

1991

Tropical Cyclones and Island States

James Lewis

James Lewis architect riba
 datum international
 101 High Street
 Marshfield SN14 8LT, UK
 Telephone: 0225 (Bath) 891426
 Fax: 0225 892092



datuminternational
 101 High Street
 Marshfield
 Nr Chippenham Wiltshire
 SN14 8LT United Kingdom
 Telephone +44 (0) 1225 891 426
 Telefax +44 (0) 1225 892 092
 e-mail datum@gn.apc.org and
 james.lewis@member.riba.org

Based on a recent report to the Commonwealth Secretariat for which information has been collated on 70 tropical cyclone disasters since 1980 in 25 island states of the Caribbean, Indian and South Pacific Oceans (1: ref.1). The author is grateful to the Commonwealth Secretariat/CFTC for permission to draw upon the Report for this paper

Why island states ?

One quarter of the world's countries are island states with a combined population of sixty-five million people; 51 of these are UN classified Island Developing Countries. Twenty-six are Commonwealth Island States which, at the request of Commonwealth Finance Ministers, have received special attention due to disasters recently affecting them, in a Report to the Commonwealth Secretariat/Commonwealth Fund for Technical Co-operation (ref.1).

Tropical cyclones, hurricanes and storms are the most frequently damaging disaster type in most island states. The incidence of hurricanes may be no higher for island states than for some continental ones, but some frequencies for islands are impressive (Table 1).

Hurricane "Allen" in 1980 directly affected at least four Caribbean island states; Hurricanes "Eric" and "Nigel" both affected Fiji and Vanuatu; Hurricane "Emily" in 1987

(1) Antigua & Barbuda; Barbados; Bermuda; British Virgin I; Cook Is; Dominica; Fiji; Grenada; Jamaica; Maldives; Mauritius; Montserrat; Papua New Guinea; St Kitts & Nevis; St Lucia; St Vincent & Grenadines; Solomon Is; Sri Lanka; Tonga; Tokelau; Turks & Caicos Is; Tuvalu; Vanuatu; Wallis & Fotuna; & W Samoa

directly affected four island countries and Hurricane "Hugo" five.

TABLE 1

Disaster frequency by country: 1980-1990 (May) Source: Lewis 1990

Country	Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
CARIBBEAN												
Antigua					**	**						**
Barbados	**					**				**		
Bermuda										**		
Br Virgin												**
Dominica					**							**
Grenada								**				
Jamaica	**						**	**	**	**		
Montserrat												**
St Kitts												**
St Lucia	**								**	**		
St Vincent	**							**	**			
Turks & C						**						
INDIAN OCEAN												
Maldives									**			
Mauritius	**											**
Sri Lanka	**				**		**	**	**			**
SOUTH PACIFIC												
Cook Is									**			
Fiji	**	**	**	**	**	**	**	**	**			
Niue												**
Papua N G		**	**	**	**	**	**	**	**			
Solomons	**		**	**	**	**	**	**	**			
Tokelau									**			**
Tonga	**		**	**	**	**	**	**	**			**
Tuvalu									**			**
Vanuatu	**	**	**	**	**	**	**	**	**	**	**	**
Wallis & F							**	**	**	**	**	**
W Samoa					**	**	**	**	**	**	**	**

Satellite imagery makes it possible to watch as vast tropical cyclones subsume one small island after another. On the other hand, some islands can easily be missed by hurricanes which proceed to pound continental shorelines; but it is the often overwhelming proportional impact of disasters in small island states which demands concern.

Proportional impact

The proportional impact of natural disasters on island states is very much higher than in continental countries (ref.2). Table 2 compares eight large disasters since 1980. Although numbers of homeless in the continental disasters were in all but two cases very much higher than the 810,000 homeless in Jamaica, the percentage of homeless were significantly highest in Jamaica, at 34%. (Earlier disasters show similar results; ref.2 and Table 3 some contemporary ones).

TABLE 2

Homeless percentages of national populations Source: Lewis 1990

Country	Type/Name	Year	Homeless	National population (000)	Percentage homeless
Algeria	Earthquake R7.3	1980	390000	19452.5	2.0
El Salvador	Earthquake R7.0	1982	50000	4857.85	1.0
Sudan Khartoum	Floods	1988	2million	24602	8.1
Guatemala	Earthquake R7.0	1985	12000	10944.44	0.1
Mexico City	Earthquake R8.1	1985	575000	86609.17	0.7
Bangladesh	Floods	1988	5million	108464.11	4.6
Jamaica	Hurricane Gilbert	1988	810000	2351	34.5
Nicaragua	Hurricane Joan	1988	230000	3546	6.5

Table 3
Tropical cyclones and island states:
Homeless percentages of national populations Source: Lewis 1990

Country	Name	Year	Homeless	National population	Percentage homeless
CARIBBEAN					
Barbados	Hurricane Allen	1980	5000	249000	2.0
St Lucia	Hurricane Allen	1980	10000	124000	8.0
St Vincent	Hurricane Allen	1980	500	104000	0.5
Jamaica	Hurricane Allen	1980	4000	2133000	0.2
Jamaica	Hurricane Kate	1985	300	2351000	
St Vincent	Trop Storm Danielle flooding	1986	142	105000	0.1
St Vincent	Hurricane Emily	1987	200	105000	0.2
Jamaica	Hurricane Gilbert	1988	810000	2351000	34.0
Montserrat	Hurricane Hugo	1989	12000	12000	100.0
INDIAN OCEAN					
Mauritius	Cyclone Claudette	1979	5000	100000	5.0
Mauritius	Cyclone Firinga	1989	4000	1042000	0.4
SOUTH PACIFIC					
Fiji	Cyclone Wally	1980	7000	634000	1.1
Fiji	Cyclone Arthur	1981	4700	634000	0.7
Tonga	Cyclone Isaac	1982	46500	93000	50.0
Solomon Is	Cyclone Bernie	1982	1000	225000	0.4
Fiji	Cyclone Oscar	1983	50000	666500	7.5
Fiji	Cyclones Eric & Nigel	1985	30000	703000	4.3
Fiji	Cyclone Gavin	1985	1000	703000	0.1
Solomon Is	Cyclone Hina	1985	650	281000	0.2
Fiji	Cyclone Martin & Floods	1986	9000	703000	1.3
Solomon Is	Cyclone Namu	1986	60000	281000	21.4
Fiji	Cyclone Raja	1986	3000	703000	0.4
Cook Is	Cyclone Sally	1987	2000	22000	9.9
Tokelau	Cyclone Tusi & storm	1987	30	2000	1.5
Vanuatu	Cyclone Anne	1988	1600	139000	1.2
Vanuatu	Cyclone Bola	1988	2000	139000	1.4

Similar comparisons have been made of damage estimates as a share of GDP (refs. 1, 3 & 4). Island states have by far the highest percentages at 190%, 77%, 49%, and 29%. UNDR0's findings (ref. 5) have the same overall conclusion with regard to island states, although this should not have been a surprise!

Economic effects

Economic effects of natural disasters can be summarised as: direct effect on people and property and incomes of persons, businesses and communities; indirect effects, the chain reaction on economic activities from direct effects; and secondary effects which appear some time afterwards, such as inflation, effect upon trade and production and on the balance of payments, and of political repercussions.

Direct impact

Housing destruction and homeless

Tropical cyclones in Fiji in 1983 and 1985 caused 13 and 27 percent housing destruction. Twenty-two percent of Tonga's national housing stock was destroyed by Hurricane "Isaac" in 1982 and fifty percent of the population was made homeless (ref. 6). Ninety percent of dwellings on Montserrat were destroyed by Hurricane "Hugo" in 1989 and virtually the entire 12,000 population made homeless. Hurricane "Gibert" in 1988 destroyed a similarly high percentage of dwellings on St Lucia, so much so that information on houses destroyed exceeds the figures of national housing stock. Hurricane "Allen" in 1980 caused very severe damage to Barbados, St Lucia, St Vincent and Jamaica, rendering 19,500 people homeless.

Many Pacific island states are archipelagic. The impact upon a few islands of a group, often hundreds of miles away from the capital, can be very much higher than national proportional impact. More than one fifth of the Solomon Islands population were made homeless by Tropical Cyclone "Namu" in 1986; mostly on Guadalcanal, the proport-

ion of homeless there was very much higher. Hurricane "Anne" (1988) especially affected the Banks and the Torres Islands of Vanuatu. In these islands respectively, total populations of 4,600 and 350 were rendered homeless.

Agricultural and fishing Agricultural damage can be severe where they typically represent large proportions of production and employment. Nine and a half thousand small farmers and their families were particularly affected in 1980 by Hurricane "Allen" in St Lucia (population 124,000: 1980) and the entire banana crop was destroyed in Jamaica. Half of the US\$21 million damage caused in 1982 by Hurricane "Isaac" in Tonga was to crops and subsistence gardens; 90% of the banana crop was destroyed. Of the US\$30 million damage caused to Jamaica by flooding in 1987, half was sustained by agriculture. Fishing boats and equipment are frequently lost in tropical cyclones and the sea surges which accompany them. Twenty-five fishing boats were lost in 1980 during Hurricane "Allen" in Barbados; ninety percent of fish traps and thirty fishing boats were lost in 1989 to Hurricane "Hugo" in Antigua & Barbuda, and 15% of the US\$7 million losses in St Kitts Nevis were to fishing.

Indirect impact

Production and trade Damages sustained by agriculture and fishing, amongst other sectors, have both capital and production/income implications. The near US\$3 million damage to bananas in St Vincent by Tropical Storm "Danielle" in 1986 was about half the average annual banana export value and reported as being 22% of the country's export earnings. Almost half of St Vincent's banana crop was destroyed again by Hurricane "Emily" in 1987. Damage estimates in Mauritius from Tropical Cyclone "Claudette" in (1979) were US\$50 million, whereas losses to national revenue were almost US\$60 million.

Of 100,000 tonnes of standing sugar cane in Fiji, 40% was destroyed in

1985 by Hurricanes "Eric" & "Nigel" and expectations were for a 5-10% sugar crop loss for that year. In fact, Fijian sugar production in 1985 showed an almost 20% drop below the average production of the five previous years. The winds of "Eric" caused the damage that allowed the rains of "Nigel" to enter; roofs were ripped off three mills of the Fiji Sugar Corporation and 20,000 tonnes of stored sugar (36%) were destroyed out of a total stored for shipment to the European Common Market of 55,000 tonnes. One third of the anticipated sugar harvest in 1986 was again destroyed in Fiji by Tropical Cyclone "Martin".

Damage to sugar industry buildings and machinery in St Kitts Nevis by Hurricane "Hugo" in 1989 was estimated as US\$136,500; sugar production was expected to drop by twenty percent. Three quarters of Vanuatu's copra crop was destroyed by hurricanes in 1985.

In addition, the direct costs of reconstruction, housing destruction and homelessness will indirectly cause losses to national production. When seeking or reconstructing shelter for their families, workers are unlikely to report for work - even where their place of work is operational. Diversion of domestic cash priorities bears upon loan and credit repayments and loan agencies thus suffer reduced incomes and are less able to offer the assistance that would otherwise be available. Reconstruction finance may be structured so as to be inaccessible to the "ineligible" poorest and most in need (ref.8).

Damage as a share of GDP

Estimates of damage as a percentage share of gross domestic product (GDP) are similarly variable, according to the magnitude of impact and prevailing conditions. As an indicator of economic impact, there are some significant percentages.

Hurricane "Allen" in 1980 caused damage in St Lucia at 78% of GDP and in St Vincent:Grenadines 29%.

Hurricane "Gilbert" in 1988 caused damage in Jamaica at almost 50% of GDP; Tropical Cyclone "Uma" in 1987 caused damage in Vanuatu at 194%; and Tropical Cyclone "Claudette" in 1979 at 15.5% in Mauritius.

Lower percentage shares show for Fiji, due to less damage per event (but 7.56% for Tropical Cyclone "Oscar" in 1983 was not insignificant), higher GDP and larger land area. Accrued damage from Fiji's high frequency disaster occurrence shows an overall higher economic impact (ref.5).

These indicators show the higher proportional impact upon island states of natural disasters in terms of housing and homelessness, agriculture, and GDP.

Disasters and Development

Decline of GDP is an indicator of a decline in growth and therefore of development as expressed in those terms. With reference to Cyclone "Martin" (1986) the Fiji Minister for Economic Development stated that a 10% reduction in sugar production would reduce GDP by 2%.

In some of the smallest island states with the most fragile economies, "development" is possible only with high proportions of regular development assistance. The Tokelau Islands (pop 2000) are supported by New Zealand at a cost equivalent to US\$2.94 million pa. The estimated cost of damage in Cyclone "Ofa" (1990: Table 1) at US\$2.4 million was 82% of the annual assistance budget.

Disasters and development are invariably considered as a one sided relationship. The impact of disasters on development receives the focus of attention, whereas the impact of development upon disasters appears to be not yet understood. Vulnerability to hazards is the main cause of disasters and their increasing impact, and decisions and activities on behalf of "development" affect vulnerability. Though direct effects may be perceived as beneficial, there may be

Indirect effects of increased vulnerability. Development for some may have meant destruction of protective features for others; erosion and landslides may be induced by construction; and communities relocated or obliged to migrate, and increased vulnerability to natural hazards may be direct or indirect - natural disasters will occur where they would not have occurred before, or be worse than they would otherwise have been.

To counter this otherwise inevitable process, development has to be made more responsive to environment - including environmental hazards - and integrative of measures for survival, rehabilitation and reconstruction in an understanding of the recurrence of hazards and of vulnerability as a dynamic process directly affected by development. **Action taken on account of one disaster must be designed and managed to also reduce vulnerability to disasters in the future.**

Response integration

Disaster reduction has to be seen not only in the physical terms of damage to buildings and loss of life, but in terms of quality of life for survivors, their access to resources and their ability to continue to survive. The prevailing or consequent quality of life preconditions vulnerability to disasters - and disasters, if left unattended, contribute to ensuing vulnerability and degradation in a truly vicious cycle.

Where measures are successfully applied on the one hand, it is very often the case that some activities undertaken by other sectors (of the same government!) may be counteractive in creating more people at risk (ref.9). Hence the need for a balanced comprehensive and multi-sectoral environmental view of hazards and disaster reduction.

The impact of relief

The value of disaster relief may be only 1 or 2% of total estimated damage. Highest relief assistance

against total estimated damage (in the contexts of this paper) was in The Solomons for Cyclone "Namu" (1986) at 29% and in Tonga for Hurricane "Isaac" (1982) at 20%. In these two cases therefore, the cost of disaster borne by the incumbent country amounted to 71 and 80% respectively. The percentage of relief income to Jamaica after Hurricane "Gilbert" in 1988 was 12.3% of the total estimated cost of damage; but in most cases the disaster cost borne by the incumbent country was 90 to 99%.

Where the cost of disaster can be as much as 70% of GDP, the impact of disaster upon development on the one hand and the paucity of disaster relief on the other, especially in island states, is self evident.

The impact of disaster relief in these terms is negligible. Material relief is at best a short term palliative to the immediate effects of disaster for some people. At worst, it disrupts local markets, induces dependency and fecklessness, and may inappropriately raise expectations (ref.10). Relief itself does nothing to reduce destruction and loss - neither this time nor for future disasters.

Development:environment contexts for vulnerability reduction

Smallness of island states underlines both the opportunity and the need for holistic multisectoral environmental planning and management. Events and processes can more easily be seen in islands to have an effect upon each other; but what happens in islands is little different to environmental processes elsewhere; islands are a microcosm from which all countries and contexts may learn for their "pattern" of development.

Natural disasters are an integral part of the dynamic processes of environment and therefore are an environmental issue, because they arise out of natural phenomena; because they have impacts upon environment of which man and communities are a part; and because the

recondition of that environment has a bearing on vulnerability to natural disasters and survival in their aftermath.

However, countless development projects, programmes and reports continue to ignore disaster potential and disaster recurrence. Even some of the most disaster prone countries do not include disaster preparedness or hazard management in their development plans; ***least of all do they express understanding of vulnerability.***

Conclusion

It is a tenet of natural hazards research that disaster impact is governed in part by the prevailing condition. Relief cannot change the long term - which is conditioned by the right kind of development. Relief may be applied where disaster has struck; whereas it could be development that was responsible for relief not being necessary ! How much are we the victims of relief propaganda ?

Identification of the need for improved building construction - a product of improved development - has become *de rigeur* because buildings are tangible and physical and their destruction visible. In matters to do with food and water supply, getting to work, looking after children, keeping warm, and avoiding disease, we see the need for immediate relief but not (on account of disaster survival) for development to ensure these are available all the time to everyone.

Proportional impact analysis is a means by which something of the insider experience of disaster can be conveyed to outsiders more often influenced by privileged global overviews and comparisons of disaster magnitude. Whilst international disaster relief operates on the basis of disaster magnitude, it will not *equally* do so on behalf of small states without taking proportional impact into account. Here at least, ***relief must be replaced by development.***

Climate change and sea level rise mean that tropical cyclones will increase in incidence, severity and extent (ref.11). Strategies for vulnerability reduction must be established *within* island states so that these will not loose out due to the *apparent* "smallness" of disasters in these countries.

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