

# FACTORS AFFECTING ECONOMIC LOSSES FROM TROPICAL STORMS IN THE CAYMAN ISLANDS

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## Summary

The purpose of this paper is to provide an overview of some of the societal factors that influence vulnerability to storms in the Cayman Islands. Specifically the paper considers how changes in the economy, society and government institutions have affected adaptive capacity and vulnerability. These changes have both enabled and disabled preparedness for storms. The paper concludes that the adaptive capacity of the islands depends on the ability of both the government and individuals to balance the consequences of increasing wealth and economic growth, with changes in social structure and institutional capacity to respond.

## Introduction to tropical storms in the Cayman Islands

The three Cayman Islands (Grand Cayman, Cayman Brac and Little Cayman) fall within the Caribbean hurricane belt and are seasonally affected by tropical depressions, tropical storms and tropical cyclones (hurricanes). Between 1886 and 1996, 128 tropical storms passed within 250 km of the Cayman Islands during the Atlantic Hurricane Season, which generally runs from June to November (Minor and Murphy, 1999). From 1887 to 1987, 4.3 tropical storms passed within 50 miles of Grand Cayman, and a tropical storm passed directly over Grand Cayman every 12.5 years (Clark, 1988). The recent storms affecting the Cayman Islands (specifically Grand Cayman – weather station identifier: MWCR) are shown in Table 1.

**Table 1. Major topical storms affecting the Cayman Islands in recent years**

Date	Wind speed (mph)	Category <sup>1</sup>	C P O A <sup>2</sup> (miles)	Name
15-Sep-55	98	h2	15	Hilda
14-Aug-69	58	ts	43	Camille
19-Sep-75	40	ts	36	Eloise
07-Aug-80	155	h5	54	Allen
07-May-81	40	ts	36	Arlene
05-Nov-81	86	h1	17	Katrina
13-Sep-88	144	h4	23	Gilbert
19-Sep-02	69	ts	52	Isidore
12-Aug-04	92	h1	32	Charley
12-Sep-04	155	h5	28	Ivan

Notes: <sup>1</sup> ts = tropical storm, h = hurricane, numbers refer to Saffir-Simpson scale

<sup>2</sup> Closest point of approach to weather station (in miles)

Source: [http://stormcarib.com/climatology/MWCR\\_all\\_isl.htm](http://stormcarib.com/climatology/MWCR_all_isl.htm), accessed May 31<sup>st</sup>, 2006

Little information exists to show the impacts of these storms on the Cayman Islands. Reporting has historically focussed on deaths and community coping mechanisms, such as ‘The 32 Storm’ a compilation of recollections of the 1932 storm which killed 67 people and damaged many homes (McLaughlin 1994), or more recently on the very short term economic impact of Hurricane Ivan on the Cayman Islands (ECLAC 2005). There is very little documentation of the effects of past storms, of the changing response to storms by different groups in the Cayman Islands, or of the long term economic effects of the storms on the islands.

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## Changing economic losses from weather-related disasters in recent decades

Following Wisner et al (2004) I start with the premise that hazards, in this case tropical storms, do not automatically lead to disasters. Disasters, and the costs associated with damage from them, occur when a vulnerable community is affected by the hazard. A tropical storm that does not make landfall does not generally create large economic losses. As Pielke and Landsea (1998) argue, societal factors such as increasing population density in hazard-prone areas and increasing wealth have increased the economic losses associated with tropical storms. This paper explores in more detail the societal factors that have increased and decreased the ability of the Cayman Islands to respond to tropical storms over recent decades. The focus is on changes in some aspects of society, the economy and government and their influence on vulnerability.

The IPCC (2001) note that vulnerability is influenced by three elements: the character, magnitude and rate of climate variation to which a system is exposed; the sensitivity of the system to the exposure; and the adaptive capacity of the system. Empirical evidence suggests that exposure to hazards comprises only a small part of vulnerability and that socio-economic factors that reduce community resilience are more important elements in increasing vulnerability (Adger and Brooks, 2003; Few, 2003; Jessamy and Turner, 2003; Pelling, 1997). Clearly the issue of how best to manage socio-economic drivers of vulnerability is an important element in planning for hazards and reducing economic losses. The relationship between vulnerability and economic losses from storms is not proven in this paper, it is assumed to be proportional, i.e. as vulnerability increases, so do economic losses generated from hazards. The causes of the changing vulnerability in the Cayman Islands are discussed below.

### Economic factors influencing vulnerability

As a result of various government initiatives in the 1960s (specifically innovative taxation and banking laws) coupled with an investment in tourism infrastructure, the Cayman Islands have experienced a booming economy since the 1970s (Johnson 2001). Data from the Cayman Islands Government Compendium of Statistics (2000) reveal that domestic electricity consumption (in megawatt hours) which is a useful proxy for income and also levels of consumption of white goods, rose over a 25 year period, at an average rate of 7% per annum, from 1.95 Mwhrs per person in 1975, to 9.23Mwhrs per person in 2000. Imports of goods rose at an average rate of 13% from CI\$12.5mn in 1972 to CI\$558.7mn in 2000 (in current prices), see Figure 1.

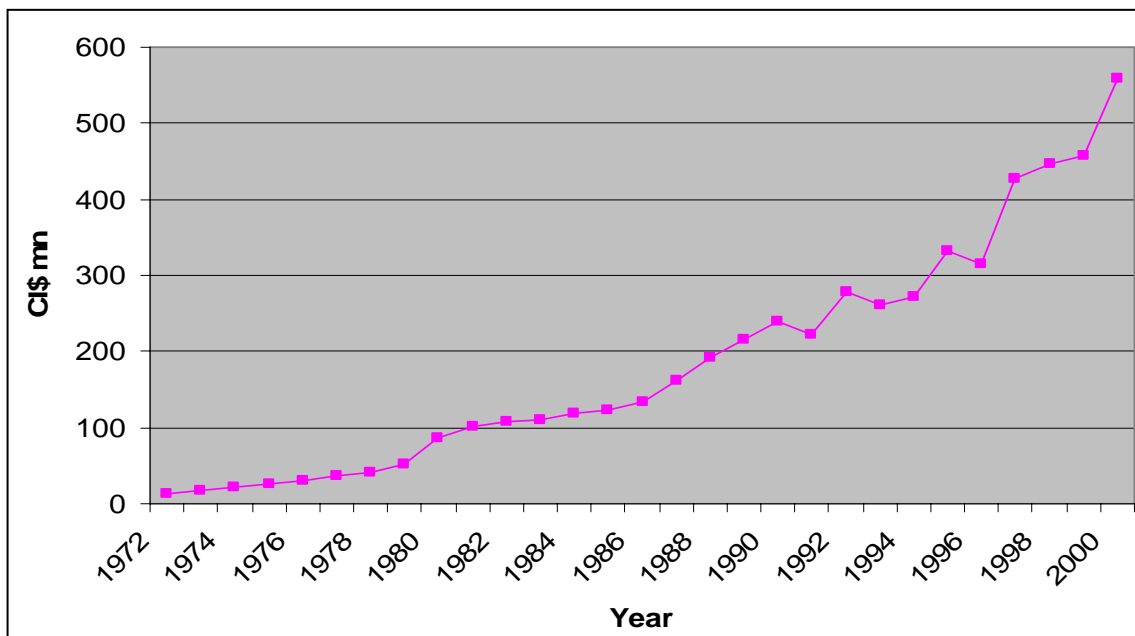


Figure 1. Cayman Islands Imports (cif), in CI\$ mn 1972 - 2000

Source: Government of the Cayman Islands (2000)

Even when adjusted for inflation, per capita imports reveal an upward trend, see Figure 2, suggesting that since the 1970's Caymanians have increased their consumption of imported goods, which account for almost all consumption locally. This suggests that that there has been an increase in the financial wealth of the country.

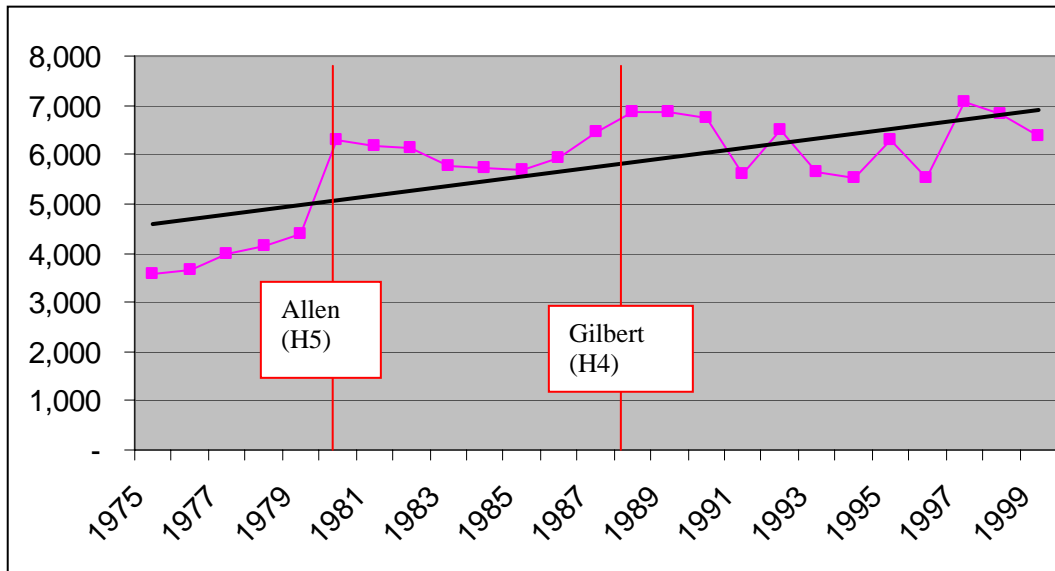


Figure 2. Inflation adjusted per capita imports (CIS\$ 1984 prices)

While energy consumption, imports, car registrations, value of land transfers and other indicators of wealth rose, so too did the number of businesses selling to the tourism and banking sectors. Figure 3 shows the number of tourism related businesses in operation from 1975 to 2004.

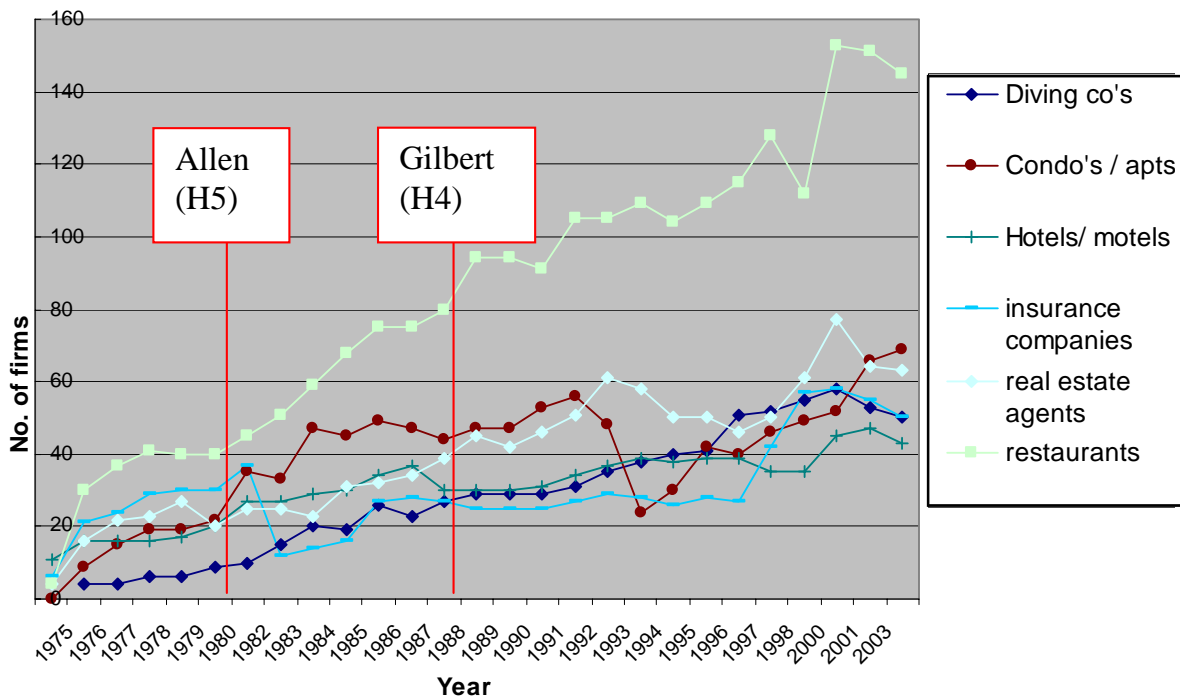


Figure 3. Numbers of firms by sector, in the Cayman Islands 1975-2003

Source: Cable and Wireless telephone directories for the Cayman Islands from 1966 - 2004<sup>2</sup>

<sup>2</sup> There are many problems with these data, hence this figure can only be considered illustrative.

Despite some slowdowns, the main direction of the Cayman Islands economy for the past 40 years has been upwards. It can be assumed from work by Pielke and others that this increase in wealth has increased the vulnerability of the islands to economic losses from storm damage.

### **Government factors influencing vulnerability**

Since the 1970s the Cayman Islands' Government has made significant investments in hurricane preparedness through increased awareness, improved communication, better use of plans and thorough testing of drills, plans and preparedness skills. For a detailed description of the changes that have occurred in the Cayman Islands see Tompkins (2005).

The investment of resources by the government in national hurricane preparedness planning has shown some signs of reducing the sensitivity of the government to hurricane impacts. A government engineer interviewed in Tompkins (2005) reports that:

“In 1988 prior to Gilbert we did our first Hurricane Preparedness Exercise. We were disorganised because it was our first attempt. It took us 16 hours to get 70% of the hurricane shutters onto the government buildings complete. Even so this exercise helped us when Gilbert hit. Even though we weren't as effective as we are now, we were better prepared than we were before we did the preparedness exercise. Since then we have held an exercise every year. We can now protect all Government buildings in 6 hours. The Andrew's, Gilbert's, Michelle's and Mitch's have helped to keep us focussed and prepared”.

This shift in behaviour and increase in preparedness by the Cayman Islands' Government appears due to the emergence of group action, led by a champion, supporting changes in legislation<sup>3</sup> and changes in the organisation and structure of the government institutions dealing with hazards<sup>4</sup>. Anticipatory national level planning for hurricanes appears to have increased the effectiveness of the government response, thereby reducing damages from hurricane impacts. Similarly national prioritisation of hurricanes may have encouraged individuals in wider civil society to engage in preparedness and hence reduce the wider social impacts of hurricanes.

### **Social factors influencing vulnerability**

There are social consequences associated with rapid economic growth. In the Cayman Islands, the growing economy has been supported by an influx of largely temporary migrant workers at all levels of society. The immigrant population rose from 15% of the population in 1975 to 47% by 2000. The majority of immigrants come from outside the Caribbean region have little or no experience of tropical storms. Due to the low-lying nature of the islands the principal threats to the Cayman Islands from storms are wind, windborne debris and storm surge (Minor and Murphy 1999). Local rhymes, radio broadcasts and the flying of flags from government house are used to inform people about the threats from storms and the need to prepare. In the aftermath of Hurricane Ivan in 2004, it became very apparent that the traditional mechanisms for passing on knowledge about storms and storm preparedness missed this group and many were entirely unprepared for what happened.

The population more than doubled between 1980 and 2000 (when it reached 41,800). With this growth came the demand for more housing, and the expansion into low-lying areas, areas known to be vulnerable to storm surge and in areas covered by mangroves. This pattern of social expansion, leading to destruction of a protective environment (i.e. mangroves, sea grasses and coral reefs) is not unique to the Cayman Islands.

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<sup>3</sup> An enhanced Building Code in 1995/6 and changes to the Development and Planning Regulations to increase waterfront set back in beach front areas in 2002.

<sup>4</sup> One: the evolution of the small Natural Resources Unit with 4 staff, to a formal Department of Environment with 26 staff, and a recognised role in the Ministry of Tourism, Environment, Development and Commerce. Two: the creation and mainstreaming of the National Hurricane Committee which coordinates the Cayman Islands' hurricane preparedness and response activities.

A further social factor that appears to be influencing social coping capacity is the uptake of insurance. The increasing uptake of insurance appears to be having two effects on behaviour in the Cayman Islands. The first is to stop self-protecting behaviour which might reduce the impacts (i.e. moral hazard), the second is to lead individuals to re-build houses in areas to be well known for experiencing significant storm damage, relying on the insurers to underwrite this risky behaviour. All of these factors are likely to increase the exposure of individuals to storm damage.

### **Implications of these societal factors for both research and policy**

Changes in the economy, society and government clearly have affected the Cayman Islands ability to cope with hazards. Some of these changes have eroded ability to cope with hazards and others have enhanced it. Research and policy action in the following four areas may assist in our understanding of how and why some societies face lower levels of economic losses from hazards, when faced with the same population density and income levels, than others.

1. What is not known is the quantitative impact of societal factors on each other, or on general vulnerability to hazards. This leads to the question: can small changes in legislation or institutional preparedness offset the economic losses caused by increases in wealth? An interesting question for researchers would be to identify the degree to which these offsets can be made, if at all, or if increases in wealth in hazard-prone areas only ever lead to increases in economic losses from damage. Policy makers need to retain their focus on increasing preparedness of the government and enhancing ability to respond to hazards.
2. A second area of interest relates to information. Clearly some individuals expose themselves to higher levels of storm risk, either because of poverty, lack of information, lack of understanding of the information, or deliberate choice. To prevent this behaviour, very different policy initiatives are required to tackle each of the issues. The challenge for researchers and policy makers is to identify more specifically what is causing individuals to increase or reduce their exposure to hazards, and then to identify mechanisms to change their behaviour.
3. A third area of interest relates to knowledge transfer. Why do some societies and communities with high levels of exposure suffer different levels of economic losses? Are there generic lessons that can be transferred between communities, or even between nations, other than the importance of the disaster risk management approach?
4. Finally, how can the problem of moral hazard be managed? There are already different approaches to dealing with moral hazard in the UK, the US and Canada. Some universal lessons on best practice would be useful.

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