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MACRO SOCIO-ECONOMIC ASSESSMENT OF THE DAMAGE AND LOSSES CAUSED BY HURRICANE TOMAS

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ST VINCENT AND THE GRENADINES

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PREFACE

This report was prepared on request of the Government of Saint Vincent and the Grenadines following the passage of Hurricane Tomas on 30 October 2010. The implications of the impact of Hurricane Tomas posed a need, apart from the immediate humanitarian response, for a rapid assessment of the social, environmental and economic effects.

The assessment was carried out using the methodology first developed by the Economic Commission for Latin American and the Caribbean (ECLAC), now known as the Damage and Loss Assessment methodology or the DaLA.[1]

The assessment will complement and expand on the emergency and humanitarian needs identified previously by the Government of St. Vincent and the Grenadines. The result of such an assessment provides a quantitative approximation of the overall damage to the economy and its impact on the affected population.

Baseline data for the conduct of the Marco Socio-Economic and Environmental effects are drawn from among official government data sets including: the Population and Housing Census 2001, the St. Vincent and the Grenadines County Poverty Assessment 2007/2008, other relevant data sets from the Government Central Statistical Offices, Ministry of Finance and Economic Planning and the Eastern Caribbean Central Bank (ECCB).

Mission Components

The ECLAC mission, undertaken from 7-14 February 2011, was supported by the United Nations Development Programme (UNDP) Subregional Office in Barbados, the Caribbean Disaster Emergency Management Agency (CDEMA) and the Caribbean Development Bank (CDB) and conducted in collaboration with the Organization of Eastern Caribbean States (OECS) Secretariat and the Inter-American Institute for Cooperation on Agriculture (IICA).

The ECLAC Team comprised:

Asha Kambon	ECLAC, Coordinator and Social Sector Specialist
Michael Hendrickson	ECLAC, Macro Economist
Vincent Little	IICA, Agricultural Specialist
David Smith	Coastal Zones and Infrastructure Specialist
Lancelot Busby	Micro Economist, Tourism and Commerce

This report was made possible by the cooperation, coordination and support provided by the relevant government authorities and the staff of the IICA St Vincent and the Grenadines office. The national counterparts were coordinated by Ms. Laura Anthony Brown, Director of Planning in the Ministry of Finance and Economic Planning. Logistical support was provided by Ms. Michelle Forbes, Director (Ag.) of the National Emergency Management Organization (NEMO).

[1] ECLAC Handbook for the estimation of the macro socio economic effect of an event can be located as follows: http://www.eclac.org/id.asp?id=14978

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EXECUTIVE SUMMARY

On the 30 October 2010, Hurricane Tomas passed close to and north of St Vincent and the Grenadines as a Category 1 storm.

Fortunately no deaths occurred as a result of Hurricane Tomas. Tomas however, took its toll on roughly 28% of the population. The number of persons severely affected stood at approximately 5,239 or 5% of the national estimated population for 2006. These persons could be defined as the primary population who suffered trauma and damage to their households and possessions. It is possible to characterize the event as a rural event, which had greater impact on those living in the rural parts of the island than the urban, and which hit the poor the hardest. NEMO reported that at its peak there were some 1,215 persons in shelters, the majority coming form the Georgetown/Sandy Bay, Chateaubelair and sub-urban Kingstown areas.

The total impact of Hurricane Tomas was estimated at EC$ 132.9 million or US$ 49.2 million. Although this might be classified as a moderate financial impact, Hurricane Tomas nevertheless, severely impacted on the poorest segments of the society resulting in significant fall-out in livelihoods of vulnerable groups and important damage to coastal areas and forestry. The total impact represented 10.5% of GDP, which can be deemed moderate given the potential disruptive impact of hurricanes in the region. However, the impact represented 119.8% of agricultural GDP and over 300% of tourism GDP, reflecting the relatively small, but growing share of tourism in GDP.

Compared with St. Lucia, where the total impact was estimated at EC$ 907.7 million or US$ 336.2 million, the fall-out in St. Vincent and the Grenadines was much more manageable. However, this does not in any way suggest that the impact is not a major challenge for the authorities in St. Vincent and the Grenadines.

The total impact represented a sizeable portion (25.3%) of exports of goods and services, suggesting important loss benchmarked against foreign exchange earnings. The impact accounted for 31% of gross domestic investment, underscoring the need to raise funds for rehabilitation and reinvestment in damage infrastructure. Finally, the total impact defrayed over 19% of public external debt and suggests that substantial financial resources would be necessary for the reconstruction and rehabilitation effort.

The productive sectors suffered the bulk of the impact with damage and losses amounting to EC$ 71.63 million, representing 54% of the total impact.

The forestry subsector was most affected with damage and losses totaling EC$ 30.36 million. Damage amounted to EC$ 22.7 million, 73% of the total impact in the forestry sector. Forestry resources were badly affected with significant damage to buildings and nursery facilities and also plantations, natural forests and wildlife resources. The banana crop was buffeted by the hurricane, with impact estimated at EC$ 18.92 million, 14% of the total effect. Plantains, which are an important contributor to livelihoods, was also severely disrupted, with over EC$ 10 million in damage and losses. Other crops, including root crops, fruits and vegetables, which are both important domestic staples and sources of export income for small farmers, suffered significant impact to the amount of EC$ 7.12 million. Meanwhile, the fallout in livestock and fishing was moderate and stemmed from loss of poultry and damage to farm houses and damage to fishing vessels. Damage and losses to farm infrastructure and land loss were modest at EC$ 0.89 million and EC$ 0.68 million, respectively.

Fortunately, the impact on the rest of the productive sector was contained with tourism suffering moderate damage and losses amounting to EC$ 1.12 million. The damage to hotels and guest houses was minor and the overall impact on the industry did not occasion any visitor cancellations or diversion of cruise ships to other ports. Losses stemmed mainly from the disruption of the operations of tour operators and taxis, owing to blocked roads and damage to tourist sites and facilities.

Meanwhile, the infrastructure sector was impacted to the tune of EC$ 35.8 million, the equivalent of 27% of the total impact. The telecommunications subsector suffered the brunt of the impact in the sector. The lineplant infrastructure was damaged as a number of electricity poles snapped due to damage from landslides. Mobile operators suffered damage to marketing equipment, including signage and billboards. The impact on the road network amounted to EC$ 4.4 million. A number of roads were affected by land slippage that led to them being blocked by fallen trees. This necessitated important road clearing costs. The cost of damage and losses to government buildings in the sector amounted to EC$ 3.9 million. Government buildings including community centres such as the Rose Hill and Campden Park community centres were damaged by the hurricane.

The total effect on the social sectors amounted to EC$ 25.4 million, equal to 19% of the total impact of the hurricane. A full 94% of the impact on the social sectors fell on the housing sector (EC$ 23.9 million). Five percent (5%) of the national housing stock or close to 1,500 houses, ranging from high to low income, were affected by the hurricane. The education sector was impacted to the tune of EC$ 1.3 million. The effect included roof damage in flooding of some schools and other educational institutions. Meanwhile, the impact on the health sector was contained at EC$ 0.2 million.

Conclusions and recommendations

Disasters, such as Hurricane Tomas, often highlight the vulnerabilities of a country. In the case of St. Vincent and the Grenadines, Tomas brought to light the interaction of disaster and poverty and its attendant ills; the vulnerability of the physical environment and its relationship to the infrastructure particularly affected by the erosion of river banks and slopes; and the management of household and Community run- off and waste water on soil and rock slopes. Significantly it highlighted the non-use of best agricultural practices. In the social area, it highlighted the high burden of care, of female heads of households with limited resources; the inability of young women to exploit the opportunities available for continuing education and employment due to early child bearing and rearing practices; the alienation of young males from the traditional education and skills sector, resulting in reduced employability; and the low levels of profitability in the agricultural sector which increases its unattractiveness to the youthful population.

Recommendations have been advanced to address the macroeconomic needs following the disaster, to respond to the damage to infrastructure, in regard to agriculture, social sectors and the affected population

In the short-term the report recommends that government seek to:

(a) Provide special incentives to increase the participation of youth and females, particularly those who are heads of households, in sustainable livelihoods process through micro lending facilities and small grants

(b) Discourage farming on marginal lands

(c) Strengthen the programme of river defences and slope management for the most vulnerable areas using natural and engineering solutions

(d) Strengthen processes for de-silting rivers and develop a de-silting and maintenance programme including examination of possible uses of the extractive materials, and

(e) Develop risk reduction programmes which include retrofitting and mitigation for the poorest, utilizing available technologies drawn from the Cuban models or from other models available through south-south technical cooperation

Strategic adaptation and mitigation approaches to advance sustainable livelihoods and development were identified. In the agricultural sector the report suggests:

(a) Establishment of a production-marketing information system to provide necessary baseline data for decision making related to strategic planning and management in the sector as well as for DaLA

(b) The provision of training in DaLA as it relates to the agricultural sector

(c) Introduction of an insurance regime in the rural areas to cover the entire farm household. The possibility of expanding the present coverage of WINCROP beyond bananas could be examined. This would significantly expand the critical coverage mass of WINCROP and, therefore enhance the viability of the company

(d) Within the context of the CARICOM–Brazil Agreement, and through the institutional (Horizontal Technical Cooperation) mechanism of IICA, explore the possibility of obtaining technical assistance from Brazil to significantly improve the arrow root plant capacity utilization, and

(e) Development and implementation of a land use and water management plan

The report notes that there is a high opportunity cost of not restoring the productive sectors as quickly as possible, and advises that where the full complement of resources required might not materialize from aid and soft loans, then it is advisable that the government undertake some borrowing on as favourable terms as it can negotiate to accelerate the recovery of the foreign exchange generating productive sectors and to rehabilitate roads, bridges and other vital infrastructure.

Lastly the report notes that risk reduction and mitigation measures need to be strengthened and incorporated in the national development planning processes to enable the country to meet the challenges and threats posed by climate variability and change. The most significant being that of more intense and frequent hydrological and meteorological events.

I. BACKGROUND

A. DESCRIPTION OF THE EVENT

This system started as a tropical wave that exited the western coast of Africa on 31 October 2010, and was soon embedded within the Inter-tropical Convergence Zone.[2] Moving quickly westward, the system contained scattered areas of strong convection, or thunderstorms, as well as a broad circulation.[3] The National Hurricane Centre (NHC) first mentioned the wave in its Tropical Weather Outlook on 27 October 2010, when the system was located about 1200 miles (1940 km) east-southeast of the Lesser Antilles. At the time, the agency assessed a 10% chance for tropical cyclogenesis within 48 hours, noting that conditions would become more favourable for development in a few days.[4] By 28 October, the system had become better organized, with a large area of convection. On 29 October hurricane hunters reported a developing surface circulation with tropical storm force winds.[5] As a result, the NHC initiated advisories on Tropical Storm Tomas late on 29 October when the system was about 290 miles (470 km) east-southeast of St. Vincent and the Grenadines.[6]

At the time of classification, Tomas was in an area of low wind shear and high moisture, both of which support rapid intensification. At the time, the lower-level and upper-level circulations were not vertically aligned, which was expected to result in slow strengthening. At that time, the NHC forecast indicated that Tomas was expected to attain hurricane status within 36 to 48 hours, however, its status was changed within three hours. By then winds had already increased to 60 mph (95 km/h).[7] The outflow became well-established in all quadrants as deep convection increased into a prominent rain band. Radar on Martinique indicated that an eye was forming and Tomas continued on a west-northwestwardly path towards the Lesser Antilles, steered by a ridge to its north.[8] While located only 35 miles (55 km) east of St. Vincent, Tomas attained hurricane status (Category 1, see figure1 below), based on hurricane hunter aircraft recording surface winds of 75 mph (120 km/h) within the system. At the time, the eye was from 35–46 miles (56–74 km) in diameter.[9] The hurricane passed close to and north of St Vincent on the 30 October 2010, as a Category 1 storm. Wind speeds over the island were estimated (and recorded) to be between 75 mph and 85 mph.

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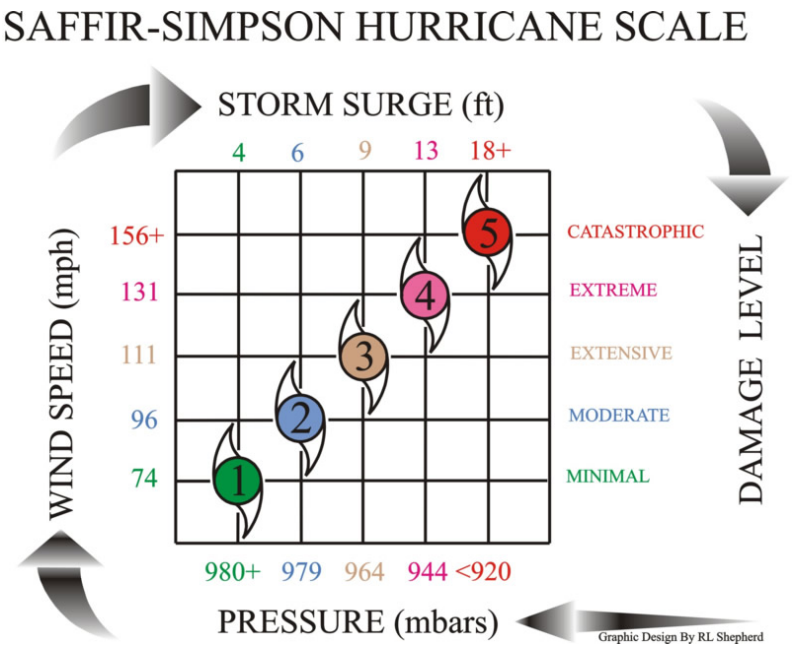
[2] Patricia Wallace (2010-10-25). "Tropical Weather Discussion". National Hurricane Center.
[3] Ibid.
[4] Pasch/Kimberlain (2010-10-27). "Tropical Weather Outlook". National Hurricane Center.
[5] Stewart/Cangialosi (2010-10-29). "Special Tropical Weather Outlook".
[6] Stacy Stewart (2010-10-29). "Tropical Storm Tomas Discussion One". National Hurricane Center.
[7] Berg/Brown (2010-10-30). "Tropical Storm Tomas Special Discussion Two". National Hurricane Center.
[8] Michael Brennan (2010-10-30). "Tropical Storm Tomas Discussion Four". National Hurricane Center.
[9] Berg/Brown (2010-10-30). "Hurricane Tomas Discussion Three". National Hurricane Center

Figure 1: Saffir-Simpson Hurricane Scale



On 30 October, Hurricane Tomas had winds of 75 mph, but was an intensifying cyclone, with winds increasing to 90 mph (148 km/h) later on that day. On the following day it became increasingly better organized, and reports from the hurricane hunters indicated that the winds had increased to 100 mph (160 km/h), a Category 2 hurricane on the Saffir-Simpson scale. Concurrently, the storm was being impacted by south-westerly wind shear, which computer models forecasted to increase and which would serve to dampen the development of this system. As a result, Tomas weakened as the convection waned near the centre, due to the shear and dry air, and by 1st November had diminished to tropical storm[10] status. The storm was described as a "highly sheared tropical cyclone", because the circulation became dislocated from the convection by more than 100 miles (160 km). As a result, the winds were estimated to have decreased to 45 mph (75 km/h) by that time, although an area of thunderstorms reformed northeast of the centre.[11] Over the subsequent day the structure became better organized with more deep convection over the centre due to lighter shear and a moister environment. By that time, it was passing just north of the ABC Islands (Aruba, Bonaire and Curacao).[12]

Figure 2 below shows the track of this system through the Caribbean and as well depicts the changes in strength along its trajectory, while figure 3 presents the occurrences and areas of hurricane force and tropical storm winds on its path.

[10] Robbie Berg (2010-11-01). "Tropical Storm Tomas Discussion Twelve". National Hurricane Center.
[11] John Cangialosi (2010-11-01). "Tropical Storm Tomas Discussion Fourteen". National Hurricane Center.
[12] Cangialosi/Brown (2010-11-02). "Tropical Storm Tomas Discussion Eighteen". National Hurricane Center.

Figure2: Storm Track and Development of Tomas (colours represent varying intensifications)

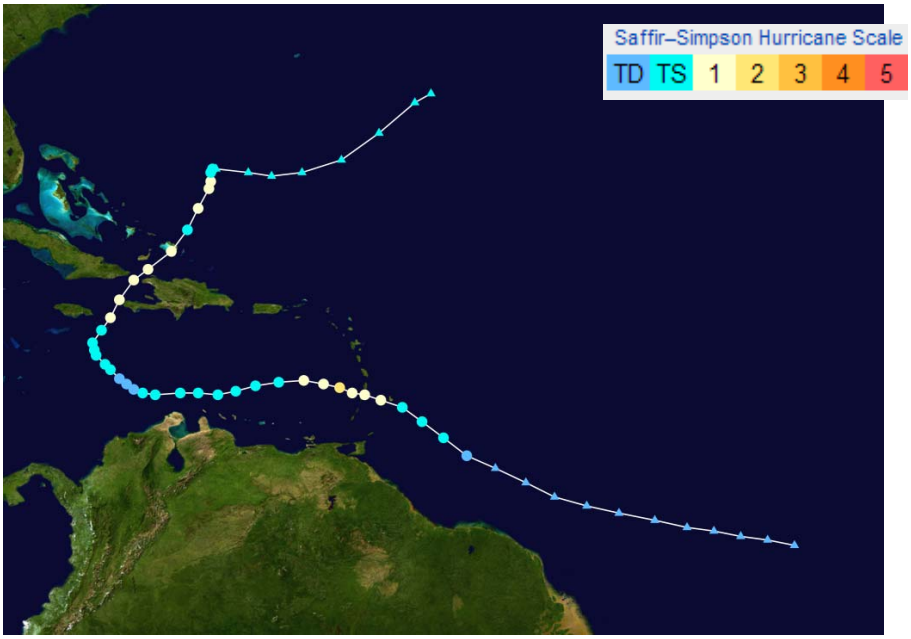
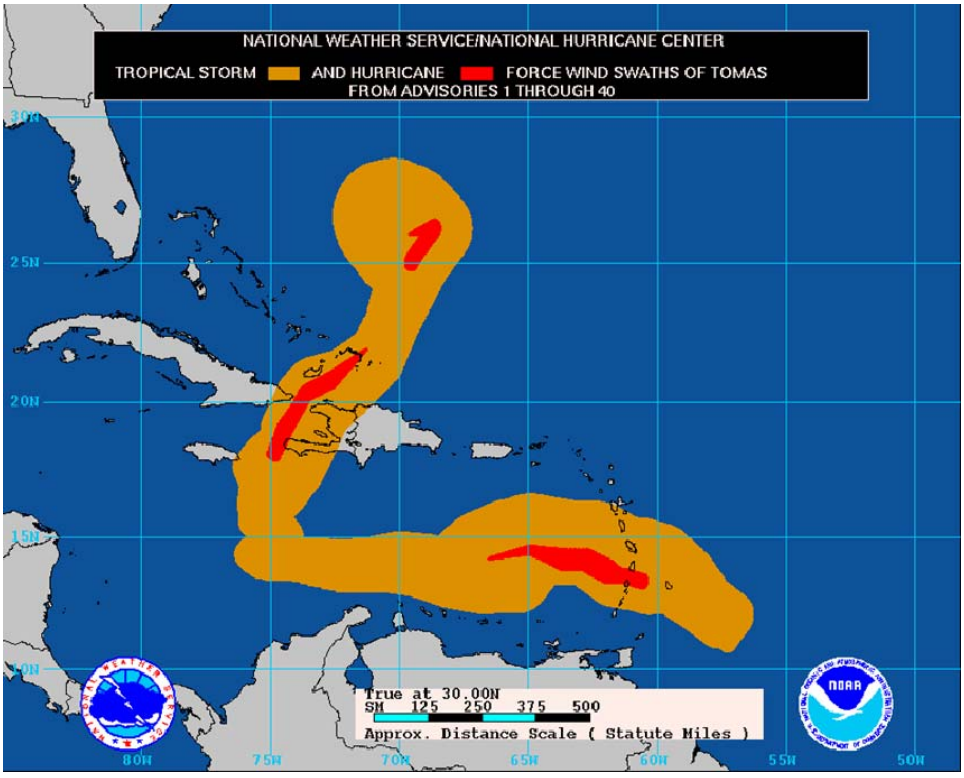


Figure3: Occurrences of Hurricane Force and Tropical Storm Winds for Tomas

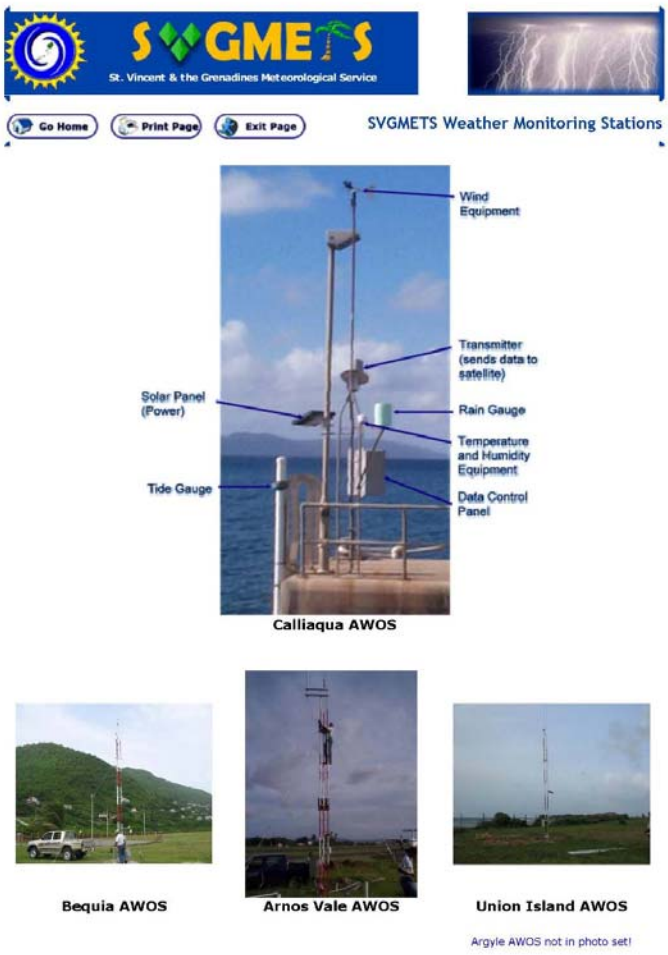


1. Rainfall Records

Climate data have been collected by the St Vincent and the Grenadines Meteorological Service (SVGMETS) for several years. This agency provides climate data and related guidance information to its users, both nationally and internationally. Presently, as a result of a flood some years ago, the database of climate variables held by SVGMETS is limited to around 28 years. Data relating to rainfall have been historically collected at the Arnos Vale station, now the E.T. Joshua Airport.

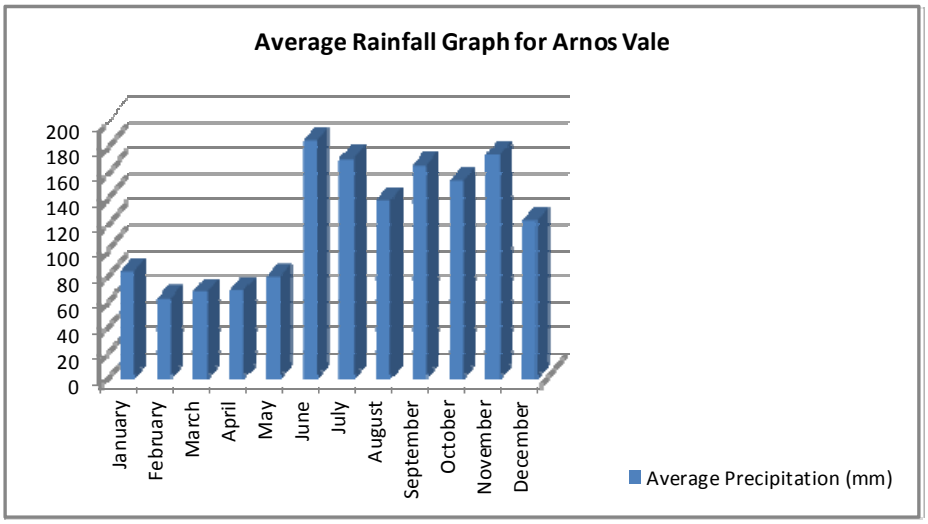
More recently, data are collected from automatic weather stations (AWOS) that are located at Argyle, Calliaqua, Arnos Vale, Bequia and Union Island (figure 4). In addition to these stations, there are limited datasets that are available from agricultural and hydro-stations rainfall across the island.

Figure 4: Automatic Weather Stations in St Vincent and the Grenadines



Average rainfall records for Arnos Vale, Kingstown, St. Vincent over the period of record reveal the pattern of semi-annual rainfall seasonality. The results are shown in figure 5. The graph indicates that the average rainfall for the month of October is 153mm.

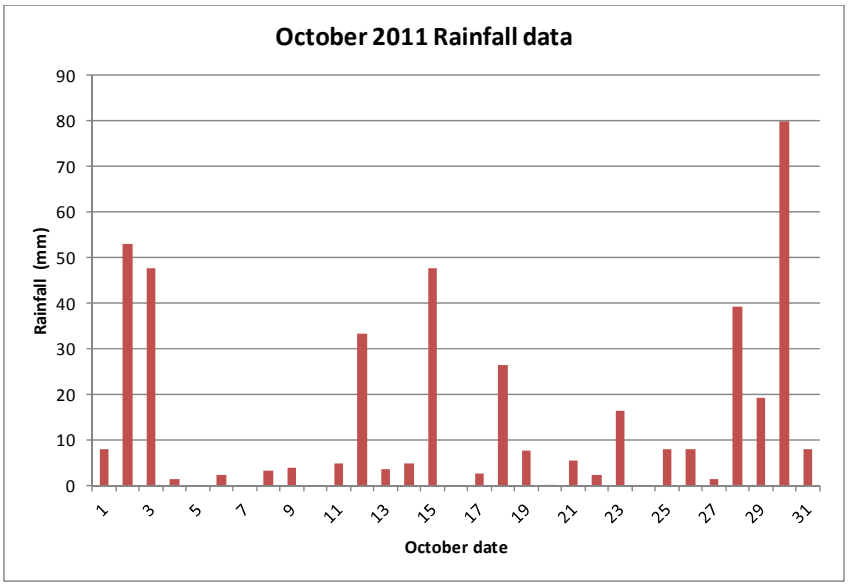
Figure 5 Average Rainfall Graph for Arnos Vale Ground, Kingstown, St Vincent



Source: ECLAC based on official government estimates

A look at the rainfall records for Arnos Vale for the month of October 2010 reveals that for that month there were a number of rainfall records of note. First, between 2 and 3 October, over 100mm of rain fell in this catchment. Then between 12 and 15 October, another 89mm of rain occurred. Finally, leading up to the passage of Hurricane Tomas, between 28 and 30 October, approximately 138mm of rainfall was recorded. The total for that month was well in excess of 350mm, or more than twice the long-term average amount of rainfall for that month, with 215mm of that being experienced before the hurricane. This would have resulted in saturated ground conditions being in place for that month, leading to the potential for landslips as a result of the hurricane rains.

Figure 6: Rainfall Data at Arnos Vale for October 2011



Source: ECLAC based on official government estimates

2. STORM WAVES

An analysis of the deep water waves that would have been generated by Hurricane Tomas as the hurricane passed between St Vincent and St Lucia was carried out. This analysis revealed that from a statistical perspective, and based on a review of National Hurricane Center (NHC) data from 1930 to 2008, the system gave rise to waves that were equivalent to a 1 in 15 year event. From this perspective therefore, it can be seen that Hurricane Tomas could not be considered as an extreme event.

II. THE AFFECTED POPULATION

The population of St. Vincent and the Grenadines is fairly evenly divided between the rural and urban areas with a slightly larger number of urban households than rural, as can be seen in table 1. St. Vincent and the Grenadines also has a marginally declining population.[13] Data for the estimated population in each census division for the period 2001-2006, suggest an average decline of -1.3 percent displayed across all census divisions, even if somewhat unevenly. Despite a high level of vulnerability, and a persistent poverty estimated at approximately 30%, St. Vincent and the Grenadines has been able to reduce its indigence levels from a high of 25.7% in the period of 1995/6 to a low indigence level of 2.9% as estimated by the Poverty Assessment report, 2007/2008. Over the same period the Gini coefficient had declined from 0.56 to 0.402 indicating an improved position of economic and social equality.[14]

Table 1:
Selected Demographic Characteristics

Poverty Indicators	**Percent**
Poverty Headcount Index	30.2
Indigence Level	2.9
Vulnerability	48.2
Households Characteristics	
Urban Percent residing	51.1
Rural Percentage Residing	48.9
Sex of Head of Household	
Male	47.9
Female	52.1

Source: St. Vincent and the Grenadines Country Poverty Assessment 2007/2008

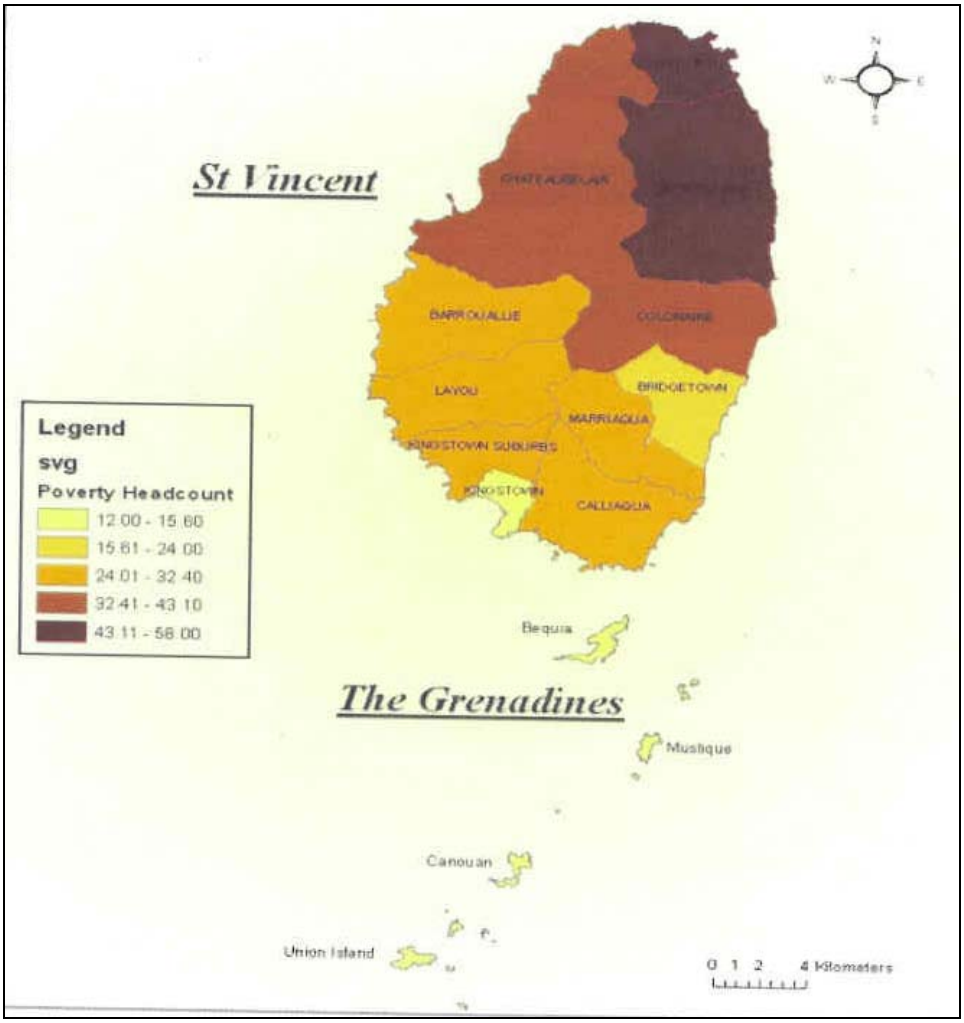
Hurricane Tomas affected mainly the rural areas of St. Vincent and the Grenadines, inflicting the effects of high winds and rain on those persons located in the North Eastern, North Western and South Western parts of the island of St. Vincent. There was minor damage in the Grenadines. In light of the fact that almost 50% of all households live in rural St. Vincent, it is possible to characterise the event as a rural event which had greater impact on those living in the rural parts of the island than the urban and which hit the poor the hardest. See map number 1 St. Vincent and the Grenadines poverty level by census divisions, 2008. The map clearly illustrates that the areas which had the highest levels of poverty were also the hardest hit. Georgetown/Sandy Bay accounts for 16.5% of the poor and had the highest incidence of poverty in the country (56.6%). Unfortunately it was among the part of the country which was hardest hit and from which the largest segments of population were required to occupy shelters.

Fortunately no deaths occurred as a result of Hurricane Tomas. The Hurricane however, took a toll on approximately 28% of the population. The number of persons severely affected stood at approximately 5,239 or 5% of the national estimated population for 2006. These persons could be defined as the primary population who suffered damage to their households and possessions and who suffered injury or trauma.

[13] The St. Vincent and the Grenadines, Population and Housing Census Report 2001, indicated that the 2001 tabulated population amounted to 106,253 persons which represented a 0.2 percent decline during the intercensal period since 1991. The 2006 estimates of population indicated for 2001 a total population of 107,582 and for 2006, 100,272 suggesting a decline of -1.13 percent during the intercensal period.

[14] The level of inequality is described by the gini coefficient. A coefficient closer to zero suggests a lower inequality; closer to one suggests a higher inequality.

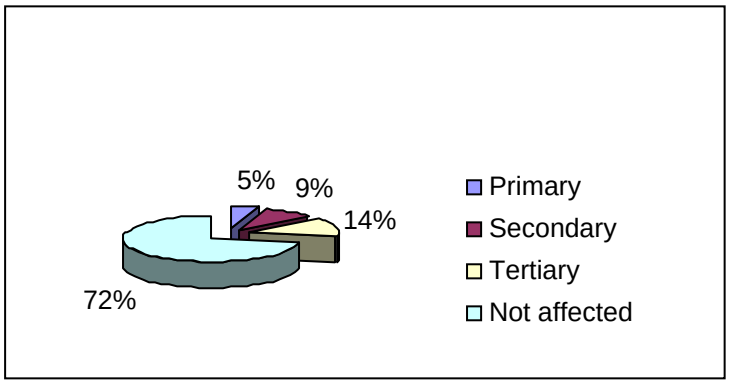
Map 1: St. Vincent and the Grenadines: Levels of Poverty by Census Divisions



Source: Poverty levels by head count. St. Vincent and the Grenadines Country Poverty Assessment 2007/2008

The secondary population affected, accounting for approximately 9% of the whole, could be identified as those who were affected due to the impact on their agricultural produce which either was meant to reach the market or to be used for family subsistence. Yet another larger group, approximately 14% of the whole would have been affected due to disruption of electricity, water and the inability to access their livelihoods through blocked roads and swollen rivers. In all some, 28,000 people or 28% of the population of the country could be identified as having been affected by Hurricane Tomas. Figure 7 illustrates the distribution of the population affected by Hurricane Tomas.

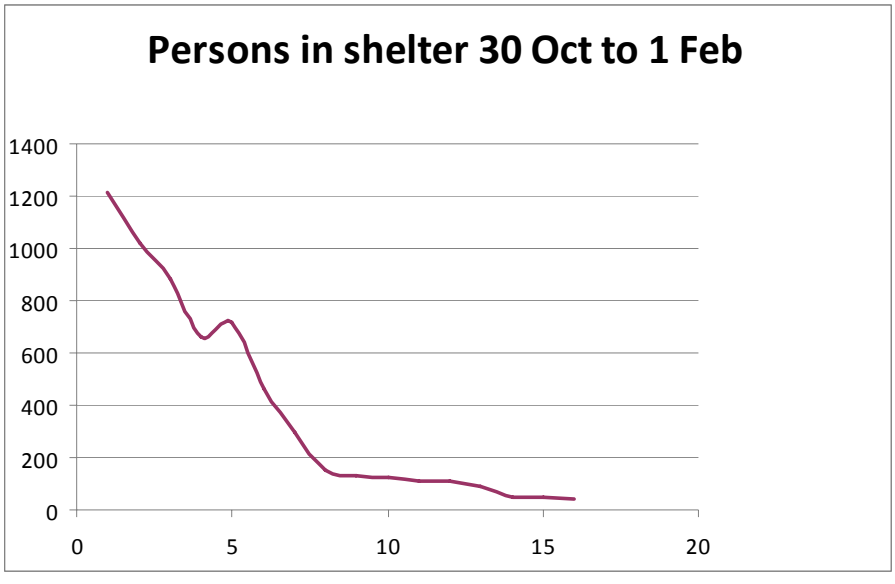
Figure 7: Distribution of population affected by Hurricane Tomas



Source: ECLAC based on official government estimates

NEMO reported that at its peak there were some 1,215 persons in shelters, the majority coming form the Georgetown/Sandy Bay, Chateaubelair and sub-urban Kingstown areas. Chart 1 illustrates the distribution of shelter occupation by persons over the period surveyed. By the time of the assessment most persons had been able to return to their homes or had found refuge with family, resulting in approximately 43 persons still in shelters. It must be noted that the strong social capital which still exists allows many people who would have had to occupy shelters to be accommodated with family or close friends. Therefore, the severely affected may be an underestimation.

Figure 8: Persons in shelters, 30 October 2010 to 1 February 2011



Source: ECLAC based on official government estimates

A. DIFFERENTIAL VULNERABILITY OF WOMEN AND MEN

In cases where the underlying vulnerabilities of women exceed that of men, disasters such as Hurricane Tomas, can have severe impact on women and their families and make their recovery and participation in the development efforts following a disaster, difficult.

The Poverty Assessment Report of 2007/8 highlights the differential vulnerabilities of poor women and men. The report notes that women headed households account for 52.1% of all households in St. Vincent and the Grenadines and among the two lowest quintiles, they account for approximately 50% of all households. Among the poorest quintiles, the average household size, ranges from 5.1 to 4.4, which is well above the national average of 3.5, demonstrating the high burden of care which poor female headed households have to bear.

In further disadvantaging poor female headed households, the report suggests that overall, the labour market was segmented along gender lines, with rewards being usually lower for women than for men, even when they function in the same occupational category.

The report notes that female headed households (FHH) are structurally destined to receive lower incomes than male headed households and the characteristics of FHH which include larger family size on average than male headed households; older household heads than male counterparts; and the multi-generational structure of such households (i.e. with members of three generations) or extended households (mostly extended families including in-laws and/or brothers and sisters or children of family members), all result in lower resilience among female headed households to natural disasters than their male counterparts.

An examination of the occupation of shelters, suggests that almost an equal number of males and females initially occupied the shelters, with males outnumbering females. However it would appear that more females remained in shelters than males, leading to the conclusion, albeit tentative, that males following Tomas may have been able to get their lives back to normalcy faster than females.[15]

A factor that could have contributed to the inability of females to bounce back quickly after Hurricane Tomas, may be the pattern of teenage fertility observed by the assessors and reported on in the poverty assessment.[16]

[15] Shelter reports although not evenly collected suggest that initially there were some 632 men and 583 women. At the mid point of the period of occupation there were 55 women and 53 men but towards the end there were 20 men and 23 women.

[16] The Country Poverty Assessment Report noted that nearly 50% of females reported having had their first birth between the ages of 15-20 and that as many as 8.5% of those in the lowest quintile reported that they had their first birth when they were under the age of 15.

III. DESCRIPTION OF DAMAGE AND LOSSES BY SECTOR

A. AGRICULTURE

1. OVERVIEW OF THE NATIONAL DEVELOPMENT OBJECTIVES

The economy of St. Vincent and the Grenadines (SVG) is externally driven, with employment and incomes being mainly dependent on tourism and tourism-related activities, agriculture, and offshore business services. In addition, both tourism and agriculture are themselves dependent on the conservation of the natural environment, although the country is subject to hazards which range from climate change and weather related events (drought, floods and wind-storms and hurricanes) through to earthquakes, volcanic activity, beach and marine contamination. In addition, there are hazards to social stability and economic activity which result from the operation of market and other economic forces outside the control of the domestic authorities.

In recognition of this situation, the Government of St. Vincent and the Grenadines has, over the years, tried to address the issues through a range of initiatives, within the context of its development objective of attaining high levels of balance and growth with low unemployment and zero incidence of poverty. Thus policy actions and programmes are geared towards:

(a) Pursuing economic diversification through the expansion of non-banana agriculture and of export services (tourism, informatics, offshore finance)

(b) Increasing public sector savings in support of public sector investment
Promoting human resource development in support of general economic activity and poverty-reduction initiatives, and

(c) Improving environmental management while strengthening the country's capacity for disaster management

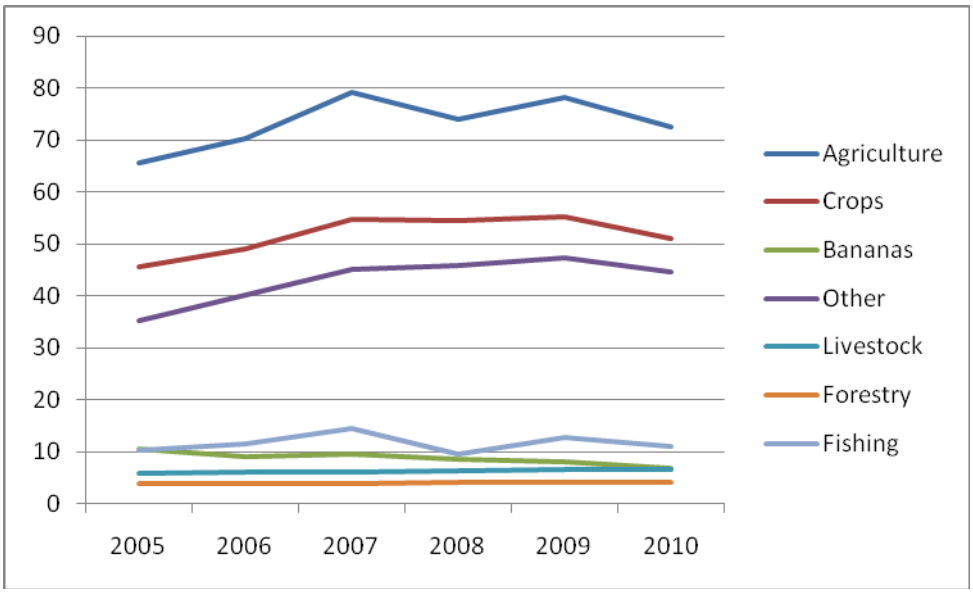
2. PERFORMANCE OF THE AGRICULTURAL SECTOR

The Agricultural Sector is a critical sector to the economy of St. Vincent and the Grenadines and although its contribution to GDP over the last five years has fluctuated, with a slight upward tendency, the sector continues to play an important role in the country's socio-economic development. The sector plays a multi-functional role in earning foreign exchange, generating employment and contributing towards economic growth and food and nutrition security.

In 2005, for instance, the sector accounted for 8.2% of total GDP, compared to 7.4% in 2008 and an estimated 7.8% in 2009. The sector's contribution to GDP in 2010 is projected to decline to 7.4% in 2010.

The contribution of the various subsectors to the total agricultural GDP is presented in figure 9. The figure clearly demonstrates the importance of the 'Other Crops' subsector to the agricultural sector, and the declining role of the banana industry.

Figure 9: Contribution of the Various Subsectors to Agricultural GDP



Source: ECLAC based on official government estimates

Table 2 presents the growth rates of the agricultural sector as well as for the various subsectors for the period 2006-2009, and projections for 2010. The table shows that in 2008, the agricultural sector recorded a poor performance when compared with 2006, 2007 and 2009. The sector is again projected to contract by 7.4% in 2010 as a result of a fall in banana output and contractions in the other crops and fisheries subsectors. The livestock and forestry subsectors are project to record marginal growths during 2010.

Table 2: rate of growth of GDP by agricultural activity at basic prices in constant prices

Year/Sector	2006	2007	2008	2009	2010(P)
Agriculture	7.23	12.72	-6.54	5.70	-7.42
Crops	7.41	11.59	-0.53	1.34	-7.29
Bananas	-13.84	5.83	-11.12	-7.49	-15.04
Other Crops	12.38	12.90	1.73	3.01	-6.01
Livestock	2.07	2.87	1.97	2.09	1.42
Forestry	1.04	1.03	1.02	1.01	1.00
Fishing	11.69	26.59	-34.78	35.06	-15.01

Source: ECLAC based on official government estimates

3. THE BANANA INDUSTRY

Banana is still the single most important agricultural commodity, though declining in contribution to GDP, foreign exchange earnings and employment. Table 3 presents the three main aspects of economic activity of the industry that provide a good analysis of the situation of the industry, namely: the number of active growers, the export volume to United Kingdom market, and the value of exports to the United Kingdom.

Table 3 shows that banana exports to the UK declined from 42,074 metric tonnes in 2000 to 11,490 metric tonnes in 2009 and an estimated 5,456 metric tonnes in 2010. Export earnings from banana have correspondingly declined from EC$ 48.1 million in 2000 to EC$ 10.42 million in 2009 and to a

projected EC $6.46 million in 2010. However, banana trade on the regional market showed significant improvements, increasing from 7,974 metric tonnes valued at EC$ 9.12 million in 2008 to 10,123 metric tonnes valued at EC$ 10.74 million.

The significant change in the fortune of the banana industry over the past years was strongly influenced by external and domestic factors. The main domestic factor relates to the loss of preferential access to the traditional United Kingdom market. The difficulties of the banana industry was compounded by increased production cost resulting from the implementation of the EUREGAP standards, as well as the increasing cost of inputs, particularly fertilizers and pesticides due to the spike in the price of oil while the price of banana either dropped or remained stable.

Table 3: Summary of United Kingdom Banana Exports, Earnings and Number of Active Growers

YEAR	Exports (Mt)	Value (EC $ million)	Active growers
2000	42,074	48.31	3,623
2001	31,918	34.86	3,360
2002	34,369	41.08	2,673
2003	23,932	30.27	2,309
2004	24,242	32.48	2,099
2005	19,385	26.85	1,737
2006	17,944	25.29	1,551
2007	17,584	24.47	1,407
2008	11,753	11.51	1,222
2009	11,490	10.42	1,200
2010 (est.)	5,456	6.46	1,031

Source: ECLAC based on official government estimates

The major domestic factors include severe droughts and outbreaks of the Moko disease and the Yellow Sigatoka leaf spot disease resulting in not only a reduction in the area under banana cultivation, but also reduced output per acre.

The industry has adjusted to the challenges in the external and internal environments by reducing acreage under production, increasing sales of fair trade bananas and increasing exports to the regional market.

4. OTHER CROPS

This subsector includes plantains, root crops (dasheen, eddoes, yams, sweet potatoes, ginger, arrowroot, cassava, tannia, carrots and peanuts), fruits and vegetables and fruit trees. The other crop subsector has taken up the void created by the decline of the banana industry and has been the major contributor to agricultural GDP (accounting for 61.3% of agricultural GDP in 2010).

St. Vincent and the Grenadines has good soil, climatic conditions and knowledge for the production of a range of root crops. Production of the various root crops (with a few exceptions) has been increasing. Production and acreage of arrowroot under cultivation is declining. In the 2004, arrowroot production recorded a high of 1.697 million pounds, but this declined to 0.794 million pounds by 2007, and in 2010 output is projected to be 0.350 million pounds. Over the past few years the government has implemented programs for the rival of the industry. These programs were aimed at production expansion, increased purchasing and processing, and the promotion and marketing of arrowroot starch and other value-added products for the domestic and export markets. Notwithstanding, the industry continues to be plagued by many problems including, labour shortages for harvesting, difficulty in obtaining / developing a mechanical harvester, low yields, and low return to farmers. The industry is an extremely high cost one,

both in primary production and processing. It is uncompetitive in its current state and requires radical policy reforms to address issues of governance, commercialization, joint venture investments and competitiveness.

Of the wide range of fruits and vegetables produced in St. Vincent and the Grenadines, only a few are exported on a consistent basis. With respect to vegetables, a few such as pumpkins and hot peppers are exported. The others, such as tomatoes, cabbages, cauliflower, and lettuce are produced but little or none are exported. The major deterrent to these vegetable exports are the high cost of production and poor quality of the commodities. There is some export of anthuriums and spices (nutmeg and mace). Available data show that for the period 2004 and 2008, increased levels of exports were recorded for golden apples, avocadoes, plums, coconuts and mangoes. However, for the same period, decline in exports recorded for breadfruit, citrus, papaya, soursop, passion fruit and hot peppers.

Exports of other crops have also been increasing. For example, available data show that the export of ginger increased from EC$ .82 million in 2008 to EC$ 1.32 million in 2009, while plantains recorded a minor increase for the same period, moving from EC$ 1.92 million in 2009 to EC$ 1.95 million in 2009. An industry plan has been implemented for cassava. The plan involved the establishment of a factory at Orange Hill and the introduction of new varieties to farmers.

5. LIVESTOCK SUBSECTOR

The livestock subsector is small, relative to crops, with production of poultry, pigs, cattle (mainly for meat) and small ruminants the main activities. Its contribution to GDP, foreign exchange earnings and employment is minimal. The industry contribution to agricultural GDP was 5.9% in 2009 and the projected contribution for 2010 is 8.1%. The subsector experienced real growth of 2.09% in 2009, and is projected to grow by 1.42% in 2010. The smallness of the subsector has presented prospects for growth and development of the industry and created opportunities for import substitution of livestock products, as well as for reducing poverty and enhancing food and nutrition security in rural areas.

In terms of animal population, the national cattle herd is estimated at approximately 3,500 head of cattle, and the small ruminant population is estimated to be 7,200 head of sheep and 6,800 head of goats. The egg production laying flock is approximately 60,000 birds and is based on imported eggs hatched at the National Hatchery.

The country is self-sufficient in table eggs and there is a significant level of self-sufficiency in pork (estimated at 50%) and small ruminants. However, overall there is high level of importation of meat and dairy products. Chicken meat (mainly parts) accounted for 63% of the 8.89 million kg of meat imported in 2008, while turkey meat accounted for another 13.7% Beef imports represented 13.8% of total meat imports, while pork accounted for 7.8%. There is a market demand in St. Vincent and the Grenadines for fresh unprocessed livestock products such as chicken, pork, mutton, goat meat and beef. The conditions under which these products are now produced are inefficient and increased levels of productivity can be achieve with improved technology and management systems.

A livestock investment project has been proposed with the overall objective of enhancing food and nutrition security in the country through the expansion and upgrading of the livestock industry. The outputs of the project are:

(a) Upgraded livestock production systems

(b) Establishment of a viable public/private sector livestock industry, including state of the art livestock slaughter and meat processing facility

(c) Increased use of domestic based feeds in livestock production

(d) Establishment of a animal waste management system; and

(e) Policy for the promotion and development of the subsector developed and adopted.

6. FISHERIES SUBSECTOR

The fisheries subsector and the marine environment are important to economic development in St. Vincent and the Grenadines, through its contribution to sustainable livelihoods in rural areas, foreign exchange earnings and GDP. The marine and coastal environments lie at the core of the country's tourism appeal and thus have strong, though underestimated, linkages to the growing and important tourism sector.

Fishing is an extremely important industry in the Grenadines and some rural communities of mainland of St. Vincent. The fishing industry is primarily small-scale and artisanal with most fishermen operating from small boats close to the shore. It is estimated that there are 2,500 persons employed in the industry, with 70% being dependent on fishing or related activity for economic survival. The industry, in 2009 contributes approximately 1.07% of Total GDP and approximately 15.4% of agricultural GDP.

Latest available data have put fish landings at an estimated 2.13 million pounds annually, with a corresponding value of EC$ 10.47 million. Fish imports stand at approximately 1.1 million pounds at a value of EC$ 5.8 million, while exports are 138,000 pounds at a value of EC$ 1.02 million. Consequently, St. Vincent and the Grenadines is a net importer of fish and fish products. Table 4 presents a comparative analysis of fish landings and exports for St. Vincent and the Grenadines for period January to June, 2009 and 2010, respectively.

Table 4: Comparative analysis of fish landed in St Vincent and the Grenadines and distributed to local and export markets for period January – June, 2009 and 2010

Species	PRICE (EC $)/lb	JAN – JUNE 2009 (lbs)		JAN – JUNE 2010 (lbs)	
		Landing	Exports	Landings	Exports
Lobster	10.00 – 18.00	18,539	16,989	13,535	12,719
Conch	8.00 – 10.00	7,806	6,773	1,703	400
Large offshore Pelagics (Large Tuna, Swordfish)	7.00 – 10.00	65,417	170	58,666	8
Small offshore Pelagics (Dolphin, Kingfish, etc.)	6.00 – 9.00	296,457	790	233,999	5,210
Small coastal Pelagics (Jacks, robin, small tuna)	1.50 – 6.00	541,445	27,117	418,237	29,623
Demersals	6.00 – 9.00	106,783	19,202	107,900	36,944
Total		**1,036,447**	**71,041**	**838,040**	**84,904**

Source: ECLAC based on official government estimates

The bulk of the landed catches are sold locally to retailers/vendors and directly to consumers, and to middlemen or fish traders for export to the United States, Martinique and other regional markets. The country is still unable to export to the European Union, though efforts are being made to meet the required standards.

There are 36 landing sites in St. Vincent and the Grenadines. These are categorized as primary, secondary or tertiary depending on the infrastructural development and the number of boats operating at

the site. The construction of fishing centres at eight landing sites on the mainland of St. Vincent and in the Grenadines was completed during the period 1990 – 2008. These sites were significantly upgraded to include ice making, storage, fuel dispensing, retailing stalls, lockers, docking and in some cases desalination and SCUBA filling facilities. Although some upgraded facilities are operating only at partial capacity, they have facilitated the improvement of the quality of fish for export and domestic consumption.

The fisheries subsector is still dominated by small fishing enterprises of relatively low efficiency. It is estimated that approximately 713 vessels, primarily below 32 ft in length, currently operate in the fishery waters of St. Vincent and the Grenadines, The main form of propulsion is the two-stroke outboard engine, ranging from 6 to 115 horsepower (HP), with increasingly higher HP ratings being favoured. There is a small but growing number of diesel-powered, decked vessels with insulated fish hold, facilitating longer periods of operation.

Strategic priorities for the fisheries subsector include: reducing pressure on the inshore fisheries and increasing the returns to fishing effort; sustainable utilization of fisheries resources; sustainable aquaculture development; enhancing safety, quality assurance, value addition and marketing.

Attention is also being given to the enhancement of efficiency within the existing artisanal fleet. These vessels are primarily daily operators and their engines consume substantial quantities of fuel. However, they are responsible for the bulk of the fish produced in St. Vincent and the Grenadines. It is for this reason that the Fisheries Division continues to promote the use of the four-stroke outboard engines, which consumes about 60% of the fuel utilized by the two-stroke engines of equivalent size.

Fishermen experience difficulties at sea and often lives are lost due to lack of proper maintenance of boat and engines. They also lack basic safety and navigation equipment.

7. FORESTRY SUBSECTOR

St. Vincent and the Grenadines is covered by 25-30% forests, which include several forest types such as the Montane Rainforest, Coastal Dry-woodlands, Littoral forest and the Elfin Woodlands. Some of these forests are important to timber production, including high value species such as the Blue Mahoe and Mahogany. The Forestry Department of the Ministry of Agriculture, Forestry and Fisheries (MAFF) has annual reforestation activity to reclaim deforested lands for the purpose of soil and water conservation.

Forests provide several services and benefits to St. Vincent and Grenadines, including:

(a) Livelihood or supplement to income for several persons in the communities (such as charcoal makers and agro / eco-tourism operators

(b) Conservation of water which benefits the population with water for drinking, irrigation and hydro-electricity, and

(c) Contribute significantly to the tourism sector through eco-tourism and the several areas designated as national parks

The conservation of the forests and wildlife resources is a major area of operation. St. Vincent and the Grenadines forests, like others, are important from a conservation and environmental standpoint for bio-diversity (12 plants, 2 birds, 4 reptiles and one amphibian are endemic to the country), water production and conservation, positive effects to clean air and the climate, and soil fertility and conservation. There are several Forest Reserves including at Cumberland and Kings Hill.

The major threats to forests and bio-diversity are deforestation due to illegal crop production, encroachment, poaching, and overexploitation. More recently with the success of increased law enforcement efforts against the producers of illicit crops, there is the need to provide alternative livelihoods for persons in rural communities.

The industry contribution to agricultural GDP was 5.1% in 2009 and the projected contribution for 2010 is 5.5%. The subsector experienced real growth of 1.01% in 2009, and is projected to grow by 1.00% in 2010.

Strategic priorities for the forestry subsector include:

(a) Increasing the contribution of forests to GDP

(b) Conservation of bio-diversity and soil and water resources

(c) Development of a comprehensive national forest policy that includes the examination of the forest wildlife legislations, and

(d) Strengthening institutional capacity

8. RESOURCE BASE

(a) Number and area of holdings by census division

Table 5 below presents information from the St. Vincent and the Grenadines Agricultural Census for 2000 on the number of holding and area of holdings by census division. The table shows that there are 876 "landless" farmers. Calliaqua is the census division with the most holdings (and, also, the most landless holdings). The Southern Grenadines has the fewest holdings, while Sandy Bay has the fewest landless holdings. Bridgetown has the largest area of agricultural land use.

Table 5: Number and area of holdings by Census Division

Census Division/ Agricultural Region	Number Of Holdings			Total Acres
	Landless	With Land	Total	
Region 1				
Kingstown Suburbs	105	403	508	**588**
Layou	67	443	510	**1,518**
Barouallie	89	393	482	**1,845**
Chateubelair	83	479	562	**1,475**
Region 2				
Kingstown	13	229	242	**247**
Calliaqua	237	1,193	1,430	**2,135**
Marriaqua	49	787	836	**2,222**
Northern Grenadines	45	269	314	**386**
Southern Grenadines	8	223	231	**312**
Region 3				
Bridgetown	62	632	694	**2,264**
Colonaire	76	549	625	**1,811**
Georgetown	38	612	650	**2,090**
Sandy Bay	4	292	296	**893**
TOTAL	**876**	**6,504**	**7,380**	**17,785**

Source: ECLAC based on official government estimates

Table 6 shows that almost 27.5% of the landed holdings are less than 0.5 acres, while only 3.5% of the holdings consist of 10 acres and more.

Table 6: Number of holdings by size

Size of holding	Total Number of Holding
Landless Holdings	876
Under 0.5 Acre	2,032
O.5 and under 1 Acre	731
1 and under 2 Acres	1,206
2 and under 5 Acres	1,634
5 and under 10 Acres	645
10 and under 25 Acres	187
25 Acres and more	69
TOTAL	**7,380**

Source: ECLAC based on official government estimates

(b) Number of holdings by size of holdings

The distribution of holdings by size in presented in table 7. All census divisions have at least one farm of 25 acres or more (large farm), with the largest number of large farms (13) located in the Calliaqua Division.

Table 7: Number of holdings by size of holdings

Census Division/ Agricultural Region	Landless	Under 25 Acres	25 + Acres	Total
Region 1				
Kingstown Suburbs	105	402	1	**508**
Layou	67	432	11	**510**
Barouallie	89	387	6	**482**
Chateubelair	83	476	3	**562**
Region 2				
Kingstown	13	226	2	**241**
Calliaqua	237	1,181	13	**1,431**
Marriaqua	49	784	3	**836**
Northern Grenadines	45	266	3	**314**
Southern Grenadines	8	221	2	**231**
Region 3				
Bridgetown	62	622	10	**694**
Colonaire	76	543	6	**625**
Georgetown	38	608	4	**650**
Sandy Bay				
TOTAL	**876**	**6435**	**69**	**7,380**

Source: ECLAC based on official government estimates

(c) Number and area of holdings under a single form of tenure

Data gleaned from the 2000 Agricultural Census show that of a total of 6,504 landed holdings, 6,237 operate under one form of tenure. Of these, 4,696 holdings are operated over 12,500 acres under owner-like possession. The largest number of these holdings was in Calliqua; Sandy Bay had the least holdings

(167), but the Southern Grenadines had the smallest area (174 acres). There were 1,200 holdings with single tenure form of renting and these holdings consisted of a total of 3,141 acres. The largest number of these holdings (237) was in the Georgetown Census Division and the smallest (11) in the Northern Grenadines. Census Division Chateaubelair reported the highest number of holdings (75) with squatting as the single form of tenure and also the largest number of acres in the holding (138 acres). The distributions of these holdings by (number and acreage) are presented in tables 8 and 9 below.

Table 8: Number of holdings under a single form of tenure

Census Division/ Agricultural Region	Owner / Owner-Like Holdings	Rent	Squatting	Other	Total Holdings
Region 1					
Kingstown Suburbs	356	26	16	0	**398**
Layou	298	110	13	3	**424**
Barouallie	247	91	38	7	**383**
Chateubelair	282	91	75	9	**457**
Region 2					
Kingstown	203	21	3	0	**227**
Calliaqua	1,008	127	19	15	**1,169**
Marriaqua	518	185	3	2	**708**
Northern Grenadines	240	11	16	2	**269**
Southern Grenadines	200	22	1	0	**223**
Region 3					
Bridgetown	448	104	29	4	**585**
Colonaire	398	104	6	9	**517**
Georgetown	331	237	18	9	**595**
Sandy Bay	167	71	36	8	**282**
TOTAL	**4,696**	**1,200**	**273**	68	**6,237**

Source: ECLAC based on official government estimates

Table 9: Area of holdings under a single form of tenure (Acres)

Census Division / Agricultural Region	Owner / Owner-Like Holdings	Rent	Squatting	Other	Total Acres
Region 1					
Kingstown Suburbs	513	50	9	0	**572**
Layou	1,061	347	7	5	**1,421**
Barouallie	1,463	169	80	7	**1,719**
Chateubelair	905	305	138	16	**1,364**
Region 2					
Kingstown	219	25	3	0	**246**
Calliaqua	1,805	213	7	26	**2,050**
Marriaqua	1,460	349	4	6	**1,818**
Northern Grenadines	365	15	5	1	**386**
Southern Grenadines	174	139	0	0	**312**
Region 3					
Bridgetown	1,639	241	52	10	**1,941**
Colonaire	1,334	284	10	22	**1,651**
Georgetown	1,117	803	18	16	**1,954**
Sandy Bay	539	201	76	11	**827**
TOTAL	**12,593**	**3,141**	**409**	118	**16,261**

Source: ECLAC based on official government estimates

(d) Land use (acres) by census division and agricultural region

As indicated in table 10, approximately 17,800 acres of land are used for agricultural purposes. As a percentage of the land area, this represents approximately 18.6% of the total land area of St. Vincent and the Grenadines. The farmers use about 42% of the agricultural land for permanent crops and about 15% for temporary crops.

Although the Census Division of Bridgetown has the largest amount of total agricultural land, Calliaqua, Marriaqua and Georgetown are not far behind.

The largest amount of permanent cropland is in Bridgetown with 19.3% of total permanent croplands. The largest amount of temporary cropland is in Calliaqua with 14.4% of the total temporary cropland. It should be noted that in the Census, where temporary crops are inter-planted with permanent crops, the land use is designated as permanent cropland.

Table 10 below presents a synopsis of the land use for crops under the different areas.

Table 10: Land use (Acres) by census division/agricultural region

Census Division / Agricultural Region	Total Land	Total Agric. Land	Perm. Crops	Temp. Crops	% Total Land In Agric.	% Agric. Land In Perm. Crops	% Agric. Land in Temp. Crops
Region 1							
Kingstown Suburbs	3,850	588	204	90	15	35	18
Layou	7,100	1,518	180	222	21	12	15
Barouallie	9,100	1,845	519	279	20	28	15
Chateubelair	19,800	1,475	300	324	7	20	22
Region 2							
Kingstown	1,150	247	94	45	21	38	18
Calliaqua	7,550	2,135	605	386	28	28	18
Marriaqua	6,000	2,222	1,354	356	37	61	16
Northern Grenadines	5,710	386	29	12	7	8	3
Southern Grenadines	4,740	312	31	19	7	10	6
Region 3							
Bridgetown	4,600	2,270	1,471	286	49	65	13
Colonaire	8,600	1,811	1,294	164	21	71	9
Georgetown	14,200	2,089	1,201	194	15	57	9
Sandy Bay	3,400	893	185	294	26	21	33
TOTAL	**95,800**	**17,789**	**7,466**	**2,669**	**19**	**42**	**15**

Source: ECLAC based on official government estimates

9. TOTAL EFFECT ON THE AGRICULTURAL SECTOR

(a) Overview

The total effect on the agricultural sector of St. Vincent and the Grenadines by Hurricane Tomas was assessed by utilizing the UNECLAC methodological framework for estimating the socio-economic and environmental effects of disasters. Within this context, effect on the sector was categorized under two broad headings, damage and loss.

The effect on the agricultural sector of by Hurricane Tomas at the time of the disaster is categorized as 'Damage'. Damage caused by the Hurricane that will have negative impact on production and income throughout the recovery period was assessed as 'Loss'.

In assessing the damage of the sector, only damage to capital assets and stocks were considered. The damages were identified under four broad headings:

(a) Damage to farmlands

(b) Damage to the physical infrastructure and to machinery and equipment

(c) Damage of crops that were ready to be harvested at the time of the event

(d) Damage of stocks (livestock, inputs, harvested products, etc)

In assessing the damage, only production ready to be harvested at the time of the hurricane was taken into consideration. However, for affected annual crops that were still growing at the time of the event, the investments in the production processes (labour and inputs) were considered.

In the case of damage to stock, damages were estimated at farm prices and input at replacement value. Assessments for partial damages were estimated on a prorated basis.

Tables 11 through 23 provide a summary of the total effect, damage and loss, respectively of Hurricane Tomas to the banana, plantain, 'other crops', livestock, fisheries and forestry subsectors, as well as to farm infrastructure and farmland loss. On-farm infrastructural damages to the livestock are included under Farm Infrastructure and not the livestock subsector. Damages to farm roads are not included in the estimates as this is addressed under the Communication, Transport and Works sector.

The impact of Hurricane Tomas on the agricultural sector, although widespread throughout the country, was concentrated in the Northern part of the country, more so the North-east, inflicting substantial damage to the sector. The damage was most severe in Region 3 (Agricultural Region), which accounted for 37.1% of the total agricultural sector damage, excluding fisheries and forestry.

The total effect of Hurricane Tomas on the agricultural sector is estimated at EC$ 69.64 million, of which total damage is estimated at EC$ 47.68 million and total loss at EC$ 21.96 million (table 11). Of the total effect, the forestry subsector accounted for 43.6%, while total effect on the banana subsector was 27.2%. Significant effects were also recorded for plantains (15.7%) and 'other crops' subsector (10.2%). Details of total effect, damage and losses by region and sector are presented in tables 12 and 13, respectively.

Table 11: Summary of total effect of Hurricane Tomas on the agricultural sector

Total Effect	**69,645,395**
Total Damage	**47,683,565**
Banana	11,735,250
Plantain	7,186000
Other Crops	5,241,810
Livestock	346,090
Fisheries	142,690
Forestry	22,267,600
Infrastructure	764,125
Land Loss	-
Total Loss	**21,961,830**
Banana	7,183,740
Plantain	3,850,000
Other Crops	1,875,020
Livestock	87,045
Fisheries	135,100
Forestry	8,086,550
Infrastructure	125,245
Land Loss	684,110

Source: ECLAC based on official government estimates

Table 12: Total effect of Hurricane Tomas to the agricultural sector

Region	Bananas	Plantains	Other crops	Livestock	Fisheries	Forestry	Infra-structure	Land loss	Total damage	%
1	839,190	515,635	3,464,400	109,295			537,690		5,466,210	7.8
2	3,222,580	2,358,765	1,332,825	35,325			59,810		7,009,305	10.1
3	14,857,220	8,096,600	2,319,605	288,515			291,890		25,853,830	37.1
Other	-	-	-	-	277,790	30,354,150	-	684,110	31,316.050	45.0
Total	**18,918,990**	**10,971,000**	**7,116,830**	**433,135**	**277,790**	**30,354,150**	**889,390**	**684,110**	**69.645.395**	**-**
%	27.2	15.7	10.2	0.6	0.4	43.6	1.3	1.0		100.0

Source: ECLAC based on official government estimates

Table 13: Estimated damage to the agricultural sector

Region	Bananas	Plantains	Other crops	Livestock	Fisheries	Forestry	Infra-structure	Land loss	Total damage
1	520,540	337,740	2,652,890	85,975			461,285		4,058,430
2	1,998,930	1,544,990	1,031,180	28,760			52,400		4656,260
3	9,215,780	5,303,270	1,557,740	231,355			250,440		16,558,585
Others	-	-	-	-	142,690	22,267,600	-	-	22,410,290
Total	**11,735,250**	**7,186,000**	**5,241,810**	**346,090**	**142,690**	**22,267,600**	**764,125**	**-**	**47,683,565**

Source: ECLAC based on official government estimates

Table 14: Estimated loss to the agricultural sector

Region	Bananas	Plantains	Other crops	Livestock	Fisheries	Forestry	Infra-structure	Land loss	Total damage
1	318,650	177,895	811,510	23,320			76,405		1,407,780
2	1,223,650	813,775	301,645	6,565			7.410		2,353,045
3	5,641,440	2,793,330	761,865	57,160			41,450		9,295,245
Others	-	-	-	-	135,100	8,086,550	-	684,110	8,905,760
Total	**7,183,740**	**3,850,000**	**1,875,020**	**87,045**	**135,100**	**8,086,550**	**125,245**	**684,110**	**21,961,830**

Source: ECLAC based on official government estimates

(b) Banana industry

The banana industry has played an important role in the economy of St. Vincent and the Grenadines contributing significantly to GDP, foreign exchange earnings and employment. Analysis of available disaggregated data show that the contribution of the industry to total GDP for the period 2004 through to 2009 varies from a high of 2.27% in 2004 to a low of 1.41% in 2005. In 2009, the contribution of the industry to GDP was 1.82%. The data also show that in 2009 the contribution of the banana industry to total agricultural GDP was 67.77%.

Figure 2 demonstrates that the banana industry is a major contributor to export earnings in St Vincent and the Grenadines. Table 15 shows the production of banana in St. Vincent and the Grenadines for the period 2007 -2010.

Table 15: Banana Production, 2007-2010

YEAR	PRODUCTION (TONNES)
2007	30,091
2008	38,465
2009	33,892
2010 (October)	21,701

Source: ECLAC based on official government estimates

The banana industry is also a significant contributor to employment in St. Lucia, It is estimated that there are 1,330 active banana farmers operating on about 7,361 acres of land and employing approximately 4,000 workers.

The banana industry was heavily impacted by hurricane Tomas, with some 1,118 farmers occupying approximately 2,439 acres affected. Total impact of the disaster on the industry is estimated at EC $18.92 million. The damage is estimated at EC$ 11.74 million, while the losses are put at EC$ 7.18 million.

The impact of the disaster was more pronounced in Region 3 and 2, which reported estimated total impact of EC$ 14.86 million and EC $3.22 million, respectively. Approximately 1,916 acres in Region 3 and 416 acres in Region 2 were impacted.

The overall impact of the hurricane on the banana industry was estimated at 93.1%. See table 16 for details.

Table 16: Total effect on the banana industry

Region	Number of Farmers Affected	Acreages under Production	Acreages Affected	% Acreages Affected	Crop Direct Damage Estimate	Indirect Crop Losses	Total Crop Damage Estimate
1: - Leeward	48	147	108.2	73.6	520,540	318,650	839,190
2: - Windward							
Marriaqua valley	241	446	415.5	92.2	1,998,930	1,223,650	3,222,580
3							
Greiggs/Lauders/Lowmans	132	-	188.6	-	907,335	555,430	1,462,765
Biabou/Spring/ New Prospect	89	-	276.2	-	1,328,770	813,410	2,142,180
Diamaonds/Chapmans/Park Hill	182	-	299.6	-	1,441,345	882,320	2,323,665
Colonaire/Byrea	105	-	326.4	-	1,570,280	961,250	2,531,530
South Rivers	80	-	212.6	-	1,022,800	626,110	1,648,910
Congo Valley/ Georgetown/ Bower	130	-	388.7	-	1,869,995	1,144,720	3,014,715
Rabacca	111	-	223.5	-	1,075,255	658,200	1,733,455
Sub-Total Region 3	829	2,028	1,915.6	94.7	9,215,780	5,641,440	14,857,220
Total damage	**1,118**	**2,621**	**2,439.3**	**93.1**	**11,735,250**	**7,183,740**	**18,918,990**

Source: ECLAC based on official government estimates

The impact of the hurricane on the industry obviously will have serious implications for future banana production as well as for farmers and export income. These implications are presented in table 17. The country is expected to have a shortfall in banana export earnings of EC $8.14 million in value up to the middle of August 2011.

Table 17: Implications of Hurricane Tomas on banana production, income and export earnings

Year	Pre-Tomas Expected Production (tonnes)	Post-Tomas Projected Production (tonnes)	Production Losses (tonnes)	Projected income Losses (tonnes)	Projected Export Earnings Losses (EC $)
2010	10,772	7,422	3,350	1,793,770	**3,006,625**
Jan-mid August 2011	8,738	3,020	5,718	3,061,730	**5,131,905**
TOTAL	**19,510**	**10,442**	**9,068**	**4,855,500**	**8,138,530**

Source: ECLAC based on official government estimates

(c) Plantains

The plantain industry, which has grown significantly over the last five years as a result of the difficulties faced by the banana industry, was also heavily impacted by hurricane Tomas, with approximately 2,666 acres affected. Total impact of the disaster on the industry is estimated at EC $10.97 million. The damage is estimated at EC $7.19 million, while the losses are put at EC $3.85 million.

The impact of the disaster was more pronounced in Region 3 and 2, which reported estimated total impact of EC$ 8.10 million and EC$ 2.36 million, respectively. Approximately 2,071 acres in Region 3 and 456 acres in Region 2 were impacted.

Details on the impact of the Hurricane on the Plantain industry are presented in table 18**.**

Table 18: Total effect on the plantain crop

Region	Estimated Acreage Affected	Direct Damage	Indirect Damage (Losses)	Total Damage
REGION 1				
Sub total	139	337.740	177,895	**515,635**
REGION 2				
Sub total	456	1,544,990	813,775	**2,358,765**
REGION 3				
Sub total	2,071	5,303,270	2,793,330	**8,096,600**
Total Plantains	**2,666**	**7,186,000**	**3,850,000**	**10,971,000**

Source: ECLAC based on official government estimates

(d) Other crops

The category ‘other crops’, which included legumes, root crops (dasheen, eddoes, yams, sweet potatoes, ginger, cassava, tannia, carrots and peanuts), fruits and vegetables and fruit trees were also heavily impacted, with total impact on the subsector estimated at EC$ 7.12 million. The damage was estimated at EC $5.24 million and the losses put at EC$ 1.88 million (table 19)

Region 1 accounted for 48.7% of the total damage, followed by Region 3 (32.6%) and Region 2 (18.7%).

The major commodities impacted were fruits/tree crops (33.8%), vegetables (29.0%) and roots and tubers 20.2%). Pigeon peas which is major legume produced in St. Vincent and the Grenadines suffered significant damage estimated at EC$ 949,800 or 13.3 percent of total damage to the ‘Other Crops’ subsector.

Table 19: Total effect on the other crops subsector (EC$)

Region/Crops	Acres/# Plants Affected	Direct Damage	Indirect Damage (Losses)	Total Damage
	REGION 1			
Pigeon Peas	105.8	449,650	185,150	634,800
Vegetables	64.2	1,139,550	208,650	1,348,200
Fruit/tree crops	71.3	563,270	256,680	819,950
Roots and Tubers	43.9	412,220	136,530	548,750
Other crops	19.6	88,200	24,500	112,700
Sub-total Region 1	304.8	2,652,890	811,510	3,464,400
	REGION 2			
Pigeon Peas	14.7	62,475	25,725	88,200
Vegetables	24.0	498,000	100,800	598,800
Fruit/tree crops	22.5	177,750	81,000	258,750
Roots and Tubers	25.4	238,505	78,995	317,500
Other crops	12.1	54,450	15,125	69,575
Sub-total Region 2	98.7	1,031,180	301,645	1,332,825
	REGION 3			
Pigeon Peas	37.8	160,650	66,150	226,800
Vegetables	5.4	95,850	17,550	113,400
Fruit/tree crops	115.2	910,080	414,720	1,324,800
Roots and Tubers	122.9	327,710	245,820	573,530
Other crops	14.1	63,450	17,625	81,075
Sub-total Region 3	295.4	1,557,740	761,865	2,319,605
	TOTAL 'OTHER CROPS' – ALL REGIONS			
Pigeon Peas	158.3	672,775	277,025	949,800
Vegetables	93.6	1,733,400	327,000	2,060,400
Fruit/tree crops	209	1,651,100	725,400	2,403,500
Roots and Tubers	192.2	978,435	461,345	1,439,780
Other crops	45.8	206,100	57,250	263,350
Total 'Other Crops'	**698.9**	**5,241,810**	**1,875,020**	**7,116,830**

Source: ECLAC based on official government estimates

(e) Livestock industry

The livestock subsector suffered moderate damage as a result of the hurricane. Regions 3 and 1 were the regions mostly impacted.

The overall estimate of damage to the livestock industry is put at EC$ 433,135. Of this total effect, damage is estimated at $346,090 represents damage and loss at EC$ 87,045. The loss of animals, mainly within the poultry industry is estimated at 5,992. Damage to livestock infrastructure was moderate, including damage to houses (mainly roof of farm buildings) and fencing. The estimated effects of Tomas on the livestock infrastructure are accounted for under the general heading of 'Farm Infrastructure.' Details of the impact of Tomas on the Livestock subsector are presented in table 20.

Table 20: Total damage to livestock subsector

Region/Animals	# Animals Affected	Damage	Losses	Total Damage
	REGION 1			
Cattle	1	2,500	750	3,250
Sheep	47	14,100	2,540	16,640
Goats	95	21,375	4,060	25,435
Swine	17	5,100	1,380	6,480
Poultry	3,300	42,900	14,590	57,490
Rabbit	-	-	-	-
Sub-total Region 1	3,460	85,975	23,320	109,295
	REGION 2			
Cattle	1	800	260	1,060
Sheep	28	8,400	1,515	9.915
Goats	38	8,550	1,625	10,175
Swine	26	7,800	2,105	9,905
Poultry	251	3,010	1,025	4,035
Rabbit	3	200	35	235
Sub-total Region 2	347	28,760	6,565	35,325
	REGION 3			
Cattle	33	82,500	24,750	107,250
Sheep	140	42,000	7,560	49,560
Goats	294	66,150	12,570	78,720
Swine	67	20,100	5,430	25,530
Poultry	1,642	19,705	6,700	26,405
Rabbit	9	900	150	1,050
Sub-total Region 3	2,185	231,355	57,160	288,515
	TOTAL LIVESTOCK – ALL REGIONS			
Cattle	35	85,800	25,760	111,560
Sheep	215	64,500	11,615	76,115
Goats	427	96,075	18,255	114,330
Swine	110	33,000	8,915	41,915
Poultry	5,193	65,615	22,315	87,930
Rabbit	12	1,100	185	1,285
TOTAL Livestock	**5,992**	**346,090**	**87,045**	**433,135**

Source: ECLAC based on official government estimates

Highest monetary damages to the livestock industry were recorded for sheep and goats (EC $190,445 or 44.0% of total livestock damage, cattle (EC$ 111,560 or 25.8%), and poultry (EC$ 87,930 or 20.3% of total livestock damage.

(f) Fisheries

The effect of Hurricane Tomas on the fisheries subsector maybe characterized as moderate, with total damage estimated at EC$ 277,790. Of this total, damage is estimated at EC$ 142,690, while loss is put at EC$ 135,100.

Table 21 presents the details of total damage to the fishing industry.

Table 21: Total damage to the fisheries subsector

Item	Description of damage	Damage	Loss	Total damage
1. Fishing Vessel "TORPEDO"	Vessel was completely destroyed by mango tree.	3,100	12,600	**15,700**
2. Fishing Vessel "AMANDA"	Vessel was also destroyed by a fallen mango tree.	2,600	12,600	**15,200**
3. Fishing Vessel "FIRST TRY"	Vessel was split down the middle.	2,800	12,600	**15,400**
4. Fishing Vessel "SIMBA"	Vessel was severely damage by fallen tree.	6,400	12,600	**19,000**
5. Fishing Vessel "PRAYERS HELP"	Vessel sustained damage to the bow and mid-section.	1,410	12,600	**14,010**
6. Fishing Vessel "PRICKLE HIND"	Loss of Long line Fishing Gears, including mainline of ten miles, branch lines, and other accessories such as hooks, buoys, snaps, etc.	23,090	28,000	**51,090**
7. Fishing Vessel "BLEM"	Vessel was completely destroyed.	77,000	31,500	**108,500**
8. Fishing Vessel	The vessel along with its engine and fishing gears sank.	12,525	12,600	**25,125**
Sub-total Vessel		**128,925**	**135,100**	**264,025**
9. Air conditioning units	Two (2) at National Fisheries Marketing Limited and one (1) at Fisheries Division.	6,450	-	**6,450**
10. Kingstown Fish Market Jetty	Loss of concrete slabs and damage to fences.	3,000	-	**3,000**
11. Calliaqua Fisheries Centre Jetty	Twenty-four 6ft planks lost.	4,315	-	**4,315**
Total Damage		**142,690**	**135,100**	**277,790**

Source: ECLAC based on official government estimates

The major area of damage incurred by the marine fishing industry was complete destruction and / or loss of fishing boats and related equipment (8 boats). Total effect on fishing vessels is estimated at EC$ 264,025, with damage put at EC$ 128,925 and loss of income at EC$ 135,100.

There were minor damages to Kingstown Fish market Jetty (loss of concrete slabs and damage to fences) and the Calliaqua Fisheries Centre Jetty (loss of twenty-four 6ft planks. Two air conditioning units at the national Fisheries marketing Limited Complex and one at the Fisheries Division were damaged.

(g) Forestry and Wildlife

Forestry

The impact of Hurricane Tomas on the Forest Resource base of St. Vincent and the Grenadines maybe described as severe, with the main areas of impact occurring in the Northern two-third of the country. Observed damage to the Forestry subsector maybe classified into five main categories as follows:

(i) Damage to the Forestry Headquarters
(ii) Damage to nursery Building and Facilities Grounds
(iii) Damage to the forestry Arboretum and Campden Park
(iv) Damage to Nichol's Wildlife Complex and Aviaries
(v) Damage to the forestry Plantation resources
(vi) Damage to the Natural Forest
(vii) Damage to the Wildlife resources
(viii) Damage to the waterways and riparian strips, and
(ix) Impact on the Ecosystem services

This section of the report does not take into consideration the impact of the disaster on forest roads and access roads, which are both accounted for under the Communications, Transport and Works sector. Details of the impact of Tomas on the Forestry subsector are presented in table 22.

(i) Damage to the forestry headquarters

The damages include:

- Leaking roof resulting in flooding of Conference room, Library, Director of Forestry and Forestry Supervisor Offices. Some damage to documents and books that were stored on the floor.
- Decorative awning damaged.
- One of the 3-phase transformers damaged resulting in loss of electricity from 1 to 3 November, 2010.

(ii) Damage to nursery building and facilities grounds

- Included in the damages were**:**
- Plastic corrugated sheets damaged, some removed.
- Toilet ventilation pipe broken.
- Bamboo shade on some plants removed.
- Some damage to trees on Forestry compound; crown snaps and broken branches.
- Damage to seedling (drying out).

(iii) Damage to the forestry Arboretum and Campden Park

- In the Arboretum over 50% of trees were damaged, characterized by uprooting, crown-snap and broken branches.
- Campden Park Forest suffered approximately 20% damage, with defoliation, crown snap and uprooting of trees.

(iv) Damage to Nichol's Wildlife Complex and Aviaries

At the Nichol's Wildlife Complex there were no damages to building and cages and no birds nor animals killed or injured. However, the compound was littered with leaves and branches of trees, and the Wildlife display billboard was damaged by fallen tree branches.

(v) Damage to the forestry plantation resources

The assessment revealed damage to forest plantations that vary from 5% to 90% damage. This variation in the degree of destruction is a result of age, degree of management, species and location of these plantations.

The affected areas include:

- Cumberland - 30%
- Zion Hill - 30%
- Richmond - 30%
- Vermont - 15%
- Montreal - 60%
- Diamond/ Lumber heap - 90%
- Colonarie - 30% to 60%
- Tibereau - 90%
- Perseverance - 60%
- Sandy Bay - 60%

(vi) Damage to the natural forest

The Natural Forest suffered damages characterized by crown-snaps, defoliation and uprooting. The impacted areas include:

- Kings Hill Forest Reserve - 5%
- Mount St Andrew - 60%
- LA Soufriere - 60%
- Richmond 60%
- Coastal Forest of the entire Island - 30%
- Central Mountain Range - 30%
- Inland Mountain forest - 40%
- Upper Mountain forest - 20%

(vii) Damage to the wildlife resources

The forest provides a habitat for country wildlife, mammals, reptiles, amphibians and birds. Any disruption will cause temporary and sometimes long-term effect on the wildlife species.

Due to the widespread destruction of the forest, with loss of trees and landslides, the forests and the habitat provided have been altered as a result of:

- The destruction of nesting (trees) sites (Parrots)
- The destruction of nests (other birds)
- The loss of food trees resulting in shortages of food sources.

(viii) Damage to the waterways and riparian strips

Hurricane Tomas resulted in river bank erosion, and with fallen trees and branching blocking waterways. Significant resources were employed in the removal of the trees and branches, which posed a threat to flooding and further soil erosion.

(ix) Ecosystem services value

The ecosystem services value has been calculated based on an estimate of 30% damage to the 13,000 hectares of natural forest in St. Vincent and the Grenadines. The calculated value of US$ 972 per hectare was determined by the use of the 'Economics of Ecosystem biodiversity Manual' for evaluating the economic value of ecosystems.

The total impact of Hurricane Tomas on the Forestry Resource Base of St. Vincent and the Grenadines is estimated at EC$ 30.36 million, with damage estimated at EC$ 22.27 million and loss put at EC$ 8.09 million. The majority of the damages in the forest was due to snapped, uprooted and wind thrown trees, and crown damage and defoliation.

Total impact on natural forest (table 22) is estimated at EC$ 14.09 million, with damage estimated at EC$ 10.25 and loss EC$ 3.84 million. Impact on plantation forest is estimated at EC$ 517,500, with damage estimated at EC$ 375,000 and loss put at EC$ 142,000.

Total effect on the ecosystem services is estimated at EC$ 15.30 million, with damage put at EC$ 11.38 million and loss estimated at EC$ 3.92 million.

The disturbances that occurred to the forest reserves from the passage of Hurricane Tomas are expected to create persistent increase in light gaps in the forest canopy, resulting in:

- Increased in colonization and density of forest stands by pioneer species and other species of low merchantable timber value, thereby, reducing the value of forest stands;

- Reduced ability for gradual transformation back to primary or climax species and the consequent reduction in biodiversity;
- Reduction in diameter classes for diversity of forest species and reduce reproduction opportunity for many species of forest trees that require long time period for maturity and reproduction;
- Reduction in the diversity of fruiting trees and the capacity of the forest to sustain some wildlife species;
- Compromised integrity of forests watersheds to conserve soil and water due to lack of mature trees with established roots systems and the lack of below ground roots stratification to anchor soils, increase water percolation into the soils and to sustain aquifers during the dry periods; and
- increased forest susceptibility to the vagaries of wildfires

Table 22: Total damage to the forestry subsector

Item	Description of damage	Damage	Loss	Total damage
1. Forestry Headquarters	Leaked roof; decorative awning damaged; and one (1) 3-phase transformer damaged.	10,500	-	**10,500**
2. Nursery Building and Facilities Ground	Plastic corrugated sheets damaged; toilet ventilation pipe broken; bamboo shade for some plants removed; and damage to seedling.	2,000	750	**2,750**
3. Forestry Arboretum and Campden Park Forest	In Arboretum over 50% of trees damaged; and in the Campden Park Forest approximately 20% of trees damaged.	10,000	4,500	**14.500**
4. Nichol's Wildlife Complex and Aviaries	Branches of trees and leaves littered the compound; and wildlife billboard damaged.	2,000	750	**2,750**
5. Forest Plantation Resources	Damage to Plantation Forest Resources, ranging from 5% to 90% in various areas.	375,000	142,500	**517,500**
6. Natural Forest	Damage to Natural Forest estimated at 30% of the 13,000 hectares, and included crown-snaps, defoliation and complete uprooting of trees.	10,245,700	3,842,150	**14,087,850**
7. Wildlife Resources	Damage included the destruction of nesting (trees) sites and the loss of food trees.	200,000	72,500	**272,500**
8. Waterways and Riparian Strips	River bank erosion; trees and branches blocked waterways.	50,000	100,000	**150,000**
9. Ecosystem Services	The damage to Ecosystem Services was estimated utilizing the 'Economics of Ecosystem and Biodiversity Manual for Calculating the Economic Value of Ecosystem (based on 30% destruction of the forest resources).	11,372,400	3,923,400	**15,295,800**
Total Damage		**22,267,600**	**8,086,550**	**30,354,150**

Source: ECLAC based on official government estimates

Forest roads and access routes in the forest subsector suffered major damage (Cost estimates included in Communication, Transport and Works Report). The assessment also focused on landslides occurring along rivers, riverbanks, water intakes and other watershed related areas. Landslides were reported in all ranges, although no major ones were reported. The damage to trails and other ecotourism activities were not substantial

Wildlife

The impact of Hurricane Tomas on the wildlife in the areas that were assessed is characterized as low to moderate. Details are provided in table 23**.**

Table 23: Wildlife habitat assessment of damage to watershed after Hurricane Tomas, November 2010

Watershed	Location	Impacts Coastal (lower)	Impacts Farmlands (mid)	Impacts Forest (Upper)	Brief Description	Observation	Damage status	Comments
Buccament	South Leeward	**Little** Impact to tree species and other food source for wildlife such as Iguana	**Little i**mpacts to farmlands and mainly breadfruit and coconut trees species	**Moderate** impact to Natural and Plantation forest	**Wildlife Reserve** Home of Endemic Species such as parrots, frogs, Black snake. Essential Watershed and catchment. A vibrant hunting community.	Several Patches of impacted forest with toppled trees, Crown Snapping, and limp snapping in Natural and Plantation forest. Est. 12ac damaged	**Little to Moderate** damage. Population of **Hunted species will survive open season**	Very important Watershed and Nature trail (NP)
Richmond	North Leeward	**Little** impact to Coastal forest	**Moderate** damage to farmlands and some Fruit trees	**Severely damaged** to the Dark View Monkoshung Forest of mainly Natural forest and wildlife food source such as penny piece	Parrot Habitat. Infiltrated by Marijuana cultivators, A Key National Park and tourism Recreational site, Vinlec Hydro power station. Hunting area.	The interlocking west facing slopes in the upper forest and rock faces were mostly impacted by the gust of winds. Valleys' were undisturbed Est. 400-500 ac damaged	**Moderately to Badly** damaged **Hunted species will survive open season**	An important site for wildlife, water and Recreation. Food sources is still readily available
La Soufriere	North Windward	**Moderate** damaged to tree crops, bananas and coconut	**Badly damaged** lots of fruit trees crops, bananas mainly breadfruit and coconut.	**Severely damaged** lots of Toppled natural forest trees, Landslides, trails blocked, hundreds of acres destroyed.	Major National park and tourism recreational site. Recovering forest of 1979 volcanic eruption. Site where lots of hunting conducted	Many landslides toppled and broken Bamboo patches and large old growth trees. Trails Blocked almost impassable at some points. Some wildlife species will migrate in order to survive Est. 700-800 ac damage	**Badly to Severely damaged** **Hunted species may not be able to withstand hunting Pressure**	An important site for wildlife hunting, bird watching, Tourism and Recreation
Congo Valley/ Jennings	North Central Windward	**Moderate damaged** Coastal tree species	**Badly damaged** to farmlands tree crops mainly breadfruits and coconuts	**Severely Damaged** several acres of Natural forest trees with crown snapping ,leafless and toppled trees	Major wildlife habitat for Parrots, Jennings Water catchment, Private forest holdings, irrigation.	Several acres of Natural and Plantation forest trees with crown snapping, leafless and toppled. No Parrots observed in Congo Valley where we always observed lots of parrots Est. 150-200 ac damage	**Badly to Severely damaged** **Hunted species may not be able to withstand hunting Pressure**	A Key habitat for the Parrots and other wildlife. Human activity within this area needs monitoring

Colonarie	South Central	**Little damaged** to coastal trees species and few Landslides	**Moderate** damage to farmlands with bananas and fruit trees mainly breadfruit and coconut trees	**Moderate damaged** within the House top, Pavement and Upper Colonarie mountains with toppled trees, crown snapping and many landslides	A major watershed for Hydro electricity, wildlife and parrot habitat, timber , some level of Recreation and Irrigation	Several landslides were observed, and many large patches of impacted forest on the west facing mountain slopes. Est.75-80 ac damage	**Little to Moderate damage**. Hunted wildlife within this water shed should be able to survive the open season.	Need lots of monitoring because this area is being deforested by Marijuana growers.
Montreal	Marriaqua (Interior center of island)	**Little damaged** valley area was covered from winds mainly large breadfruit trees affected	**Moderate damage** to farmland with bananas and fruits mainly breadfruit and coconut trees	**Severe damage** to plantation forest of Caribbean pine and Blue mahoe **Moderate damage to** Natural forest Mostly west facing ridge slope along Simpson and Petit Bonhomme that were affected	A major watershed for potable water and catchments, wildlife species, Timber logging and recreation.	The damaged in this watershed varied from moderate in Natural forest where most of these trees were denuded of their leaves with little toppling and crown snapping. Est.45-50ac damage to natural. Plantation forests of Caribbean pine which are at rotation age were greatly impacted on also Blue Mahoe.	**Little to Moderate damage** Hunting of the abundant spices of Tattoo and Manicou, Agouti seems to be a dying tradition in many of the communities	Most attention should be giving to the monitoring of timber and logging activities and aesthetics of are because of the close proximity to the Montreal Gardens
Cumberland	North Leeward	**Little damaged** to coastal dry forest habitat to mainly Iguanas and other wildlife	**Little damage** to farmland tree species of mangos, breadfruits. Some landslides	**Little damaged** to Natural and plantation forest. No significant impact	A major watershed for A proposed forest reserve, most of the Endemic wildlife species especially the Parrots, water catchment and Hydro power station and recreation, tourism site and timber production.	**Minimal damage observed** only a few old weak trees from natural and plantation forest seem to have been affected by gust of winds and either suffered crown snapping or toppled	Little damage **An active community of hunters that meet hunters from other communities.**	This watershed contains all the major actives such as Catchment, Recreation, hydro station, timber logging and a major habitat for Endemics species

Source: ECLAC estimates based on official government data

(h) Farm Infrastructure

Farm infrastructure suffered moderate damage. The overall estimate of the damage to the infrastructure, excluding farm roods (accounted for in general infrastructure) is put at EC $0.89 million, of which damage is estimated at EC $0.76 million and loss at EC $ 0.13 million.

Most of the damage to the infrastructure was in the areas farm housing (EC $780,770 or 87.8% of total farm infrastructure damage) and fencing structures (EC $72,480 or 8.1%). The arrowroot factory at OWIA suffered significant damage valued at EC $170,00. Details of the overall impact of Hurricane Tomas on farm infrastructure are presented in Table 3.13.

(i) Farmland Loss

The agricultural sector experienced farmland loss of approximately 349 acres, due mainly to landslides. The opportunity cost of utilizing the land for banana production formed the basis for calculating the impact of this land loss. Estimated value of net income loss from the country's inability to cultivate the land is estimated at EC $684,110 and represents the present value of the flow of net income from 349 acres of banana over ten (10) years.

B. THE TOURISM AND COMMERCE SECTORS ESTIMATES OF DAMAGE AND LOSS

1. TOURISM

The tourism sector is not a stand alone economic activity like the manufacture of food or drinks or tobacco. Rather, it cuts across a number of industries that include Hotels, Restaurants, Crafts industries, Transportation, local sites of interest, recreation including diving and personal services to the extent that they cater for the tourist.

The citizens of St. Vincent and the Grenadines utilize the beaches, waterfalls, forests, hiking trails, rivers, all elements of the infrastructure, for pleasure and recreation. Recreational activities include cook outs and picnics, bathing and swimming, fishing and hiking. These aspects of the natural environment are also heavily utilized by tourists. Whereas they remain elements of infrastructure and are to be accounted for in infrastructure, their use constitutes a tourism offering. Their use generates income streams to government and to private concerns such as tour operators and taxi drivers who cater for the touristic use of the facilities.

Hurricane Tomas, a category 1 hurricane, struck on 30 October 2010 and affected the northern portion of the island and the islands to the north of the mainland. The geographical concentration of the hurricane implied a minor effect on the more densely populated south of the island where there is a concentration of population and economic activity, including tourist accommodation units. There is a measure of tourism activity to the North of the island where boating and other marine attractions draw some tourists. The fact of category one force excused the economic centres from major damage but exerted its destruction on the less populated but heavily agricultural north. The main casualty was the banana and plantain acreage and engine for foreign exchange earnings. The estimates of damage to agriculture are presented in an appropriate part of the assessment report. This section addresses damage and loss to the tourism sector.

The tourist high season runs from 15 November to the end of April during which time hotel occupancy rates are at their highest. The timing of the high season reveals the orientation of the tourist market towards the countries of the North where the winter months coincide with the designated "high"

season in the Caribbean and offer rest and relaxation and a chance to escape some of the cold weather in the country of origin of the tourists. A close correlate to the indicator of hotel occupancy is the statistic of stay over tourist arrivals.

The tourism sector cannot be clearly demarcated, especially in the face of an absence of a Tourism Satellite Account. For purposes of this study, the Hotels and Restaurants sector will be used as a proxy to the tourism sector pending the creation of a tourism satellite account. The following table represents movements in the approximated tourism sector and the total GDP over the years 2007 through 2010 projected with a view to putting the size of the tourism sector into perspective.

Table 24: Gross domestic product by economic activity at basic prices in current prices (EC$M)

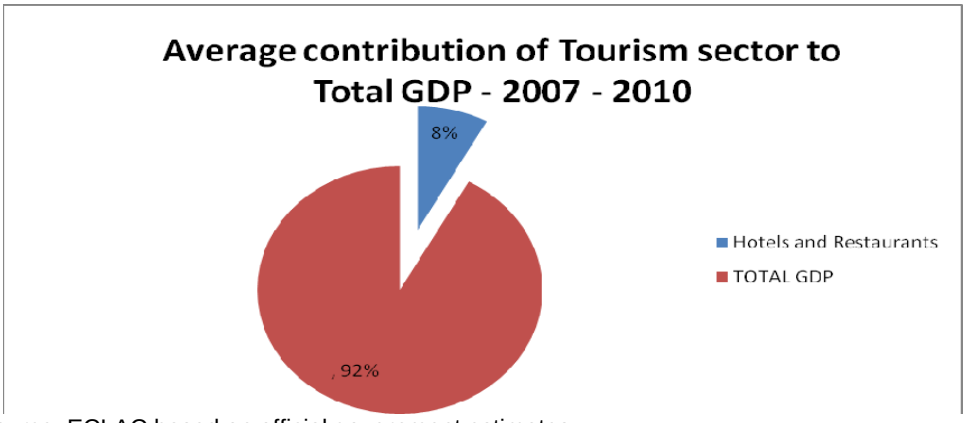
SECTOR	2007	2008	2009	2010 projected
Hotels and Restaurants	849.62	895.45	773.91	825.12
Growth Rate for sector (%)	…	5.39	(13.57)	6.62
TOTAL GDP	9759.40	10421.79	9861.86	9770.09
GROWTH RATE (%)	8.99	6.79	(5.37)	(0.93)

Source: Eastern Caribbean Currency Unit, of the ECCB

The tourism sector as measured in the above table accounted for 8.7 percent of GDP in 2007, 8.6 percent in 2008, 7.8 percent in 2009 and 8.4 percent in 2010 using the projection for 2010. The estimated contribution of the tourism sector to total GDP is therefore of the order of 8 percent. Adjusting the Hotels and Restaurants figures for the portion of Restaurants that does not benefit significantly from tourism, the contribution of the "tourist" sector to GDP is expected to be a bit less than 8 percent of GDP. Notwithstanding the adjustment in coverage of the sector, the projection for the growth rate in the sector in 2010 is for a decline of 2.8 percent from the 2007 figure of EC$849.62 contribution to GDP.

To some extent the performance of the tourism sector has tracked developments in the United States of America as that country adjusted from the economic crisis of 2008, 2009 and to some extent 2010. An analysis of tourist arrivals for a similar period yields the following table. Figure 10 below is a visual of the contribution of the proximate tourism sector to total GDP of St. Vincent and the Grenadines.

Figure 10: Visual of contribution of proximate tourism sector to total GDP



Source: ECLAC based on official government estimates

Table 25: Stay-over visitors (all countries) by purpose of visit

COUNTRIES	PLEASURE	BUSINESS	YACHT	SPORTS	STUDY	OTHER	2008	2007
United States	17,926	2,041	3,834	15	28	198	24,042	26,642
Canada	5,387	645	780	34	5	31	6,882	6,745
Antigua	635	361	8	43	0	31	1,078	1,246
Barbados	5,816	2,663	215	78	4	217	8,993	9,574
Grenada	719	521	22	26	34	52	1,374	1,463
St. Lucia	952	1,146	36	30	2	31	2,197	2,323
Trinidad	5,696	2,236	175	73	0	155	8,335	8,610
French Caribbean	286	103	95	0	0	130	614	436
Dutch Caribbean	280	104	25	0	0	4	413	576
Other Caribbean	3,484	1,732	53	110	4	88	5,471	5,731
United Kingdom	12,589	1,075	1,709	6	13	50	15,442	16,742
France	913	98	572	0	1	2	1,586	1,973
Germany	578	73	205	2	0	3	861	736
Italy	1,035	153	453	0	1	8	1,650	1,491
Sweden	333	21	103	0	1	2	460	382
Switzerland	260	28	95	0	0	2	385	470
Belgium	129	26	67	0	0	0	222	179
Spain	170	18	50	0	0	7	245	156
Ireland	140	40	42	1	0	2	225	208
Holland	74	6	43	0	0	0	123	112
Norway	75	16	58	0	0	0	149	122
Other Europe	614	88	249	1	1	1	954	883
South America	639	408	95	0	3	19	1,164	1,172
Other Countries	678	397	83	53	1	24	1,236	1,665
TOTAL	**59,408**	**13,999**	**9,067**	**472**	**98**	**1,057**	**84,101**	**89,637**

Source: ECLAC based on official government estimates

Table 26: Tourist arrivals

PORT	2008			2009			% CHANGE		
	AIR	SEA	TOTAL	AIR	SEA	TOTAL	AIR	SEA	TOTAL
St Vincent	**64,027**	**87,208**	**151,235**	**57,576**	**127,218**	**184,794**	**(10.1)**	**45.9**	**22.2**
Bequia	3,125	38,134	41,259	3,256	36,602	39,858	4.2	(4.0)	(3.4)
Mustique	5,166	533	5,699	6,209	1,083	7,292	20.2	103.2	28.0
Canouan	8,407	892	9,299	6,669	461	7,130	(20.7)	(48.3)	(23.3)
Union Island	9,157	33,219	42,376	6,921	24,957	31,878	(24.4)	(24.9)	(24.8)
TOTAL	**89,882**	**159,986**	**249,868**	**80,631**	**190,321**	**270,952**	**(10.3)**	**19.0**	**8.4**

Source: ECLAC based on official government estimates

An extrapolation to 2010 leads to the view that in 2010 the performance of the tourism sector did not regain the 2006 level as measured by the total number of visitors of 283,268 in 2007.

Table 27: Total visitor arrivals (by visitor type, a historical comparison)

MONTH	AIR		SEA		TOTAL
	STAY-OVERS	SAME-DAY	CRUISESHIP	YACHT	
1999	68,293	17,468	89,621	47,743	**223,125**
2000	72,895	21,135	75,763	86,247	**256,040**
2001	70,686	15,049	91,862	76,494	**254,091**
2002	77,622	13,062	86,451	70,314	**247,449**
2003	78,535	13,696	84,330	64,965	**241,526**
2004	86,721	12,936	77,585	84,227	**261,469**
2005	95,505	8,928	69,391	84,610	**258,434**
2006	97,432	9,034	106,474	93,638	**212,940**
2007	89,637	6,799	144,555	42,277	**283,268**
2008	84,101	5,781	116,709	43,277	**249,868**
2009	75,446	5,185	149,462	40,859	**270,952**

Source: ECLAC based on official government estimates

Table 28: Total visitor expenditure

YEAR	EC$m
2005	**245.73**
2006	**246.22**
2007	**258.00**
2008	**281.10**
2009	**…**
2010	**…**

Source: Eastern Caribbean Currency Unit, of ECCB

(a) Physical damage to hotels, administrative buildings and equipment

Investigations reveal some, though relatively minor, damage to hotels and guest houses. The lack of claims on the insurance companies derives from either a situation of no insurance or under-insurance of small establishments engaged in tourist accommodation or other services. Reports state that there were no tourist cancellations or ship diversions as a result of the event. Some field investigations uncovered a number of instances of physical damage as well as losses resulting from the cessation of work in the aftermath of the event. The following table presents intelligence on the nature of damage and loss to the tourist industry from investigations made by the team. Damage to hotels and their appurtenances is presented as affecting the tourism sector.

(b) Losses sustained by tour operators

Losses refer to cessations or curtailments in the income stream generated by the physical assets that were compromised. Interviews with tour operators led to an estimate of the value of loss of business. Some six tour operators service the tourists as they visit tourist sites and national parks. Roads to these sites were blocked by fallen trees and other vegetation. Some of the roads remained impassable for two weeks and resulted in a supply deficit to the tourist. In some cases alternative sites were visited. Even with the substitution of site visits, some loss of business was sustained.

(c) Losses sustained by taxi drivers

The estimate of losses was made after taking into consideration the length of time that facilities were closed and the loss of income of the taxi drivers during the period of downtime of the tourist facilities. An estimate puts loss of income over a period of one week.

(d) Damage to national parks, tourist sites and other facilities

Some damage to national parks was reported. Much of it was associated with damage to infrastructure, vegetation and clean-up operations. Damage to these sites is accounted for under infrastructural damage. The loss of business or earnings to tour operators and to the government from disruption in the income stream from tourist visits to these sites is estimated as loss to the tourism sector. The losses sustained in tourist sites derived from loss of earnings due to closed facilities.

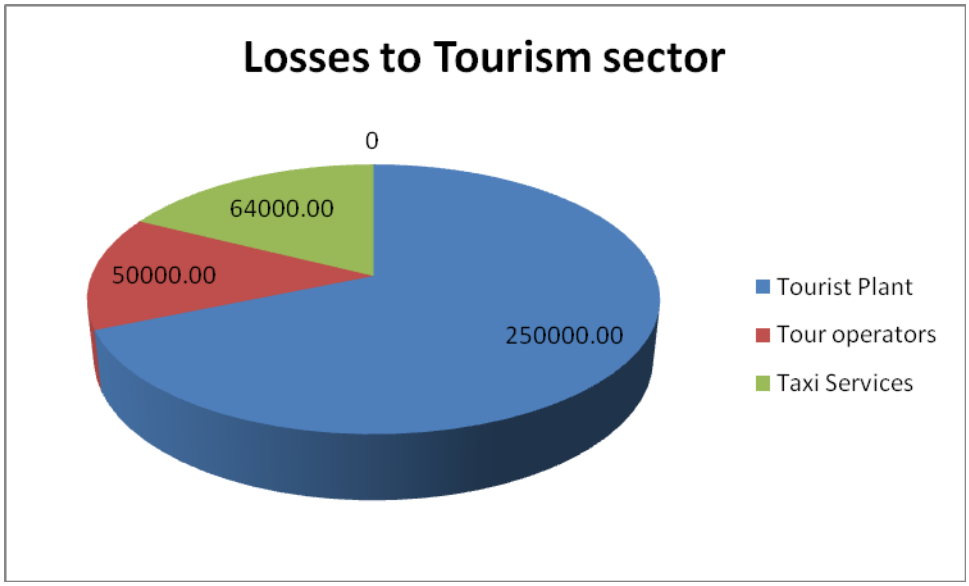
Table 29: Estimated damage and losses to the tourism sector (EC dollars)

	Total Damage Plus losses	o/w Damage	o/w Losses	Public	Private Damage	BOP content
TOURIST PLANT	**1,014,000**	**764,000**	**250,000**	**-**	**764,000**	**370,000**
Grand View Hotel	300,000	200,000	100,000		200,000	100,000
Friendship Bay Resort	100,000	100,000	-	--	100,000	60,000
Tranquility Beach Hotel	228,000	198,000	30,000	-	198,000	80,000
Empress Palace	86,000	66,000	20,000	-	66,000	30,000
Estimate for unreported cases	300,000	200,000	100,000	-	200,000	100,000
TOUR OPERATORS	**50,000**	**-**	**50,000**	**-**	**-**	**-**
TAXI SERVICES	**64,000**	**-**	**64,000**	**-**	**-**	**-**
TOTAL	**1,128,000**	**764,000-**	**364,000**	**-**	**764,000**	**370,000**

Source: ECLAC based on official government estimates

The damage to the Villa Boardwalk (EC$ 28,000) is accounted for under coastal infrastructure.

Figure 11: Losses to tourism sector



Source: ECLAC based on official government estimates

2. COMMERCE

Reports indicate that not much damage was done to Commerce as defined by those firms that are not engaged in farming, manufacturing or transportation.

A number of definitions of Commerce have been proffered. They include the following:

> *"The interchange of goods or commodities, especially on a large scale, between different countries or between populations within the same country: It includes trade (the buying, selling, or exchanging of commodities, whether wholesale or retail) and business (the purchase and sale of goods to make a profit)."*

By and large, the Commerce sector is thought of as being associated with Wholesale and Retail Trade. The emergence of Supermarkets has all but eliminated the small establishments that sold produce and foodstuff to small communities. The sector operates on the fringes of the productive sectors through its main activity that is the wholesale and retail trade. For example, export earnings from the sale of bananas are a distributive activity and are not taken into account in Agriculture.

Most, if not all of the distribution that is done in the affected area is transacted from Kingstown where such activity is concentrated. It is more than likely that a very small distribution activity takes place in the north, but is of an informal nature and does not contribute significantly to total recorded supply. Damages to such commercial activities would more likely have been associated to housing in those areas. As such, no estimates are made for damage to commercial buildings of the type described in distribution in the interest of avoiding double counting. The effect of the event is therefore seen as one of creating a supply shortage of bananas, plantains and fruits and vegetables to hotels, restaurants and households. Such a shortage is expected to last an estimated four months and will cause some increase in the price of fruits and vegetables. Meanwhile, generally and in the tourist accommodation units, a shift to substitute or other fruits and vegetables has already been noted. Damage and losses to agriculture are accounted for in the Agriculture sector.

The main area of incidence of the event was the less populated north of the island where population density is estimated to be of the order of 494 persons per square mile as compared with an estimated 707 persons per square mile nationally.

Table 30: Estimates of damage and loss to the distribution sector

	Total Damage Plus losses	o/w Damage	o/w estimated Losses	Public	Private	BOP content
Kingstown vegetable market	127,680	103,680	24,000	103,680	12,000	50,000
Estimate for unreported damage to shops and other retail outlets	41,000	25,000	16,000	-	25,000	12,500
Total	**168,000**	**128,000**	**40,000**	**103,680**	**40,000**	**62,500**

Source: ECLAC based on official government estimates

Table 31: St. Vincent and the Grenadines: Summary of damage and loss to the tourism and distribution sector

Total Effect	**1,296,000**
Damage	**892000**
i. Value of Damaged Distribution facilities	128,000
ii. Value of Damage to Tourist Plant	764,000
Losses	**404,000**
i. Value of losses to shops and retail outlets	16,000
ii. Value of losses to Kingstown Vegetable market	24,000
iii. Losses to Tour Operators	50,000
IV. Losses to Taxi Services	64,000
v. Losses to Tourist services	250,000

Source: ECLAC based on official government estimates

3. COMMENTS

NEMO did a commendable job in attempting to provide a preliminary estimate of damage and loss in the aftermath of Hurricane Tomas but was limited in its success because of a difficult data supply problem. It was difficult to obtain some data although they existed in the government sector. The same situation confronted the assessment team. There is need for the enunciation of a government policy and position on information for the benefit of the nation taking into consideration a careful understanding and interpretation of the Statistical Act.

The fragility of the information system in St. Vincent is, like the other countries of the region, well known. To the extent that the countries have now pledged to plan with disasters in mind, we must put in place and maintain a database or inventory of the attributes of the country at the local or small level of geography. This means that for the smallest monitored geographical unit, the Census Enumeration District, we should store data that describe the housing stock, some indicator of the value of houses in that area, a description of the population living in that area, complete with an age disaggregation, data on the number of business establishments that operate in the area, their size and type of economic activity.

Contrary to the popular belief that the census statistics are worthless four or five years after the census year, the census data are extremely useful for many years in the following nine or ten years. These data can be analysed at the level of the E.D. and stored in a database from which they can be retrieved to assist in the valuation of damage and losses in those areas. The position of the Central Statistical Office regarding the provision of census data at the local level is known, but the issue of confidentiality can be solved by anonymized datasets. In such a manner the assessors may use the data without the fear that confidentiality will be breached. In addition to the Census data, the data on business establishments which is a major input into the national accounts will assist in the detection of damage, losses and the effect on the GDP.

The national statistical system should be strengthened. The chief statistician should be aware of all data collection activities of other government ministries. Each ministry is free to develop statistical series that may seem to satisfy a ministerial data demand without reference to the accounting or strategic

requirements for building and holding such a database. This situation should be reviewed for possible change to a system in which the technical leadership in the collection and treatment of data should be provided by the statistical office. Recent enquiries have unearthed responses from several statisticians that suggest that their governments are happy with the present situation of the statistical offices in the region. If this is the case, there will be no significant re-organization of the statistical system and no improvement in data collection, provision or use. This will have repercussions on the effectiveness of agencies such as NEMO, to provide policy makers with the data and information needed to report to the nation within eight hours of an event. In addition, even beyond NEMO, government will not benefit maximally from a wide dataset of statistics in its possession.

C. INFRASTRUCTURE

1. UTILITIES

(a) Central Water and Sewerage Authority

The Central Water and Sewerage Authority (CWSA) is a statutory corporation established in 1970, under the revised Central Water and Sewerage Authority Act (1991). The authority operates as a semi-autonomous public sector enterprise under the Ministry of Health and the Environment (MHE). It has three main functions in St. Vincent and the Grenadines:

- Water supply - treatment, transmission and distribution of potable water to domestic, commercial, shipping, and government customers.
- Sewerage - management and operation of two sewerage systems that serve the central business district (CBD) of Kingstown and the Arnos Vale Housing Scheme respectively.
- Solid waste - CWSA assumed responsibility for the Solid Waste Management Unit (SWMU) from April 1998. The Unit became fully operational in 2002.

An interview was conducted with Ms Joan Ryan, who is the Public Relations and Marketing Manager of the CWSA, on 9 February 2011. Ms Ryan was able to provide information on the damage received as a result of Hurricane Tomas in each of the above mentioned functional areas.

(i) Water supply

There was little damage to the water supply system throughout the island, as most of the pipelines in the system are buried underground and thus were not vulnerable to the hurricane hazard. The only damages occurring were therefore those associated with the damage to pipelines located above ground.

It is notable that during and after Hurricane Tomas the bulk of users (≈ 80%) had a consistent water supply. Conversely, approximately 20% of consumers had an interruption in their water supply, and these users and the limited damage which did occur to their supply systems were confined to the north of the island. In particular, the 'Jennings system' in the North Windward area was significantly impacted.

Those consumers that were without water had their water restored in 3 - 4 days. This pertained to the bulk of affected consumers; however, there were consumers in small trouble areas, such as Sandy Bay, where it took as much as 1.5 weeks to have their service restored. The water supply system in St Vincent is an entirely gravity-fed system, and there are therefore no pumps used in it. This is one major way in which the vulnerability of the water supply system is reduced, as there is no impact of power loss on water supply.

The water in St Vincent is sourced through rainfall, whereby streams and rivers are tapped, fed into storage tanks and treated before distribution. The CWSA implements a disaster response procedure whereby in preparation for an event the inflow system is shut off. In this instance, it was shut off between midnight and 1:00am on the Friday night, 29 October 2010). This procedure ensures that turbulent, silty waters, which may damage equipment, are not fed into the system. During the storm and up to about three days after its passage, the storage tanks (which are usually adequately filled) supply water to CWSA customers. The inflow system is switched back on after the storm has passed, turbulent waters have clarified and 'normalcy' has returned to the flow. In this manner the disruption to the customer base is significantly minimised.

Primary losses occasioned by CWSA pertained to loss of use and consequently revenue shortfalls in the northern section of the island, where supply was off for 3 – 4 days. Additional losses experienced by this utility during Hurricane Tomas were associated with difficulties in accessing the areas where above-ground pipes had been damaged. This was a substantial part of the loss, which included the labour costs of clearing the roads to access damaged pipelines (CWSA did not wait on BRAGSA to clear the roads). There were several instances where pipelines could have been repaired sooner had access been available to the affected pipelines.

All of the materials used as replacement pipes were taken from storage areas. No pipeline material therefore had to be purchased for this event, although it is expected that replenishment of stores will have to take place over the next six to eight months and preferably before the start of the next hurricane season.

On the grenadine islands, the damage was not at all significant. However, for those islands the CWSA does not have a lot of responsibility, as most residents catch rainwater in private tanks in their properties and use it.

(ii) Waste water treatment

There are two sewerage systems that serve the central business district (CDB) of Kingstown and the Arnos Vale Housing Scheme respectively. There was no reported damage to either of the waste water treatment plants (WWTP) as the majority of the equipment is located underground.

All of the other homes and businesses not tapped into these treatment systems treat their sewage on-compound through septic tanks, etc. There were no damages to individual septic tanks reported to the CWSA.

(iii) Solid waste

Although the CWSA has responsibility for solid waste collection, there was no extra clean up that was put in place in terms of extra trucks etc. after the storm. Any extra work that was done in St Vincent was in fact carried out by private organizations or individuals who brought solid waste, downed trees, etc., to the CWSA landfill. There is no cost associated with the use of the landfill, i.e. material dumping there. The only costs are with the collection of waste items.

In the Grenadines, there is a private consultant (under contract by the CWSA) which collects the solid waste and disposes of it. These consultants reported no unusual or extra costs associated with the passage of Hurricane Tomas.

Damage for this utility have been estimated at EC$ 100,000. Losses have been estimated at EC$ 800,000, a figure that includes loss-of-use estimates based on a review of CWSA net profit figures for

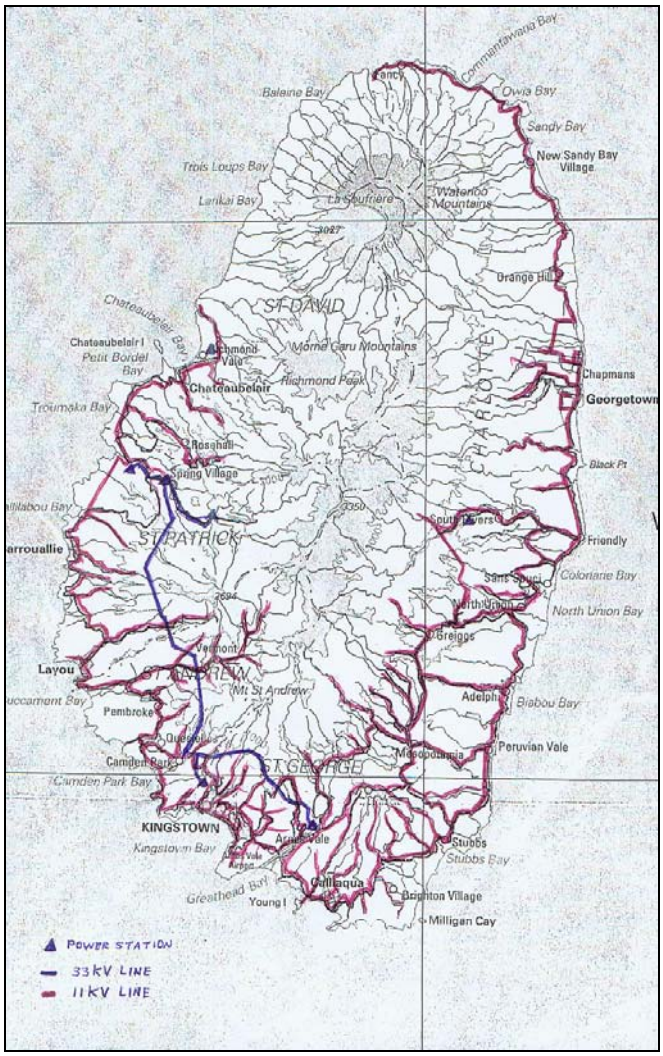
2009 and assuming that profits represent 10% of total revenues. The loss estimate figures also include labour and materials required to carry out repairs to the system (estimated by the CWSA engineering department).

(b) St Vincent Electricity Services Limited

The St Vincent Electricity Services Ltd. (VINLEC) is a 100% state-owned utility that delivers electricity to over 37,000 customers in St Vincent, Bequia, Canouan, Union Island and Mayreau. It is the sole provider of electricity in St Vincent and the Grenadines, and employs approximately 280 employees. On St Vincent, the Company operates two diesel plants, one at Cane Hall and the other (a more recent addition in 2006) at Lowmans Bay. Hydro-electric plants are located at South Rivers, Cumberland and Richmond.

The supply of electricity is done through a network that spans over 350 miles of lines (33kV, 11kV, 400V and 230V). Figure 12 shows the network.

Figure 12: VINLEC Transmission Line Network



A meeting was held with Mr. Thornley Myers, CEO of VINLEC on Friday 11 February 2011. Mr. Myers indicated that the capacity of this utility is approximately 26MW, with peak supply being 21.2MW. Of this, 5MW is provided by hydro power, while the balance is from fossil fuel. The system is interconnected, there being five different locations for generation throughout the island. In addition, there are another four separate systems in place in the Grenadines.

In Kingstown, most of the distribution lines are below ground (≈ 95%), whereas outside of the city, the distribution lines are all above ground. This provides a certain amount of resilience to the electricity distribution system in Kingstown, in the event of a natural disaster such as a hurricane.
The emergency response and preparedness plans for this utility include the following provisions:

- When hurricanes are approaching, VINLEC will keep power on for Category 1 and 2 storms. For more extreme events, power is turned off in advance of the storm.
- There is a Preparedness Plan that deals with emergency supplies, staff movements, etc. This is put into place once a natural hazard is forthcoming or has occurred.

Hurricane Tomas was a Category 1 storm as it approached St Vincent, and therefore power was not turned off in advance. Nevertheless, as a result of some damages that occurred, the entire system had to be shut down during the storm, commencing at Lowmans Bay. Damages were primarily as a result of lost poles due to fallen trees (90% of damage), or (to a lesser extent) due to landslides. Repairs commenced at around 6:00pm the day of the hurricane and by 8:00pm power had been restored to the City of Kingstown (Cane Hall station). By the end of that night, power had been restored to the major hotel areas such as Villa, etc. Total or near total power was restored to all areas within a week.

Damages were mainly as a result of broken poles and overall, approximately 85 poles were replaced. These were primarily in the north-windward area, where it took the longest time for power to be resumed. In responding after the hurricane, VINLEC used its existing bucket trucks and obtained poles and transformers from its existing stores. Crews were assisted by a local contractor, Rudy's Electrical Contracting Co., which has appropriate experience across the region. It is expected that in the future, and specifically over the coming year, new poles will have to be imported in order to replenish spares inventory. These poles are usually imported from Texas, USA.

Losses to VINLEC were primarily as a result of loss of income, anticipated importation of spare poles and clean-up activities.
The event gave VINLEC an opportunity to look at how their system performed in a natural hazard situation.

In summary, damage for this utility have been estimated at EC$700,000. Losses have been estimated at EC$970,000, a figure that includes loss of income estimates provided by VINLEC, an estimate for imported poles to replace those taken from spares and clean-up activities.

(c) Recommendations for vulnerability reduction

For the CWSA, a certain degree of vulnerability reduction is already inherent in the system, first due to the fact that the majority of distribution pipes are buried underground and second, to the fact that the entire system for St Vincent is gravity flow based. These two factors give a great degree of resilience in the event of hurricanes or tropical storms, volcanic activity, or in the event of a complete loss of electricity. It is likely, however, that in the event of seismic action, some of the buried pipelines could become ruptured.

For VINLEC, the City of Kingstown is relatively well insulated against major electricity disruption as a result of hurricane activity, due mostly to the fact that up to 95% of the distribution lines in the city are below ground. This implies that the city has a relatively high degree of resilience in this regard, since most or all of the Government infrastructure, such as the hospital, will be served in this manner. An improvement to this level of resilience may be achieved by extending the network of buried lines out to the main tourism zone.

(d) Summary of damage and losses

The summary of damages and losses for the two utilities are:

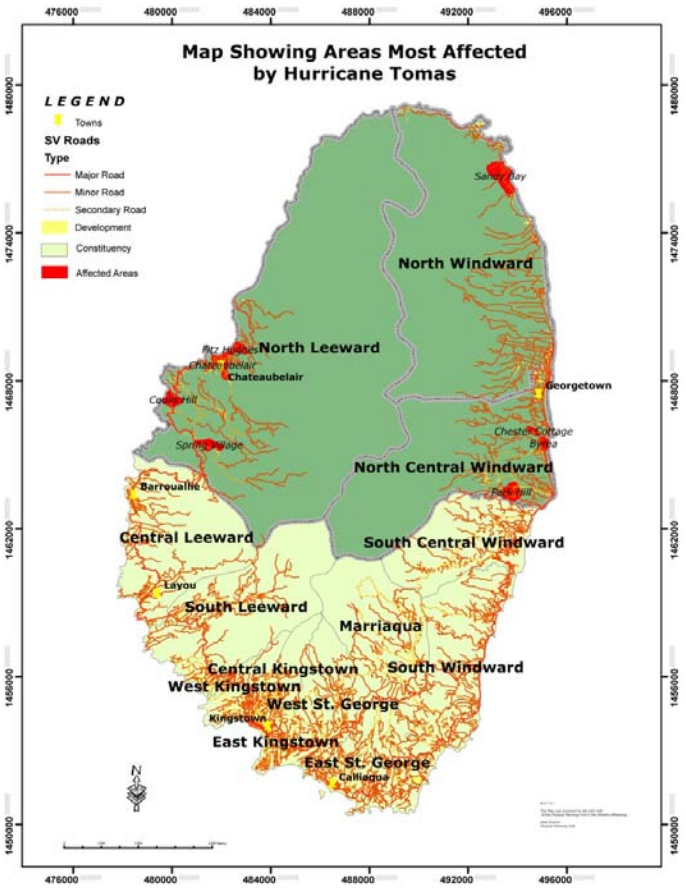
- Total damages – Utilities EC$ 800,000
- Total losses – Utilities EC$ 1,770,000

2. ROADS, BRIDGES AND BUILDINGS

(a) Roads

Information on the damage to the road and bridge network as a result of Hurricane Tomas was garnered through a damage assessment conducted by the Ministry of Transport and Works (MTW) as well as from interviews with the CEO of The Bridges, Roads and General Supplies Authority (BRAGSA), Mr. Brian George. Additionally field visits were made under the guidance of Mr. Simon Bailey, Chief Quantity Surveyor for the MTW to the island of Bequia, as well as to the Central and North Windward areas of St Vincent, where most of the damage occurred (figure 13).

Figure 13: Areas Most Affected by Tomas (Ref. MTW)



It should be noted that from the perspective of inter-relationship between these two agencies, the Bridges, Roads and General Supplies Authority (BRAGSA) has responsibility solely for reinstating the roadways in functional order. All major road works repair is the responsibility of the Ministry of Transport and Works.

The primary problems experienced for these agencies related to land slippage and fallen trees. As a result, almost all of the roadways had to be cleared, which was a labour intensive and time consuming exercise. Some of the farm roads were cleared by December 2010. By the time of the ECLAC mission, all the roadways which were reported as blocked had been cleared save for some small farming and feeder roads. Although the complete clearance of roadways took some amount of time, the aim of BRAGSA was to facilitate passage (of even single lane traffic) within 48 hours. For the most part, this was achieved along all major roadways. This commitment is made in order to ensure the safe and timely passage of the vehicles related to the utility companies can proceed with their restoration works as quickly as possible.

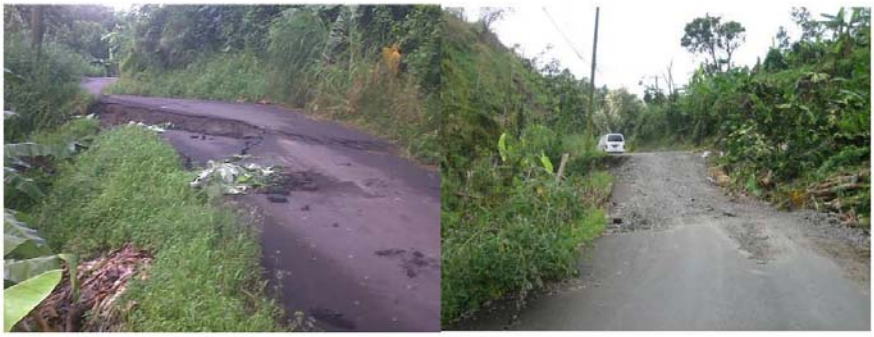
The bulk of the roadwork clearing was confined to the roadways in the central and North Windward areas of the island. As the storm passed to the North of the island, these areas were where the bulk of landslides and fallen trees were located.

In addition to clean-up activities carried out by BRAGSA, road restoration works were also done by the two agencies. In particular, minor restoration works were done by BRAGSA at: Langley Park

Estate Road, North Union Road, Lauders, Overland Road, Hermitage Road, Fiddle Piece Road and Natural Trail Road.

Road restoration works were carried out by the MTW at Hopewell Road, Lowmans Main Road and the London Jack Feeder Road (photos 1, 2, and 3). At the Hopewell Road area there was significant damage to a portion of roadway (in the vicinity of the Seclusions Bar) where the pavement had collapsed. This portion of roadway is approximately 160ft in length and vehicular passage through this portion of the roadway was considered to be dangerous. Due to the fact that the under layer had been exposed, this portion of the roadway was therefore even more vulnerable to complete erosion.

Photo 1: Hopewell Main Road (Ref. MTW)



Hopewell Road Settlement on October 15th 2010 & October 30th 2010

Photo 2: Lowmans Main Road (Ref. MTW)

Lowmans Main Road – Upper and Lower embankment failure

Photo 3: London Jack Feeder Road (Ref. MTW)

London Jack Feeder Road – Scour beneath road pavement and landslide above roadway

The Ministry of Transport and Works explained the cause of the destruction as follows:

On October 15th torrential rainfall resulted in the Zenga River eroding a significant section of the embankment along the Hopewell Road measuring 100ft x 6 – 12ft (inwards). This erosion of the embankment resulted in settlement of the road pavement of between 6 – 12 inches. The rains associated with Hurricane Tomas also resulted in erosion of the road embankment. There has been further settlement of the road pavement which now exceeds 2 feet.

In summary, damages for the roads subsector have been estimated at EC$ 3,090,070 and includes all of the road restoration works carried out by both BRAGSA and MTW. Losses have been estimated at EC$ 1,271,865 a figure that includes all road clean-up activities carried out by BDAGSA.

(b) Bridges

Several bridges were overtopped by water during the storm, which made them impassable, but the only significant damages reported were to bridges in Lourdes and Marriaqua. It is anticipated that this bridge repair will be done through the Ministry of Transport and Works. Estimates of bridge repair works were made for each of these two bridges, including repairs to abutments and some deck repair work.

In summary, Damages for the bridges subsector have been estimated at EC$ 1,000,000 and includes all of the repair works to carried out by MTW at the two bridges. No Losses have been estimated for this subsector.

(c) Buildings

Damage occurred to some Government buildings and community centres in the northern and central sections of the island. Specifically, the following government buildings had to be restored (excluding hospitals and health facilities, which are covered under the health sector):

- Georgetown Government School
- Georgetown Technical Institute
- North Union Secondary School
- Troumaca - Ontario Secondary School
- New Adelphi Secondary School
- Questelles Government School
- Kingstown Vegetable Market

Similarly, a number of community centres were damaged. These included:

- Rose Bank Community Centre
- Rose Hall Community Centre
- Rillan Hill Community Centre
- Campden Park Community Centre

In summary, damages for the buildings subsector have been estimated at EC$ 3,925,800 and includes all of the restoration works to carried out by MTW at the listed sites. No Losses have been estimated for this subsector.

(d) Recommendations for vulnerability reduction

It is imperative that all Government buildings be designed using an acceptable building code, so as to be able to withstand hurricane force winds and seismic occurrences. In some instances, retrofitting may have to be carried out in order to bring some buildings up to code. What is therefore required is a detailed structural inspection of all the Government buildings, by a qualified and registered civil engineer.

For the community centres, it is also important that buildings be designed in accordance with a proper building code. This is particularly important in this case as community centres are very often used as shelters after a disaster event and so must if necessary be retrofitted to be able to be used by many people for extended periods of time.

(e) Summary of damage and losses

The summary of damages and losses for this subsector were:

- Total damages – Roads, bridges and buildings EC$ 8,015,870
- Total losses – Roads, bridges and buildings EC$ 1,271,865

3. RIVER DAMAGE

(a) River Damage and Training

The embankments of the Zenga River (which courses through the Mesopotamia valley) are currently reinforced by a gabion basket river defence system. The embankments support the community centre and the Levi Latham Health centre. A significant portion of the gabions, a length of approximately 100ft, collapsed during the hurricane due to the force of the water. Although only a certain length of gabion baskets have been destroyed, the Ministry of Transport and Works wishes to reconstruct the entire 600 ft of gabion river defence as it is felt that the remaining sections of the gabion baskets have been undermined by the river.

There was further significant damage to the river embankment further upstream, but still in the Mesopotamia valley. However in the second instance, there was no retaining structure, and the embankment simply slipped away into the water.

Like the roadways, the water courses were similarly, blocked with debris and fallen trees and foliage and had to be cleared. In many areas, the water courses still had not been cleared up to the time of the UNECLAC mission.

Damages pertained primarily to repairs to river training works on the Zenga/Teviot River, and to a second degree to residences in Lodge Village and Yambou River in Collins. Losses related to the de-silting of rivers and urban drainage channels, and to slope stabilization works.

Photo 4: Zenga – Teviot River – Near Levi Latham Community Centre

(b) Recommendations for vulnerability reduction

In order to reduce the vulnerability of settlements adjacent to watercourses and rivers, it will be necessary to carry out hydrologic studies of the various watersheds and catchments, as well as hydraulic investigations of the carrying capacities of these river courses. Information that will be required for these investigations include:

- Topographic survey data of the catchment areas;
- Surveys of the river courses, including longitudinal (plan) and section surveys;
- Hydrological data within each catchment;
- Tidal information; and
- Flood elevations and freeboards for the 1 in 25, 1 in 50 and 1 in 100 year return period events.

(c) Summary of damages and losses

The summary of damages and losses for this subsector is provided below:

- Total damages – River damage and training EC$ 1,960,980
- Total losses - River damage and training EC$ 100,000

4. Telecommunications

Telecommunication services in St Vincent and the Grenadines are comprised of land lines, mobile phones and broadband internet. The two main service providers are LIME and Digicel, however a third, Karib Cable, provides cable services.

(a) LIME

LIME estimates their market share in St Vincent to be comprised as follows: 47% to 48% of the mobile market, 85% to 87% of the broadband market, and 95% to 96% of the fixed line market. Deductively, one can conclude that Digicel controls 53% of the mobile market.

A summary of damages suffered by LIME is presented[17]:

To date, through damage assessments, investigations and repairs conducted, LIME estimates that Hurricane Tomas damaged:

- 30% of the Line plant infrastructure (which serves fixed line customers)
- 25% of the Copper Transmission network infrastructure (which serves the northern part of the network)
- 10% of the Fibre Optic network (which connect one of the exchanges and Mobile site). In particular, 2km of fibre optic cable between Chester Cottage and Georgetown had to be replaced
- 10% of the Mobile Network
- LIME building sites at Careenage and Mt Hartman

From the perspective of per cent impact, a large portion of the damage assessed was to the Line plant infrastructure which serves fixed line customers. This damage was caused by physical cables coming down when poles snapped. Poles were snapped as a result of both wind force and landslides, although it is felt that wind damage was minimal and landslides caused the bulk of the problem. The hardest hit area in LIME overall infrastructure was at the Line plant Network within the North of the island, both on the windward and leeward sides of the island. The poles themselves are owned by the electricity company (VINLEC) and the cost of reinstating them are solely that of VINLEC. All poles were back up within 2 – 3 days (maximum a week) and cables were re-strung within the week.

As listed above, there was also damage observed at LIME building sites such as the Careenage and Mt. Hartman offices; as well as to internal equipment such as desktop computers, wireless computer equipment, vehicles, gates to enter some sites and other office related equipment.

There were no reports of LIME service vehicles or other property damage. Vehicular damage is the only type of damage covered under local insurance, for which no claims were made.

For the damage that was done, LIME is currently in the process of filing a plant and property insurance claim ("one event" clause) through its head offices in the UK.

LIME recovery costs were predominantly those regarding the labour and materials for re-stringing the cables once the poles went back up. Cables could not be re-used based on the fact that several cables were cut off and stolen by local residents once they went down. Further cables are stretched

[17] Information garnered through an interview with Mr. Angus Steele, CEO of LIME St Vincent, as well as from archived press releases from the company.

upon collapsing, and that type of damage impacts the performance of that technology. Essentially, all cables that fell had to be replaced.

All LIME offices were closed on the Saturday of the Hurricane (30 October) but re-opened Monday. Therefore the LIME stores lost a half day of sales. Other losses included the labour costs for replacing cables and loss of income for three days to 30% of the fixed line customer base. LIME mobile services remained uninterrupted throughout the storm. And LIME was the only service provider that had data exchange (blackberry messenger) functional all throughout the storm and in its aftermath.

In summary, damages for LIME have been estimated at EC$ 15,000,000, and include work related to fibre optic cable replacement, damage to building sites, damage to internal equipment and replacement of fallen cables. Losses for the telecommunications provider were estimated at EC$ 900,000 and included labour costs for replacing cables, loss of sales at LIME stores and loss of income for three days to 30% of fixed line customer base.

(b) Digicel

The damages associated with marketing equipment were primarily related to the signage and billboards placed around the island for purposes of advertising. Damage assessments revealed that several billboards and signage markers had been downed and/or destroyed. The damages associated with buildings referred mainly to damaged sales offices. This damage was however minimal and related mostly to an awning on a sales office which was completely destroyed. The damages associated with technical issues related to destroyed site equipment, which included: connector flanges, antennas, satellite receivers and elliptical waveguides[18].

It should be noted that this figure does not include the lost income from having the mobile system and data exchange system down for approximately the full day of the storm. First, an estimate of loss of income resulting from the system being down for a day was developed. This estimate was based on an assumption of 80% of the population having cell phones; a Digicel market share of approximately 50%; and an average weekly top up spend of EC$ 10. Second, an estimate of loss of income from vendors was made. This assumed approximately 240 vendors being involved; each having approximately 50 sales per day; and the average take per sale being EC$ 3[19].

In summary, damages for Digicel have been estimated at EC$ 81,000 and losses were estimated at EC$162,000.

(c) Karib cable

An interview was held with Mr Ian Mulhern the Group General Manager of Karib Cable, on Friday 11th February, 2011. Mr Mulhern indicated that Karib Cable is the only cable company in St Vincent and the Grenadines besides LIME. It provides service to Bequia, Canouan, Union Island and Myreau.

The main issues that were reported pertained to a major increase in service calls received by the cable provider after the hurricane. In a typical month, Karib Cable will receive approximately 150 service calls. For the month of November, however, over 1800 service calls were received. This was judged to be

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[18] Telephone interview with Ms. Sonia Polius, Regional Manager of Digicel.

[19] Ms. Polius was not able to give a figure for losses associated with the event; estimates were made in this regard.

as a result of the breakage of "500 cable" equipment. As expected, teams were dispatched to pull and repair the cable. Service teams for this work are typically between 2 and 4 people.

It should be noted that service was down for approximately two weeks. During that time, free service was given by the cable provider to its affected customers. Mr Mulhern also informed that Karib Cable has insurance, however not for the LIME related equipment.

With respect to vulnerability, a significant amount of the associated plant is underground, particularly in the Kingstown → Diamond and Kingstown → Buccament. This reduces the vulnerability of the transmission equipment in the main central areas.

In summary, damages for Karib Cable have been estimated at EC$ 500,000, and are associated primarily with damages to cables outside of the Kingstown area. Losses for the telecommunications provider were estimated at EC$ 382,000 and are associated with staff costs to carry out repairs and loss of income for a month.

(d) Recommendations for vulnerability reduction

The recommendations for vulnerability reduction relate primarily to Karib Cable. The opinion was expressed by management of this cable provider, that a pro-active activity would be to ensure that all shrubbery around lines be cleared on a regular basis and certainly before the onset of an approaching hurricane.

(e) Summary of damages and losses

The summary of damages and losses for this subsector were:

- Total damages – Telecommunications EC$ 15,581,000
- Total losses – Telecommunications EC$ 1,444,000

5. PORTS OF ENTRY - AIR AND SEA PORTS

(a) Airports

There are four airports in St Vincent and the Grenadines. These are E.T. Joshua Airport on St Vincent and smaller airports on the islands of Bequia, Canouan and Union Island. Information on the status of airports was obtained through a telephone interview with Mrs Corsel Robertson, Director of Airports. She emphasized that there had been no significant damage to any of the airports in the state.

The terminal buildings, control towers and runways all escaped without damage. The hangars are not part of her domain, as they are operated by the individual airlines, however, she could state that there was no visible damage to any of the hangars on the airport compounds.

The only property damage noted was to wind gauge equipment. There was minor damage incurred to wind gauges at the airport in Bequia as well as the airport in Union Island. Mrs Robertson was unable to attach a cost to this damage; however, these have been assessed based on manufacturers costing for similar equipment.

All of the airports in the state were closed for a day and a half, namely the day of passage of Hurricane Tomas over the island (30 October 2010) and for half of the following day (31 October). Based

on average flight numbers for each day, it is estimated that the following numbers of flights were cancelled due to the storm:

- ET Joshua Airport - 50 flights
- Union Island Airport - 10 flights
- Calliaqua Airport - 8 flights
- Bequia Airport - 4 flights

Losses resulting from these cancellations were therefore attributed to be as a result of non-payment of departure taxes, landing fees, parking fees and air navigation fees, among other associated airport fees and taxes.

In summary, damages for airports have been estimated at EC$10,000, and are associated primarily with damages to wind gauge equipment at Bequia and Union Island Airports. Losses for the airports were estimated at EC$19,440 and are associated with missed flights due to airport closure, and the resultant loss in fees.

(b) Seaports

A telephone interview was held with Mr. B. John, Manager of the SVG Ports Authority. Mr. John indicated that minor damage was suffered at Campden Park. This included:

- Minor infrastructural damage;
- Concrete panel slabs on the jetty were popped out from the pile caps and would have to be re-cast. There were approximately eight (8) of these slabs (each 15ft x 15ft);
- The nature of the damage was quite dangerous to equipment and to personnel using the jetty.
- No significant damages were noted for any of the other ports in St Vincent and the Grenadines. It should be noted, however, that a CARICOM vessel broke anchor in the harbour and collided with the cruise ship pier. As a result of this incident, an 8ft x 8ft panel fender will have to be replaced.

In summary, damages for seaports have been estimated at EC$ 78,300, and are associated primarily with damages to jetty decking and to the cruise ship fendering system. No Losses were assessed for the seaports.

(c) Recommendations for vulnerability reduction

The recommendations for vulnerability reduction within this subsector relate primarily to the provision of adequate drainage for airport facilities, along with the specification of metering equipment (such as wind gauges) that are built to withstand storm and hurricane force winds.

For seaports, it is recommended that any new decking for jetties should be designed to withstand at a minimum, the 1 in 50 year hurricane wave.

(d) Summary of damages and losses

The summary of damages and losses for this subsector were:

- Total damages – Air and sea ports EC$ 88,300.
- Total losses – Air and sea ports EC$ 19,440

6. ENVIRONMENT – NATIONAL PARKS, COASTAL ZONE AND BEACHES

(a) National parks

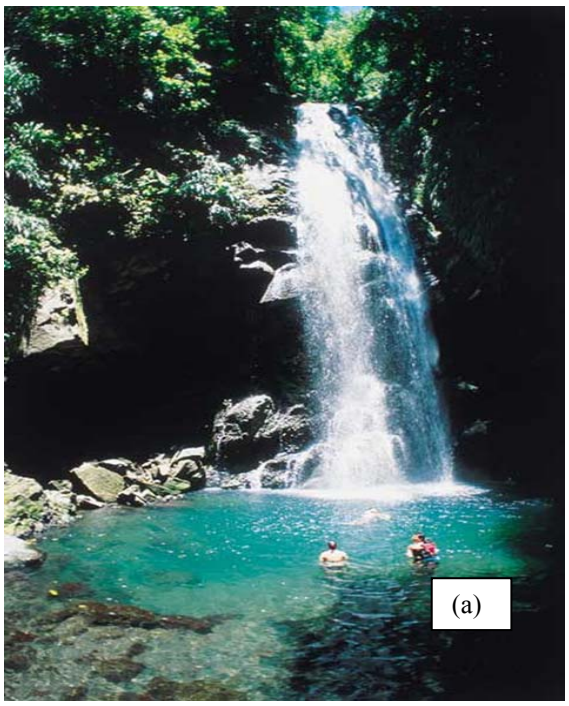
A number of parks in St. Vincent and the Grenadines were affected by the passing hurricane. The list of parks that suffered damage includes:

- Black Point Recreation and Heritage Park
- The Botanic Gardens
- Darkview Falls
- Falls of Baleine
- The Layou Petroglyph
- Owia Salt Pond
- Rawacou Beach and Recreation park
- Vermont Nature Trail
- Wallilabou Heritage and Recreation Park
- Cumberland Nature Trail
- La Soufriere Cross-Country Trail
- Trinity Falls Access Road and Trail

Photographs of some of these facilities (pre-hurricane) are provided on the following pages (Photos 5 and Photos 6).

The majority of the damages related to: damaged or downed trees; damage to buildings, fences, water tanks, sea defences; damages walkway bridges; damage to jetty, boardwalk and signage.

Photo 5: Falls of Baleine (a); Darkview (b); and Trinity (c)



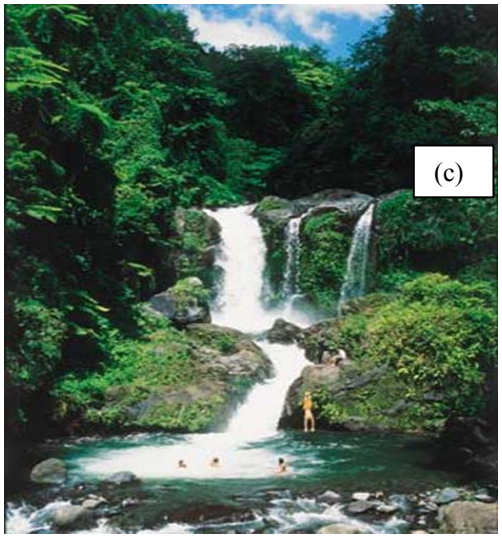
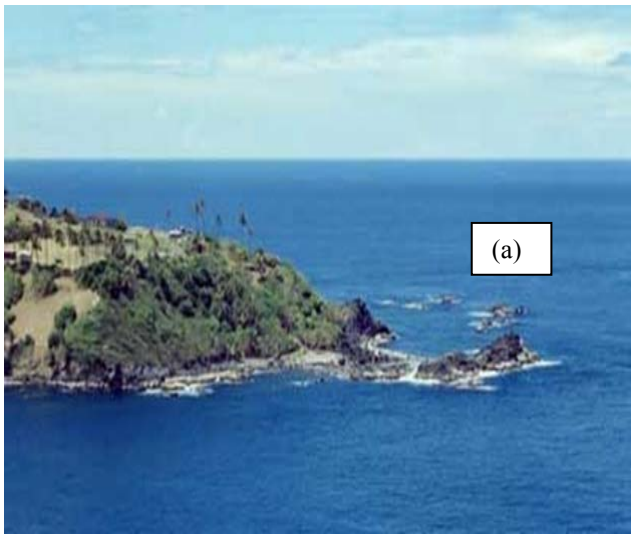


Photo 2: Owia Salt Pond (a); Vermont Nature Trail (b); and La Soufriere Trail (c)



The losses were as a result of: clean up and rehabilitation of downed vegetation; loss of income from visitor's contributions; and losses due to tour cancellations.

A summary of the damages and losses for the national parks system were:

- Total damages – National parks EC$253,700
- Total losses – national parks EC$205,150.

(b) Coastal zone and beaches

Descriptions of various observations of damage in the coastal zone, and for some beaches around the island are set out in the following paragraphs. In Villa, the newly constructed boardwalk suffered structural damage to 60ft of the deck north of the Aquatic Club dock. The supporting piles of the boardwalk appeared to sustain the impact of the wave action. The Young Island dock also sustained damage to a 20ft section of its fendering system which is now detached from the dock. Several pieces of lumber were also detached from the deck.

Extensive beach erosion occurred along the Big Sand area in Sandy Bay. The amount of erosion is however unknown, but at a minimum appears to be of the order of 5m horizontal retreat.

Photo 7: Sandy Bay Coastal Erosion

At Colonarie, there was extensive erosion of the beach, dunes and backshore areas, with significant inundation of houses and businesses that were located at the back of the beach. This is a community that is, in general, located very close to the water, and as such is relatively vulnerable to storm and hurricane waves. In some instances, residents have built in the beach swash zone and as a result pay the price during times of storm waves. This is demonstrated in the photo following.

Photo 8: Exposed Beach at Colonarie with infrastructure in the swash zone

A visit was also made to the beach area at Diamond. This area is approved as a beach and dune system that may be mined for sand under Government control. The visit revealed that Hurricane Tomas had in fact worsened the erosion occurring at this beach, and resulted in major erosion of the dune system. Repairs to this system may require some form of beach stabilization and is expected to be hampered in a major way by the ongoing mining of beach sand, as the sand removed by the hurricane will not easily be replaced by the natural system of sediment transport.

Photo 8: Eroded Beach and Dune at Diamond

On the south of the island and in the area which is dominated by the tourism sector, significant erosion was observed at Indian Bay. It is likely that this erosion has been ongoing for some time; however it is believed to have been worsened significantly by Hurricane Tomas in its passage. The problem of beach erosion at this location is worsened by the fact that there is a vertical concrete wall at the back of the beach, thereby contributing to the reflection of wave energy when water levels are high

(storm surge) and the incoming waves are large. The resolution of this problem may be achieved through beach nourishment using carbonate sand, and the possible use of protective structures in the near shore regions. A photo of the eroded beach is shown below. It can clearly be seen that there is very little dry beach remains and users of the beach are against the wall.

Photo 10: Eroded Beach at Indian Bay

The gabion basket coastal defence system at Shipping Bay (on the Windward side) also experienced some damage from the wave action. The gabion basket system appears to be failing via overturning. As such it is pulling away from the road way and creating a sink hole along the road pavement.

The concrete jetty at the main fishing complex in Kingstown was damaged as two of the concrete slabs (approximately 1m by 1m each) were removed. It is unknown whether or not the slabs had been previously loosened. The jetty is still functional.

On the island of Bequia, the Belmont Walkway is a very important coastal access, servicing several businesses there. A significant portion of the walkway, approximately 70 feet, is destroyed. The cement fell and broke up, making this portion of the walkway impassable. It is however believed (through speaking to residents) that this portion of the walkway was destroyed in Hurricane Lenny (1999) and not as a result of the recent passage of Hurricane Tomas.

A summary of the damages and losses for the coastal zone and beaches subsector were:

- Total damage – Coastal zone EC$ 3,058,000
- Total losses – Coastal zone EC$ 0.

(c) Fisheries

An interview was conducted with Mr Raymond Ryan – Chief Fisheries Officer, who informed that the Fisheries Division is responsible for all the marine parks around the islands of St Vincent and the Grenadines as well as the points of entry into the water (i.e. beaches, wharves, etc.). Although the Fisheries office supervises all of the activities of the marine parks and including maintenance, the primary responsibility for this falls to the conservation agencies. There are a total of 9 conservation agencies under the fisheries banner. The Tobago Keys Marine Park Conservation Agency is however a separate statutory body.

Since the storm, and up to the time of this ECLAC assessment, there has been no real visual assessment undertaken to gauge the level of damage to the reefs etc., in the marine parks. Monitoring activities are usually conducted by the respective conservation agencies and occasionally by UWI marine biologists. However there is no long-term, regular monitoring that is carried out, due to a lack of personnel and resource capacity. Some monitoring of temperatures at the reefs is carried out by regional climate change centres; however, this has not occurred recently. In summary, there has been no monitoring or analysis of the reefs since the storm.

With regards to fisheries infrastructure, the bulk of the fishing centres were not affected by the hurricane. There was however, significant damage to the Barrouallie fishing centre where a retaining wall collapsed and the beach was eroded.

The jetty at the Kingstown fisheries centre was damaged, as wave action lifted the cement slabs along the jetty. The jetty however remains functional.

A coastal protection structure at Owia sank/settled slightly. The structure is armoured with tetrapods and the interlocking system was maintained so no units slipped out of the armour layer, however the entire structure sank somewhat, thus lowering the crest height. It is unknown as to whether or not this was due to scour at the foot of the structure or the sinking/settling of the seafloor. The lowering of crest height will render this structure more vulnerable to storm action in the future.

(d) Recommendations for improvement

The following recommendation and suggestions are made for improvement:

1. Further investigations are necessary to determine the impact of coastal erosion at Overland to determine the need to relocate the Windward highway at this location. Similar activities are necessary for the Dark View section of the Leeward highway.

2. Some consideration should be given to implementing an armour stone revetment at Sandy Bay. It is estimated that an approximately 400m length of revetment will be required, which should be designed to withstand the 1 in 50 year hurricane wave condition.

3. A proper beach enhancement scheme for Indian Bay needs to be developed, in order to provide for a wider beach.

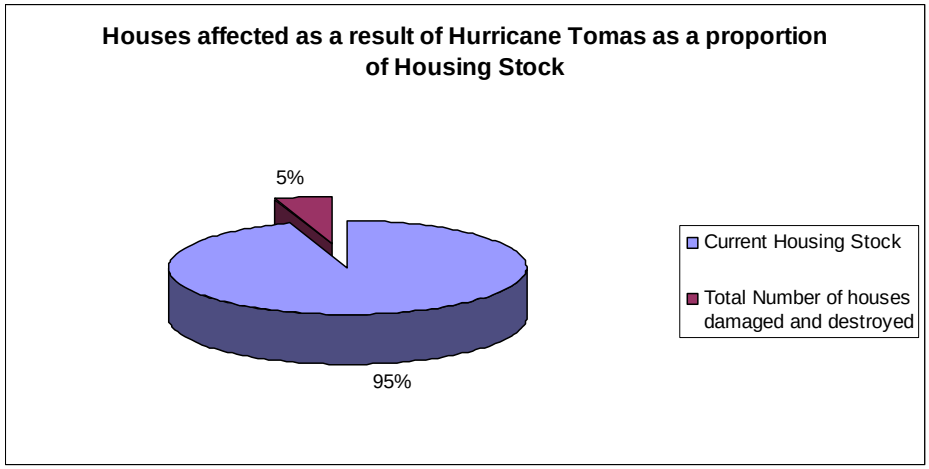
4. The sustainability of sand mining at Diamond needs to be urgently investigated, in order to ensure that sand removed will be replaced at an equivalent rate as a result of natural processes.

D. SOCIAL SECTORS

1. HOUSING

Hurricane Tomas affected 1,497 houses or 5% of the national housing stock of St. Vincent and the Grenadines as illustrated in figure 14.

Figure 14: Houses affected as a result of Hurricane Tomas as a proportion of housing stock



Source: ECLAC estimates based on official government data

The housing stock in St Vincent and the Grenadines is by and large of good quality with over 70% having been constructed with outer walls made of concrete or concrete blocks. Even among the lowest quintiles over 60%, of households lived in similarly constructed houses. In regard to roofing over 90% of all roofs were made of galvanized iron sheets.

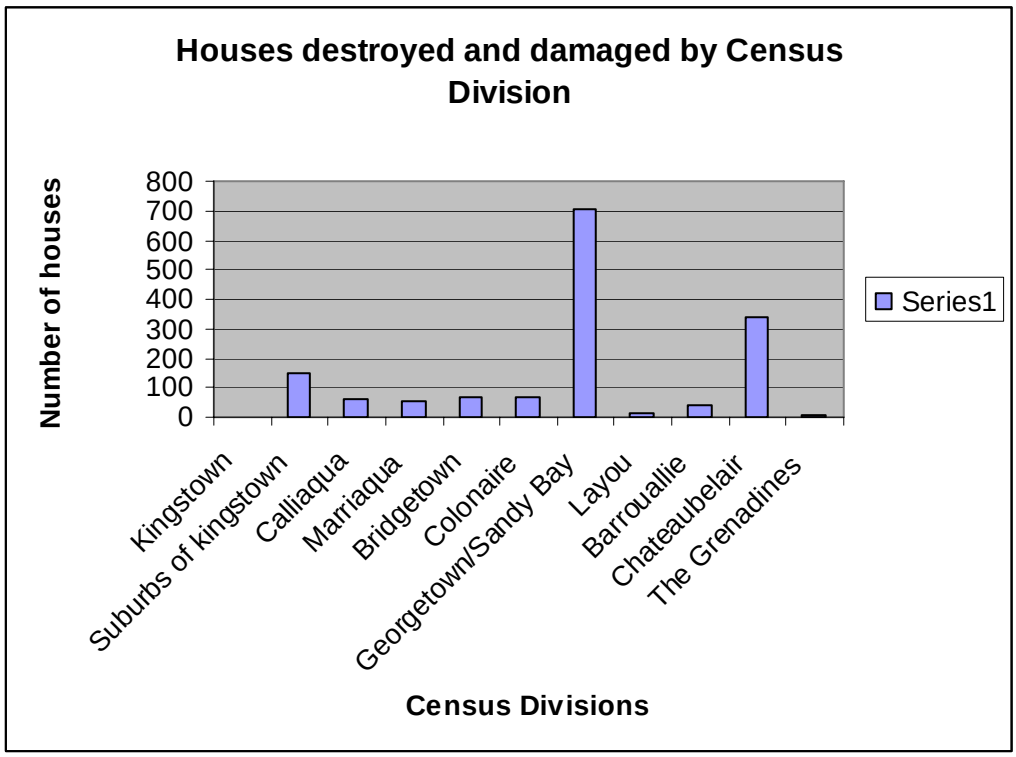
Table 32: Houses destroyed and damaged by Census Divisions

Census Division	Estimated Households *	Houses destroyed	Houses damaged	Total Houses destroyed and damaged
Kingstown	3,562	1	1	2
Suburbs of Kingstown	3,373	33	117	150
Calliaqua	5,957	5	54	59
Marriaqua	2,196	2	49	51
Bridgetown	1,821	8	58	66
Colonaire	2,017	12	53	65
Georgetown/Sandy Bay	2,597	64	639	703
Layou	1,699	1	12	13
Barrouallie	1,462		42	42
Chateaubelair	1,641	29	309	338
The Grenadines	2,323		8	8
Total	**28,649**	**155**	**1342**	**1497**

Note: * Estimated households based on 2006 estimated population (100,272) and average household size of 3.5
Source: ECLAC estimates based on official government data

It was not surprising therefore, that of the 1, 497 houses that were affected by Hurricane Tomas, only a small proportion 10%, or 155 houses were destroyed. Table 32 details the houses destroyed and damaged by hurricane Tomas and figure 15, illustrates the distribution of the houses by census divisions. The data suggest that the area of Georgetown/Sandybay was the most affected with by far the largest number of houses both destroyed and damaged, 703, followed by Chateaubelair , and the suburbs of Kingstown, which had a total of 338 and 150, respectively.

Figure 15: Houses destroyed and damaged by census division



Source: ECLAC estimates based on official government data

Home ownership is relatively high in St. Vincent and the Grenadines with almost 80% of the population reporting ownership. Of that group only 18.9 % were involved in mortgage arrangements[20]. Knowledgeable persons in the insurance field have suggested that approximately 30% of home owners may have had insurance and most would have been underinsured. Such a situation points to the dilemma of risk transfer and for provisions of support for reconstruction and retrofitting to homeowners in the aftermath of Hurricane Tomas.

Unfortunately it would have been those in poorest circumstances who would have been most affected and would be without the capacity for self help to repair their homes after the disaster.

Table 33 presents the summary of the effects of Hurricane Tomas on the housing sector. Of the EC$ 23.8 million of the total effect, damage to houses and furnishings accounted for 7% of the total effect or EC$ 22 million. The balance 7% or EC$ 1.5 million comprises loss of rental income and the cost of the removal of debris.

[20] St. Vincent and the Grenadines, "Country Poverty Assessment 2007/2008". Table 10.3

Table 33: St. Vincent and the Grenadines: Summary table - housing

Total Effect	**23,888,692**
Damage	22,303,120
i. Value of Houses Damaged	10,065,000
ii. Value of Houses destroyed	4,650,000
ii. Value of Household furnishings damaged and destroyed	7,588,120
Import component	
Losses	**1,585,573**
i. Loss of rental income	**88,573**
ii. Cost for removal of debris in compounds	1,497,000

Source: ECLAC estimates, based on official government data

2. EDUCATION

The education system in St. Vincent and the Grenadines supports the education of some 26,256 girls and boys, with males accounting for 50.4% and females 49.6% of the school population. These students are accommodated in 26 Secondary and 67 Primary schools. Rural schools make up 65% of all secondary schools and 81% of all primary schools. The details of their distribution are contained in table 34.

Table 34: Distribution of schools by district, location and type

District	Location	no. of secondary	no of primary
Sandy bay	rural	1	3
Georgetown	rural	1	4
Colonarie	rural	2	6
Bridgetown	rural	1	5
Marriaqua	rural	3	6
Calliaqua	rural	2	10
Kingstown and Environs	urban	9	13
layou	rural	1	3
Barrouallie	rural	1	3
Chateaubelair	rural	2	5
Grenadines	rural	3	9
Total		26	67

Source: St. Vincent and the Grenadines Directory of Schools and Colleges 2007/2008

In all, six schools were affected by Hurricane Tomas, One, technical training schools, three secondary schools and two at the primary level. The details of the damage to the schools are contained in table 35. As was expected the largest proportion of damage to schools occurred in the Georgetown/Sandybay and in the Chateaubelair Divisions.

Sporting facilities were also affected and table 36, presents the details of such damage. Those that were especially hard hit were located in the direct passage of Hurricane Tomas such as Arnos Vale complex in Calliaqua and the facilities in Sandy Bay.

Table 37 presents the details of damage to school furniture, the extent of which amounted to some EC$ 0.575 million dollars.

Table 35: Damage to education facilities

Facility	Description of damage	Cost
Georgetown Government School	Flooded classrooms and damaged ceiling boards	50,662.71
Georgetown Technical Institute/Multipurpose Center	Flooded classrooms and damaged ceiling boards due to the removal of 70% of galvanize sheets	21,014.30
North Union Secondary School	Galvanize sheets removed or deplaced from the roof of one wing and one covered walkway	4740.78
Troumaca Secondary School	Flooded classrooms and damaged ceiling boards due to 75% of galvanize sheeting to the roof of one wing	58,574.65
New Aldephi Secondary	10% of Galvanize sheets removed or damaged at the roof of the wing	4,624.05
Questelles Government School	40% of galvanize sheets removed from roof of students toilets and watchman's booth	5,000.00
Total		**144,616.49**

Source: ECLAC estimates based on official government data

Table 36: Damage to sporting facilities

Facility	Description	Cost
Arnos Vale Sports Complex, Calliaqua	Double Decker pavilion damaged; players pavilion & administrative Centre; Netball complex	58,953.1
London Playing Field, Sandy Bay	Wall damaged	15,813.00
London Hardcourt	damage to hardcourt	2,153
Sion Hill Players Field, Sion Hill	Ground water damage	38,280
Total		**115,199**

Source: ECLAC estimates based on official government data

Table 37: Damage to furniture

Type of Furniture	Quantity	Unit	Estimated Cost
Senior schools (chairs and Desks	245	Set	$110,250.00
Junior School (Bench & Desk to seat three students)	225	Set	$78,750.00
Lower Juniors/Infant school – table and chairs	100	Sets	$50,000.00
Storage cupboards	50	NR	$47,500.00
Chalkboards	10	NR	$9,500.00
Cafeteria furniture (2 benches & table)	20	Sets	$15,000.00
Computer Desk with chairs (1 Desk 1 Chair)	25	Sets	$37,500.00
Computers	50	NR	$150,00.00
Principal Chairs	5	NR	$
Teacher's Furniture (1 desk 1 chair)	50	Sets	$75,000.00
TOTAL			**$576,750.00**

Source: ECLAC estimates based on official government data

The summary of the effect to the Education Sector appears in table 38. It is important to note that overall disruption to the sector was minimal, and the total effect amounted to EC$ 1.3 million, with damage to educational infrastructure amounting to 98% of the total effect. Losses were negligible and were attributed to cleaning and debris removal most of which was undertaken without cost.

Table 38: St. Vincent and the Grenadines: Summary table education sector

ST. Vincent : Summary Table Education	
Total Effect	**1,333,625**
Damage	**1,314,537**
i. Value of Damaged Schools	144,616
ii. Value of Equipment and furnishings damaged and destroyed	576,560
iii. Value of damage to sporting facilities	**118,280**
iv. Damaged student school supplies	475,081
Import component	
Losses	**19,088**
i. Cost for removal of debris in compounds	12,000
ii. Clean up of Schools Used as Shelters	5,099
iii. Sanitizing of schools damaged from Hurricane Tomas	1,989

Source: ECLAC estimates based on official Government data

3. HEALTH

As with other OECS member States, the health status of the population of St. Vincent and the Grenadines is good with positive health indicators to demonstrate such. The Government's National Socio-Economic Development Plan, (2010-2025) indicates that access to medical/health facilities is at a satisfactory level with 95% of births being attended to by skilled personnel. There is full immunization coverage for the under-five age group and maternal deaths (per 1000) is almost non existent.

Hurricane Tomas affected the health sector only slightly with no outbreaks of diseases and only three facilities being negatively impacted. Details of damage to facilities as presented in table 39, suggests that most damage occurred to Cedars Doctors' Quarters, located in Bridgetown, which amounted to EC$0.105 million.

Table 39: Damage to health facilities

Facility	Description	Cost
Lewis Punnett Home	Collapsed walkway cover	4,786
Cedars Doctors' Quarters	Approximately 70% of galvanize sheets removed by strong winds, broken timber roofing members	105288
Milton Cato Memorial Hospital	Galvanize sheeting to covered walkway between female Medical Ward and the Operating Theatre	9098
Total		**119,172**

Source: ECLAC estimates based on official Government SVG data

Table 40 presents the summary of the effect of Hurricane Tomas on the health sector. The impact was slight, amounting to EC$ 0.144 million with the damage to health facilities accounting for EC$ 0.192 or 83% of the total effect. Losses accounted for the balance and were attributed to the public health campaign mounted through attempts at insect vector control and the removal of debris.

Table 40: St. Vincent and the Grenadines: Summary of the effect of Hurricane Tomas on the health sector

St Vincent Health Sector Summary Table	
Total Effect	**144,204**
Damage	119,172
i. Value of Damaged health facilities	119,172
ii. Value of Equipment and furnishings damaged and destroyed	…
Import component	
Losses	**25,032**
i. Cost for removal of debris in compounds	9,000
ii. Public health campaign	16,032

Source: ECLAC estimates based on official government data

IV. THE MACROECONOMIC IMPACT OF HURRICANE TOMAS ON ST VINCENT AND THE GRENADINES

A. SUMMARY OF IMPACT

The total impact of Hurricane Tomas was estimated at EC$ 132.9 million or US$ 49.2 million. Although this might be classified as a moderate financial impact, Hurricane Tomas nevertheless, severely impacted on the poorest segments of the society resulting in significant fall-out in livelihoods of vulnerable groups and important damage to coastal areas and forestry. The total impact measured relative to major macroeconomic indicators provides a useful indication of the scale of the effects. The total impact represented 10.5% of GDP, which can be deemed moderate given the potential disruptive impact of hurricanes in the region. However, the impact represented 119.8% of agricultural GDP and over 300% of tourism GDP, reflecting the relatively small, but growing share of tourism in GDP.

Compared with Saint Lucia, where the total impact was estimated at EC$ 907.7 million or US$ 336.2 million, the fall-out in St. Vincent and the Grenadines was much more manageable. However, this does not in any way suggest that the impact is not a major challenge for the authorities in St. Vincent and the Grenadines.

The total impact represented a sizeable portion (25.3%) of exports of goods and services, suggesting important loss benchmarked against foreign exchange earnings. The impact accounted for 31% of gross domestic investment, underscoring the need to raise funds for rehabilitation and reinvestment in damage infrastructure. Finally, the total impact defrayed over 19% of public external debt and suggests that substantial financial resources would be necessary for the reconstruction and rehabilitation effort.

These would require critical rehabilitative and restorative work that would demand scarce financial resources. The productive sectors suffered the bulk of the impact with damage and losses amounting to EC$ 71.63 million, representing 54% of the total impact.

The forestry subsector was most affected with damage and losses totaling EC$ 30.36 million. Damage amounted to EC$ 22.7 million, 73% of the total impact in the forestry sector. Forestry resources were badly affected with significant damage to buildings and nursery facilities and also plantations, natural forests and wildlife resources. The banana crop was buffeted by the hurricane, with impact estimated at EC$ 18.92 million, 14% of the total effect. Plantains, which are an important contributor to livelihoods, was also severely disrupted, with over EC$ 10 million of damage and losses. Other crops, including root crops, fruits and vegetables, which are both important domestic staples and sources of export income for small farmers, suffered significant impact to the tune of EC$ 7.12 million. Meanwhile, the fallout in livestock and fishing was moderate and stemmed from loss of poultry and damage to farm houses and damage to fishing vessels. Damage and losses to farm infrastructure and land loss were modest at EC$ 0.89 million and EC$ 0.68 million, respectively.

Fortunately, the impact on the rest of the productive sector was contained with tourism suffering moderate damage and losses amounting to EC$ 1.12 million. The damage to hotels and guest houses was minor and the overall impact on the industry did not occasion any visitor cancellations or diversion of cruise ships to other ports. Losses stemmed mainly from the disruption of the operations of tour operators and taxis, owing to blocked roads and damage to tourist sites and facilities.

Meanwhile, the infrastructure sector was impacted to the tune of EC$ 35.8 million, the equivalent of 27% of the total impact. The telecommunications subsector suffered the brunt of the impact in the sector. The lineplant infrastructure was damaged as a number of electricity poles snapped due to damage from landslides. Mobile operator, Digicel also suffered damage to its marketing equipment, including signage and billboards. The impact on the road network amounted to EC$ 4.4 million. A number of roads were affected by land slippage that led to them being blocked by fallen trees. This necessitated important road clearing costs. The cost of damage and losses to government buildings in the sector amounted to EC$ 3.9 million. Government buildings including community centres such as the Rose Hill and Campden Park community centres were damaged by the hurricane.

The total effect on the social sectors amounted to EC$ 25.4 million, equal to 19% of the total impact of the hurricane. A full 94% of the impact on the social sectors fell on the housing sector (EC$ 23.9 million). A number of houses ranging from high to low income were affected by the hurricane. The education sector was impacted to the tune of EC$ 1.3 million. The effect included roof damage in flooding of some schools and other educational institutions. Meanwhile, the impact on the health sector was contained at EC$ 0.2 million.

Table 41: Summary Damage and Losses from Hurricane Tomas on St. Vincent and the Grenadines

	Total Impact US$ millions	Damage and losses			% of Total Impact
		Total Impact EC$ millions	Damage	Losses	
Exchange rate to US dollar	**2.70**				
Total	**49.24**	**132.95**	**103.07**	**29.88**	**100.00**
Productive sectors	**26.53**	**71.63**	**48.45**	**23.18**	**53.88**
Agriculture	**26.11**	**70.51**	**47.69**	**22.82**	**53.04**
Bananas	7.01	18.92	11.74	7.18	14.23
Plantains	4.09	11.04	7.19	3.85	8.30
Other Crops	2.64	7.12	5.24	1.88	5.36
Livestock	0.45	1.22	0.35	0.87	0.92
Fishing	0.10	0.28	0.14	0.14	0.21
Forestry	11.24	30.36	22.27	8.09	22.84
Farm infrastructure	0.33	0.89	0.76	0.13	0.67
Land loss	0.25	0.68	0.00	0.68	0.51
Tourism	**0.41**	**1.12**	**0.76**	**0.36**	**0.84**
Distribution	**0.06**	**0.17**	**0.13**	**0.04**	**0.13**
Social Sectors	**9.40**	**25.37**	**23.73**	**1.64**	**19.08**
Housing	8.85	23.89	22.30	1.59	17.97
Education	0.49	1.33	1.31	0.02	1.00
Health	0.06	0.15	0.12	0.03	0.11
Infrastructure	**13.25**	**35.78**	**30.76**	**5.02**	**26.91**
Electricity	0.62	1.67	0.70	0.97	1.26
Water supply	0.33	0.90	0.10	0.80	0.68
Roads	1.62	4.37	3.10	1.27	3.29
Buildings	1.46	3.93	3.93	0.00	2.96
Bridges	0.37	1.00	1.00	0.00	0.75
River Damage and Training	0.76	2.06	1.96	0.10	1.55
Telecommunications	6.30	17.02	15.58	1.44	12.80
Feeder Roads	0.30	0.80	0.80	0.00	0.60
Airports and Seaports	0.04	0.11	0.09	0.02	0.08
National Parks	**0.17**	**0.46**	**0.25**	**0.21**	**0.35**
Environment	**1.28**	**3.46**	**3.25**	**0.21**	**2.60**
National Parks	0.17	0.46	0.25	0.21	0.35
Coastal Zone/Beaches	1.11	3.00	3.00	0.00	2.26

Source: ECLAC estimates, based on country data and information

B. MACROECONOMIC PERFORMANCE DURING THE THREE QUARTERS OF 2010

(a) Output and inflation

For the period prior to hurricane Tomas economic activity and overall performance was buffeted by the fall-out from the global recession. During the first three quarters of the year, activity remained sluggish despite the easing of recessionary conditions in some major markets. Weakness in distribution, transport and communications and construction contributed to the downturn in the economy. Real output in construction was pinned down by a sharp in both public and private sector activity. Construction was affected by weakened investor sentiment that led to delays in foreign direct investment related projects. What construction was carried centred on the completion of the first phase of the Buccament Bay tourist Resort and the renovation and rehabilitation of public building and roads. Moreover, dampened construction activity fed through to weak demand in wholesale and retail and mining and quarrying, accentuating the weakness in the economy.

Agricultural output declined during the first three quarters of 2010 in line with reduced production in the crops and fishing subsectors. Banana production contracted by some 43% to 3,203 tonnes and EC$ 19.81 million by value. The banana crop was affected by disease infestation and diversification into other crops. At the same time, other crops also declined,

Value added in tourism declined on account of 16.4% contraction in total visitor arrivals in the first three quarters of the year. High spending stay over arrivals slipped by 2.3% to 54,322, mainly owing to lower arrivals from the United Kingdom, United States and Caribbean markets. Meanwhile, cruise passenger arrivals plummeted by 30% to 70,573. While tourism demand from international markets was softened by impact of the financial crisis on personal wealth and business confidence, the high cost of intra-regional travel alongside tepid economic activity contributed to sluggish tourist arrivals from Caribbean markets. The downturn in tourism also spilled over into construction, which saw reduced activity in the road and air subsectors.

Inflation picked up in the first three quarters of 2011, relative to the similar period last year. Consumer prices rose by 1.7% in first three quarters of 2011, relative to a decline of 2.2% in 2010. Impulses for higher prices came from the costs of food, including ground provisions and evaporated milk and fuel and electricity which had fallen in 2009 on account of a decline in the fuel surcharge.

(b) Government finances

The public finances strengthened during the first three quarters of 2011, compared with the similar period of 2010. The overall deficit contracted by 12% to EC$ 40.62 million. Even though total revenue declined marginally, this was offset by a greater decline in total expenditure. Total revenue fell by 3%, owing largely to a 6% decline in tax revenues. Receipts from taxes on international trade and transactions fell by 6.7%, largely reflecting lower proceeds from customs service charge. Revenues from taxes on domestic goods and services were down by 6.6%, owing to reduced intake from excise and value added tax associated with softness in the economy. Similarly, proceeds from taxes on income and profit declined by 4.7%, mainly due to a fall in corporate tax receipts, reflecting government tax incentives to businesses that were buffeted by the weak economic activity. By contrast, non-tax revenue posted strong growth of over 39%, linked to dividends paid to the government.

Total expenditure contracted by 4%, mainly driven by a steep fall in capital spending. Capital spending plunged by 41% associated with delays in the implementation of some government projects. However, reduced capital spending was also influenced by government's efforts at fiscal consolidation to reduce the deficit. On the other hand, current spending increased modestly by 2.7% led by higher outlays

on transfers and subsidies, reflecting spending on social safety net programmes to cushion the impact of the international crisis on vulnerable groups. Spending on personal emoluments was also up stemming from a 3.0% increase in salaries to public servants. On the other hand, spending on goods and services contracted by 15.9%, reflecting efforts to reduce outlays on this item of expenditure.

(c) Monetary and exchange rate conditions

Reflecting sluggish conditions in the economy, broad money remained stagnant during the first three quarters of 2011, relative to the similar period of 2010. Although quasi-money expanded by 3.2%, owing to higher inflows of time and savings deposits, this was offset by a 6.7% fall in narrow money. The fall in narrow money reflected a fairly sharp fall in currency held by the public in keeping with sluggish economic conditions.

Meanwhile, growth in domestic credit was tepid at 1.4%. Credit to the private sector grew by only 2.3%, reflecting business uncertainty and weak credit demand in the recessionary environment.

(d) Balance of payments performance

The merchandise trade deficit edged up from EC$ 387.1 million during the first half of 2009 to EC$ 388.2 million in the first half of 2010. This stemmed from a fall in the value of exports, which offset the decline in payments for imports. Export receipts dropped by over 21%, in line with lower proceeds from banana, feeds and manufactured products. Similarly, import payments declined by 1.8% to EC$ 441.6 m, reflecting reduced demand in a contracting economy. Lower imports were associated with a reduced fuel bill and lower payments for food and manufactured goods.

At the same time, owing to the fall in stay-over visitor arrivals, gross travel receipts were down by 2.3%, while commercial banks drew down their assets abroad, leading to net capital inflows.

C. THE POST-DISASTER MACROECONOMIC PERFORMANCE

(a) Overview

Although the brunt of the impact of hurricane Tomas fell on the productive sectors, the fact that the impact was contained and that the hurricane occurred late in the year helped to mitigate the impact on GDP in 2010. In this sense, the hurricane was more a livelihoods event in that it severely disrupted the lives of a wide segment of the less fortunate part of the population. There will be so carryover effects on real output in agriculture and forestry in 2011, but these might be offset by recovery in tourism, distribution and other sector, which in any event will be contingent on external factors, including the recovery in major markets.

(b) Impact on GDP

The overall impact of the hurricane on GDP growth depends on the loss of value added in individual sectors and the weight of these sectors in GDP. Moreover, an important factor was the extent of construction spending on rehabilitation and reconstruction works, which would partly offset the dampening effects of lost value added in other sectors.

Based on the overall lost value added it is estimated that the hurricane would have led to a decline in real GDP of around 0.5% in 2010. This means that the economy was expected to decline by around 3.14%. Therefore, the hurricane has compounded the hardship for citizens arising out of the global recession in 2010 and the early part of 2011 at least.

The agriculture sector suffered the greatest fallout in GDP was projected to decline by almost 13%, up from the earlier forecasted decline of around 10%. Within the agriculture sector, the banana subsector was projected to decline by 21.7% after Tomas extending the contraction of 15% that was projected before the event. The significant damage and losses to the banana crop will extend past the middle of 2011, limiting farmers' incomes and wellbeing. The other crops subsector was expected to contract by 8% after Tomas, deepening the previous estimated decline of 6%. The fallout in the other crop subsector is important in that it impacts not only on farmers' incomes, but the quality of nutrition of vulnerable groups who depend on subsistence crop production for an important portion of their food supply. The impact on real output in livestock and fisheries was estimated to be marginal as these sectors were spared the brunt of the effects of the hurricane.

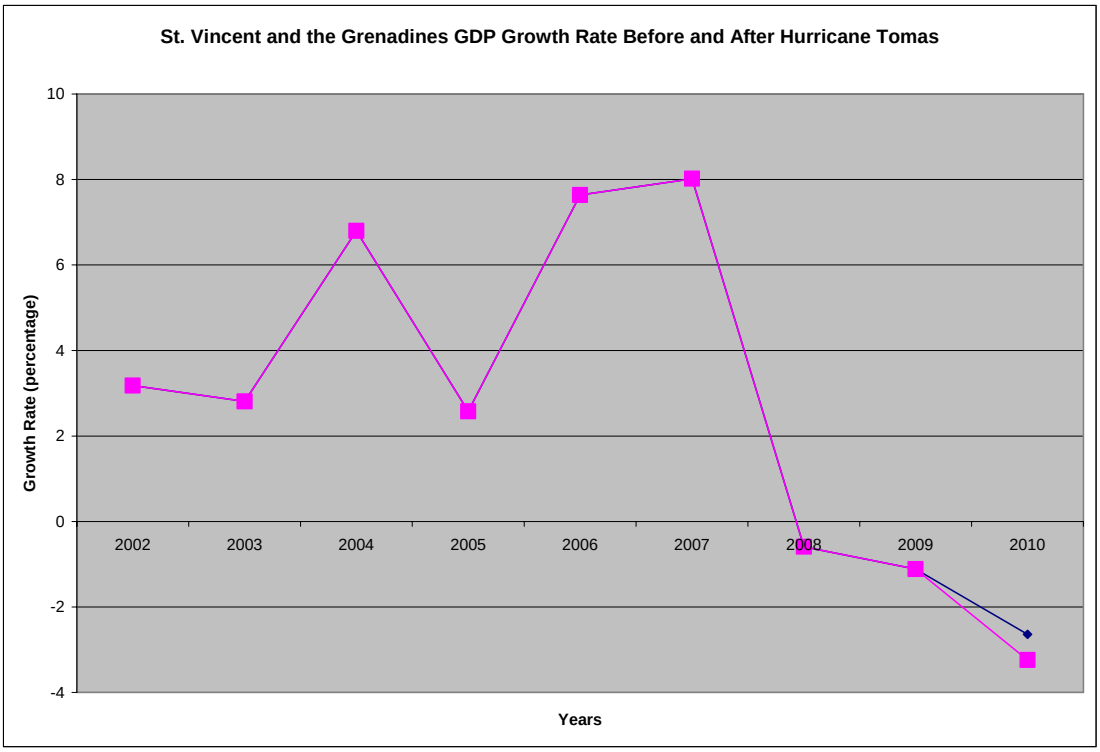
The downturn in the electricity and water subsector deepened -0.67% before and -0.8% after the hurricane. Meanwhile, the positive growth (3%) projected for the wholesale and retail sector before the hurricane, was estimated to slow to 2.6% after the hurricane. The hurricane disrupted domestic trade in agricultural produce including bananas, plantains, root crops and fruits and vegetables.

The tourism sector was already affected by weak global demand before the hurricane, with stay-over arrivals down by 2.3%. This was accentuated by the hurricane, with real output in the sector estimated to decline by further (5% after and 4% before) the hurricane. The tourism plant itself suffered minor damage, which helped to contain the impact on the sector. Nevertheless, a number of tourist sites were fairly badly affected, leading to loss of incomes for tour operators and taxi drivers.

The decline in the transport sector was expected to increase in 2010 (9.5% before and 10% after Tomas). Road transport was disrupted by fallen trees and debris that necessitated clean-p costs. Higher air transport costs were also incurred in moving stranded passengers to the destinations. At the same time, real output in communications was estimated to decline by 0.9% after Tomas, compared with 0.5% before Tomas.

By contrast, the decline in mining and quarrying was expected to ease, owing to increased output to facilitate the reconstruction effort. Also, construction was expected to be lower (-6% after and -9% before Tomas), as the public sector undertook rehabilitation road and other reconstruction works.

Figure 16: St Vincent and the Grenadines GDP growth rate before and after Hurricane Tomas



Source: ECLAC estimates based on official data

(c) Prices, wages and employment

The rate of inflation was expected to increase, owing to domestic food shortages arising from the disruption in the supply of bananas, plantain, fruits and vegetables. Moreover the substitution of domestic supply with imports would also have contributed to higher inflation as a result of higher average international prices. It is expected that a number of workers in the agricultural sector would have suffered a cut in their wages in line with the disruption in the sector. Further, unemployment was expected to increase in the sector stemming from the disruption of farm work.

(d) Fiscal operations of central government and debt

In recognition of the need to get its fiscal house in order, the government of St. Vincent and the Grenadines had undertaken a programme of fiscal consolidation before hurricane Tomas. This consolidation programme continued in spite of the hurricane, as the government was able to secure some aid finance from donor countries to defray some of the relief, rehabilitation and reconstruction costs after Tomas. As a result, despite the fallout from the hurricane, the government finances actually strengthened after hurricane. The overall fiscal position was expected to swing from a deficit of EC$ 260.3 million in 2010 before Tomas, to a surplus of EC$ 6.4 million. This sharp turnaround was propelled by an over 74% cut in capital expenditure (EC$ 226 million). This major retrenchment of capital spending stemmed in part from a hold-off on significant infrastructure spending.

Total revenue and grants rose marginally, as most heads of current revenue declined, and were not offset by a 31% increase in capital revenue. Taxes on income and profits were estimated to contract

around 5%, owing to lower receipts from corporation and withholding taxes, reflecting in part the impact of weak domestic demand conditions. Taxes on profit were expected to rise marginally by 1.9%. Meanwhile, taxes on international trade and transactions, which comprise the bulk of revenue was contracted by 3.7%, associated mainly with lower proceeds from the VAT, customs service charge and excise duties. Reduced receipts from these taxes partly reflected sluggish economic conditions that affected the spending of households and firms, and significant one-off payment of arrears of excise duty and customs service charge in 2009 that was not repeated in 2010.

Revenues from licenses declined by 11%, as both alien land holding proceeds and motor vehicle licenses netted less revenue. At the same time receipts from fees, fines and permits were expected to increase marginally to over EC$ 21 million, responding to a sharp increase in registration fees from the Commerce and Intellectual Property Office (CIPO) due to the payment of arrears. At the same time, interest, rents and dividends were up as a result of currency profits received from the ECCB, while other revenue was boosted by substantial budget support from the European Union (EU).

Capital revenue was estimated to expand by around 31% to EC$ 85 million. Receipts were bolstered by a substantial increase in receipts from the sale the National Commercial Bank (NCB) and higher revenues from the sale of SDRs.

On the other hand, total expenditure took a major cut of over 32% to EC$ 561 million after Tomas. Current spending declined by over 7%, associated with reduced spending on personal emoluments, interest payments, transfers and subsidies and goods and services. There was a 7% cut in personal emoluments, while outlays on wages rose marginally.

Interest payments fell by around 14%, partly reflecting lower debt obligations. Meanwhile, transfers and subsidies were down marginally, reflecting efforts at fiscal consolidation. Similarly, expenditure on goods and services fell by around 15%, due to efforts at improved efficiency in spending on sub-categories.

Table 42: The Fiscal Impact of Hurricane Tomas on St. Vincent and the Grenadines

Fiscal Impact of Hurricane Tomas (EC$ millions)	2008	2009	Pre-Hurricane Tomas 2010	Post-Hurricane Tomas 2010
Details				
TOTAL REVENUE & GRANTS	**536.21**	**544.77**	**567.25**	**567.52**
CURRENT REVENUE	**489.47**	**466.37**	**502.44**	**482.46**
Taxes on Income & Profits	**110.39**	**110.35**	**114.00**	**108.81**
Individuals	55.99	57.64	61.00	61.69
Companies	46.69	44.86	45.00	40.03
Withholding	7.71	7.86	8.00	7.09
Taxes on Property	**2.20**	**2.72**	**2.85**	**2.90**
Taxes On International Trade	**188.62**	**192.24**	**185.26**	**178.41**
Import Duties	45.59	46.15	46.00	48.16
Customs Service Charge	30.81	31.56	30.00	29.29
Travel Tax	1.26	1.06	1.20	0.83
Direct Entry Tax	0.05	0.03	0.04	0.04
Vehicle Surtax	3.69	3.81	3.50	3.48
Excise Duties	20.74	29.27	23.00	22.52
VAT	86.00	80.36	81.52	74.10
Taxes on Domestic Transactions	**119.32**	**105.14**	**119.27**	**105.93**
Stamp Duties	29.16	18.74	24.30	22.68
Excise Duties	4.18	3.73	4.20	4.15
Insurance Premium Tax	3.81	3.60	3.80	3.79
Interest Levy	10.32	10.44	11.00	9.06
Airport Service Charge	4.29	3.79	4.50	3.71
VAT	67.54	64.83	71.47	62.53
Licences *(Of which:)*	**27.34**	**22.02**	**28.80**	**25.39**
Alien land Holding	*8.08*	*3.93*	*8.00*	*4.28*
Motor Vehicle	*8.19*	*8.59*	*9.00*	*8.59*
Fees, Fines and Permits *(Of Which:)*	**18.19**	**18.94**	**21.29**	**21.49**
Off Shore Financial Services	*3.95*	*3.55*	*3.90*	*3.44*
Merchant Shipping (Int'l)	*4.26*	*4.93*	*4.96*	*3.35*
Interest, Rent and Dividends	**11.57**	**10.04**	**8.60**	**13.42**
Other Revenue	**11.83**	**4.92**	**22.36**	**26.12**

Table 42 cont'd

CAPITAL REVENUE	**46.74**	**78.40**	**64.81**	**85.06**
Sale of Crown Lands	1.59	1.47	0.00	0.88
Grants	45.16	76.94	64.81	14.16
Other	0.00	0.00	0.00	70.03
TOTAL EXPENDITURE	**561.79**	**599.76**	**827.58**	**561.16**
RECURRENT EXPENDITURE	**430.82**	**469.75**	**522.94**	**483.16**
Personal Emoluments	185.73	191.25	220.19	203.88
Wages	21.11	20.74	17.41	17.87
Interest	46.81	51.02	61.87	52.67
Domestic	23.80	28.44	34.71	31.50
External	23.01	22.58	27.15	21.17
Transfers & Subsidies	86.15	120.68	145.48	142.50
Goods & Services	91.02	86.07	77.99	66.24
CAPITAL EXPENDITURE	**130.97**	**130.01**	**304.64**	**78.00**
CURRENT BALANCE	**58.65**	**-3.38**	**-20.50**	**-0.71**
PRIMARY BALANCE	**21.23**	**-3.97**	**-198.46**	**59.03**
OVERALL BALANCE	**-25.58**	**-54.99**	**-260.33**	**6.36**

Source: ECLAC estimates, based on country data and information

(e) Monetary and exchange rate conditions

After improving in the period before Tomas, money and credit conditions were expected to tighten after the hurricane. The fall-out in incomes, especially for small farmers in the agriculture sector was expected to dampen bank deposit growth. Moreover, credit, which was already sluggish due to the impact of the global recession, would have been further constrained by the weakened income positions of affected households. Government financial relief would have helped to cushion the overall effect, but this would only have partly offset the fall in incomes.

(f) Impact on the balance of payments

The impact of hurricane Tomas on the balance of payments reflected the fallout in the main productive sectors, the response of imports for rehabilitation and reconstruction and the offsetting effects of aid transfers.

The current account deficit is expected to increase from 36.6% of GDP (US$ 575.9 million) before Tomas to 39.5% of GDP (US$ 621.1 million) after Tomas. The current account was strongly influenced by the wider merchandise deficit (US$ 745 million after Tomas against the previously projected US$ 708.7 million. Agriculture was disrupted by the hurricane. The agriculture sector suffered significant losses amounting to EC$ 25.4 million. Goods exports were squeezed by the sharp fall in banana exports on account of the substantial damage to fruit bearing plants. In fact, up until end of

February 2011, no bananas were exported from St. Vincent and the Grenadines. Exports of plantain, which has grown in importance in recent years, as a number of farmers switch to its cultivation, in place of bananas in some instances, also suffered. Meanwhile, imports were projected to increase by over 5% after Tomas to US$ 844.9 million. Imports of building materials, supplies and other household goods were expected to be higher in response to demand for relief and rehabilitation works.

The fallout in the services account stemming from the impact on tourism was limited. There were little or no tourist cancellations or cruise ship diversions as a result of the hurricane and this kept the total impact to a modest EC$ 1.15 million. Losses in the sector resulted mainly from loss of income to taxi drivers and tour operators due to damage to tourist sites and facilities. This meant that the social welfare impacts were greater than the actual economic fallout in terms lost service export receipts.

The transfers surplus was bolstered by aid inflows from friendly governments. Nevertheless, there is still need for much more concessionary financial assistance to catapult the reconstruction and rehabilitation effort, especially of affected homes, economic activity and forestry and coastal zones.

Table 43: The Impact of Hurricane Tomas on the Balance of Payments of St. Vincent and the Grenadines

	2004	2005	2006	2007	2008	2009r/	Pre-Hurricane Tomas 2010p/	Post-Hurricane Tomas 2010
Balance of Payments								
	-275.61	-268.31	-318.29	-514.68				
I. CURRENT ACCOUNT	-275.61	-268.3	-318.29	-514.67	-621.1	-530.64	-575.9	-621.08
Percentage of GDP								
Goods: exports f.o.b.	106.11	114.95	111.14	138.65	154.41	148.3	105.9	99.9
Goods: imports f.o.b.	-537.23	-573.46	-641.74	-777.36	-887.43	-793.28	-814.62	-844.88
Balance on Goods	**-431.12**	**-458.51**	**-530.6**	**-638.71**	**-733.02**	**-644.98**	**-708.72**	**-744.98**
Services (Credit)	392.09	426.52	461.24	434.34	413.04	375.16	376.5	375.6
Transportation	29.23	28.4	31.39	32.68	29.64	22.27	23.02	22.67
Travel	258	280.51	305.8	297.03	259.29	236.35	236.74	236.34
Other services	104.86	117.61	124.05	104.63	124.11	116.54	116.74	116.59
Services (Debit)	-197.7	-212.77	-238.06	-308.35	-275.77	-252.57	-244.64	-244.64
Transportation	-87.1	-92.46	-102.41	-123	-138.79	-122.97	-124.42	-124.42
Travel	-38.58	-40.26	-42.43	-54.44	-47.53	-38.91	-37.77	-37.77
Other services	-72.02	-80.05	-93.22	-130.91	-89.45	-90.69	-82.45	-82.45
Balance on Services	**194.39**	**213.75**	**223.18**	**125.99**	**137.27**	**122.59**	**131.86**	**130.96**
Balance on Goods and Services	**-236.73**	**-244.76**	**-307.42**	**-512.72**	**-595.75**	**-522.39**	**-576.86**	
Income (Credit)	**13.32**	**22.67**	**36.72**	**36.2**	**27.31**	**28.45**	**28.3**	**28.3**
Compensation of employees	1.8	2.89	9.93	17.27	11.02	10.61	10.94	10.94
Investment income	11.53	19.78	26.79	18.93	16.29	17.83	17.36	17.36
Direct investment	…	0	0	0.01	0.01	0	0	0
Portfolio investment	4.66	6.64	11	4.44	10.21	10.47	10.22	10.22

Table 43…..cont'd

Other investment	6.87	13.14	15.79	14.48	6.08	7.36	7.14	7.14
Income (Debit)	**-90.3**	**-94.96**	**-102.04**	**-92.58**	**-88.2**	**-67.54**	**-60.04**	**-60.04**
Compensation of employees	0	-1.64	-1.45	-1.45	-0.02	-0.04	-0.04	-0.04
Investment income	-90.3	-93.32	-100.59	-91.12	-88.18	-67.5	-60	-60
Direct investment	-67.25	-59.66	-62	-52.97	-48.89	-33.46	-34.66	-34.66
Portfolio investment	-2.9	-5.73	-4.06	-8.74	-3.98	-3.84	0	0
Other investment	-20.1	-27.94	-34.53	-29.42	-35.31	-30.2	-25.34	-25.34
Balance on income	**-76.98**	**-72.29**	**-65.32**	**-56.38**	**-60.89**	**-39.09**	**-31.74**	**-31.74**
Current transfers (Credit)	67.86	71.28	87.02	95.64	75.26	69.69	70.39	62.39
Current transfers (Debit)	-29.76	-22.54	-32.57	-41.22	-39.72	-38.85	-37.71	-37.71
Balance of transfers	**38.1**	**48.74**	**54.45**	**54.42**	**35.54**	**30.84**	**32.69**	**24.68**

Source: ECLAC estimates, based on country data and information

V. CONCLUSIONS AND RECOMMENDATIONS

Following the passage of Hurricane Tomas the Government of St. Vincent and the Grenadines may wish to explore ways and means to strengthen institutions, mechanisms, and capacities at all levels but particularly at the community level that can systematically contribute to building resilience to hazards.

Although the impact of Hurricane Tomas has not caused as much devastation to St. Vincent and the Grenadines as could have occurred, the predictions regarding the likely effects of climate change on the Caribbean such as rises in temperatures, sea level, and increased hurricane intensity leaves little doubt that a more comprehensive view of natural hazards is required. In addition, because of the complex nature of the challenges which disasters pose and the multi hazard environment that is the Caribbean, mitigation and adaptation, recovery and reconstruction, require an integrated and comprehensive planning process.

The notion is gaining currency that such an approach should take into consideration the vulnerability of the people, their livelihoods, their housing and the common infrastructure of the county such as it roads , bridges and essential infrastructure including health and education facilities. Taking a comprehensive approach also requires that Governments' address the perception of risk held by various stakeholders such as the ordinary people, the investors and the policy makers themselves. The differing risk perceptions may influence attitudes and cultures to mitigation and resilience building. It is important to recognize that disasters are a social phenomenon with social causes.

Very often, disasters such as, Hurricane Tomas highlight the vulnerabilities of the country. In the case of St. Vincent, Tomas brought to light the interaction of disaster and poverty and its attendant ills; the vulnerability of the physical environment and its relationship to the infrastructure particularly affected by the erosion of river banks and slopes; and the management of household and Community run- off and waste water on soil and rock slopes. Significantly it highlighted the non-use of best agricultural practices. In the social area, it highlighted the high burden of care, of female heads of households with limited resources; the inability of young women to exploit the opportunities available for continuing education and employment due to early child bearing and rearing practices; the alienation of young males from the traditional education and skills sector , resulting in reduced employability; and the low levels of profitability in the agricultural sector which increases its non attractiveness to the youthful population.

1. Recommendations for economic recovery and resilience

a. Hurricane Tomas has aggravated an already difficult economic environment. The economic contraction was expected to deepen in 2010 with growth projected at 2.64%, before the hurricane, constraining growth in jobs and incomes. Nevertheless, it was expected that by 2011, the economy would have posted a modest recovery on the backs of improved global demand for tourism, a recovery in construction and distribution. Moreover, despite the adverse environment, the government had embarked on a programme of fiscal consolidation to contain growth in the deficit and debt.

b. In the aftermath of Tomas both the strength of the recovery in 2011 and the programme of fiscal consolidation are expected to be adversely affected. Government would have to divert scarce resources to the reconstruction and rehabilitation. The government has already raised some resources from donor countries. However, given the debt situation and scarcity of resources, government should intensify its efforts to raise as much of the resources for the reconstruction programme in the form of grants or concessionary finance. This could include a coordinated donor appeal, where donors can finance specific projects based on

government's priorities. Such projects should strive for balance between short-term recovery and long-term mitigation and 'building back better'.

c. Nevertheless, given the stringent economic conditions in donor countries and the multiple calls on the finance of multilateral financial institutions, the full complement of resources required might not materialize from aid and soft loans. In this event, it is advisable that the government undertake some borrowing on as favourable terms as it can negotiate to accelerate the recovery of the foreign exchange generating productive sectors and to rehabilitate roads, bridges and other vital infrastructure. Such necessary debt could be viewed as public investment and would have a relatively high rate of return in the medium to longer-term. A good use of this debt would be to restore damaged eco-tourism and heritage sites to rehabilitate and upgrade the product on offer so as to attract more visitors and to increase average spending. In any event, it must be noted that there is a high opportunity cost of not restoring the productive sectors as quickly as possible.

d. Furthermore, the policy authorities should strike a careful balance between providing relief and rehabilitating damaged infrastructure and restoring and upgrading the productive sectors. This is vital, as the incomes and foreign exchange earnings from agricultural and tourism exports will be critical to financing sustainable rehabilitation and restoration of damaged infrastructure and coastal zones. Governments often err on the side of one sector to the detriment of the other which is not optimal policy.

e. Given that over 50% of the impact fell on the agriculture sector, it is proposed that the disaster be converted into an opportunity for the sector. This could entail a major recovery and competitiveness programme for the sector. This should include the development of a niche agro-industrial sector centred on the making of plantain chips, arrowroot processing and possibly the making of dasheen flour. This should be supported by a marketing strategy to secure a foothold for these products.

f. The importance of data management for development can never be overemphasized. The government is therefore encouraged to undertake an audit of the data management resources at the national and community levels examining the data management and statistical resources in the country. In light of the possibility of increased and more intense weather events, it is imperative to create and maintain databases for production and marketing which would allow for rapid evaluation of damage and losses.

2. Short-term recommendations:

The Report recommends that Government seek to:

a. Provide special incentives to increase the participation of youth and females , particularly those who are heads of households, in sustainable livelihoods process – through micro lending facilities and small grants ;

b. Discourage farming on marginal lands;

c. Strengthen the programme of river defences and slope management for the most vulnerable areas using natural and engineering solutions;

d. Strengthen processes for de-silting rivers and develop a de-silting and maintenance programme including examination of possible uses of the extractive materials;

e. Develop risk reduction programmes which include retrofitting and mitigation for the poorest, utilizing available technologies drawn from the Cuban models or from other models available through south-south technical cooperation.

3. Strategic Adaptation and Mitigation approaches to advance sustainable livelihoods and development

(a) General

a. Address the relocation of communities and critical infrastructure located in the hazard zones;
b. Establish affordable micro credit facilities (rural development investment funds);
c. Strengthen/develop the benefits of biodiversity and eco-tourism;

(b) River training

a. River training initiatives need to be implemented at approaches to major bridges on the island
b. Prior to these initiatives, proper flood plain mapping must be carried out, for the 50 and 100 year return period rainfall events
c. Strengthen the gauging of rainfall for catchments across the island with the intention of observing trends in climate patterns.

(c) Coastal Zone Management

a. Detailed mapping of coastal zone hurricane waves and storm surge to be carried out for the 50 and 100 year return period hurricane events
b. Prior to these initiatives, proper bathymetric and topographic mapping must be effected, in the coastal zone areas
c. Evaluation of sustainable volumes to sand mining and optimum locations to be carried out;
d. Implementation of long term tidal gauge data to facilitate the prediction/observation of the manifestation of global sea level rise.

(d) The agricultural sector

a. Establishment of a production - marketing information system to provide necessary baseline data for decision making related to strategic planning and management in the sector as well as for Damage and Loss Assessment;
b. The provision of training in Damage and Loss Assessment related to the agricultural sector;
c. Introduction of an insurance regime in the rural areas to cover the entire farm household. The possibility of expanding the present coverage of WINCROP beyond bananas could be examined. This would significantly expand the critical coverage mass of WINCROP and, therefore enhance the viability of the company;
d. Within the context of the CARICOM – Brazil Agreement, and through the institutional (Horizontal Technical Cooperation) mechanism of the Inter-American Institute for cooperation on Agriculture, explore the possibility of obtaining technical assistance from Brazil for improving significantly the Arrow Root plant capacity utilization;
e. Development and Implementation of a Land Use and Water Management Plan;

(e) Recovery framework and strategy

a. Develop a Recovery Plan which will:
   - Address vulnerability reduction;
   - Be based on national economic and social development plans and strategic plans;
   - Incorporate disaster risk reduction in all strategic plans;
   - Ensure the inclusion of stakeholders and beneficiaries in the planning processes.

Lastly it is important to note that risk reduction and mitigation measures need to be strengthened and incorporated into the national development planning processes to enable the country to meet the challenges and threats posed by climate variability and change. The most significant being that of more intense and frequent hydrological and meteorological events.

ECONOMIC COMMISSION FOR LATIN AMERICA AND THE CARIBBEAN
Subregional Headquarters for the Caribbean
#1 Chancery Lane, P.O. Box 1113, Port of Spain, Trinidad and Tobago