (followed by Puerto Rico) in the Caribbean. The extreme density of its population (664 people/km<sup>2</sup>) increases the vulnerability of the island to natural hazards [25].

Barbados is susceptible to hurricanes due to its proximity to the North Atlantic hurricane belt; however, the country has not been affected by a major hurricane since 1955, when hurricane Janet destroyed almost all of the housing stock [14]. Tropical storm Tomas in October 2010 was a 'wake-up' call and a reminder of the importance of disaster preparedness: public utilities were interrupted in some parts of the island for up to a week, and homes, as well as large areas of vegetation, were severely damaged [5].

The risk of flooding – in particular pluvial flooding – is considered by some experts to be higher than that of wind damage [16,32,7]. Pluvial flooding is particularly disruptive as it may last

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**Fig. 1.** Map of Barbados.  
Source: Adapted from Wikimedia.

for a number of days thus interrupting transport and posing health risks; whilst the direct losses may not be high, the indirect losses to the built environment and related infrastructure can be significant [32].

While not as recurrent as storms, hurricanes and flooding, there are other natural hazards that pose a potential threat to Barbados, as highlighted in the various academic literature and national and international reports (e.g. [8,5]). In the last decade the evidence of soil erosion has been increasing, particularly in the Scotland District, which is prone to landslides due to geological and topographical characteristics. Earthquakes also pose a serious long-term threat to the island [8]. An earth tremor was experienced on 29th of November 2007, caused by a powerful earthquake in Dominica. Although the tremor did not cause major disruption in Barbados, some houses were damaged in the parishes of St George and St. Philip, and the mobile network system was out of service for about an hour.

While Barbados is not a volcanic island, it is under the threat of tsunami events, which could be caused by the active submarine volcano 'Kick'em Jenny', located 9 km northeast of Grenada, and about 260 km south-west from Barbados [27].

It has already been acknowledged that one of the main challenges Barbados faces in reducing its vulnerability to natural hazards is the enhancement of construction practices, and consequently, the quality of building stock [6]. To date this has been hard to achieve due to the lack of enforced building codes and a low level of awareness of the vulnerabilities among the population. The most recent GAR 2015 has acknowledged that Disaster Risk Reduction (DRR) activities need to move away from an approach that has been constrained within disciplinary siloes dominated by emergency management and civil protection practitioners [31]. A broader range of important stakeholders should take on responsibility for DRR activities; this however will require suitable levels of training and practical support. Arguably, the general public—the most important stakeholder (whether they are aware of it or not) should be central to such holistic approach. The aim of this paper is twofold:

- to explore how the lack of enforces building codes affect the mainstreaming of DRR, and

- to understand whether the enforcement of such codes can increase public awareness of vulnerabilities.

## 2. Methodology

In order to understand the relationship between the lack of enforced building codes and mainstreaming of DRR, a case study approach was applied: it is the most appropriate research method when questions whether and how are asked [13,35]. The conclusions taken from case studies can be applied to the development of new theories and concepts, and the revision of existing ones [35], and to present a 'comprehensive research design, with a multi-disciplinary character and a large number of factors to be considered' [10].

The key gaps discussed in this paper have been identified by Chmutina and Boshier [6] and suggested for further investigation – which this paper sets out to achieve. Extensive web and literature research was initially conducted to identify relevant secondary data. An extensive content analysis of the 'Draft of the Building Code' was also performed based on the identification of sections relevant to the natural hazards prevalent in Barbados.

Three site visits were then conducted in 2013 and 2014 as this helped to obtain valuable insights [20] when discussing ongoing development projects and to understand the environment and the context in which the projects are taking place. Semi-structured interviews with a broad range of stakeholders that are (or should be) involved in DRR were conducted. The interviewees were selected through some trusted sources that work in the construction industry in Barbados; after that the interviewees assisting in making contact with other relevant stakeholders. The interviewees were representing stakeholders generally involved in the construction and disaster/emergency management sectors. Both private and public stakeholders were interviewed to enable a better understanding of governmental and business points of view. Overall, 15 semi-structured in-depth interviews with key stakeholders from a range of professional backgrounds were conducted:

- Two architects working in the private construction sector.

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