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THE IMPACT OF HURRICANE IVAN IN THE CAYMAN ISLANDS

This document has not been formally edited. Subject to changes in form and content.

Contents

INTRODUCTION AND SUMMARY

The advent of Hurricane Ivan and its tragic and devastating consequences in the Cayman Islands and particularly in the Grand Cayman puts a strain on the economy and fiscal pressures on Government.

The consequences of Ivan pose the need beyond the humanitarian response, for a rapid assessment of the damage (impact on assets) and losses (effects on economic and social flows) to determine its macroeconomic, social and environmental consequences and its implications for the country's fiscal stance. At the request of the Cayman Islands Government and with the support of the United Nations Development Programme (UNDP) such assessment was undertaken by an ECLAC-led mission in accordance to its well-established and accepted disaster evaluation methodology. (ECLAC, 2004, www.eclac.cl/mexico). [1]

This assessment will complement and expand on the emergency and humanitarian needs identified previously by the government and particularly by the Economics and Statistics Office. The result of such an assessment provides a quantitative approximation to the overall damage and reconstruction costs of the event and looks into the effect on the country's macroeconomic performance as compared to the pre-hurricane targets. The final section of the report outlines some strategic considerations and priorities for projects and actions required, for which additional resources will be needed. The findings of the report suggest areas of attention for incremented emphasis in the content of the country's economic programmme, and the need to mobilize both international cooperation resources and private sector investment.

It is quite evident, even before an assessment is made, that additional needs and stronger emphasis should be put on the cross-cutting theme of disaster and risk management, in the face of the country's crystallized exposure and vulnerability to natural hazards. This year's events testify to a dramatically increased vulnerability not only in the jurisdiction of the Caymans but in the Caribbean basin as a whole, affecting island nations and territories as well as continental states in Mexico and the United States.

This approach transcends the Cayman Islands, leading to the need to consider a regional Caribbean strategy.

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[1] This methodology has this year been applied to assess the impact of hurricanes and tropical storms in Grenada, Jamaica, the Dominican Republic and the Commonwealth of the Bahamas. This methodology has been used for over 30 years to assess such large-scale disasters as Hurricane Mitch in Central America, major earthquakes in Central America and Mexico, and the El Nino effect in the Andean region.

Mission Components

ECLAC prepared, with a team of experts and consultants, a multi-sector, integrated damage and losses report. This report was made possible by the cooperation and coordination and support provided by the relevant government authorities. In the process appropriate dialogue and coordination was made with the relevant national institutions. These are namely The Office of Economics and Statistics; The Governor's Office; The Monetary Authority; the Budget and Management Unit; The Department of Tourism; The Department of Environment, The Port Authority, the Public Transport Board, Planning, Communications, Works & Information Technology; Education, Human Resources and Culture, Health Services, Culture and Community Services, Women Affairs, Youth and Sports.

The mission comprised the following ECLAC staff and consultant:

- Ricardo Zapata-Marti, coordinator;
- Asha Kambon, who assessed the social sectors, with emphasis on housing needs, livelihoods and relevant social issues trying to incorporate a gender perspective;
- Erik Bloomestein, who looked into the specific characteristics of the event in the territory, its consequences for the tourism sector and the related environment impact;
- Michael Hendrickson, who covered the rest of the productive sectors, including the banking and financial impact, particularly dwelling on the consequences on public finance. As the macroeconomist in the team he also looked at the implications for the territory's growth and external balance, and the absorptive capacity in the face of the reconstruction needs and the potential inflows of capital and investment, including insurance payments.; and
- Roberto Jovel, infrastructure sectors, including infrastructural aspects to housing and technical coordination.

The national counterpart team was coordinated by the Economics and Statistics Office. The mission team expresses its gratitude and recognizes that the assessment would not have been possible without the support from this group led by Ms. Catharine Read, Director of that Office, and the task force pulled for this exercise. [2] Special mention is made of the support provided by:

- Francis Arana, ESO,
- Stran Bodden, ESO
- Cassandra Connolly, ESO,
- Christina Rowlandson, from the Cabinet Office, and
- Shanna Saunders, ESO,

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[2] A list of persons and institutions contacted is annexed to this report.

Photographic material included in this assessment comes from the mission team and some additional pictures came from Ward Scott, Video/Photography director of the Cayman Islands Government Information Services, and the Lands and Survey Department.

I. DESCRIPTION OF THE EVENT

Since the early nineties the Caribbean region seems to have entered a 20 to 30 year cycle of above long term average incidence of hurricanes and tropical storms. Indeed since 1995 each year, except for ENSO years, the region has experienced an above average number of storms. This does not bode well for the region and such an increase in activity needs to be anticipated with appropriate prevention and mitigation policies and with better risk management and risk transfer instruments. This years seems to be paradigmatic as a cluster of hurricanes and tropical storms blanketed the region with devastating consequences (see figure 1 and table 1 that show the severity of this year's activity).

Table 1

HURRICANE SEASON 2004: MAJOR EVENTS FROM JULY TO SEPTEMBER

Name	Dates	Maximum Wind (average)	Deaths
		(km / hr.)	
Tropical Depression One	31 July	50	
Hurricane Alex	31 July- 6 August	200	
Tropical Storm Bonnie	3-12 August	110	
Hurricane Charley	9-14 August	240	15
Hurricane Danielle	13-21 August	175	
Tropical Storm Earl	13-15 August	75	
Hurricane Frances	24 August-9 September	240	23
Tropical Storm Gaston	27 August-	116	
Tropical Storm Hermine	29-31 August-	55	
Hurricane Ivan	2-24 September	275	90
Tropical Depression Ten	7-9 September	58	
Hurricane Jeanne	13-29 September	200	2000
Hurricane Carl	16-24 September	232	
Tropical Storm Lisa	19 September	116	
TOTAL (July-September)		153	2128

Source: ECLAC, on the basis of several sources.

Ivan was one of the most damaging hurricanes of the 2004 season; it has been categorized as the most powerful hurricane to hit the Caribbean in 10 years. On September 7 and 8 it damaged 90 percent of the homes in Grenada and killed at least 16 people as it swept over this country, [3] Barbados and the other islands in the area. By Thursday morning on September 9, Ivan's sustained winds reached 160 mph making it a rare category 5 hurricane on the Saffir-Simpson scale.

[3] A report on the damages caused by Hurricane Ivan in Grenada was produced by the OECS with ECLAC's assistance and can be seen at: www3.cepal.org.mx/ricardo.

Ivan may be best described as a "classical" long lived Cape Verde hurricane. On September 2 Ivan developed in a tropical depression, into a tropical storm on the following day and as a hurricane on 5 September. That very same day Ivan became a major hurricane (category three and over) and passed over Grenada and then North of Venezuela and the Netherlands Antilles toward Jamaica, while strengthening to a category 5 hurricane. It weakened to a category 4 as it moved westward south of Jamaica. [4] It briefly regained strength before it reached Grand Cayman on September 11 which experienced the hurricane until the morning of Monday 13 September, whereupon the cyclone proceeded towards the Western tip of Cuba before making landfall in the USA.

Figure 1

HURRICANE ACTIVITY IN 2004: MULTIPLE AND SIMULTANEOUS HURRICANES

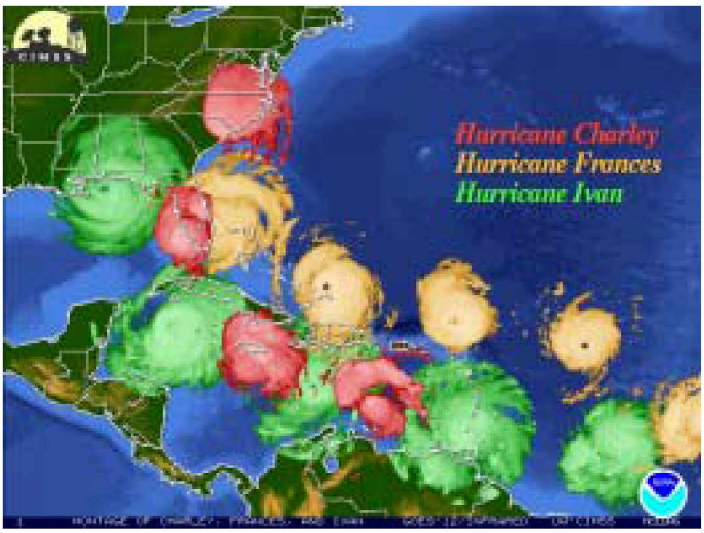


Figure 2 charts the track of hurricane Ivan from its inception as a tropical depression to its landfall in the USA.

On September 11 Ivan began affecting the Sister islands of Cayman Brac and Little Cayman with tropical storm winds and Grand Cayman began experiencing tropical storm winds later that afternoon. According to information from the local meteorological office the centre of Ivan was located 113 miles SE of Grand Cayman by 10 pm and at that time hurricane force winds of over 100 miles per hour were already being experienced on the island.

[4] The report made by ECLAC with the support of UNDP and the Planning Institute of Jamaica (PIOJ) (LC/MEX/L.636, LC/CAR/L.22, 20 October 2004) may be seen also at www3.cepal.org.mx/ricardo.

At 5am on Sunday the storm surge from the North Sound was peaking at 10 ft. The hurricane made its closest approach at 10 am on Sunday when the eye passed 21 miles SW of the Grand Cayman with winds of 150 mph and gusts of 220 mph. Another storm surge affected South Sound when the eye of the hurricane moved. Ivan was a slow moving hurricane which increased the exposure of the island to hurricane force winds as well as increased the total amount of rain.

Figure 2

HURRICANE IVAN'S CARIBBEAN JOURNEY

Source: NOAA.

Given the characteristics of the Cayman Islands: long strips of land with very little elevation (with the exception of Cayman Brac that has a bluff that rises over 140 ft. (43 mts.), the territories are highly exposed and vulnerable. (Figure 3, shows the exposure to hurricane of the Cayman Islands) It was Grand Cayman that suffered the brunt of the storm in all its intensity: windswept first from the southeast in a north-westerly direction and with storm surges that flooded large portions of the coastal areas and deposited huge amounts of sand over roads, houses and infrastructure from East End to West Bay.

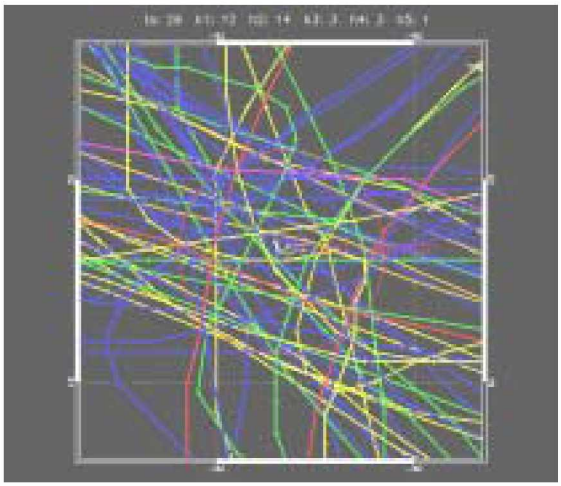
Figure 3

MAP OF THE CAYMAN ISLANDS

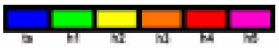
Source: Cayman Islands Government.

Figure 4

HURRICANE AND TROPICAL STORMS PATHS HAT HAVE AFFECTED THE CAYMANS



Scale:



Hurricanes have been a part of the history of the Caymans since its inception. The historically recorded hurricanes, which are closely linked to important historical events on the jurisdiction date back to 1837. Perhaps the best documented one is the "storm of '32". [5]

In the post-war period, Hilda (category 2) in 1955 and an unnamed tropical storm also in 1955 passed within 25 miles of Grand Cayman. Figure 4 shows tropical storms and hurricanes that passed within 60 miles of Grand Cayman since 1853. On recent years prior to Ivan, hurricanes Michelle in 2001, Gilbert (category 4) in 1988 and Katrina (category 1) in 1981 affected the island.

[5] See Michael Craton (2003), *Founded upon the Seas. A history of the Cayman Islands and their people,* written with the New History Committee, Ian Randle publishers, Kingston, Miami.

THE PRE AND POST IVAN CONSEQUENCES: A BIRDSEYE VIEW

The extensive damage done by the hurricane may best be appreciated by observing pre-Ivan and post-Ivan images, such as the following ones, provided by the Lands and Survey Department. [6]

Bodden Town

Before 11 September, 2004

After Ivan

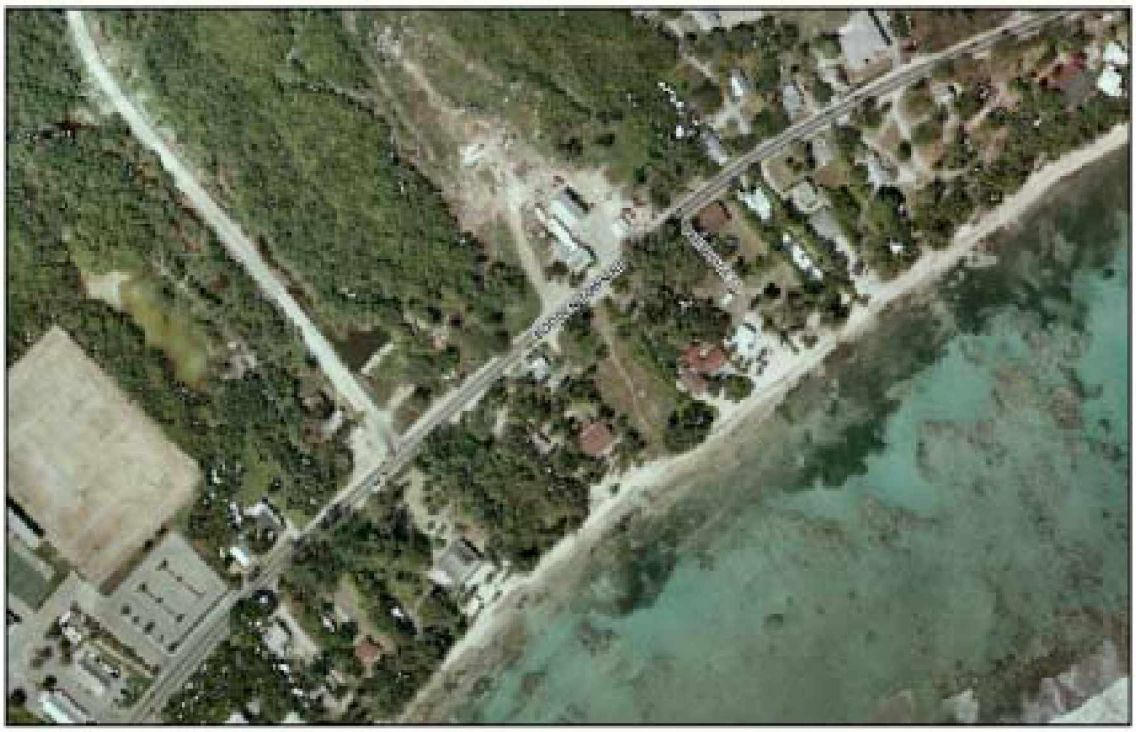
[6] See www.caymanlandinfo.ky.

Governors Harbour

Before 11 September 2004

After Ivan

Pease Bay



Before 11 September 2004

After Ivan

South Sound Road

Before 11 September 2004

After Ivan

II. AFFECTED POPULATION

Hurricane Ivan took the lives of two persons on Grand Cayman, and it temporarily displaced significant proportions of the population. Some 35,189 persons or 83% of the Grand Cayman population was directly affected by the wrath of Hurricane Ivan. [7] Of the remaining 7,207 or 17% of the population, it could be said that they were indirectly affected as they sheltered or cared for those directly affected. [8] All persons experienced the loss of electricity, water and access to telecommunications for some period immediately following the disaster and work stills continues to restore full electricity and water supply. Entire Districts such as Bodden Town were isolated due to debris and individuals across the island were isolated in their homes due to high water and debris.

The most affected population could be found in the five Districts of Grand Cayman as presented in Table 2, which comprise: Georgetown, West Bay, Bodden Town, North Side, and East End. Of those five Districts, the three most affected were Georgetown, Bodden Town and East End. Together these three Districts account for 75% of the total population on Grand Cayman.

Table 2

POPULATION OF GRAND CAYMAN BY DISTRICT

Population by districts	Total	Percent
George Town	23275	55
West Bay	9470	22
Bodden Town	7133	17
North Side	1208	3
East End	1312	3
Total	42397	100

Source: Labour Force Survey 2004.

[7] Computed based on the proportion of dwelling units which were damaged and the average family size of 2.6.

[8] The population of the Cayman Islands consists of 44,237 persons. Some 42,397 or 95% reside on Grand Cayman and 1,842 and 100 reside on Cayman Brac and Little Cayman, respectively.

Of all the persons who make up the Grand Cayman population, 60% or 25,426 are Caymanian and some 40%, 13,391, Non Caymanian. Table 3 presents the proportions of the population of Grand Cayman by their Status. Of the population in the Labour force, some 4.3 % were classified as unemployed.

Table 3

DISTRIBUTION OF GRAND CAYMAN POPULATION BY STATUS

Status	Number	Percent
Caymanian	25,426	60
Non Caymanian with Work permits	13,391	32
Non-Caymanian without Work permits	1250	3
Other	1876	4
Total	42,397	100

Source: Labour Force Survey 2004.

Hurricane Ivan made no distinction of the statuses of the population as all were affected alike. Even the already dead were affected as many cemeteries which are on the sea side, were impacted by the sea surge resulting in the destruction of tombs and the loss of entombed family members. This also was a source of grief to islanders.

Anecdotal reports from most persons on Grand Cayman told of experiences in rising sea water, and or water soaked belongings from damaged roofs. The responses to the hurricane may have differed however, as many non Caymanian were repatriated by their employers, or their families were repatriated, while the main breadwinner stayed behind, causing many to experience the pain and discomfort of separation.

This was not the experience of Non Caymanians alone, as many Caymanians who had relatives in other parts of the Caribbean, England or North America, chose to leave or send children abroad in the wake of the disaster. Although emigration data is still being compiled, during the period September 9 to 30, it is estimated that some 10,470 persons left the island. This is supported by reports from the various schools which indicate a significant proportion of children who were not in attendance as the schools reopened.

Many persons (402) were treated for lacerations, wounds, removal of foreign bodies, fractures and burns as a result of the disaster, but generally speaking, the health and well being of the population was well maintained by the dedicated health care professionals through a highly sophisticated network of health care delivery services and a committed social service delivery staff.

As a result of the disaster approximately 17% of the population or over 6,000 persons were evacuated and sheltered. Table 4 represents the distribution of those sheltered by District and persons located in formal and non formal shelters. Non- formal shelters opened as the formal shelters either lost their roofs or were inundated by water, forcing those occupying them to flee or be evacuated to other locations. In the District of Bodden Town, the Civic Centre was an example of a formal centre having to be evacuated. Some 195 persons were removed to higher ground as water inundated the building. Many of these were elderly. The population of Bodden Town has some knowledge of hurricanes. Originally called "South Side" Bodden Town was the first historical capital of the Cayman Islands. Home to the largest settlement of people in the 18th century it was the ideal point of trade boasting its own natural harbour for ships to dock.

In the first half of 19th century, successive hurricanes in 1812, 1836, 1838 and 1846 destroyed this natural harbour [9] and exposed the vulnerability of this location to passing hurricanes. The capital subsequently relocated to George Town, which is situated on the south western side of the island. It was a credit to the social Services personnel and Shelter Wardens that not a single life was lost in the process of relocating persons. Anecdotal reports abound of persons who remembered their grandmother's warning and took shelter in the old Bodden Town Library making it one of many non-formal shelters, as this was considered a 'safe' location to pass a hurricane. This location indeed saved a family from the inundation of water to their private dwelling. Hotels, tall Government buildings, Commercial banks, Hospitals and Libraries were also opened to perform the function of non formal shelters.

[9] Harbour was filled with silt making it shallow.

1. Women and Children

Although the Cayman family is described as a traditionally matri-focal one, family life in the Cayman is predominantly a two-parent household with two to three children who are resident. [10] The ratio of two-parent family homes to single-parent family homes was found to be 1.4:1 in a study conducted in 1997. [11] There is nothing to suggest that this has changed substantially. The matri-focal quality evolved from the early patterns of livelihoods in the Caymans with mother as decision maker and guardian and father who went out to sea. The tradition continues with the man often still being segregated from the domestic duties and responsibilities with area of family responsibility falling on the women. The women no longer work within the sphere of the home, but now form an equal part of the labour force. Women, according to the 2004 Labour Force Survey, comprise 50.6% of the labour force and represent 50% of the employed.

Table 4

DISTRIBUTION OF PERSONS HOUSED IN SHELTERS BY DISTRICT AND TYPE OF SHELTER

By district & name	Formal	Non-formal	No of persons
Bodden town			
Bodden Town Civic Centre			165
Bodden Town Primary School Hall			91
Bodden Town Primary School classrooms			
East end			
Breakers Community Hall			15
East End Civic Centre			194
East End Primary School			108
East End Gun Bay Hall			79

/Continue

[10] The non-Cayman family structure has not been formally studied bur anecdotal reports suggest that it differs substantially from that of the traditional Caymanian one.

[11] The Status of the Family in the Cayman Islands by Dr. Eleanor Wint, U.W.I. Mona, found that there were 6524 two parent households and 4736 one parent households within the Cayman population.

Table 4 (Conclusion)

By district & name	Formal	Non-formal	No of persons
George town			
Community College Hall			535
George Town Primary School Hall			209
George Hicks High School			192
John Gray High School Assembly Hall			232
John Gray High School Islay Connolly Hall			117
Prospect Primary School			590
Red Cross Building			125
Cable & Wireless One Technology Square			500
Citrus Grove			150
Cayman Corporate Centre			300
Scotia Bank & Trust Building			50
Fosters Food Fair - Airport Location			
Health Services Authority			500
Weslyn Holiness Church- Windsor Park			
Bank of Butterfield - Fort Street Location			
Maples & Calder Queensgate			150
Ugland Building			150
Chrissie Tomlinson Memorial Hospital			480
Cayman Islands Hospital			1100
Agape Church			
Family Life Centre			126
George Hicks High School classrooms			
North side			
North Side Civic Centre			135
West bay			
West Bay Primary School Hall			307
West Bay Primary School classrooms			
TOTAL			**6,600**

Source: Estimates of ECLAC based on official information.

Many young women can be found to predominate in the care giving professions, such as Education, Health and Social work, and can also be found at the lower income scale, among the unskilled workers. In these categories the ratio of men to women is 1:4 at the higher end and 1:2 at the lower; the ratio is drastically reversed, in the technical fields such as electricity and water supply, however, where the ratio of men to women is 18:1.

The burden of care for family and the elderly continues to fall on women, leaving them in the post disaster phase of relief and reconstruction over burdened. Thus issues such as the reopening of school and the cost of pre-school education place a particular burden on women. Anecdotal reports that the effects of Hurricane Ivan were beginning to be felt, with increased reports of domestic violence and gambling among men and depression and thoughts of suicide among women. Reports of the effects of the disaster on children are also beginning to come to light. This is not unusual as following natural disasters evidence points to differing responses to the crisis by both men and women and of people in different age groups and socio-economic backgrounds.

The Ministry of Health is not unmindful of the need to provide support due to the psychological trauma which the hurricane has brought on the population and particularly among the children, elderly and socially vulnerable. However, ensuring that the support services were fully operational during the disaster and in the relief phase was their first priority and stretched their capacities. Having maintained the physical health of the population during this very difficult time, they are now making arrangements to conduct community outreach in support of the mental health of the population.

2. Emergency Relief

Hurricane Ivan found the National Hurricane Committee well prepared with designated shelters, shelter wardens assigned and a basic stock of supplies in place. However nothing could have prepared the population for the hurricane force winds of 155- 200 mph and the eight foot rise in sea level which devastated everything in its path. For more than 24 hours, the whole of the population had no respite from the pounding winds, rain and seas.

One day after the hurricane, airport services were restarted and some roads were made passable. Basic food, water and other relief supplies were distributed for several days. Supermarkets and other businesses donated necessities to the public.

The first external response came from the British Royal navy ships, the Richmond and Wave ruler, whose officers provided supplies and humanitarian assistance in the critical first four days. Overseas, families and friends also loaded planes with relief supplies, supplementing provisions sent by the Red Cross and other international agencies. Representatives from Jamaica, Barbados, Honduras and other parts of Central and South America, the USA, Canada, UK and South Africa, arranged evacuation flights and assistance for their nationals. Many private companies did the same for their employees and large numbers of expatriates and Caymanians alike took advantage of those flights, put on by Cayman Airways, Air Jamaica and North American and other commercial and chartered carriers.

Hotels, that were up and running opened their doors to local and incoming relief workers. Hotels such as the East End Morritts Tortuga also arranged a daily supply of 75,000 gallons of fresh water, shower and toilet facilities for hard –hit Districts.

Tables 5a and 5b represent the available data collected on the relief effort, both from local and foreign sources, which amounts to CI$ 3,773.347.00 This of course is an underestimated figure as many services and supplies were provided which we have not been able to capture.

Table 5a

RELIEF ASSISTANCE BY AGENCY AND VALUE (FOREIGN)

Agency	Supplies/funds	Total
Total (international and local)		**3,773,347**
Total international relief		**2,508,747**
British red cross		**8,747**
	Blankets	2,700
	Hygiene kits	900
	Kitchen sets	900
	Plastic sheets	900
	Jerry cans	321
	Flashlights	1,000
	Batteries	2,000
	Tents	25
	Generators	1
Digicel		**1,500,000**
	Food & water	
	Building supplies, telephone credits	
Cable& wireless		
	Emergency relief supplies	
Private donations		**1,000,000**
British government		
	Provision of law enforcement advisor	
	Funding for 21 police officers	
	5,000 tarpaulins	
	100 chainsaws	
	Water purification tablets for 40,000 people for one week	
	10,000 tetanus shots	
Governor of honduras		
	1,000 bottles of 1 gallon water	
Care international		
	Tetanus shots	
Carec medical		
	Free medical supplies	

Table 5b

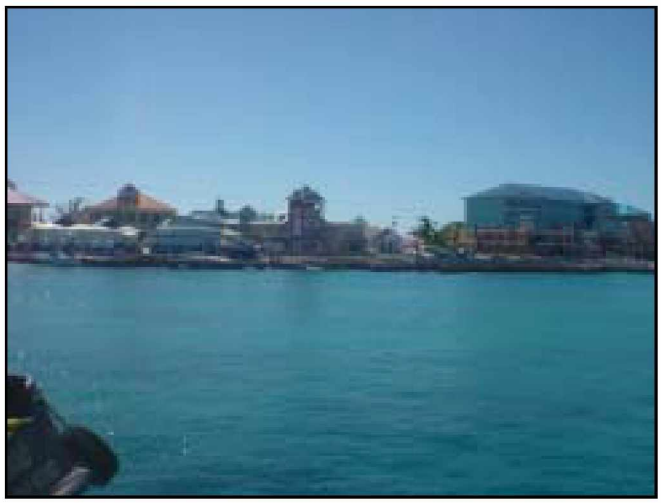
RELIEF ASSISTANCE BY AGENCY AND VALUE (LOCAL)

Total local relief		**$1,264,600**
National hurricane committee		**$1,240,000**
	Food & prepared meals	$275,000
	Costs of nhc members time	$330,000
	Professional fees from auditors for co-ordination work	$220,000
	Vehicles leased	$35,000
	Fuel for shelter generators & vehicles	$60,000
	Mobile communication equipment	$320,000
Community kitchens		**24,600**
First baptist church	2,000 meals a day for 5 weeks	12,000
Mise en place	1,500 meals a day for 4 weeks	9,000
Community college	600 meals a day for 4 weeks	3,600
Local restaurant & business community		
	Uncooked meat	
	Food supplies	
	Free drinking water	
Cayman airways ltd		
Private companies		
(for staff & families)	Generators	
	Tarpaulins	
	Bedding	
	Water	
	Canned food	
	Free airline flights	
	Candles	
	Batteries	
	Flashlights	

III. DESCRIPTION OF DAMAGE AND LOSSES BY SECTORS

1. Productive Sectors

The main productive sectors in the entire territory of Grand Cayman suffered the impact of hurricane Ivan. The Sister Islands of Cayman Brac and Little Cayman sustained damage and losses as well, albeit of lesser extent and magnitude. The economic consequences in terms of damage and losses to them are outlined in this chapter. In addition to indicating the damage suffered and the resulting losses in terms of increased costs to restore vital activities and provision of goods and services or loss of business and income foregone, where relevant, the sector by sector analysis indicates the external impact of the damage and losses as reflected in loose of foreign income through exports, incremented need for foreign supplies and imports and incoming resources in the form of foreign assistance or aid and insurance and reinsurance payments.



a) Tourism

Tourism is, with financial services, the major economic sector within the Cayman Islands and contributes significantly to exports, employment and government revenue. The impact of hurricane Ivan, although not severe enough to affect the sector's viability and capacity to host foreign visitor in the 2004 winter season, does have an impact in the overall damage suffered by Grand Cayman and will generate significant losses. This is so given that tourism contributes over 50 percent to GDP and 27% to employment, has revenues of CI$30.7 million, accruing to government and statutory bodies. [12]

Hurricane Ivan hit when the sector was experiencing a comeback after stay over tourism in the Cayman Islands had experienced an almost continuous decline since 1998. Furthermore, this decline was reinforced after 2001by the weak economic performance in the USA and the drop in travel following the terrorist attacks in the United States on 11 September. The trend began to reverse in October 2002 and, like much of the Caribbean region, the 2003/2004 tourist season exceeded the performance of the previous years.

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[12] These figures come from a recent economic impact study by Deloitte and Touche, *A Study to Assess the Economic Impact of Tourism on the Cayman Islands,* Cayman Island Tourism Association, CITA, 2003.

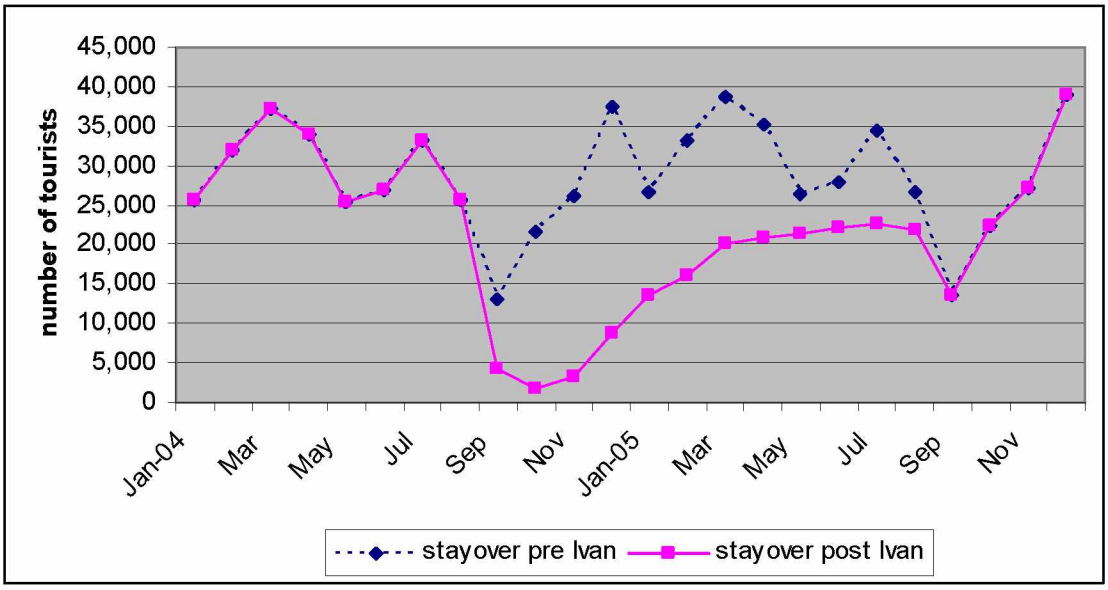
Stay-over arrivals grew by 14.46 per cent over the period January to July 2004 as compared with the same period in the previous year. Expectations for the remainder of the year and for the 2004/2005 season remained strong. Indeed the pre Ivan scenario forecasted total tourist arrivals of about 338,000 people for the year 2004. Figure 5 shows the loss in stay-over visitors expected after Hurricane Ivan.

Damage

Ivan caused major damages to properties in the sector mostly through flooding by the storm surge (75% of the damage cost), affecting the ground and first floors and by extension common areas such as lobbies, restaurants and equipment, and to a lesser extent by wind damage (25% of the damage) that affected roofs although, of course, this distribution of incidence varied property by property. The end result of the combination of flooding and wind was that many properties suffered 15 to 45 % damages. With these levels of damage they were effectively withdrawn from the available supply, albeit temporarily. The Cayman Islands has a well developed tourism mixed product of hotels, condominiums and apartments, guesthouses and villas.

Figure 5

IMPACT OF HURRICANE IVAN ON STAY-OVER VISITOR ARRIVALS IN 2004

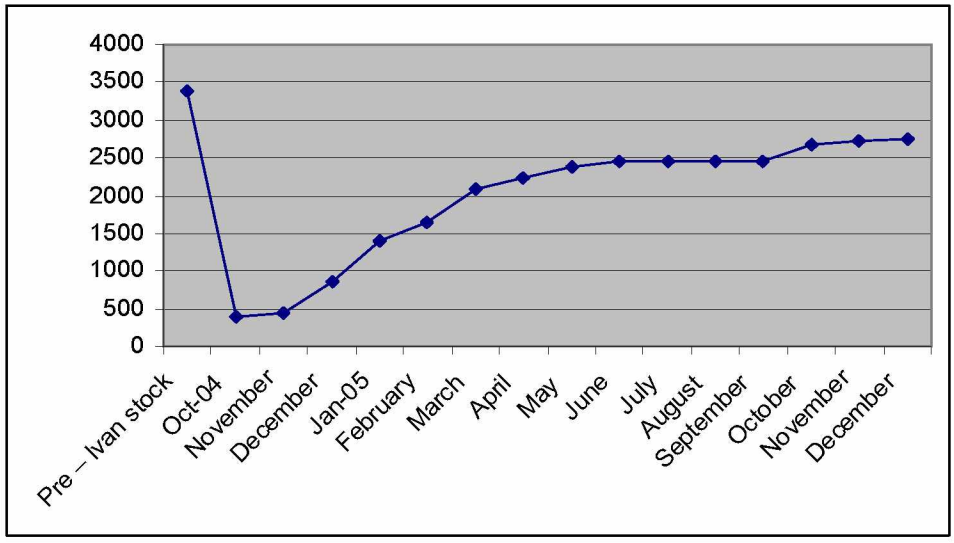


Source: ECLAC.

Before hurricane Ivan hit, the jurisdiction had 2,292 hotel rooms, 963 units in condominiums and apartments and 131 rooms in guesthouses available for rental. In addition a major international hotel chain was to open an upscale hotel with 365 rooms, and a complex of high income condos was also scheduled to open in December. Both openings have been postponed.

Figure 6

AVAILABILITY OF LODGING AFTER IVAN



Source: ECLAC.

Because of the extent of the damage the available room stock declined dramatically. Given the emergency need for lodging after the disaster the actual occupancy rate of all unaffected facilities increased as they were taken by residents in need of shelter or by relief and recovery workers such as policemen, construction workers or insurance adjustors. If this continues for a longer period and overlaps with the regular high season, it could further reduce the room stock available for tourists. Ivan will have permanent effects since there are properties that will be permanently withdrawn from the supply as they are either demolished, diverted to other uses or both. Figure 6 shows the anticipated room stock available for tourism until the end of 2005. It shows the progressive incorporation of accommodations.

The direct impact to the sector stems from the damages to hotels, condominiums, apartments, villas, boats and yachts and are estimated at CI$ 281.9 million. Of this amount, CI$ 109.5 million can be attributed to hotels, CI$ 172 million to condominiums, apartments and guesthouses and CI$ 0.4 million to boats and yachts. The estimate for condominiums, boats and yachts may be somewhat conservative because not all these assets are locally insured, nor has averaging been taken into account. Damages to villas are partly accounted for in the housing section, and restaurants and water sports facilities under commerce.

Losses

Losses occurred both in the stay over visitors and the cruise ship tourist. Following the onset of Ivan all tourism activities ceased and it was not until mid-November that tourism activities resumed.

i) Stay over visitors. Following the hurricane, government imposed travel restrictions allowing only travel to Grand Cayman by Caymanians, Cayman Island residents, those with work permits and relief workers and later also those with property on the island. These travel restrictions were lifted on 20 November. In the case of cruise ships, their stop in Grand Cayman resumed on 1 November.

In respect of losses associated with stay over visitors, the indirect impact includes the loss in business because of the non availability of rooms and the additional operating costs. The loss in business will carry on during 2005 since supply restrictions will continue to remain operative until well into that year.

The loss in stay over arrivals amounts to 79,869 tourists in 2004. Using the implicit stay over expenditure per tourist estimated for 2003 at CI$ 910.1 (US $ 1137.59), the loss in stay over tourism revenue for 2004 amounts to CI$ 72 million. This was partially compensated by expenditures from relief and recovery workers from abroad.

Following a similar procedure, the loss in stay over arrivals is estimated at 91,000 visitors for 2005. Applying the same average visitor expenditure, the loss in stay over revenue would amount to CI$ 82.8 million. In 2005 capacity constraints will remain until September because this month is in the through of the low season and the reduced capacity will be able the respond to the typical September demand quite comfortably. Thereafter capacity should no longer be an issue, even though the room availability will remain below the pre-Ivan total.

In mature tourism destinations the capacity constraints may be followed by stagnation or a drop in demand, perhaps somewhat similar to what the Cayman Islands experienced during 1998 to 2001. With an increased effort to implement the national tourism management plan, the relatively new and upcoming market plant and with a combined private and government sector promotion campaign, a drop in demand could be offset. This could actually lead to an improvement in the typical low occupancy rates that have characterized Grand Cayman.

It is a matter of concern that, while most major hotels have loss of business insurance, indications are that few condominiums, apartments and guesthouses have a similar insurance. While fixed costs will continue (e.g. bank overdrafts, loans and mortgages) there would be reduced revenue from either guest rental not compensated by insurance payments. This is a situation that needs careful monitoring since it may eventually lead to business closures. As far as insurance coverage is concerned, it must be pointed out that — as in other sectors such as housing and commercial activities — there is a high level of underinsurance. Thus, when claims are settled averaging may reduce receipts from insurance companies to well below the repair or replacement costs.

Another concern pertains to time share and buildings that have multiple owners. Experience form other islands has shown that repair or reconstruction can be delayed by years (9 years in the case of Mullet Bay in St. Maarten), [13] which can have repercussions on the physical image of the whole island as a destination. It is advisable to consider imposing a time limit by which property owners either have to proceed with reconstruction or have to demolish the wreckage.

[13] That property got severely damaged by the 1995 hurricanes Luis and Marilyn and after almost ten years is still in disrepair because the owners can not agree on the repair budget and how to share the costs among them.

ii) Cruise ship tourism. Direct damages in the cruise ship sub sector were limited to damages to the port and the new cruise ship facilities currently under construction, and are detailed in the corresponding section on ports. Indirect damages include the loss of port charges (referred to also in the port section), and the loss of expenditures by cruise ship visitors and crew for the period of cancelled or reduced visitation. This latter figure is included as a loss to tourism. After the 9th of September no cruise ship visited until 1 of November when they commenced a return to port. During November there were still restrictions in place on the number of cruise ships that could dock in George Town while the Cayman Islands government was assessing the availability of transport, restaurants, attractions and other aspects of the local support infrastructure vis-à-vis visitor demands. The restrictions on the number of calls have been gradually reduced and by December no further restrictions will be necessary and the number of cruise ship visitors returns to as planned. [14]

As a consequence of Ivan the loss of cruise ship arrivals is estimated at 320,438 visitors for 2004. Using the implicit expenditure multiplier calculated for 2003 (of US$ 97.62 or CI$ 78.10) the loss of revenue from cruise ship activity stands at about CI$ 25 million. Table 6 summarizes the effects of Ivan on the tourism sector.

Table 6

CAYMAN ISLANDS SUMMARY OF IMPACT ON TOURISM

	CI 000's
Total Impact	**462,421.2**
Direct Damage	281,890.0
Accommodation	109,476.0
Condominiums, apartments, other	172,000.0
Boats and yachts	414.0
Losses	180,531.2
stay over tourism	155,506.4
cruise ship tourism	25,024.8

Source: ECLAC estimates based on official data.

[14] Even prior to the impact of hurricane Ivan it had been a matter of concern the number of cruise ship tourists that could land in Grand Cayman at once and the sustaining capability of existing infrastructure, such as roads, taxis, etc. and whether the limit of such capability was being pushed at the ongoing level.

iii) The impact on tourism associated sectors. The loss of tourism expenditures has an additional impact on those sectors that are direct recipients of the tourist dollar. Table 7 illustrates the disaggregated revenue impacts of expenditures foregone in hotels, restaurants, attractions, transport, shopping can be derived.

Table 7

IMPACT ON TOURISM SUB SECTORS (CI $THOUSANDS)

Item	Composition of tourist's expenditure		2004	2005
	stay over visitor	cruise ship visitor		
Accommodation	0.31	0.00	$22,491.33	$25,626.71
Food and beverages	0.28	0.10	$22,973.91	$23,216.09
Transportation	0.08	0.05	$7,109.94	$6,682.36
Shopping	0.17	0.57	$26,535.03	$13,954.62
Tours	0.01	0.17	$5,390.44	$1,229.99
Recreation	0.01	0.01	$1,286.26	$1,154.93
water sports	0.11	0.07	$10,014.93	$9,435.67
Other	0.02	0.02	$1,909.38	$1,518.83
	1.00	1.00	$97,711.20	$82,819.20

Source: ECLAC.
Note: Differences due to rounding.

b) Agriculture and livestock

Damage and losses in the agriculture sector, including livestock and fisheries were estimated at roughly $5.6 million. While direct damages were relatively small, indirect losses make up the bulk of the total. This reflects the fact that the present value of the stream of income that was lost, especially from trees with a bearing lifetime. This are mostly fruits such as papaw, sugar apples and citrus. Animal raising is mostly of small species, namely poultry, pigs and goats. In spite of its relatively small size, the Cayman Islands have a fairly vibrant domestic agriculture sector for domestic consumption and which also provides some products to the tourism-catering businesses. Its characteristics and size nevertheless makes the islands highly dependent on imported food products. Its most salient feature is that, as traditional farm production tends to be, it is fairly labour intensive with about 1,200 persons involved in the activity, most of them Caymanian, which marks a distinction with employment in the other sectors.

Crops

In the crop sub-sector, it is estimated that 90-95% of crops were destroyed in Grand Cayman. [15] Given the fairly shallow soils, most of the many fruit trees were uprooted. It is expected that there will not be any mango or avocado and some other fruit crop next year. The small banana crop was hard hit, but those plants that were cut before the hurricane or soon after, and should recover to bear fruit within 9 months. Table 8 illustrates the crop production in the jurisdiction.

Table 8

CROP PRODUCTION IN GRAND CAYMAN

(Percentage of total, based on historical data)

Crop	100.00%
Avocados	1.73%
Bananas	38.08%
Breadfruit	0.72%
Cassava	1.23%
Coconuts	0.03%
Citrus	15.29%
Leafy Vegs. (calaloo, patchoi)	6.86%
Mangoes	22.45%
Papaya	1.21%
Plantains	2.60%
Pumpkins	5.40%
Sweet Potatoes	0.32%
Tomatoes	0.94%
Melons	0.97%
Yams	2.17%

Source: ECLAC, from official data.

Fortunately, some plants that toppled over are still viable and the Department of Agriculture has been urging farmers to conserve these trees, which can be restored to production or can be used budding and grafting.

[15] There is some agricultural production in the bluff of Cayman Brac that seems not to have been affected.

The small crops sub-sector also suffered badly, with the near destruction of the yam, hot pepper and callaloo crops. More significantly, the government's Experimental and Research Unit was destroyed, and thus given the loss of the plant propagation system led to the loss of a large number of seedlings.

Livestock

The livestock sub-sector was not badly affected, considering the strength of the hurricane. Most of the animals were kept in sheds, although some of them lost part of their roofing and walls. Such was the case of a farm in the northeastern part of the island where their pig shed was damaged. Although the large animals fared better than the smaller ones, they were still badly affected. It is estimated that about fifty cows were lost, also some horses and more than a hundred goats. The local poultry industry suffered serious damage to its infrastructure. Henceforth, caged poultry suffered heavy losses, with some farmers being completely wiped out, with dire implications for their livelihoods.

Fisheries

Fishing is a small scale activity in the Cayman Islands, of minor importance even in relative terms as it compares to other Caribbean states. Apart from the direct damage to their boats, fish pots and other equipment, fishermen are set to suffer income losses in the future that would affect their welfare. Aquaculture has more importance in Grand Cayman and suffered badly due to salt intrusion and flooding of pools. One new venture of tilapia incurred significant loss. The Caymans Turtle Farm, in contrast, did not suffer any significant damage or loss of turtles.

Given the cultural importance and potential of agriculture as an additional attraction to tourism, namely supplementing the interest of those tourists attracted to nature, sea diving and fishing as well as a supplier of local food that lends more originality to the hotel and restaurant fare, the recuperation and promotion of this sector seems strategically relevant. An integrated strategic plan for rehabilitating and ensuring dynamic growth in the sector could be a positive step in the creation and promotion of a niche market production, incorporating traditional systems of production with organic output for the tourism sector. In order to enhance the quality of produce through plant propagation techniques

the early restoration of the experimental station seems a project worth pursuing, rallying external support to it. In order to restore this sector's dynamism and promote its expansion there is need for a financial programme tailored to the needs of agricultural producers, including lines of credit and term credit need to be established along with proper insurance systems.

c) Commerce

The total damage in the commerce sector has been estimated at $463.4 million, of which, $429 million or over 92% are direct damage derived from destruction of locales, warehouses and shopping spaces. Some large supermarket spaces as well as shops in numerous shopping plazas and malls were severely affected by flooding, roofing damage and, in some cases, looting in the immediate aftermath of the event. In addition to rebuilding or relocating costs, the loss of stocks is substantial. Nevertheless the indirect losses associated with interruption of business will be less significant since most merchants started immediately to operate, reopen and offer business by provisional means, under emergency circumstances or in other locations.

Since commerce accounts for 13% of GDP and 14.5% of employment in the Cayman Islands, its rapid recuperation is essential to the functioning of the economy. Thus, in spite of the heavy direct damage — a portion of it insured — the reinitiating of business is essential. This is even more so when considering that few merchants were insured in terms of interruption of business or business losses.

In terms of recovery, larger businesses that were insured are better able to cope and to resume operations, whereas small businesses, which employ about 40% of the work-force, are in a more precarious position. Additionally there is a larger proportion of small and medium merchant and small businesses that were not insured and therefore have to find alternative funding to restore operations. It bears noting that roughly 60% of small businesses are operated by women as a means of livelihood implies that forms of assistance are needed to help them restore their operations.

Thus, although the commercial sector suffered significant damage and losses as a result of Hurricane Ivan (not considering trade associated with tourism which is considered under that heading), it is one of the fastest recuperating areas of the economy. As indicated, property

damage accounted for the major portion of the total, but loss of stocks and income flows from closure were also important.

Shortages of goods in the commercial sector are likely to lead to temporary increase in prices and higher imports to restock supplies are expected to lead to a widening of the merchandise deficit of the balance of payments.

Financial services and offshore activities did not suffer any significant direct damage as such and were quickly operating, in some cases even while the storm was still over the jurisdiction. Through re-routing of business and by placing staff abroad in an efficient and immediate manner this sector almost did not miss a beat. It has not been possible, though, to assess its increased operating costs that must have been significant. A sign of those is the expenses incurred in travel and relocation of their staff and families, and in operating through alternative communications and utilities.

This quick response and immediate recovery is crucial to maintain the country's lead in these activities and is surely recognized by their clients, as is attested by the fact that, even during the month of September, the number of company registrations increased, in keeping with the very positive trend observed during the first three quarters of the year.

Table 9

ESTIMATES OF DAMAGE IN THE PRODUCTIVE SECTORS

(CI $000)

	Direct damage	Indirect losses	Total	External component
Tourism (the indirect losses include related commerce and activities)	281.9	180.5	462.4	462.4
Agriculture, Livestock and fisheries	0.4	5.2	5.6	1.5
Commerce	429.0	34.4	463.4	448.3

Source: ECLAC.

2. Infrastructure

a) Electrical Sector

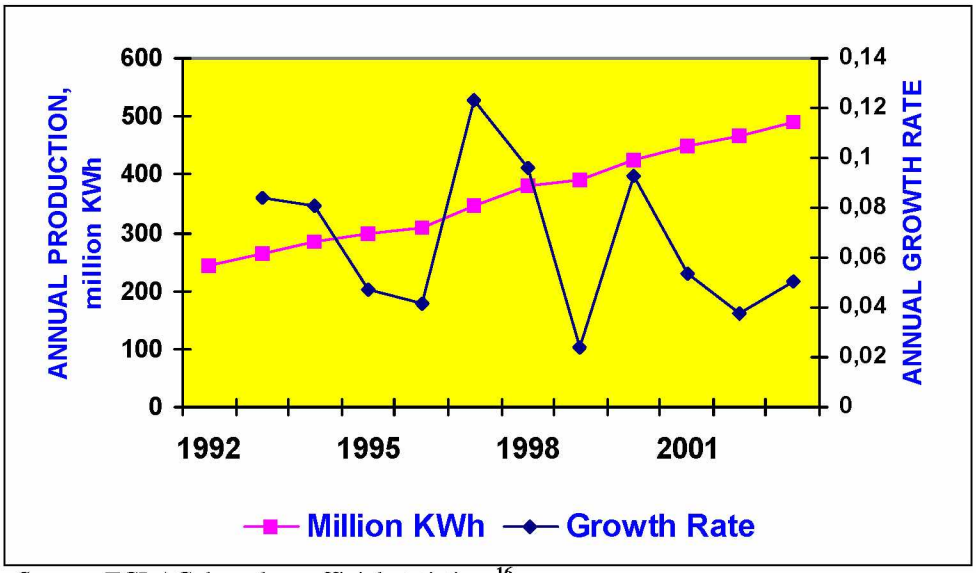
Background Information

The Caribbean Utilities Company (CUC) provides electrical power in the Cayman Islands. This enterprise has a system that includes 18 power units of varying capacities in its North Sound Road plant, five major electrical substations, and about 300 miles of aerial high-voltage transmission and distribution lines and grids, as well as 14 miles of high-voltage submarine cable. [15]

The utility company has been steadily increasing its installed capacity over the years, which presently stands at 123 megawatts, in order to meet the growing electrical demand of the island. Total electricity consumption has been growing at average annual rates of around 6%, to a value of 490 million KWh in 2003, as shown in Figure 7.

Figure 7

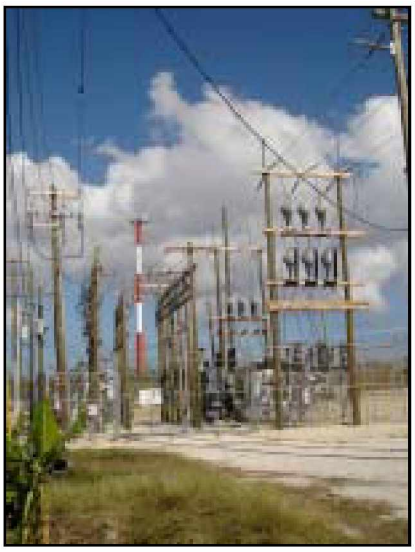
ELECTRICITY PRODUCTION IN THE CAYMAN ISLANDS 1992 TO 2003



Source: ECLAC, based on official statistics. [16]

[15] See *Cayman Islands 2003 Annual Report and Official Handbook*, George Town, Cayman Islands, June 2004.

The Impact of the Hurricane



i) Damage Sustained by the System. Contrary to what was done in other places, electricity was not shut down in Grand Cayman before arrival of the hurricane. Total system failure came at around 01:40 hours on 12 September. Slight damage was sustained by the North Sound Road power plant, and more extensive damage occurred in transmission lines and several substations as well as in distribution grids. Furthermore, it was found that the submarine cable in the North Sound was damaged 1,500 feet offshore.

ii) Restoration program. In order to respond to user demands to restore electrical service, CUC secured the assistance of Fortis, Inc., its main stockholder, and of a line construction contractor from North Carolina (Mastec). Furthermore, thanks to the existing subregional Hurricane Action Plan of CARILEC, [17] teams from Barbados, Belize, Bermuda and Turk and Caicos electrical enterprises cooperated in the restoration plan of action. This enabled a faster pace in restoring power supply. Efforts were made in order to attend first the needs of priority areas such as hospitals, schools and other key government buildings.

CUC resorted to using its stock of equipment and construction materials to effect repairs. However, this was insufficient and CUC was forced to charter vessels for the urgent transportation of 70-foot poles, transformers and other electrical hardware.

CUC undertook repairs to its power units and lines. By end-November, full recovery of the system had been achieved, even though electrical demand was still well below pre-disaster levels, as reported by CUC. The following graph shows the recovery of power generation by CUC, in comparison with 2003. [18]

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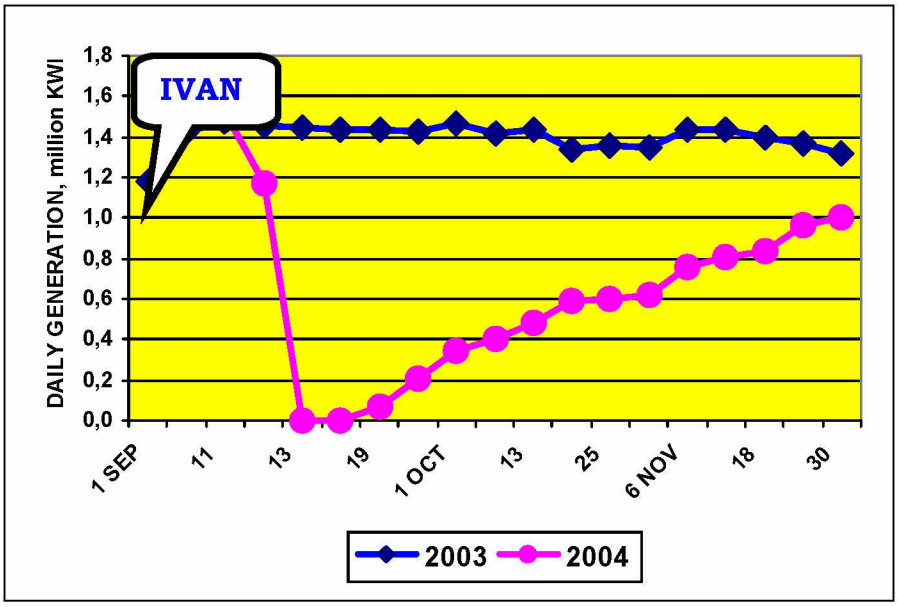
[16] *2003 Cayman Islands Compendium of Statistics*, page 122, Statistics Office, George Town, Cayman Islands, June 2004.

[17] Caribbean Electric Utility Services Corporation.

[18] Press Release, *CUC Restoration Update-November 30*, Canada NewsWire.

Figure 8

POWER GENERATION AFTER THE HURRICANE



iii) Estimates of Impact. Preliminary estimates made by CUC show that insured damage to power plant units, transmission and distribution subsystems, buildings, materials inventories and other items reach an amount of CI$ 33.9 million. Further estimates by CUC indicate that its insured business interruption losses in the following 24 months due to the lower billings over the recovery period will be CI$ 35 million. [19] The latter is due to the abrupt fall in sales following the hurricane, and to the slow recovery of demand in many customers whose premises were damaged or destroyed during the disaster.

CUC has ample insurance to cover its damage and losses. Its insurance policy abroad includes US$ 100 million coverage to its North Sound Road power plant, remote substations and all transmission and distribution equipment located within 1,000 feet of its main plant and substations, [20] plus US$ 55 million in business interruption per year within a 24-month indemnity period. The policy has a maximum of US$ 4 million in deductible on asset insurance and a 45-day deductible on business interruption insurance, as well as US$ 15 million in machinery breakdown insurance.

CUC is therefore adequately covered to face most of the damage and losses sustained after Ivan. It also has available a special hurricane fund of US$ 4 million to cover deductibles and

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19 Press Release, *CUC Restoration Update-November 30*, Op. Cit.

20 Transmission and distribution insurance beyond 1,000 feet from the boundaries of the main plant and substations is not presently included since CUC was not able to obtain such coverage at reasonable economical rates.

uninsured risks, a US$ 7.5 million line of credit for reconstruction, and a US$ 10 million bridging loan facility.

Taking into consideration the uninsured transmission and distribution components, the total impact of the hurricane on the electrical sector of the Cayman Islands has been estimated as CI$ 68.9 million, of which 41% (CI$ 33.9 million) are damage to assets and the remaining 59% (CI$ 35 million) are business losses (see table 10). The damage and losses sustained by the sector will result in the need to import equipment and materials for an estimated amount of CI$ 22.6 million, which will be offset by estimated reinsurance proceeds from abroad of CI$ 48.5 million.

Table 10

ESTIMATED IMPACT OF DISASTER ON ELECTRICAL SECTOR

(Million Cayman Island Dollars)

	Total Impact			Sector		Imports, exports
	Total	Damage	Losses	Public	Private	
Total Impact	68.9	33.9	35.0	--	68.9	
Assets	33.9	33.9	--			22.6
Losses	35.0	--	35.0			
Lower revenues	35.0		35.0 [21]			
Increased operational costs	...					

Source: ECLAC, on the basis of information provided by CUC.

It is to be noted that the interruption of electricity over the five days following the passage of the hurricane caused losses in the productive sectors that utilize it as an input. These losses will be estimated and accounted for under each user-sector in other sections of this report. As of November 30 CUC had restored service to the entire island. However, an estimated 20% of customers have not been reconnected due to the ongoing repair and rebuilding of their premises.

One last comment is due to stress out the fact that the above estimated damage and losses do not compromise the Utility's financial survival, since they represent — respectively — 11 % of the value of its property, plant and equipment assets and 19% of the annual operating revenues, as stated in the most recent CUC report. [22]

[21] No estimates on this item are available as yet.

[22] See *2004 Annual Report*, Caribbean Utilities Company, Limited, George Town, Grand Cayman, 2004.

b) Water Supply and Wastewater Disposal

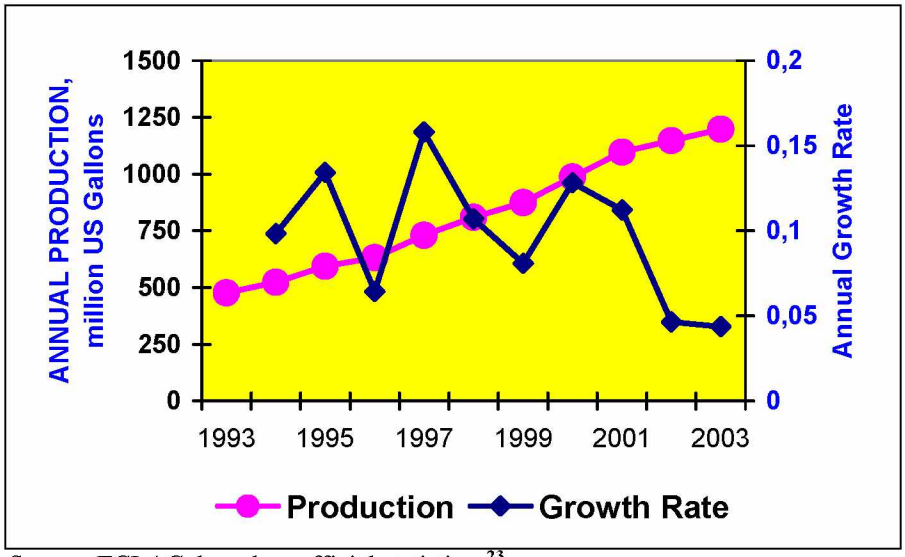
Background Information

There exists a very limited groundwater supply for drinking purposes in the Cayman Islands, mainly tapped at the East End well field. Six reverse osmosis seawater desalination plants, with a combined capacity of 19,800 cubic meters per day (5.3 million US Gallons per day), are in operation to fulfill drinking water demands; they require electrical power for their functioning. These six plants are operated by Consolidated Water Company, Limited (CWCO), which sells water directly to consumer sectors and to the Government's Water Authority-Cayman (WAC). The total water production capacity is divided between the CWCO and WAC water distribution systems, at 45% and 55% respectively.

Potable water demand has steadily grown in the past decade, at average annual rates of near nine per cent, although such growth has decreased in the most recent years (see Figure 9). Total annual consumption of water in Grand Cayman reached 1,200 million US Gallons in 2003, with residential and industrial-commercial consumption taking the main share (see graph 2-4).

Figure 9

WATER SUPPLY IN THE CAYMAN ISLANDS 1993 TO 2003



Source: ECLAC, based on official statistics. [23]

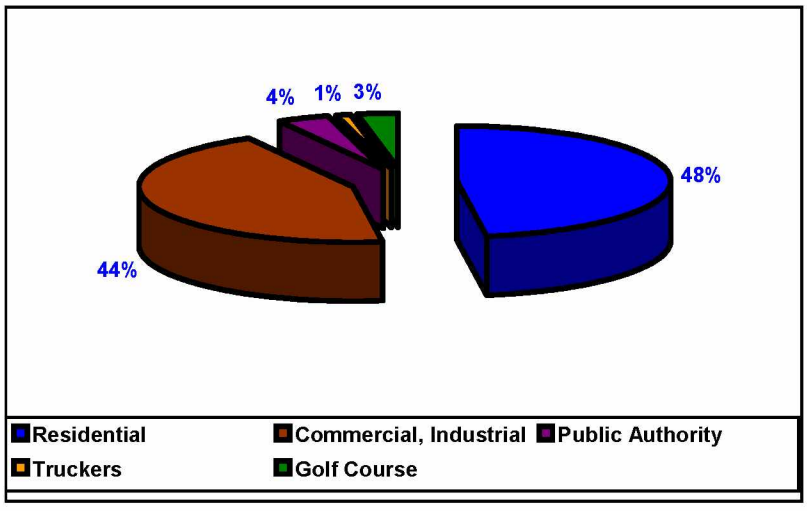
[23] *2003 Cayman Islands Compendium of Statistics*, page 124, Statistics Office, George Town, Cayman Islands, June 2004.

The Water Authority operates a wastewater collection and treatment system for part of Grand Cayman in the West Bay Beach area. The collection system operates by a combination of gravity and pumping operations and discharges effluent wastewater to stabilization ponds. Treated wastewater is then pumped into the subsoil by means of 150 feet deep disposal wells.

The total volume of wastewater treated in the system increased from 310.6 million US Gallons in 1993 to 534.5 million US Gallons in 2003, an annual average rate of around 7.2%; the number of connections rose from 243 in 1993 to 290 in 2003. [24] In order to improve treatment and potentially increase the coverage of wastewater collection and treatment, a 2.5 million US Gallons capacity Sequencing Batch Reactor system has been under construction since September 2002, and was due to enter into operation precisely at the time when the disaster occurred. The construction of the new wastewater treatment works was carried out by a joint venture of Hadsphaltic International Limited and Wharton-Smith Inc., with financing provided by FirstCaribbean International Bank. [25]

Figure 10

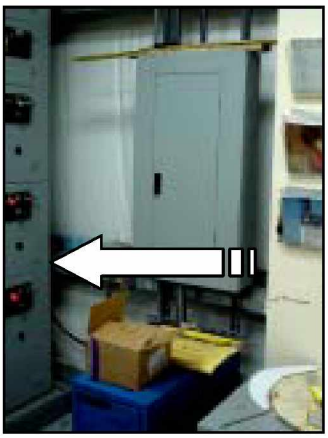
WATER DEMAND BY SECTOR IN GRAND CAYMAN, 1993 TO 2003



[24] See previous footnote.

[25] See *Cayman Islands 2003 Annual Report and Official Handbook*, Op. Cit., page 187.

The Impact of the Hurricane



i) Damage Sustained by the System. Seawater from the storm surge and strong winds damaged the buildings and equipment of the water production plants, and the lack of electricity brought down their operation. The CWCO headquarters building sustained heavy damage and was evacuated, while relatively minor damage occurred at the Water Authority headquarters. The action of seawater so heavily affected the Britannia water plant (1,600 cubic meters per day capacity) that it was put out of operation permanently, thus reducing the island's total capacity by about 8%. Neither CWCO's nor WAC's water storage tanks were severely damaged. Some 2,000 meters of WAC's main water lines that ran alongside coastal roads became exposed due to the storm surge and although not all of these pipes broke, they must be re-laid in order to ensure structural integrity.

The wastewater collection network became flooded by seawater and the electrical components of 90% of the pumps were damaged. Wastewater could not be disposed nor treated for a few days but no wastewater was discharged onto the roads or properties The WAC utilized portable pumps and sewage vacuum trucks to move wastewater to the waste stabilization ponds for treatment prior to the restoration of power. The new wastewater treatment plant, which was scheduled for inauguration on 8 October, sustained significant damage, primarily to its electrical control system.

ii) Service Restoration Program. CWCO began repairing the damage to the water production plants immediately after the disaster. No power was available from 12 to 17 September; when power returned, the water production plants were placed into operation as per the schedule described below. In some cases, use was made of portable generators to advance the operation of the plants.

While the water production plants were being repaired and placed into operation, CWCO and WAC systematically inspected their water distribution systems and repairs were made in the exposed and damaged interrupted water pipe lines.

The above recovery efforts of the water service enabled 67% of the water users to be connected by 29 September, and 90% by 1 October. [26] Water demand has decreased due to the destruction of many households and to the decrease in the arrival of tourists to hotels, and it is expected to remain below normal at least throughout the next tourist season. This will alleviate the situation posed by the permanent loss of the Britannia water plant.

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[26] See *Press Releases*, Water Authority-Cayman, 29 September and 1 October 2004.

Table 11

SCHEDULE OF RECOVERY OF WATER PLANTS FOLLOWING THE DISASTER

Water Plant	Capacity, Cubic meters per day	Recovery, in % October 5	Recovery, in % October 19
North Sound	3,000	100	100
Red Gate	5,000	100	100
Lower Valley	3,000	100	100
West Bay	2,700	65	100
Governor's Harbour	4,500	0	100

Source: Reports by CWCO.

In regard to the wastewater collection and disposal system, pumps were and will be operated manually until new electrical starter motors and control systems can be installed.

Repairs to the new sewage treatment plant are still underway at the writing of this report and it is expected to begin operations in early December; i.e. two months behind schedule.

iii) Estimates of Impact. In its third quarter report on operating results, CWCO provided estimates on damage and losses sustained as a result of the disaster. The report indicated that damage to its plant and equipment was CI$ 1.3 million; spare parts inventories, CI$ 93,200; and increased costs to rebuild operations, CI$ 111,130. Net losses of revenue of CI$ 322,893 due to the reduced sales of water to its customers in September were recorded. [27] CWCO also indicated that water sales are expected to recover during the balance of the year, and that it expected its fourth quarter results to still show additional hurricane-related costs and below-normal sales.

The above estimated damage and losses do not compromise CWCO's financial performance, since they represent — respectively — 5.1% of the value of its property, plant and equipment assets and 8% of annual operating revenues.

The WAC has estimated damage to its buildings, plants and equipment — including its new wastewater treatment plant — at CI$ 3.6 million.

Including estimates of future revenue losses and increased operational costs beyond 1 October, the total impact of the hurricane on the water supply and wastewater disposal system sector of the Cayman Islands has been estimated as CI$ 5.6 million, of which 86% (CI$ 4.8 million) are damage to assets and the remaining 14% (CI$ 808,600) are business losses (See table 12 below). It is estimated that CI$ 3.6 million will be used to import equipment and construction

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[27] Press Release, *Consolidated Water Company, Limited, Reports Third Quarter Operating Results*, PR Newswire, 23 November 2004.

materials for the reconstruction, and that insurance proceeds from abroad will be around CI$ 4.4 million.

Table 12

ESTIMATED IMPACT OF DISASTER ON THE WATER SUPPLY AND WASTEWATER DISPOSAL SECTOR

(Thousand Cayman Island Dollars)

	Total Impact			Sector		Imports,
	Total	Damage	Losses	Public	Private	exports
Total Impact	5,620.4	4,811.8	808.6	3,628.0	1,992.4	3,649
Assets	4,811.8	4,811.8		3,600.0	1,211.8	3,649
- CWCO	1,211.8	1,211.8				
- WAC	3,600.0	3,600.0				
Losses	808.6		808.6	28.0	780.6	
- Through 30 September	434.0		434.0			
- From 1 October onwards [28]	374.6		374.6			

Source: ECLAC, on the basis of information provided by CWCO and WAC.

c) Road Transport

Background Information

The highway system of Grand Cayman includes approximately 225 kilometers (140 miles) of roadways (See map below), of which approximately 145 kilometers (90 miles) are of primary and secondary roads with hot-mixed asphalt surface. The remaining 80 kilometers refer to collector, local and other minor streets with oilspray-and-chip surface. In 2001 it was estimated that the asset value of the road network was approximately CI$ 330 million, or CI$ 180 million if land costs were excluded.

Projections of the number of vehicles for 2004, [29] just before the hurricane struck, yield a total number of 34,520.

Motorcars, private	27,400
Trucks	5,320
Buses	530
Motor cycles	330
Trailers	435
Special vehicles	508

[28] Projections made by ECLAC that cover through the end of the first quarter of 2005.

[29] Made on the basis of the series of *Vehicles Inspected and Passed by Type*, in *2003 Cayman Islands Compendium of Statistics*, page 112, Statistics Office, Grand Cayman, 2004.

Damage to the Road Network

The seawater, sand and debris brought by the storm surge and the strong winds of the hurricane caused extensive damage to the road network and drainage, to traffic signal and signs and to vehicles.

i) Roads. A survey conducted by the National Roads Authority (NRA) determined that 39 sections of the road network sustained from minor to major damage. The greatest damage was in the sections located in East End, Breakers, Bodden Town, Spotts, and South Sound. The 5 to 6 meter high storm surge caused seawater to enter inland more than 100 meters in some cases, and washed away entire sections of roads located along the coast. Many thousand cubic meters of sand, collected by the storm surge at the sea bottom and beaches, were deposited on roadways and drainage ditches. New channels and gullies were cut by the action of the surge in the ironshore.

Roads were cut in some sections, and/or reduced in width in others. The asphalt carpeting was removed or damaged severely in still other sections. Drainage structures sustained erosion or silting.

There occurred some cases where fallen trees, even entire houses and many partially or totally destroyed vehicles were deposited on the roads, and many sections were literally buried in deep deposits of sand. Coastal protection for some road sections were destroyed which results in increased vulnerability against new natural phenomena. Traffic was paralyzed in those sectors for several days, until roads were cleared using heavy machinery. And then, longer times than normal were required until traffic was fully restored. The authorities are considering shifting the location of selected road sections to ensure their safety during the hurricane season.

ii) Land Drainage. Surveys conducted by NRA personnel have found that nearly 500 vertical drain well systems were affected in various ways. Sand clogged these wells in the East End, Bodden Town, South Sound and West Bay road areas. Leaves and other debris have reduced the effectiveness of the wells in George Town and in sections of West Bay. Estimates indicate that at least 100 of these wells would have to be redrilled, while the rest are to be cleaned or cleared through mechanical or manual means. Flooding due to rain is likely to result in the absence of such cleaning and reconstruction of the well system.

iii) Traffic Signs and Signals. The action of the strong winds damaged or destroyed the eight signalized intersections in the island, and it was determined that water had infiltrated the electronic and electric components of the computer control component of seven of them. Traffic slowdown has been inevitable as a result.

In addition, many of the traffic signs in the entire road network were blown away or bent by the wind, which results in difficulties when searching for unknown addresses. Furthermore, the shop used to make the signs was damaged and the machinery and stock of materials was seriously affected.

iv) Vehicles. Due to the lack of high places in which to safeguard vehicles during the passage of the hurricane, a heavy toll was sustained due the action of the seawater, sand and fallen trees. Nearly 1 out of five private motor vehicles was rendered useless, since the action of the seawater and sand affected their electrical and electronic components and the upholstery. Heavy transport vehicles were in short supply after the hurricane as well, both in the government and in the private sector.

Not only the average citizen was affected by this, but taxi drivers did not have sufficient vehicles to meet the demand when cruise ships began arriving on 1st November. Car rental companies were pressed to meet the increased demands. Urgent imports of several thousand vehicles were arranged for after the disaster, but the loading docks in Florida were also overburdened due to the action of the hurricanes in their shores.

v) Other Items. The NRA sustained damage to its laboratory and materials testing equipment, as well as to several of its buildings.

Transport Losses

Indirect losses were incurred in the transport sector due to the above-described damage to its assets. On the one hand, increased transport costs were sustained by the users of the road system due to the temporary suspension of all traffic in the affected sections of roads that required reconstruction and clearing, and due to the need to circulate at lower-than-normal speeds in same over an extended time period in road sections of inferior quality than before. In addition, increased maintenance costs are being incurred by all vehicles because of this situation. Furthermore, many persons that lost their cars are resorting to temporarily renting other vehicles while they are able to acquire new units, and/or to share vehicles with friends or relatives.

The information required to undertake an estimation of these increased transport costs was not fully available at the time of the assessment, but it is certain that may be as high as one-third the value of the damage to assets in the sector.

Summary

The assessment reveals that the total impact sustained by the road transport sector amounts to CI$ 194.9 million, of which 75% are damage or destruction of assets (CI$ 146.2 million) and the remaining 25% refer to increased operational transport costs (CI$ 48.7 million), as described in table 13. Furthermore, that imports of vehicles, machinery and materials for an amount of CI$ 143 million will have to be made in order to restore the assets. Additional estimates indicate that about CI$ 100 million in reinsurance proceeds may be received once the claims are processed and reimbursed.

Table 13

ESTIMATED IMPACT OF DISASTER ON THE ROAD TRANSPORT SECTOR

(Thousand Cayman Island Dollars)

	Total Impact			Sector		Imports, exports
	Total	Damage	Losses	Public	Private	
Total Impact	194,865.0	146,165.0	48,700.0	24,565.0	170,300.0	143,100.0
Assets	146,165.0	146,165.0		14,965.0	130,300.0	
Road network	10,000.0	10,000.0				
Land drainage well system	190.0	190.0				
Traffic signals and signs	1,600.0	1,600.0				
Buildings and laboratories	75.0	75.0				
Vehicles [30]	134,300.0	134,300.0				
Losses	48,700.0		48,700.0	8,700.0	40,000.0	
Increased transport costs [31]	48,700.0		48,700.0			

Source: ECLAC, on the basis of information provided by NRA and other sources.

d) Ports and Airports

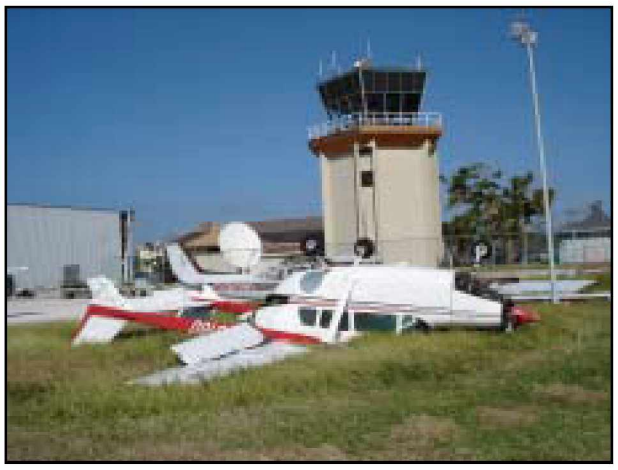
Grand Cayman's Owen Roberts International Airport

i) Background Information. The Cayman islands Airport Authority (CIAA) operates Owen Roberts International Airport in Grand Cayman. [32] This airport links the Cayman Islands with the outside through more than 108 flights per week, of which 70% are to and from Miami. Connections are available to the Sister Islands. During 2003 there were over 25,000 flights into and out of the airport.

[30] The number of units and their estimated value is as follows: private cars (5,480 at CI$ 18,000 each), trucks and buses (175 at CI$ 55,000 each), other transport units (315 at CI$ 125,000 ea.), and government vehicles at CI$ 3.1 million.

[31] Estimated preliminarily as equivalent to 75% of the assets´ value.

[32] See *2003 Annual Report and Official Handbook Cayman Islands*, pages 181 and 182, George Town, Cayman Islands, 2004.



ii) Impact of the Disaster. The terminal building sustained significant damage; it lost most of its roof due to the action of the wind and electrical equipment and connections were damaged by water. Air traffic equipment was also damaged and must be replaced. The CIAA office building, the General Aviation, the air cargo office and the Meteorological Office facilities suffered extensive roof and water damage. Seawater up to 60 centimeters in height was brought by the storm surge, and caused the total loss of communications and computing equipment, and of upper-air observation receivers. In addition, the lighting system and electronic equipment for navigational assistance and the emergency generator sustained considerable damage and destruction. The perimeter fence was severely damaged. The runway itself sustained no significant damage. No damage to airport facilities in the Sister Islands was reported

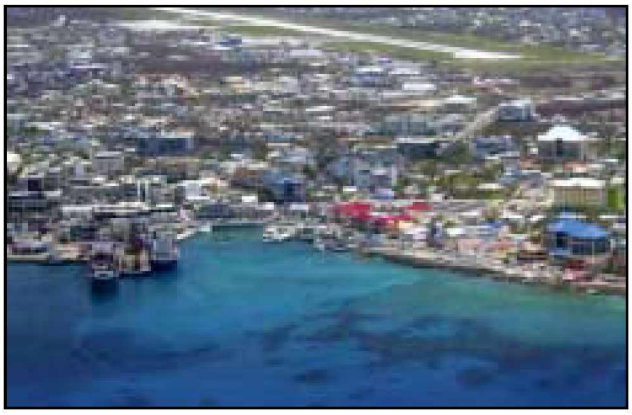
The international airport was closed to operations for two days. On 14 September, daytime operations were reinitiated, and were promptly expanded in order to accommodate incoming relief flights. The government imposed temporary travel restrictions into and out of Grand Cayman. Airlines were requested not to transport any non residents into the Islands, excepting those that were to cooperate in the reconstruction. These restrictions were lifted on 20 November and tourists began to arrive.

Damage sustained by airport building and infrastructure has been estimated at CI$ 1.1 million. The cost of replacing radio and lighting systems reaches CI$ 950,000 while the perimeter fencing repair and replacement and damage to other buildings was valued at CI$ 4.2 million more. Three small private planes that were destroyed by the action of the winds are valued at CI$ 1,950,000.

The reduction of passenger traffic since the hurricane occurred and at least through mid-2005 — when it is expected to reach normal levels provided the tourism infrastructure is back to normal — will cause losses of revenue due to uncollected airport taxes and security fees. These losses have been estimated as CI$ 4.5 million.

Therefore, the total impact of the disaster on the international airport facilities and operations has been estimated at CI$ 12.7 million, of which 65% are direct damages to infrastructure and equipment and the remaining 35% are revenue losses (See table 2-5 below). Some CI$ 9.5 million will have to be assigned to import equipment and materials from abroad, and about CI$ 5.8 million are expected as reinsurance from abroad.

George Town Port



i) Background Information. The Port Authority operates the port facilities at George Town. In 2003, a total of 1,152 port calls were made by 288 cargo ships, 852 cruise ships, 35 tankers and 4 government vessels, and 1.6 million cruise ship visitor landed in the island. A finger pier that was damaged by a storm in 1998 and by hurricane Michelle in 2001 was under restoration.

ii) Impact of the disaster. The winds and storm surge imposed damage to infrastructure and equipment in the port. Vehicles were affected by salt water and by flying debris. The cruise terminals sustained some damage, but the cargo pier was unaffected. The warehouse and its components suffered from the action of the winds, losing part of the roofing. Other buildings, including the mechanic shop and outdoor sheds, the taxi dispatch facility and the Spotts landing, were similarly affected.

The demand on port facilities was temporarily reduced due to the suspension of cruise ships arrival, until their resumption on 1st November, and port operation revenues were reduced accordingly. On the other hand, the Port Authorities have had to cope with the increased cargo traffic to bring in relief assistance and reconstruction equipment and materials.

The total impact of the disaster on port facilities has been estimated as CI$ 3.0 million, evenly divided into direct damage on infrastructure assets and losses of income, as indicated in table 2-5 below. This will also have an impact on the balance of payment due to increased imports of relief and reconstruction goods and to lower revenues from abroad, to the tune of CI$ 2.6 million. Assets and revenues were partially insured, so that a flow of about CI$ 2.8 million.

Table 14

ESTIMATED IMPACT OF DISASTER ON PORT AND AIRPORT SECTOR

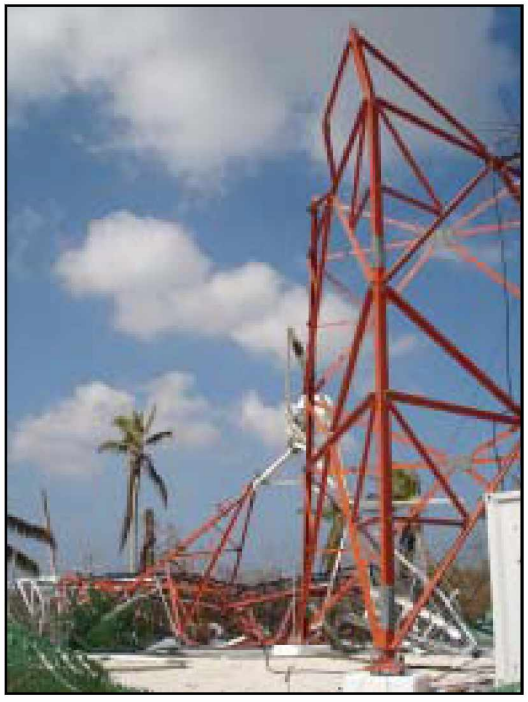
(Thousand Cayman Island Dollars)

	Total Impact			Sector		Imports, exports
	Total	Damage	Losses	Public	Private	
Total Impact	15,738	9,700	6,038	13,788	1,950	12,101
International Airport	12,700	8,200	4,500	10,750	1,950	9,485
Terminal building	1,100	1,100				
Radio and lighting equipment	950	950				
Other buildings and fencing	4,200	4,200				
Airplanes	1,950	1,950				
Losses in revenue	4,500		4,500			
Port Authority	3,038	1,500	1,538	3,038	--	2,616
Cargo distribution center	600	600				
Cruise terminal	380	380				
Administration buildings	300	300				
Heavy equipment	220	220				
Losses in revenue	1,538		1,538			

Source: ECLAC, on the basis of information provided by CAA and Port Authority.

e) Telecommunications

A single company — Cable and Wireless, which has a regional coverage mostly in the English-speaking Caribbean — provided telecommunication services to the Cayman Islands in the past. In mid-2003, the Government and Cable and Wireless signed an agreement through which staged competition was introduced in the Islands. Since then several other enterprises — including AT&T, Digicel, TeleCayman and others — have entered the market. The Information & Communications Technology Authority regulates their functioning.



The strong winds of the hurricane combined with the intrusion of seawater from the storm surge caused extensive damage to the telecommunications licensees. In addition, the temporary lack of electricity played was a key element in the restoration of services.

The winds caused the collapse of three major telecommunications towers whose utilization was shared by several of the licensees; many antennas became misaligned. Entry of seawater into base stations damaged the electronic equipment at many cell sites, which required replacement. The landline network was damaged by the winds that brought down poles shared with the electric utility, and by flooding of telephone exchanges and underground optical fibre cable lines. While about 50% of customers presently have service, it is expected that full recovery will not occur until February 2005.

The Maya-1 submarine fiber optic cable that provides international telecommunications traffic sustained damage in the Half-Moon Bay area, and the Cayman-Jamaica Fibre System (CJFS) cable was partially damaged at its shore end. No total traffic interruption occurred, however, since partial capacity was maintained throughout until repairs were completed.

Some of the telecommunications companies flew in portable electrical generators from the United States in order to expedite the resumption of their services; operational costs have risen due to the use of fuel for this purpose. Cable and Wireless brought in some fixed wireless technology equipment to compensate the temporary loss of its landline works. Despite this, many customers have temporarily resorted to the use of mobile telephony instead.

Revenues for the licensees have been lowered on account of the downtime of their services and due to the absence of stay-over visitors. Operational costs have risen due to the use of higher cost energy. Each company has a different timetable for achieving full recovery. Nevertheless, the licensees expect to recover promptly and are even introducing new technologies to improve their services.

A cable television company sustained significant damage due to flooding and is restoring its services on a staged fashion. Radio broadcasting companies were also affected but — with the exception of one radio — are now back in business.

Estimates conducted by ECLAC, on the basis of partial information provided by the enterprises, indicate that the telecommunications sector sustained a total impact of CI$ 79.5 million, of which 60% were damage to assets [33] and 40% are business losses (See table 15). Furthermore, it is estimated that imports of around CI$ 40 million will have to be made in order to replace destroyed or damaged equipment. In addition, insurance proceeds from abroad are expected to the tune of CI$ 69.2 million.

[33] Some of the licensees have lost a sizable fraction of their assets.

Table 15

ESTIMATED IMPACT OF DISASTER ON THE TELECOMMUNICATIONS SECTOR

(Million Cayman Island Dollars)

	Total Impact			Sector		Imports, exports
	Total	Damage	Losses	Public	Private	
Total Impact	79.5	48.1	31.4	0.3	79.2	40.3
Damage and destruction of infrastructure and equipment	48.1	48.1				
Decreased revenues and increased operational costs	31.4		31.4			

Source: ECLAC, on the basis of information provided by private telecommunications enterprises.

f) Public Buildings

Many government and privately owned buildings for public use sustained damage and destruction to its infrastructure and furnishings. The following buildings, not included in the sector-by-sector assessment of the previous sections of this report, are listed in table 16 below.

While most of them have insurance on their infrastructure, many were underinsured for the furnishings and equipment they contain. The total value for their repair has been estimated at CI$ 42.4 million (See table 16).

Summary of Infrastructure

The total amount of the impact on the infrastructure sector has been estimated as CI$ 407 million, of which 70% (CI$ 285 million) are direct damage to assets and the remaining 30% (CI$ 122 million) are losses of revenue and increased operational costs (See table 17). This will also have an impact on the external sector since imports for CI$ 251 million will have to be made for the reconstruction. Insurance proceeds for a total of CI$ 274 million are expected for the entire infrastructure sector.

Table 16

LIST OF PUBLIC-USE BUILDINGS AFFECTED

Building	Insured value, Thousand CI$	Estimated Damage, Million CI$
Government-owned facilities	100,001	17.4
Social Service facilities	4,731	
Cadet Corporation	382	
Vehicle and Equipment Services	881	
Marine Enforcement Officer	218	
Fire Services	3,861	
Governor's Residence	1,269	
Immigration	2,010	
Judicial	2,639	
Lands and Surveys	21,734	
Legislative Assembly	3,601	
Licensing	273	
Ministry of Community Services	941	
Ministry of Planning	234	
MCRU	764	
Police	5,303	
Postal Services	5,068	
Prison	12,160	
Public Works	2,461	
Environmental Health	2,940	
Ministry of Tourism	681	
Tourism Attraction Board	7,906	
Turtle Farm	6,465	
Youth and Sports	8,927	
Substance Abuse	1,405	
Others	3,145	
Churches		25.0
Total		42.4

Table 17

SUMMARY OF DAMAGE AND LOSSES TO INFRASTRUCTURE

(Million Cayman Island Dollars)

	Impact			Ownership		Effect on
	Total	Damage	Losses	Public	Private	Imports
Total	407.0	285.1	122.2	60.5	346.5	251.4
Electricity	68.9	33.9	35.0	--	68.9	22.6
Water and Wastewater	5.6	4.8	0.8	3.6	2.0	3.6
Road Transport	194.9	146.2	48.7	24.6	171.2	143.1
Ports and Airports	15.7	9.7	6.0	13.7	2.0	12.1
Telecommunications	79.5	48.1	31.7	1.2	78.3	40.3
Public Buildings	42.4	42.4	--	17.4	25.0	87.5

Source: ECLAC.

3. Social Sectors

a) Housing

Approximately 83% or 13,535units of the total housing stock of dwellings, in the Grand Cayman have suffered some degree of damage at a cost of CI$1,444.9 million. [34]

The total number of dwellings in Grand Cayman amount to 16,307 units. Of that number, 58% consist of detached houses and the remaining 42% represent condominiums or apartments. Table 18 presents the dwellings by District and by type of housing. The largest number of dwellings can be found in Georgetown which accounts for some 55% of all units. According to the 1999 Population Census, 45% of households are owner occupied with half of those being owned with a mortgage. Another 49% are rented with the balance being provided rent-free. Sixty-eight percent (68%) of those who live in detached homes are Caymanians and some 21% are non-Caymanians. Of those who live in apartments, 29% are Caymanians and 58% are non-Caymanians. It was not possible to ascertain the exact number of households that were uninsured but it has been suggested that approximately 30% of residences are not insured.

Table 18

HOUSEHOLDS BY DISTRICT AND BY TYPE OF DWELLING

Type of Dwellings by District	Total	Detached houses	Condo/Apartments
Georgetown	8952	4118	4834
West Bay	3642	2331	1311
Bodden Town	2743	2194	549
North Side	465	353	112
East Side	505	465	40
Total	16307	9461	6846

Source: ECLAC, Economics and Statistics Office.

Dwellings which were situated on the sea shore, in low lying, or swampy areas suffered the most severe damage, examples of this could be found along Seven Mile Beach and South Sound Road in Georgetown; Savannah , in proximity of North Sound, Pease Bay and Half Moon Bay in Bodden Town; and High Rock and Gun Bay in East End. Housing that was of a sub-standard nature, such as those found in locations off Watlers Road and Washington Boulevard in Georgetown, was particularly severely affected.

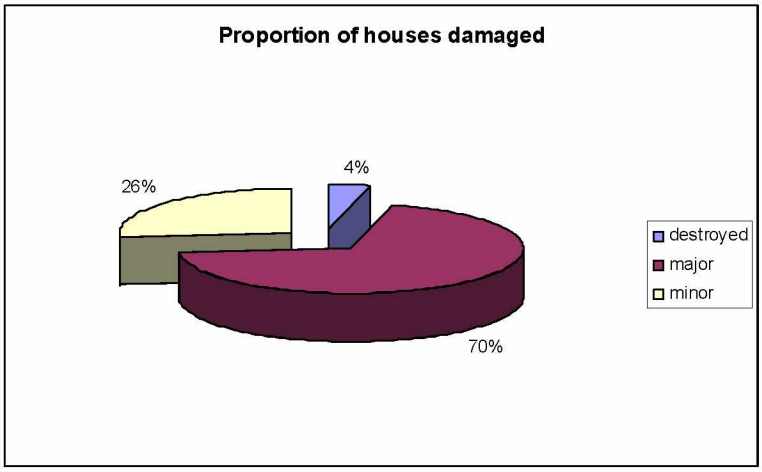
Four per cent (4%) of homes that were affected, were so severely damaged, that they require complete reconstruction. As displayed in Figure 11, 70%, or 9, 475, dwellings, can be classified as having suffered severe damage which resulted from sea surge or damage caused by winds to roofs, windows and doors. The remaining 26% or 3,519 dwellings, have suffered minor

[34] See Appendix I at the end of the section for calculations regarding damaged dwellings.

damage caused by partial roof removal or low levels of water inundation or flying roofs and floating objects such as containers.

Figure 11

PROPORTION OF HOUSES DAMAGED BY HURRICANE IVAN



Source: Estimated by ECLAC from official sources.

The housing structure in Grand Cayman can be broken down into four categories based on the cost structure: the affordable and below, the middle income, high income and luxury housing. Figure 12 presents an estimation of the proportion of housing found in each category. The cost structure has affected the cost of the damage.

In seeking to address the housing situation of persons living in poor housing or persons having difficulty affording housing, which amounts to some 72% of the working population, the Ministry of Community Services, Youth and Gender Affairs, established the National Housing and Community Development Trust which intends to make available 200 homes in the first instance, to qualifying low-income families through a plan called the Affordable Housing Initiative. Of some 35 houses built under this initiative off Eastern Avenue in George Town, at least half were destroyed by hurricane Ivan.

Figure12

DISTRIBUTION OF HOUSING BY CLASSIFICATION [35]

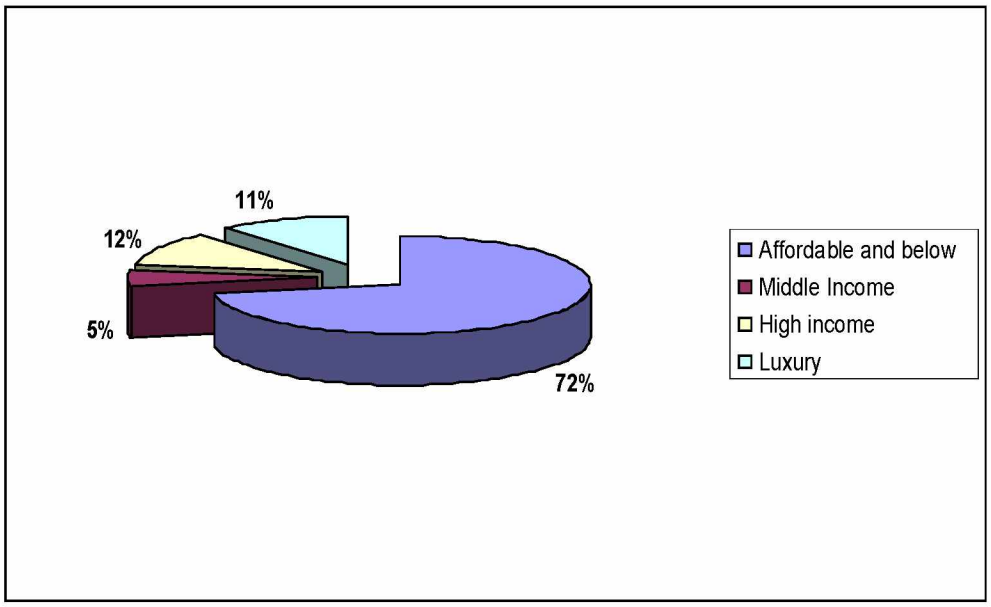


Illustration of level of housing

Affordable and below

Middle Income

[35] Classifications were derived using the Government defined income requirements for affordable housing (set at CI$2,000.00).; information from 2003 Cayman Islands Compendium of Statistics, Table 4.02; and the Cayman Islands 2003 Annual Report and Official Handbook p131.

High income

Luxury

Table 19 presents the summary of effects on the housing sector. Of the CI$1,444.9 million in total damage to the housing sector caused by Hurricane Ivan, direct damage accounted for 91% of the cost. Damage to dwellings totally destroyed accounted for 69% and the indirect losses accounted for 9% of the total value of damage. However the extraordinary housing expenditure incurred due to accommodating governmental and private sector personnel in hotels due to the loss of homes accounted for 42% of the total indirect losses to the sector.

The cost of furnishings, appliance and personal items lost is very high and, in most instances, not covered by insurance or only covered partially. Given the fact that most of these items had been purchased over a number of years and in some cases with heavy personal debt, their replacement will be very difficult to most middle and low income affected.

Table 19

SUMMARY EFFECTS ON THE HOUSING SECTOR

Total	1,444,868,244.11
Total Direct damage	1,319,996,530.98
Direct effects: (a = i + ii + iii)	
i. Cost of damaged houses	990,688,330.76
ii. Damage to houses totally destroyed	231,224,454.10
iii. Cost of damage to furnishings	98,083,746.13
iv. Imported component	1,187,996,877.88
Total Indirect Losses	124,871,713.13
Indirect effects	
i. Strip and removal of debris from housing sites	58,427,100.00
ii. Loss of rent	13,844,613.13
iii. Extraordinary Housing expenditure	52,600,000.00

Source: Estimated by ECLAC based on information received from official sources.

Appendix 1

DAMAGED DWELLINGS

	Number	Percentage of housing stock
Total Housing stock (number of dwellings)	16,309.0	100.0%
Claims received from insurance	5180	31.8%
Claims received from Cayman National Recovery Fund	1202	7.4%
Claims received from CIDB	400	2.5%
Total claims Received	6782	41.6%
Claims expected to be received by formal insurance a/	4077	25.0%
Total estimated claims on dwellings damaged	10859	66.6%
16% un insured b/	2676	16.4%
Total estimated dwellings damaged	13535	83.0%

b) Education

Damage to the education sector proved to be both costly and disruptive to the every day life patterns of the Grand Cayman population. Financial damage to the sector amounted to CI$ 44.8 million. However if it were measured in school days lost, this varied from 25 days to a maximum of 40 days per student depending on level of education and the severity of the impact of Ivan on the specific institution.. It would be safe to estimate that as much as 64% of the student population was directly affected.

The structure of the education system consists of Government schools and Schools run by the Private sector, with government servicing some 66% of the school population. See details of the distribution of the school population in table 20. For the education system, Hurricane Ivan could not have come at a worse time than at the beginning of the school term. Students had just acquired new books, uniforms and begun the school terms. Schools which had to undergo refurbishment for the new school term had just undergone such. Much of this was lost.

Table 20

NATIONAL STUDENT ENROLLMENT FOR 2003

	Pre-Primary & Primary	Secondary	Total	Number of Schools
Government	2597	1940	4537	14
Private	1570	748	2318	10
All Schools	4167	2688	6855	24

Source: Department of Education.

Students had approximately one and a half weeks of schooling when Hurricane Ivan hit, disrupting their education and their life pattern. The school system in the Cayman, forms a central component of the support network for working women who comprise 52% of the population and 50.6% of the labour force. It can be understood that for women to be able to play their productive roles in the labour force, the care and supervision of their children's education of necessity must run smoothly.

Of Grand Cayman's 14 public schools, most experienced minor to moderate damage. John Gray High School (JGHS) and George Hicks High School (GHHS), which are the only two public secondary schools and have an enrollment of 1,841 students or 41% of the total school population, sustained major damage. George Town Primary (GTPS) one of the largest primary schools on the island, also sustained major damage. The details are presented in table 21.

Table 21

DAMAGE ASSESSMENT OF PUBLIC EDUCATION FACILITIES

Building	District	Minor	Moderate	Major
George Hicks High School	George Town			x
John Gray High School	George Town			x
George Town Primary School	George Town			x
Red Bay Primary School	George Town	x		
Light House School	George Town	x		
Prospect Primary School	George Town	x		
University College of Cayman	George Town		X	
Tiny tots Nursery	George Town		X	
Alternative Education	George Town		X	
West Bay Primary	West Bay		X	
West Bay Sunrise Training Centre	West Bay		X	
marine Institute building 1 and 2	West bay	x		
Savannah Primary School	Bodden Town		X	
Bodden Town Primary School	Bodden Town	x		
East End primary School	East End		X	
North Side Primary	North side		X	

Source: Department of Education.

The Cayman Islands education was preparing for a technological leap, not only among its student and staff, but also in regard to its administration and delivery of teaching methods and materials. The cost of damage to the technology involved in the education system is still yet to be tallied. Through its ITALIC (Teaching and Learning in the Cayman Islands) programme over 250 teachers were trained in the delivery of technology to their students. Hurricane Ivan may set back the processes of this programme.

The Community College, established in 1987, and which was designated in September 2004 as the University College of the Cayman Islands, was schedule to begin offering bachelor's degrees in accounting, business administration, economics, finance and marketing. It has experienced a major set back as it suffered major damage to its structures to the tune of some CI$1.5 million dollars. It is not clear if the impact of hurricane Ivan will delay the conversion of the College into a full four year University.

Following Ivan, private schools experienced a drop in enrollment by some 47% of the student population. Government schools fared only a little better, experiencing a drop in

enrollment of some 40%.[36] Day Care centres found they had unused capacity as some were functioning with just 55% of there normal enrollment. But there was great urgency to get Day Care Centres up and running in order to enable women, who had the main responsibility for child caring and rearing, to get back as quickly to their work places.

As is customary in many Caribbean states, schools were used as shelters. Of the eighteen approved shelters on Grand Cayman, 11 were school buildings. Of the other 37 buildings which were designated as suitable for temporary accommodation in addition to public shelters, some 13 were schools. It was not surprising, that this action resulted in a substantial loss to the education sector by schools being used as shelters, resulting in a cost of some CI$1.5 million as can be seen in table 22.

In addition to the schools, a number of Cayman Islands Cultural and historical sites, including the National Gallery, the Archive, the Harquail Theatre, Studio and supporting facilities and The Pedro St. James Castle, and the National Museum felt the wrath of hurricane Ivan.

The total damage to the education sector amounted to CI$ 44.8 million of which the direct damage to schools represents 96% of the overall damage.

Table 22

CAYMAN ISLANDS: SUMMARY OF EFFECTS OF HURRICANE IVAN
ON THE EDUCATION SECTOR

(CI $)

Total	44,819,456.4
Total Direct damage	42,987,345.4
Direct effects: (a = i + ii)	
i. Cost of damaged public schools	26,616,017.0
- private schools	9,616,017.0
ii. Cost of damage to school materials	1,935,142.0
iii. Cost off damage to cultural/heritage sites	4,820,169.4
iv. Imported component	38,688,610.9
Total Indirect Losses	1,832,111.0
Indirect effects	
i. Losses due to school closure	332,111.0
ii. Damage to schools used as shelters	1,500,000.0

Source: ECLAC.

[36] Information provided by Ministry of Education.

c) Health

Of the three components of the Social Sector, damage to the health sector was the least, amounting to the CI$19.0 million. Cost of damage to the sector derives, in the main, from damage to Cayman Islands Hospital (CIH) on Grand Cayman and to the private health institution, the Chrissie Tomlinson's Memorial Hospital. This does not suggest that other institutions were not affected, but cost of damage is not yet available. The Jessie Ritch Memorial Health Centre in Bodden Town, is an example of a facility which was severely damaged.

From the time that the initial hurricane warning came into effect on September 10th all six medical shelters were opened. These were staffed by physicians, nurses and other health care workers in order that health care could be provided before, during and after the hurricane, and until restoration of the regular service. These shelters also housed the special needs patients. Table 23 provides a listing of the facilities and their location.

Table 23

GOVERNMENT HEALTH INSTITUTIONS
BY LOCATION

Name	Location
Cayman Island Hospital	George Town
Faith Hospital	Cayman Brac
Nurses Health Centre	West Bay
Jessie Ritch Memorial Health Centre	Bodden Town
Dica Brown Memorial Health Centre	North side
Lilith Mc Laughlin Memorial Centre	East End

Source: 2003 Cayman Islands: Annual Report and Official Handbook.

In the CIH, provisions were made for a two-shift rotation of staff. In the hospital, at the time of the hurricane, however, there were some 35 patients and 600 members of staff and their families. Patients such as the 26 who were in the dialysis unit were flown off island to Miami because of problems with the water supply. All have since returned Problems with equipment resulted in 8 chemotherapy patients being sent overseas. The cost of provision of these services to the health sector is significant and has not yet been calculated.

During the hurricane 480 residents sought shelter at the hospital because of flooding and destruction of their own properties. The ability of the CIH to withstand the intensity of a category five hurricane, to continue operations throughout the hurricane despite loss of electricity and piped water supplies, and to manage a shelter, is of tremendous credit to the management and staff of the institution. There are anecdotal reports of a premature baby being kept warm and thus alive under the jacket of a nurse when electricity went down.

The CIH is a 139,066 sq ft. two story facility with 124 beds, providing around- the-clock care. During Hurricane Ivan, the CIH provided shelter and food for approximately 1,100 persons for one week, which heavily impacted on its resources. The cost of providing shelter services would cost the institution some CI$900,000. Many of its staff, as much as 85% or 497, found themselves with severely damaged homes and 135 experienced total loss of homes.

Partial damage was sustained to the roof of the CIH, forensic department, eye clinic, dietary building, two conference centres and its dental clinic.

The Chrissie Tomlinson Memorial Hospital, while following its hurricane disaster preparedness plan, treated some 255 patients for hurricane related injuries and conditions, and housed some 300 homeless patients during the hurricane. This institution also suffered damage to equipment and minor damage to facilities.

The total damage to the health sector amounted to some CI$19.0 million, of which direct damages accounts for 51% while indirect losses, accounts for 49%, or CI$ 9.3 million.

Table 24

CAYMAN ISLANDS: SUMMARY OF EFFECTS ON THE HEALTH SECTOR

Total	18,965,964.00
Total Direct Effect	9,645,585.00
Direct effects: (a = i + ii)	
i. Damage to Health facilities	7,255,000.00
ii. Damage to equipment	2,390,585.00
Imported component	8,681,026.50
Indirect Losses	
Total Indirect Losses	9,320,379.00
i. Cleaning and removal of debris	25,500.00
ii. Additional cost of staff services	1,162,200.00
iii. Loss due to use of facilities as shelter	900,679.00
iv. Additional Public Health Services	1,177,000.00
vi. Losses due to forgone income	6,055,000.00

Source: ECLAC.

4. Cross-cutting aspects: Environmental impact [37]

Massive amounts of sand blanketed most of the coastal areas in the south-eastern and western parts of Grand Cayman, given the strength of the hurricane winds and the storm surges. The storm surges and water accumulation in ponds and wetlands led to flooding and in many low lying areas water and debris moved from the beaches inland and from the ponds and marshes into the sea.

The Department of Environment (DOE) has conducted detailed inspections of most of the territory of the jurisdiction. Minor impact was experienced in Cayman Brac and Little Cayman, most of the damage being concentrated in the southeast and western shores of Grand Cayman. It is important to put the effects of what Hurricane Ivan brought in the appropriate perspective. Hurricanes are a very important aspect of coral reef development and their modern shape and formation. Just as forest fires are an important part of forest development, hurricanes help to remove old and unstable reef structures, pile up rubble that forms the fringing reefs and deposit large quantities of sand from the deeper offshore regions into the shallow systems to build beaches and build up land mass. Ecologically they are devastating in the short term, but, as with all natural systems, they repair themselves. The complicating factor today is that modern reef environments have so many artificial factors to hinder recovery that reefs may often be overwhelmed. That is why there is a need for interventions in this natural recovery process that are intended to help with the rapid recovery of marine resources. This is particularly important given the economic value that such environments have, particularly in the case of tourism.

a) Impact in different parts of Grand Cayman

From the assessments conducted by the DOE till the completion of this report, the condition of the different locations of Grand Cayman after the passage of the hurricane was as follows:

i) West Side. Much of the large-scale reef structure remained intact and largely undisturbed. The West side sustained the least amount of physical damage due to its leeward position through out much of the storm, however large amounts of building debris, trees, foliage including marine flora and fauna can now be found littering the reefs, with George Town Harbour being the worst hit. A comprehensive reef clean up for this area has been identified as a major priority. At many of the deep reef Wall sites there is evidence of large scale movements of sand caused by the scouring effects of heavy waves and fast currents. Cursory observations indicated that much of the sand movement was towards the shore as there was little evidence of large scale smothering of reefs towards deeper water or down the wall. Areas recently exposed by the movement of sand appear bright white although typically the newly exposed reef substrates will rapidly become colonized by fast growing marine algae, giving these areas a green appearance in the coming months. The Wreck of the Doc Polson, Sunset House Mermaid and the Balboa looked largely unaffected. The Ore Verde wreck may well have sustained considerable damage, but further confirmation of her condition prior to the storm is needed.

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[37] This part of the report benefited extensively from the assessment done by the Department of Environment.

ii) South Coast. The South Coast dive sites from Sand Key to Spot's dock appear relatively intact. There is abundant evidence of scour of the actual reef substrate (coral fragments rather than sand) from previous storm deposits (perhaps Hurricane Gilbert in1989) giving the impression of smothering, however the newly exposed corals have been dead for some time and are not associated with the destruction of Hurricane Ivan. Soft corals, sponges and perhaps fish abundance have been impacted, particularly in the shallower dive sites. The shallow fringing and back reef areas of South Sound, between the Wreck of the Palace and Sand Key (now relocated approximately 50 meters to the West) provide a good example of an area that will require many years and perhaps decades to recover, if indeed a recovery is possible as destruction was on a massive scale. Prior to the Hurricane Ivan this area had been identified by marine scientists as a regionally important habitat due to the abundance of Staghorn, Elkhorn and Finger Coral that still existed in this area. These corals were once the major coral reef framework builders in the region, but were largely wiped out by disease in the 80's and 90's and are now relatively rare throughout the Caribbean.

iii) North Coast. The North Coast deep and intermediate reefs also appeared largely unaffected in the deep reefs with damage remaining consistent with sediment removal and loss of soft corals and sponges. Localised impacts were observed on the reefs adjacent to the Main Channel, where fine sediments exiting from the North Sound had been deposited on the reef to a depth of approximately 10 cm. Smothering to this extent will be catastrophic for the all benthic marine flora and fauna and wide scale mortality can be expected unless there is significant wave action within the next few weeks to remove the sediment.

iv) North Sound. Visibility in the North Sound remains at 30cm or less making visual assessments nearly impossible. The Department of Environment has conducted assessments of water quality, including measurements of Dissolved Oxygen that are critical for sustaining fish and other marine invertebrates. Water quality problems continue to remain a major concern as the North Sound acts as a drainage basin for a large majority of the Grand Cayman's terrestrial run off. Many problems are compounded in canals where wind driven currents are causing the collection of substantial quantities of marine debris that is causing oxygen levels to be depressed below those critical for survivable of marine animals. The Department of Environment has responded to several calls for assistance with regards to poor water quality and resulting fish die offs. Low oxygen levels have been the primary cause of the majority of fish kills reported to date. South Easterly winds will greatly assist in clearing the North Sound by pushing floating debris from the South eastern portion of North Sound out into the mid sound and eventually out over the reef to open ocean.

Preliminary investigations of seagrass health show the North Sound to be ecologically still viable, although substantial losses in primary productivity can be assumed with seagrass beds compromised by reduced light levels and the mechanical loss of seagrass blades, witnessed by the tremendous quantities of new seagrass blades collecting on the shore or floating as rafts in the North Sound.

Navigation of the North Sound remains hazardous with many submerged obstacles including sunken boats, trees and other debris still not marked. To date the DOE has attempted to mark many of the sunken obstacles that present a navigation hazard, but many remain unidentified.

v) South Sound. The main South Sound Channel is severely blocked by rubble and access is limited to a draft of 2ft or less weather permitting. Inside the Sound considerable quantities of sand have been deposited completely smothering the turtle grass beds that existed previously. Turtle grass can withstand some smothering and it is anticipated that turtle grass will push through the sand in the next few months. Navigation within the Sound may be severely compromised due to sediment deposition and resulting sand bars therefore caution is strongly advised.

vi) National parks. No large-scale assessment of terrestrial resources completed to date. Qualitative assessments have been undertaken for the proposed Barkers National Park and the Queen Elizabeth II Botanic Park.

In the first one (Barkers), the site, located on the northern tip of Grand Cayman was dedicated as Cayman's first National Park in 2003. Government is currently committed to the purchasing the land in this area, a traditional area for local recreation, featuring undeveloped beaches and mangrove wetland. The natural features of Barkers weathered the effects of storm remarkably well and the ecological integrity of the site appears to be intact. Preliminary investigations of the site indicate only limited damage to the mangroves, while the beaches have effectively benefited from the removal of non-native Casuarinas trees from along the shore-line. The potential for designation of the site as Cayman's first National Park remains high. Some damage to the pre-existing network of roads was visible, especially along the north coast; however, given that these roads were emplaced prior to the designation of the area as a national park, their loss may be beneficial in the development of wilderness and limited access areas within the park boundaries. With swift and effective management, it will be possible to capitalise on the effects of the storm in Barkers, and turn them to the benefit of the future National Park.

As for the Queen Elizabeth II Botanic Park, significant damage has occurred to many of the Park's flower gardens. Native trees and other flora, such as those featured along the Woodland Trail have faired better. The interpretation centre and shop appear to have suffered minimal damage. Perhaps most significantly, the National Trust's Blue Iguana Recovery Program, which is based at the Park, suffered minimal damage during the storm. This was a result of extensive pre-storm preparations being made by a team of volunteers, with strong support post-storm from local volunteers in conjunction with volunteer assistance from both the United States (International Reptile Conservation Foundation) and the UK (Durrell Wildlife Trust). This has enabled the program to quickly repair damages and maintain the iguanas with great success and no loss of life. The program is keen to re-establish visitors to the Captive Breeding Facility, as this represents a significant source of income for the program which operates on a tight budget even under normal conditions.

Damage to the different components of this fragile ecosystem was assessed as follows:

i) Dive Mooring. Most of the Department of Environment installed Public Moorings remain intact and are operational. However, the DOE would advise all members of the boating community that are intending to use a public mooring in the next couple of months to be cautious and conduct a thorough inspection of the mooring. Observations to date have revealed that pick up lines are very tightly entangled around the mooring buoy and down line, this line must be untangled prior to securing your boat to the mooring. The mooring should be fully inspected for abrasion; particular attention should be given to the white nylon line that passes through the buoy, connecting the pick up line with the down line as several buoys have been identified with severe abrasion in this area. Attachment to the sea floor at the pin is also subject to abrasion and should be thoroughly inspected. The Department of Environment will be conducting inspections and subsequent 'change out' of all moorings island wide over the next few months. The public is asked to assist in reporting damaged or missing moorings to the DOE.

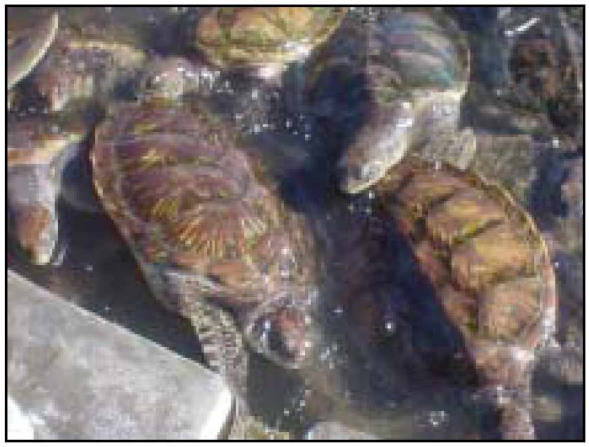
ii) Sand Bar. Several inspections of the sand bar have revealed that despite an initial change in shape it has reformed and remains more or less as before. Water depths have not changed dramatically and wading at the sand bar is still possible. Stingrays, although less abundant than before are still present and approach boats upon arrival. At this stage there is no

evidence to indicate that the sand bar and its associated stingray population has been compromised. [38]

iii) Beaches. An island wide survey of beaches has been conducted by road, with more quantitative assessments of critical turtle nesting beaches being conducted on foot. Beaches remain largely intact although substantial changes have occurred in a number of locations. Seven Mile Beach remains in a relatively healthy state, with only the usual trouble spots (Southern end and Boggy Sand road) presenting problems. Substantial quantities of sand were pushed up from the deeper offshore reserves and it can be anticipated that subsequent winter storms will further build up the beach. Considerable quantities of sand were pushed over the West Bay Road and other areas around the Island, including South Sound, Bodden Town and East End. The Department of Environment is working closely with the Planning Department to advise on the placement of sand that has been pushed off the beach. The initial estimate of the amount of beach sand placed ashore is about 200,000 cubic yards.

As a result of the clean up stock piles of beach sand have been established at several locations around the islands such as at the public part of the Seven Mile beach (estimated at 2000 cubic yards). It has also been suggested that government purchases a large stockpile of sand that remained after a private development (about 5000 cubic yards or 4500 m3)

The deposition of large amounts of sand into the shallow waters of Seven Mile Beach will prove helpful in providing naturally accessible sand for the long term recovery of eroded sections of Seven Mile Beach. It can be anticipated that winter Nor'westers may well move much of these previously inaccessible deep water reserves of sand onto the beaches in the following months.



iv) Marine turtles. Hurricane Ivan struck in the closing months of the marine turtle nesting season (typically May to October, with nests hatching until December). Most loggerhead turtle nests (75%) had hatched prior Ivan, but the majority of green turtle nests had not yet hatched. As a result, 86% of green turtle nests and 25% of loggerhead nests were lost on beaches around

[38] The deep Stingray City site has not yet been inspected by DOE, and will be reported on at a later date.

Grand Cayman. The northern tip of Seven Mile Beach sustained significant damage, though one turtle nest hatched after the storm. South Sound sustained substantial impacts and all remaining turtle nests in this area are presumed lost. It is possible that nests in North Side will still hatch, unhindered by changes in beach profiles. Turtle nesting activity did not cease following Hurricane Ivan and a few nests have since been recorded following the passage of Ivan. The DOE's marine turtle satellite tracking program remains unhindered and it is interesting to note the movement of 5 turtles during Hurricane Ivan that were tagged with satellite tracking devices during 2004. [39]

v) Reefs. In general, the most noticeable impacts to the reef environment on all three sides of the island to date are the removal of the soft corals (gorgonians) and sponges. Deep and shallow reefs and associated pan bottom environments have all been affected, with the shallow more exposed sites impacted the most, with some sites completely devoid of anything larger than a couple of centimetres in diameter. The removal of sea fans, sea whips and many of the sponges gives the reefs a feeling of loss of colour and for divers familiar with particular dive sites around Cayman; this may well make dive sites appear radically different. The good news is that soft corals, and to some extent sponges have relatively fast growth rates compared to their hard coral relatives and recovery estimates are on par with 1-2 years when compared with other corals that may not recover within a human lifetime. The DOE has in place a Long Term Coral Reef Monitoring Program that will be used to provide quantitative results resulting from the impacts and subsequent recovery of coral reefs at the 10 metre (30ft) and 20 metre (60 ft) contour around Grand Cayman. Permanent transects established on the reefs over the last 8 years will be used to photograph and quantitatively document changes in benthic coverage. It is anticipated that data collection will begin and be completed before the end of the year and that analysis and comparison of data collected for the same sites in 2003 will be completed by the end of this year.

Of particular concern was the apparent reduction in numbers of fish around many of the observation dives and snorkel tows. DOE is encouraging individuals familiar with particular areas to make their own assessment of structural damage to reef components and other marine flora and fauna and to report it to them. Photographers with ability to provide before and after photographs of changes to reefs, shallow marine and coastal environments, including beaches would be extremely valuable in assisting the Departments ongoing research efforts.

Although danger to species and habitats does not seem to have increased, detailed assessments for key species and habitats will have to be undertaken to establish baselines for recovery. [40] Detailed species and habitat assessments could be undertaken to establish baselines

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[39] Turtle movements can be tracked at www.seaturtle.org

[40] The DOE plans to utilise pre- and post-Ivan imagery supplied by Lands and Survey to undertake rough quantitative assessment of changes to main vegetation communities.

for recovery, within the context of a Darwin Biodiversity Grant. It should be borne in mind that Cayman's environmental resources have evolved under the influence of a history of hurricane damage and recovery. While short-term damage may appear significant the revitalization of natural features should be expected to occur if they are allowed to do so.

b) Solid waste and debris disposal and clean up

Debris has been collected by various departments and the private sector. Government institutions that were involved in the removal of debris included Public Works, the National Roads Authority, and the Environmental Health Department. The private sector was involved as government is not responsible for the removal of debris generated by the commercial sector and house clean up was undertaken both individually and by neighbours in order to restore some normalcy. Given the extent of the damage, the considerably large sand deposits and the amount of household appliances, all types of equipment and vehicles destroyed, the clean up task is largely to be completed, with a considerable cost. Some important decisions were made as time passed. Firstly a concerted effort to recover sand and restore the beaches led to accumulate it as roads were cleaned and private property was cleared, but disposal of it privately was prohibited. Salvaging and disposal of waste and debris from households, vehicles, etc. was assigned to contractors and temporary deposits were established till definitive solutions and new landfill sites were designated in addition to the existing one.

With an estimated 300,000 cubic yards (270,000 m3) of debris government subcontracted debris removal, sorting and processing (including burning of vegetation, crushing of metals etc.), the processing of household appliances including Freon removal, cars including waste oil removal and beach sand. Excluding the beach sand component the latter costs are estimated at CI$ 7.920 million. These are not all the costs associated with beach restoration and debris removal. Activities carried out by public works (debris, sand), the national road authority (sand, debris) and the environmental health department (debris) are accounted for under their respective headings. Likewise the removal of debris by the private sector is accounted for under their headings.

Table 25

LOSSES TO THE ENVIRONMENT ASSOCIATED WITH CLEAN UP AND DEBRIS REMOVAL

	Thousand CI$		
	Damage	Losses	Total
Department of Environment	613.1		613.1
- Boats (sunk)	258.0		258.0
- Equipment	45.1		45.1
- Mooring buoys	38.0		38.0
- Vehicles	272.0		
Environmental Health		597.0	597.0
Beach restoration		1,355.0	1,355.0
Debris removal		7,920.0	7,920.0
TOTAL	613.1	9,872.0	10,485.1

Source: ECLAC.

The summary table thus only reflects the direct damage suffered by the Department of Environment (in terms of equipment and supplies) and the indirect environmental costs associated with the cleaning effort. No information was available to attempt a valuation of the assets loss or deterioration or the loss of environmental services associated to the damage caused by the hurricane.

IV. SUMMARY OF DISASTER IMPACT

Despite scarcity of information and the resulting limitation of accuracy, the assessment undertaken indicates that the total impact of the disaster on the Cayman Islands was CI$ 2,860 million, or its equivalent of US$ 3,432 million.

Most of that figure — CI$ 2,370 million or 83% — reflect damage and destruction of assets, and CI$ 491 million (the remaining 17%) are losses of production and revenues as well as increased cost in the provision of services. The private sector sustained most of the impact (CI$ 2,735 million or 96% of the total) while the public sector suffered considerably less (CI$ 125 million or 4%). Table 26 shows the full breakdown of damage and losses by sector.

Table 26

SUMMARY OF DAMAGE AND LOSSES CAUSED BY HURRICANE IVAN
IN THE CAYMAN ISLANDS

(CI$ million)

Sector	Impact			Ownership	
And sub sector	Total	Damage	Losses	Public	Private
Total	2,861.1	2,369.6	491.7	124.9	2,735.7
Social Sectors	1,508.7	1,372.6	136.0	48.2	1,460.5
Education	44.8	43.0	1.8	34.9	9.9
Health	18.9	9.6	9.3	11.7	7.3
Housing	1,444.9	1,320.0	124.9	1.6	1,443.3
Productive Sectors	931.4	711.3	220.1	---	931.4
Agriculture	5.6	0.4	5.2		5.6
Commerce	463.4	429.0	34.4		463.4
Tourism	462.4	281.9	180.5		462.4
Infrastructure	407.0	285.1	122.2	65.2	341.8
Electricity	68.9	33.9	35.0	5.6	63.3
Water and Wastewater	5.6	4.8	0.8	3.6	2.0
Road Transport	194.9	146.2	48.7	24.6	170.3
Ports and Airports	15.7	9.7	6.0	13.7	2.0
Telecommunications	79.5	48.1	31.7	0.3	79.2
Public Buildings	42.4	42.4	---	17.4	25.0
Environment	10.5	0.6	9.9	10.5	---
Emergency Assistance	3.5	---	3.5	1.0	2.0

Source: ECLAC.

These impact and losses place the Cayman Islands in a different level when compared to the damage suffered by other islands in the Caribbean this year. Not only the absolute figure is well above those of other cases assessed by ECLAC in the developing Caribbean basin, but the implications in terms of reconstruction and resilience make the Cayman Islands very particular case. Even though some common traces are evident, such as the canvassing effect that a major hurricane can have over a very small insular territory, and the overarching consequences on the infrastructure, social fabric and dynamics and economic performance and resilience; there are also major differences.

The 2004 Hurricane Season in the Caribbean Subregion

Tropical storm and hurricane activity in the Caribbean basin has been especially notorious in 2004. Not only the Small Island Developing States have been affected; the bordering continental countries have been stricken as well, as the cases of Florida and Cozumel in Mexico attest.

ECLAC has been called upon to assist the affected island states, through the application of its well-known damage and loss assessment methodology, to evaluate the impact of each disaster. The main results of those analyses are the following.

Island State	Natural Event	Economic Impact, US$ million	Impact as % of GDP
Grenada	Hurricane Ivan	889	212.0
Jamaica	Hurricane Ivan	595	8.0
Dominican Republic	Tropical Storm Jeanne	296	1.9
Bahamas	Hurricanes Frances and Jeanne	381	7.3
Cayman Islands	Hurricane Ivan	3,432	183.0

Before the assessment in the Bahamas and in the Cayman Islands were completed, it was assumed that the most severe socioeconomic and human loss toll were concentrated in the least developed, smaller countries such as Grenada and Haiti. Nevertheless, the analysis reveals that other island states with higher degrees of development have been seriously affected as well.

In disasters of this type, most losses are sustained by the productive sectors of agriculture and tourism and are expected to persist for a relatively long time period of several years. In addition, damage to assets – especially housing and other essential infrastructure – also has a negative bearing on social wellbeing.

While most of the impact falls on the shoulders of the private sector, Governments are required to take care and assist the lower income strata of the population. In most instances, the government´s capacity to face these challenges is very limited, and recovery is seriously hampered, especially in the face of recurrent disaster events.

It is therefore deemed essential that all states in the sub region undertake planning measures and activities to reduce disaster risk as an integral part of their development process.

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See ECLAC, www.eclac.cl/mexico.

For one, most of the damage in the Caymans, be it private or public, had some level of coverage from insurance. For another, the value of Caymanian assets is a lot costlier than that of its neighbouring states, countries and territories, and the value added by its predominantly offshore services economy is also closer to that of a developed country. Nevertheless, the jurisdiction's institutional and structural organization is certainly that of a small developing one.

As shown in the previous table, the sectoral breakdown of the total impact was as follows:

	CI$ million	%
Social sectors	1,508.6	53
Productive sectors	931.4	33
Infrastructure	407.0	14

The most affected individual sector was housing, with a total impact of CI$ 1,445 million, followed by commerce and tourism with figures of around CI$ 460 million each. In regard to damage and destruction of assets alone, again housing was the frontrunner (CI$ 1,320 million), followed by commerce (CI$ 429 million), tourism (CI$ 282 million) and road transport (CI$ 146 million). In regard to losses, the most affected sectors were tourism (CI$ 180 million) and housing (CI$ 125 million). By the same token, the main offshore services (financial, legal) remained largely unaffected.

The impact of the disaster on the Cayman Islands cannot be overemphasized. While the above figures speak for themselves about the severity of the disaster impact, some comparisons are more revealing. On the one hand, the total amount of damage and losses is equivalent to about 183% of the gross domestic product (GDP) for the preceding year. [41] In this regard, it is of interest to take into consideration that Ivan and other tropical storms and hurricanes have caused a very negative economic impact in the Caribbean basin as shown in the box above, with high impact on these countries GDP and representing a large percentage of their economic indicators.

Consequently, as in the other cases, the amount of per capita damage and losses estimated for Ivan in the Cayman Islands is extremely high – US$ 75.700 per person. This figure is the highest ever encountered by ECLAC in its long experience of disaster assessment in the region. This sheds light on a particularity of the Caymanian circumstances. The measurement of GDP not only underestimates the economy's size (as is the case in many developing countries where the informal sector or the non-market, non-tradeable activities are not appropriately reflected), but in this case leaves out the implications of being a major player and recipient of offshore financial services: the financial institutions constituted and operating based in the Cayman Islands have assets and liabilities more than tenfold the size of the jurisdiction's estimated GDP.

[41] The experience accumulated by ECLAC in the assessment of the economic impact of disasters in the Latin America and Caribbean region over the past thirty years indicate that reconstruction and recovery following any disaster that causes an impact equivalent to more than 15% of a country's GDP can be very negative to its capacity for development.

A final consideration is that the financial reconstruction requirements – for a direct damage of CI$ 2.4 billion – exceed by far the observed construction performance of the Cayman Islands that in the best year of the present decade granted construction permits for an amount of about CI $ 400 million.

The capacity of the Cayman Islands to recover from this disaster is analyzed in the following sections of the report. It is more linked to its physical capacity of absorbing the required massive investment in terms of importing labour, transport to the country and stockpiling the necessary inputs and construction materials. The recent experience in delays and postponement in the deadlines set for major investment projects illustrates this problem.

V. MACROECONOMIC EFFECTS OF HURRICANE IVAN ON THE CAYMAN ISLANDS

1. Introduction

The Cayman Islands has been known for its relatively stable macroeconomic environment over the last decade. A combination of prudent economic policies, founded on broad fiscal rectitude, stable prices, controlled money growth and sustainable debt acquisition has led to vibrant investor confidence, foreign and local investment and growth. The country has also benefited from fortuitous circumstances, including dynamic growth in high value added tourism and off-shore financial services. The blend of policies and integration to the global economy rather than the more traditional model of development based on resource exploitation has delivered a relatively high standard of living for the average Caymanian citizen.

Hurricane Ivan devastated the Cayman Islands in September 2004 and is set to a divergence from the macroeconomic performance from expected trend. To appreciate this, in this chapter a three-fold analysis of the overall national performance is made. The first section analyses macroeconomic performance in 2003 and the second section examines performance as observed and expected to date prior to the advent of the hurricane. These two sections provide a baseline or benchmark from which to illustrate the impact of the disaster on the economy. Section three, thus, attempts to provide a macroeconomic assessment of the impact of the disaster. It examines the extent to which the disaster is likely to thwart budgeted and expected out-turns of major variables and indicators of performance and the implications for policy and welfare, as it is possible to measure them in an economy that has limited national accounts.

The reports seeks to provide sufficient detail given the constraint of limited data in some areas, but more importantly to provide a big picture of impact of the hurricane on the macro economy and what it means for policy adjustment to ensure stable and equitable growth, with sustainable fiscal, money and external payments conditions.

2. Macroeconomic performance in 2003

Real GDP rebounded to grow by 2.4% in 2003, following more sluggish growth of 1.9% in 2002. Growth was buttressed by recovery and higher demand in major markets, particularly the United States, where growth improved to 3.0% from 1.9%. On the domestic front, growth was propelled by strengthened construction activity, including tourism properties, condominiums and port rehabilitation. Tourism is — besides financial offshore services — the major engine of economic growth and rebounded in 2003. Visitor arrivals shot up by 12.5% to 2.1 million. The much heavier spending stay-over market had been somewhat stagnant for some years and the Cayman Islands appeared to be losing competitiveness in this critical sub-sector as in 2003, stay-over visitor arrivals fell by 3.5% to 293,517. In contrast, the less per capita purchasing cruise ship passenger arrivals expanded by 15.5%, confirming the recognized advantage of the Cayman Islands in this segment and it successful marketing impetus.

Activity picked up in the financial services sector. Mutual funds, insurance companies, stock exchange listing and new company registrations were all up. By contrast, there was a reduction in the number of bank and trust licences.

The Cayman Islands have benefited from relatively low inflation over the last five years. Between 1999 and 2003, inflation averaged a moderate 2.7%, in a framework of stable monetary and exchange conditions and low imported inflation. Prices increased by a modest 0.6% in 2003, compared with 2.4% in 2002. The only contrasting items were medical services (8.5%) and household equipment (5.9%), partially offset by the heavily weighted housing index by 3.1%. Wage pressures remained curtailed in 2003, as both government and the private sector sought to ensure that wage increases kept pace with productivity growth. Unemployment the bane of many other Caribbean countries remains fairly constrained in the Cayman Islands, as a vast proportion of its labour force is constituted by non Caymanian residents, whose work permits expire when their contractual relation to the employer is ended. In recent years, on average unemployment has trended downwards.

a) Fiscal Performance

Fiscal consolidation in 2003 was reflected in improved central government finances. The overall fiscal surplus increased by 14% to CI$21 million. Similarly, the current account surplus strengthened by over 17% to 42.5 million, the equivalent of 2.7% of the estimated GDP. The current account was bolstered by a robust growth of tax revenue. Firstly an increase of 10.2% in taxes on international trade and transactions, as imports expanded by more than 10% generated higher receipts from import duties by almost $9 million. The travel and cruise ship tax also netted improved receipts (up by $1.5 million), on account of growth in cruise ship passenger arrivals; taxes on property registered significant growth of over 23% to reach $17.7 million; and to top this domestic taxes on goods and services, a big ticket tax, also increased by 1.7% to $153.4 million.

By contrast, the dynamism in non-tax revenue was offset by a decline of over 13% in other or non-tax revenue. Receipts from all sub-categories, including sales of goods and services and health service fees contracted during the year.

Fiscal discipline was also present as expenditure was contained in 2003. Total expenditure grew by 3.2%, a marginally slower pace than for total revenue. Current expenditure rose by 2.1%, constrained by a reduction of 7.5% in personnel costs, which was due in part to a reclassification of health expenditures. Personnel costs continue to account for almost 50% of expenditures, thereby limiting the room for manoeuvre of government with respect to allocations for investment and development activities.

In spite of that capital expenditure and net lending posted strong growth of 21.5%, including outlays on education and affordable housing. With the overall surplus complemented by borrowing injections, the reserves position of government improved by $33 million during the year.

b) Financial Sector Developments

On the assets side, net domestic credit registered growth of 3.7% to reach $4028.9 million. In keeping with espoused policies of macroeconomic prudence, credit to the private sector expanded (by 12.1%,), but was offset by a sharp contraction in credit to the public sector, thereby negating any claims of crowding out. Indeed, government's bond issue of US$163 million was largely used to repay loans outstanding to local commercial banks. With respect to the private sector, substantial portions of demanded credit were used to build up real assets, thereby increasing the countries capital stock. The bulk of credit to businesses went to financial services, construction and utilities, while households used acquired credit mainly for real estate development, home construction and debt consolidation, the latter particularly in light of low prevailing interest rates.

As an off-shore financial centre, stable monetary and exchange conditions are critical to maintaining confidence in the Cayman Islands jurisdiction. Monetary conditions remained stable in 2003, contributing to relatively low inflation. Broad money supply expanded by 10.9% to $4,028.9 million, consistent with improved economic growth and the pattern of financial deepening that has been taking place in the economy over the last five years. The foreign currency component of money supply increased by 6.8% to 3284.2 million.

In a favourable move for investment, the cost of credit fell a bit in 2003. The average prime lending rate declined from 4.7% to 4.1% in 2003.

c) External sector performance

The Cayman Islands, as much of the small states and territories in the Caribbean are heavily depended on imports of goods, materials and equipment and some types of services such as construction and engineering. This small domestic supply capacity is a structural feature of the economy. In 2003, as the economy grew, the trade deficit expanded by 10.5% to $549.2 million since imports increased by 10.7% to 553.5 million, compared with a decline of 4.1% in 2002. Imports of machinery and transport equipment grew by 32%, reflecting the upsurge in building construction, including new upscale hotels from major chains and condominiums. Meanwhile, imports of fuels declined by 12.6% probably as a result of higher international prices. Exports of goods, which are a small portion of imports, rose by 30% to $4.3 million.

3. The outlook for 2004 prior to 11 September 2004

In 2003, the Caymanians economy seemed to have returned to its longer term growth trajectory following adjustments to compensate for the fallout from the September 11 events in the United States in 2001. Consequently, the growth impetus of 2003 was expected to carry over into 2004.

Real GDP was expected to grow by about 3.1% in 2004. Growth during the first half of the year was bolstered by a pick up of activity in construction. Major projects included a large hotel, high-level condominiums and the new Royal Watler Cruise Ship Terminal. Tourism was projected to improve its overall performance in 2004, as group bookings were up. Importantly

this portended strengthened value added in the heavily weighted stay-over market. In addition, the cruise ship market was projected with a continuous robust growth.

For the first semester, total visitor arrivals expanded by 14.5%, compared with the similar period in 2003. Cruise ship passenger arrivals increased by 14.8% and stay-over arrivals grew by a 12.7% to 181,254. This reflected in part the opening up of new markets in Chicago with flights from there by the local Cayman Airways and United Airlines. For 2004 as a whole, visitor arrivals were expected increase by 15%, reaching a record-breaking 2.4 million.

Dynamism in construction persisted at the previous year level during the first half of 2004. Planning approvals — a barometer of future construction activity — increased by 62.7% for the first semester to a projected investment figure of $296.5 million. Two large commercial buildings accounted for a significant share of this growth. Home construction activity also picked up in 2004, increasing about $5 million in the first half of the year. By contrast, project approval pointed to reduced activity in the government sector, with the value declining by half of the 2003 level to $4.1 million.

Real estate activity was also robust in 2004. For the first semester, property transferred reached a five year peak. By value, property transfers were up by 49% to $251 million. Condominiums — a segment of the market that has been quite attractive in recent years — reported a 63% increase in sales relative to the same period of 2003. A welcomed development was resurgent activity in the single-family home segment of the market. Dynamic demand of single family homes in 2004 had resulted in higher prices (up 18% in the first half of the year); bolstered by grants of status to some foreign residents and changes in the immigration laws.

a) Fiscal Performance

Central government finances were expected to strengthen in 2004, following their sound performance in 2003. The overall fiscal surplus was projected to increase by over 15% to $24 million while contemplating an increased capital investment development programmes and works (up 55.6%). Capital expenditure and net lending was projected to rise by over 16%, as government undertook improved capital works including the Royal Watler Terminal Cruise Tendering Facility. This was facilitated by a 4.9% growth in total revenue. The current account was expected to yield a surplus of $49.3 million, 16% higher than last year.

All the major heads of revenue were expected to yield higher receipts. Revenue from taxes on international trade and transactions were projected to increase 2.3%, reflecting growth in imports for construction projects in the private and public sector. Property tax receipts were expected to increase by 19.2%, in line with growth in transfer of properties. Similarly, non-tax revenue was projected to grow by 35% to $43.4 million, mainly as a result of substantial growth in returns from sales of goods and services.

On the expenditure side, current expenses were expected to rise by about 4% to $317 million, reflecting government's commitment to social and development programmes. Current spending on wages and salaries was still expected to grow by about 3% to $143 million, and

interest payments were also and increased burden, as government aimed to reduce the interest burden of the debt.

b) Financial Sector developments

Dynamic growth and deepening of the financial system was continuing in 2004. The domestic banking sector continued to intermediate significant credit flows to private firms and households for construction, real estate development and the purchase of durable goods.

At the end of June 2004, loans and advances to the private sector had increased sharply, with loans to households expanding by over 74%, in spite of a 21% decline in flows to businesses. For the semester compared with a year ago, credit for domestic property increased by more than 100% associated with growth in property acquisitions and transfers. For 2004 as a whole, domestic credit was expected to increase sharply by over 18%, driven by loans to the private sector, as government continued to expand its income from the bond issue, having made provision of part of its fiscal surplus to pay off debt.

c) External Sector performance

The external position of the Cayman Islands was expected to weaken in 2004 as growth in imports led to a widen merchandise deficit that was not offset by capital inflows.

4. The effects of hurricane Ivan on the economy

Hurricane Ivan was a catastrophic event and as such will have a major impact on socioeconomic performance in 2004, 2005 and beyond. Hurricane Ivan is expected to result in stopping the positive dynamic of the economy that was recuperating from the 2001 downturn. In fact, given its impact on fiscal revenue, output and tourism income drop on the fourth quarter, a negative growth of 1.2% is anticipated in 2004 after Ivan, as compared with previously projected growth of 3.1%. The decline in real output will be associated with a fallout in value added in the almost all sectors with the exception of construction — which was already growing and will certainly expand with the reconstruction process in 2005/2006 — and offshore financial services whose performance was not affected, although their operational costs will have increased in the period of September through the end of the year.

Real value added in tourism is projected to decline given the fourth quarter's performance, reversing the dynamic growth that was experienced during the period before Ivan.

The commercial sector (wholesale and retail) value added is forecasted to decline mostly through increased costs and the losses in stock and infrastructure. Even though sales may rebound in the remainder of the fourth quarter and, for certain items such as cars, electro-domestic appliances, furniture, etc., the margin of profit in this sector will be negatively affected by the reconstruction and rehabilitation costs.

As said, the construction sector's activity is expected to keep its growth path in 2004, and further expand in 2005. thereby compensating for the dampening effect of other sectors on growth. As said, construction activity was quite dynamic in the first half of the year and this trend is already accelerating as property reconstruction and rehabilitation take place. The constraint on domestic capacity in the sector, a long standing one in the Caymanian economy, is overcome by the importation of labour, equipment and materials from overseas as a complete package to undertake rapid repairs.

a) Fiscal Performance

The finances of government are expected to weaken in the aftermath of Hurricane Ivan. This is readily anticipated, as government has had to incur additional expenses to facilitate clean-up, emergency repairs and restoration of basic services and communications. As reconstruction of public infrastructure proceeds in order to improve the plight of the most vulnerable members of society, its expenditure will increase in the short term, prior to receiving insurance compensation. The overall fiscal position is thus expected to move from an anticipated surplus to a short term deficit of about $42.9 million. Considering that insurance claims will be settled before the end of the current fiscal year this poses more than a fiscal problem a cash-flow one. This is worsened by the anticipated current revenue decline by 5%, given the downturn in economic activities. Nevertheless, even in the short term, this is being compensated by increased revenue from the vastly increased imports after the hurricane, even considering the reduction in duties levied which was adopted to facilitate private recovery. Expenditure is predicted to increase by over 6%. as outlays on clean-up operations, which have been substantial, provision of housing and emergency relief operations and other incidentals increase sharply.

In 2005, government finances are expected to start improving and to return to it their normal growth trajectory soon after, as contingency expenditure and tax relief decline.

b) External Sector performance

The current account deficit is projected to widen both in the remainder of the year and in 2005, as growth in imports outstrip capital inflows, although as insurance payments are settled and reinsurance is recuperated by the local insurers, these flows will increase. Given that properties and other assets in the Cayman Islands were relatively well insured, the country is set to benefit from significant insurance inflows. In addition, remittances are also expected to increase as relatives abroad try to alleviate the financial plight of family members. Nevertheless, the sharp spike in imports growth is set to offset these gains leading to a widening of the merchandise deficit.

Annex I

MACROECONOMIC ESTIMATES, WITH AND WITHOUT IVAN

	1999	2000	2001	2002	2003	2004 Pre Ivan (a)	2004 Post Ivan (b)
Nominal Gross domestic product (CI$ million, current)	1,382.50	1,444.90	1,482.30	1,546.00	1,603.20	1,710.00	1,616.03
Gross Domestic Product (1986 prices)	803.80	811.80	816.70	830.60	847.20	873.50	860.39
Growth in real Gross domestic product (1986 prices)	3.40	1.00	0.60	1.70	2.00	3.10	-1.50
Gross domestic product per capita (CI$000)	35,220.83	34,705.83	34,556.67	35,000.00	34,970.00	35,634.17	33,675.96
Employment, wages and prices							
unemployment rate	…	…	7.50	5.60	5.60	3.90	…
Total employment			26,608.00	28,091.00	28,871.00	29,991.00	
Rate of change in the consumer price index	6.80	3.00	1.30	1.70	1.20	1.90	2.50
Nominal exchange rate	1.20	1.20	1.20	1.20	1.20	1.20	1.20
Weighted deposit real interest rate							
Weighted lending real interest rate	8.00	9.20	6.80	4.70	4.10		
Central government							
Total revenue		278.50	285.40	314.10	326.20	342.10	326.50
Current revenue		277.70	284.40	314.10	326.20	342.10	
Current expenditure			290.60	295.70	305.20	292.80	269.40
Current account balance			-6.20	18.40	21.00	49.30	-42.90
Capital revenue			0.90	0.00	0.00	0.00	
Capital expenditure			25.90	17.70	18.80	25.00	
Overall fiscal balance			-31.20	18.40	21.00	24.30	…

	1999	2000	2001	2002	2003	2004 Pre Ivan (a)	2004 Post Ivan (b)
Public sector external debt	128.20	144.40	143.50	132.10	143.90		
Interest payments			6.10	3.80	5.10		
Millions of Cayman Islands' dollars							
Money and credit							
Domestic credit			1,629.40	1,331.00	1,380.80	1,387.70	
To the private sector			1,478.30	1,235.70	1,384.80		
To the public sector			151.10	95.30	-4.00		
Money supply (M3)	561.00			3,631.70	4,028.90	4,512.37	
Foreign currency deposits				3,075.20	3,284.20		
Balance of payments							
Current account balance							
Merchandise balance			-502.00	-520.30	-605.30	-674.50	
Exports (f.o.b)			2.40	3.00	4.30	5.50	4.00
Imports (f.o.b)			514.90	494.40	553.50	669.00	747.20
Services balance							
Tourism receipts			488.90	467.00	458.30	501.30	
Supplementary							
Visitor arrivals	1,430.20	1,385.00	1,548.90	1,877.60	2,112.50	2,429.38	
Notes							

Source: ECLAC estimates.
(a) and (b) Forecasts/projections for 2004 before and after Ivan.

VI. THE RECOVERY AND RECONSTRUCTION PROCESSES

1. Strategic and priority considerations

The assessment of the disaster caused by hurricane Ivan in the jurisdiction of the Cayman Islands highlights the increased priority and urgency on some of the areas already identified by the Office of Economics and statistics in terms of the rehabilitation and reconstructions process. This makes evident that the reconstruction process is to be framed as part of disaster mitigation and risk management process.

The mission's findings and discussions held with both Government officials and private sector representatives and organization point to the need for a closer link to be promoted between short to medium term environmental and social restoration, economic and physical recovery and long term management of a viable and sustainable development. There is an immediate need for funds in the short term to face the reconstruction tasks.

Given the size and structure of the Caymanian economy, with a very small native population, heavily dependent on foreign labour and oriented to the global services and financial economy, the challenge posed by the need to restore its physical and housing infrastructure is daunting.

Unlike other countries in the region the constraint is not given primarily by the lack of financial means to be invested in the process –most of the damage was covered by adequate levels of insurance, although business losses and incremented operational costs associated to the hurricane were not adequately insured. The challenge lies more on the mobilization of the needed workforce, the importation of the necessary building materials and components, the urgency to restore some of the infrastructure in a very short period of time, and for the government to have access to resources that will both compensate for the budget deficit incurred in the emergency and to have appropriate capital investment resources for the reconstruction.

Both the financial services and offshore activities require a fully functioning infrastructure in terms of communications and energy. Even though they experienced almost no break in their functioning, the extraordinary costs of working in the post disaster situation were high. In the face of this experience, the adoption of mitigation and preventive measures as part of the reconstruction process should make the jurisdiction stronger and more resilient.

The tourism sector in addition to the provision of basic services must bring on stream the accommodations affected — both hotel rooms and associated services ranging from restaurants to beach services and landscape — and the non resident owners of vacation houses need now access to builders, contractors and repair personnel to bring their properties back, in addition to the usual amenities that they enjoy during their visit. Again, being both these groups positively insured — mostly overseas — this poses no pressure on the country's resources but on its capacity to provide all those services.

More concretely, the following elements ought to be considered:

- House reconstruction and urban rehabilitation, relocation and renewal as a priority to be coupled with job creation, income generation and restoration of social capital,

- Measures to reduce the actual physical vulnerability in the islands given the high cost of this year's event in human, social and economic terms,

- Access to public services as part of a systemic approach to increase resilience coupled to actions of land zoning and planning in an integrated approach leading to risk reduction,

- Rehabilitation and strengthening of the country's infrastructure coupled with more resilient, local and regional development strategies, and

- Institutional strengthening in terms of having both appropriate legislation that promotes risk management, transfer and reduction; and appropriate information management and coordination among public sector offices and institutions and the private sector. [42]

2. Relation to government's budget, reflecting the resulting modified financial gap

Beyond the fiscal constraints the emerging reconstruction needs will pose, the assessment addresses the government's concern with the country's absorptive capacity as modified by the disaster. It ought to set as joint priorities economic recovery and physical reconstruction while reinforcing a framework of social participation.

The government's limited income base — given the duty free and offshore nature of the most important and dynamic sectors in the Cayman Islands — has been pressed by the emergency. In many areas of government, such as social and environmental services, they have almost exhausted their existing budgets and left without appropriate provision their programmed and budgeted activities till the end of the fiscal year. It is an urgent matter to replenish those budget lines that were used through the reorientation of funds during the emergency response phase.

Although government income may increase in the face of the reconstruction process (as levies on imports will generate extraordinary revenue given the needs for reconstruction, even though the actual rate of taxes was reduced, and insurance claims will be settled and paid), regular government activities will be under funded in the short term, and emerging needs of the population will have to be met, primarily assistance to the most vulnerable groups in the social

[42] The hurricane emerging needs were met both by government action and social and entrepreneurial solidarity. An example of the former are the donations and housing needs assessment made by IAMCO, a catholic charitable incorporated institution that was set with a regional (Caribbean) outlook prior to the disaster to promote development projects in the less well-off and exposed communities.

fabric, and credit support to those that, being underinsured and heavily indebted already, would not be in a position to reconstruct. This assistance will be needed given the high level of credit to individuals, highly concentrated in personal and real estate loans (mortgages).

There is an immediate short term liquidity problem facing the economy that, if left unattended may lead to an undesirable instability in the Cayman's fundamentally sound and dynamic economy. To face this is that the government requires external assistance. The Cayman Islands government cannot face this task with its existing resources.

3. Some guidelines for the medium and long term: towards a risk reduction and risk transfer state policy

The disaster certainly presents an opportunity to give added impetus to the overall risk management strategy. An integrated assessment of Ivan's effects as this one helps focus on the natural risks to be addressed and the interventions to be prioritized by the government. Furthermore, such an assessment would provide a quantitative basis to determine the additional needs that emerge after the disaster that ought to be part of the government's financial needs, since these new needs pose incremental strains on internal and external resources.

The disaster — seen as a positive opportunity for action — gives voice and urgency to overcoming the emergency, and improving preparedness and resilience in the case of future similar events. The assessment helps differentiating the very short-term goals of immediate restoration of services and reconstruction of infrastructure affected and the more medium term ones of reducing the island's exposure to hazards in a way that both short and medium term actions are synergic.

One such areas is physical planning and land zoning, particularly as to beach preservation, mangrove and sea defence interaction and the allowance for buildings not to be put in risk or exposed locations. Beyond more stringently observed construction codes, appropriate legislative and regulation changes to strengthen existing norms, appropriate enforcement and accountability in this area will increase the credibility and trustworthiness of government in all areas.

It must be reiterated that insurance cover both of the private sector and of government infrastructure at best covers partially assets damaged or destroyed, not income lost, business interruption or extended social service needs. The underinsurance penalty (reduction of claimed amount) resulting from the current coverage also points out to the need that appropriate regulation of mandatory insurance to be supplemented by promotion of insurance mechanisms (such as tax relief or fiscal incentives and / or their development with appropriate technical and financial backing.

In a sophisticated financial economy that has been deepening its banking sector, the Cayman Islands are particularly well positioned to develop new innovative instruments for risk transfer and reduction that may lead to a regional Caribbean strategy that spreads and reduces risk among countries. This would reduce the risk of any particular territory and lower the cost of insurance and reinsurance premiums while expanding the insurance market that — even though the Cayman Islands are an exception — have insufficient penetration in the region.

In this context the UNDP is planning to help define development projects to face the reconstruction need while promoting disaster mitigation, risk reduction and risk management.

Concrete areas for government direct intervention are the poor, now rendered homeless; the low medium income households, many headed by females, which are heavily indebted and require assistance to rebuild their houses and replace their basic needs and amenities. To the extent that government has expended regular budget resources, reorienting them to the emergency response and the resulting reconstruction needs in public infrastructure and public services to be provided by the statutatory organizations, a means should be found to fund these. This is particularly acute since government had already limited space to maneuver within its budget given its income and expenditure constraints. The fact that the disaster poses a short term liquidity problem only makes more urgent the need to receive financial relief in the form of additional development funds either through donations and funding by partnerships with the private sector; and non-governmental organizations, or by incremented debt in the international official development aid market or private sector hedging instruments.

Even though the present assessment does not identify specific reconstruction and disaster reduction projects, or quantifies the financial gap experienced by government (partly due to the lack of updated accounting of expenses incurred after the disaster associated to the response phase), the assessment of damage and losses clearly indicates that the present government resources, in the best of circumstances, are not enough even to cover the remaining emergency needs, let alone the reconstruction process.

Annex II

LIST OF CONTACTED INSTITUTIONS

Area	Contact Person
Environment	Gina Ebanks-Petrie
Chief Surveyor	Grant Vincent
Chief Valuations Officer	Nigel Bates
Tourism	Cassandra Hibbert – CITA (Cayman Islands Tourism Authority) Gloria Mcfield-Nixon , and Department of Tourism representative
Port Authority	Paul Hurlstone
Debris	Mark Scotland Roydel Carter
Meteorologist	Fred Sambula
Planning	Kenneth Ebanks
Infrastructure	
Roads – National Roads Authority	Edward Howard/Dennis Thibeaut/Peter Ogden
Airport Authority	David Frederick
Civil Aviation Authority	Richard Smith
Consolidated Water	Greg Mctaggart
Water Authority	Gelia Frederick
Electricity	Richard Hew – Caribbean Utilities Company
Public Works	Max Jones
Telecommunications	David Archbold – ICTA (Information and Communications Technology Authority)
Land & Sea Co-op	Julia Swanson
ATT	Raul Nicholson-Co
C&W	Albert Anderson
Digicel	J.D. Buckley
TeleCayman	Dilbert Chalifoux
Vehicle Licensing Dept.	Dale Dacres
Protocol/Administrative	
Leader of Government	Richard Parchment
H.E. Governor	Bruce Dinwiddy
Press	Radio/TV/Paper
Peter Gough	Finance
Cayman Islands Recovery Operation (CIRO)	Committee
Human Concerns	
Social Services/Relief	Deanna Lookloy Angela Martins Dan Duguay
Health	Steve Tomlinson Shirley Enriques - Health Services
Education	Joy Basdeo
Culture/Sports	Mary Rodriguez
Housing	Carson Ebanks/Frank Mcfield

Area	Contact Person
National Housing Trust	Roger Bodden/Catherine Tyson
	Max Jones
	Private Developers
	Angela Miller – Cayman Islands Development Bank (CIDB)
Mental Health	Dr. Kumar/Diane Montoya
National Hurricane Committee	Donovan Ebanks
Finance & Economics	
Small Business/Labour	Walling Whittaker
Agriculture	Dr. Alfred Benjamin
Government Finances	Frank Gallippi/ Peter Gough
Insurance	Marylou Gallegos – Cayman Islands Monetary Authority (CIMA)
	Danny Scott - Private
	Michael Nixon – Government Risk Management Unit
Chamber of Commerce	Wil Pineau
Finance	Cindy Scotland - CIMA
	Deborah Drummond