

Chapter 5.

Sectoral Impacts

The economy-wide analysis in Chapter 4 shows how Dominica has been affected by extreme tropical storms, especially the catastrophic Hurricane David in 1979. This analysis also suggests that these negative effects have been most severe on the agricultural sector. In contrast, after Hurricanes David, Frederick and Allen, whose effects were cumulative, activity in the rest of the economy was less obviously subject to short-term negative impacts from subsequent hurricanes. To understand more fully these contrasting broad sectoral effects, the impacts of the more extreme events between 1979 and 1999 are explored in this chapter at a sectoral and sub-sectoral level. The exploration considers the major productive and commercial sectors of the economy, broadly as reflected in the national accounts – agriculture (including bananas, other crops, livestock and fisheries), manufacturing, tourism, construction and international financial services. Transport and public utilities are examined in Chapter 6 as part of an assessment of the impact of storms on the largely public owned infrastructure, whilst financial aspects including possible inflationary effects, banking and credit institutions are covered in Chapter 9 and public sector finance in Chapter 10. The approach adopted in this and subsequent chapters is again eclectic, combining evidence on the behavior of national accounting aggregates and other quantitative measures of economic and financial performance with qualitative evidence from interviews with present and former officials and members of the business community.

5.1 Agriculture, Livestock and Fisheries

Agricultural Vulnerability

The agriculture sector broadly defined²² is still the major productive sector of the economy, accounting for over 20% of GDP and 25% of exports of goods and services during the late 1990s. Agriculture is also the major source of livelihoods. In the 1991 Census (still the most comprehensive social survey), 30% of the economically active population were recorded as having agriculture as their primary activity. In addition, because many more include as part of their livelihoods some agricultural activity, if only self-provisioning and/or small-scale market-oriented production, probably around half of the population is still directly dependent on agriculture. Consequently, the damage caused by natural disasters to agriculture and disruption to agricultural production and markets impacts immediately and deeply on the welfare of the majority of the population.

All agricultural sub-sectors are potentially highly vulnerable to climatic hazard. Hurricanes and tropical storms as well as associated flooding and waterlogging are likely to affect all crops. The dominant crop, bananas, is especially sensitive to damage from winds of 40 mph or more, so that even the fringe impacts of less severe tropical storms can cause serious damage. Perhaps surprisingly in view of the high rainfall, crop production is also sensitive to moisture stress if there is a more extended or exceptionally low rainfall dry season. This is because there is a high proportion of continuous crop production of tubers (bananas and plantains) and root crops that exploit usually high moisture availability - but growth is quickly checked by moisture stress.

There is the further question of genetic vulnerability, which is not considered in this study. The tendency towards monocrop cultivation based on an exotic species with a narrow range of varieties leads to greater susceptibility to pests and diseases. Historically, this was a problem for coffee and limes, and remains a source of risk for bananas.

²² The GoCD includes within a single government department directorates of Agriculture, that is crops (except bananas, organized separately under the Dominica Banana Marketing Corporation), livestock, fisheries and forestry. These are also reported in the national income accounts as 'Agriculture' and separate sub-sectors within agriculture. These sub-sectors are also sometimes collectively grouped together as the renewable natural resources sector. We follow the widespread practice of referring to these sub-sectors together as 'Agriculture'.

Long Term Trends

Agriculture, although still dominant, has been rapidly declining in relative importance since Independence in 1978, and especially during the 1990s (Table 5.1). The sector product and its share of total GDP is sensitive to the variable export performance. Its share of GDP fluctuated within the range 32-38% in the fifteen years up to Independence without any marked downward trend. However, within the overall sector product there was considerable structural change away from plantation production of tree crops to owner cultivation of bananas. Subsequently, real agricultural sector product and agriculture's share of GDP has fallen substantially with each major natural disaster shock- 1979-80, 1989 and 1995- failing to recover previous levels of relative importance. Most of this decline is attributable to the crop sector, and within that total to bananas (Figure 5.1). Otherwise, there has been significant growth in only the small livestock sector. All sub-sectors were extremely negatively impacted by Hurricane David. Afterwards fisheries has been affected by capital losses of boats and equipment and typically performs more poorly in years of major hurricane shock (Figure 5.2). In the absence of more precise evidence, the post-disaster shift out of agriculture seems to be explained by a combination of a further reduction in larger-scale production (failure to invest fully in replacement), a shift of smallholders into employment in other sectors and also off-island migration. The 2001 Census will provide useful more detailed evidence on these structural changes in the economy and society.

Table 5.1 Agricultural Sector GDP: Relative Shares of Crop, Livestock, Forestry and Fisheries Sub-sectors

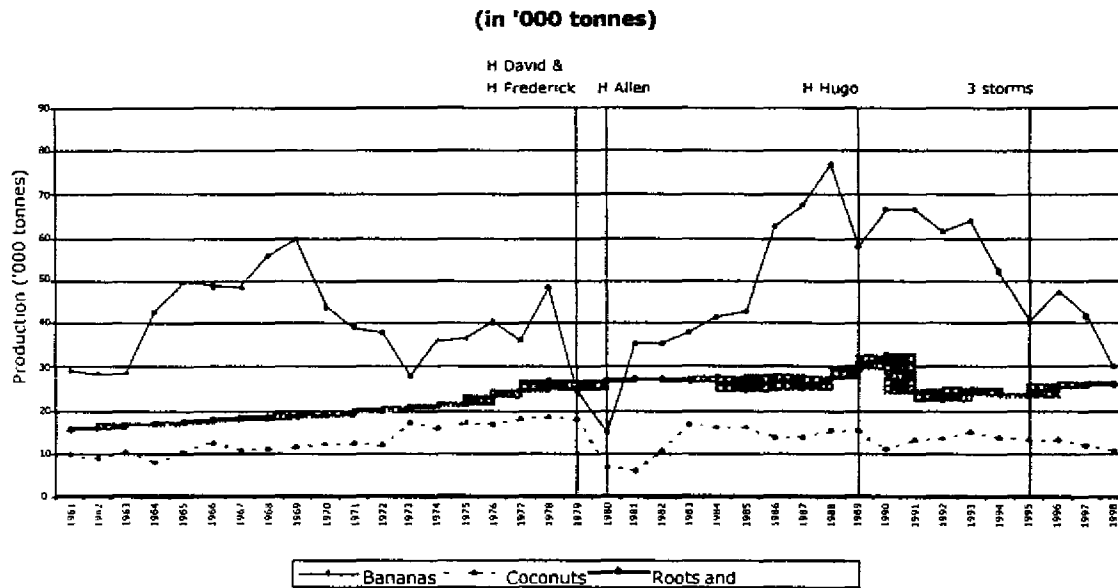
	1962	1977	1987	1997
Crops	90	84.6	83.6	82.3
Livestock	6.5	7.0
Fisheries	7.1	7.8
Forestry	...	4.3	2.8	3.1
Total Agriculture	100	100	100	100
Agriculture as % of GDP	36	38	29	19

Note. .. figures not available separately

Source: GoCD Central Statistical Office, ODA, BDD(C) Economic Survey and Projections, 1967.

Agriculture's decline has been especially marked since Hurricane Hugo. Crop sector product in real terms in the late 1990s was more than 20% below the 1988 peak level (Table A.4.1). This decline is accounted for largely by a substantial contraction in the banana sector in a period of relatively slow GDP growth, and given further impetus by exogenous external factors and climatic variability (Figure 5.1). The importance of bananas within the economy and the extreme vulnerability makes it necessary to consider its performance separately and in more detail.

Figure 5.1: Dominica - Banana, coconut and roots and tuber production, 1961-1998



Banana Sector

From the early 1950s bananas supplanted lime products as the primary export commodity, taking advantage of protected access to the UK market. Banana production in 1990 involved a range of farm size from large producers (10-100 tonnes per year) equivalent to 20-30 acres (10-15 hectares), accounting for 22% of growers and 70% of production, to many part-time and semi-subsistence producers (under 1 tonne), 36% of growers but under 1% of output. This is a continuous production highly perishable crop, which is very sensitive to storm damage (winds in excess of 40 mph), dislocation of transport and moisture stress. Continuous production with labor and recurrent inputs as a high proportion of costs is also extremely sensitive to the effects of external price shocks on profitability. Production grew rapidly in the absence of more extreme hurricane impacts up to 1979 and as the government facilitated transfer of unprofitable and closed down lime and coconut estates into owner-occupation.

Since Hurricane David in 1979 the sector has experienced considerable short run variability in production associated with tropical storms (quantified in this study), drought and external factors influencing prices. The typical pattern of storm damage has been up to complete loss of the crop followed by recovery over 9-12 months, provided growers can finance replanting and have access to inputs. Recovering production has sometimes temporarily exceeded pre-hurricane levels. These short-term effects are better captured in a quarterly rather than the annual analysis. Natural disaster impacts were compensated for by favorable price movements in the 1980s and then accentuated by declining profitability. There was a severe price shock in 1993 after the UK£ left the European Exchange Rate Mechanism, and subsequently there has been much price variability around a declining trend. The impacts of storm damage temporarily caused up to near total halt to production. These effects as well as any short-term disruption to marketing are directly reflected in a fall in export earnings. An analysis of these effects, based on quarterly data is reported in Chapter 7 on the external account.

Box 5.1: WINCROP Banana Crop Insurance Scheme

The Windward Islands Crop Insurance (1988) Ltd., or WINCROP, provides insurance for banana export growers against damage by 'windblows' and tropical storms. The scheme launched in Dominica in 1987 and extended to cover the entire export crop in Dominica, Grenada, St Lucia and St Vincent is owned by the banana marketing organizations in the four countries. In 1999 there were 12,906 'active' growers, producing 131,000 tonnes, averaging 10.1 per grower. Of these 3,038 were in Dominica, producing 27,975 tonnes, an average of 9.2 tonnes per grower. The net exposure of the company was EC\$24.6 m, the retained risk was \$3.5m and reinsured risk EC\$ 21.1. There were 16 loss events, almost 4,000 claims and a pay-out of EC\$ 2.4 m (including 1,474 claims and EC\$ 1.1m. in Dominica), of which 90% were settled against fringe effects of Hurricane Lenny, which passed 150 miles to the north of Dominica (Map 3 and Table A.5.1.3)

The scheme, as it works in Dominica (some details are different in the other islands) provides cover of about 20% of estimated loss of deliveries. All growers pay a premium equivalent to about 5% of sales receipts, which is automatically deducted by the Dominica Banana Marketing Corporation (DBMC), with a 30% no claims bonus after 3 years. Losses are assessed by a 5% physical survey to obtain the proportion of damaged plants, and benefit is then based on 75% of average deliveries over the preceding 3 years and a value per plant of about 25% of delivery price. Payments are supposed to be made within 30 days of the submission of a claim.

The scheme is extremely important in providing a risk spreading mechanism for banana growers. The benefits are only 20% of potential losses but, as a large part of costs may include own labor and delivery, payouts enable growers to quickly rehabilitate, as reflected in rapid recovery in post-hurricane export earnings (Figure 7.2).

WINCROP does not cover damage, such as landslip or flood, unless wind related, because of difficulties in quantifying risks and losses and a lack of interest by reinsurers. It has also been unable to extend coverage to other crops or to other business on behalf of banana growers. There are legislative restrictions and rates quoted by reinsurers have been discouraging. Therefore, the decline in banana exports and a squeeze on grower profitability threatens the viability of the scheme: the ratio of overheads is rising and there are pressures to keep down premiums. For example, the no claims bonus was stopped in 1996 after losses in 1995, although reinstated in 1999. WINCROP is also vulnerable because risk is insufficiently widely spread in a year when all the islands are badly affected. For instance, in 1995 losses of EC\$ 4.7m left a claims reserve of only \$2.0m (Source: WINCROP, *Annual Reports*)

The scope of the enquiry did not extend to exploring the additional impacts of drought and moisture stress. However, this is well recognized and finally after a poor season in 1997 the European Commission committed support to a project for irrigated production as part of a regional program for enhancing productivity in prospect of loss of trade preference under the WTO.

The impacts of wind damage have been mitigated by the compulsory WINCROP insurance scheme giving growers approximately one fifth of the value of estimated lost production (Box 5.1 and Table A.5.1.3). The vulnerability to transport disruption is highlighted by the loss of one week of exports by the DBMC in November 1999 (value EC\$ 723,000), caused by the temporary closure of Woodbridge Bay port.

Banana production appears to be more sensitive to climatic variability, especially wind damage, than the previously more important tree crops, but it is also more resilient.²³ In a protected market shared with other small-scale exporters, temporary decline in exports did not threaten potential market share. These circumstances favored increasing concentration on banana production to the exclusion of other crops from the 1950s to 1980s, and led to Dominica possibly becoming more vulnerable economically to both natural hazard and extended price shocks from

²³ Bananas are susceptible to damage from wind gusts of upwards of 38 mph. They are likely to be severely damaged by sustained winds of Tropical Storm force (38 mph/61 km per hour) and above, which have had an average frequency of once every three years over 100 years (Annex A, Table A2.3). However, lime orchards and coconuts are only likely to suffer extensive damage in less frequent more intense hurricane force storms.

the 1960s onwards. The obvious mitigation strategy would be some combination of diversification within the agricultural sector and also reduced reliance on commodity production earnings. As a World Bank (1992) Economic Memorandum notes, agricultural diversification has been on Dominica's agenda ever since the Royal Commission of 1893. However, various projects to promote the expansion of other crops had very limited success (OECS, 1986). The fundamentals of rural development policy – shifting land to small scale owner-cultivators, the assured highly regulated market, the insurance scheme linked to bananas - all favored this crop, and the potential resilience in output after the effects of natural disasters or price shocks made a concentration on bananas the easiest recovery and growth strategy for government to support and producers to pursue (Box 5.2). However, a sustained profit squeeze caused by a less favorable external environment, interacting with rising labor costs in the 1990s, has made bananas less resilient in the face of climatic variability. The effect of each shock has been to accelerate overall decline rather than significant diversification of the agricultural sector (Figure 5.1). The share of bananas in total agricultural production actually rose between 1977 and 1987 from 28% to 39%, falling back to 27% in 1997 (see Table A.5.1.2).

Box 5.2: Banking on Bananas - a Short-sighted Strategy?

Following Hurricane David the Barbadian reporter, Patrick Hojos (1979), asked in a special report 'Can Dominica survive?' He answered – 'The general plan is for cash crops to be planted so that within four or five months rural farmers can reap their own fruit, while disaster aid bridges the gaps. Within a year a reasonable crop of bananas could be harvested but it will take five or six years before long-range crops like citrus, coconuts and so on are contributing.'

On the evidence for the 1980s this is what happened. Despite aspirations to diversify agriculturally, there was, in fact, an increasing concentration of crop production in bananas, making Dominica more vulnerable to the direct and passing impact of every range of tropical storm.

Other Crop Sub-sectors

There was no substantial diversification away from bananas until the 1990s (Table A 5.2). In fact the opposite occurred – Hurricane David led to increased concentration on mono-crop banana production, at odds with official policy, so that the share of bananas in value of production of the 10 main crops rose from 28% to 39% between 1977 and 1987. This development is ascribed to the resilience of bananas and the protected and assured market.

The production of tree crops was severely affected by Hurricane David. The impacts of subsequent storms has been less severe. The relatively weak performance of the coconut sector is particularly notable. Despite projects for rehabilitation, production levels had not recovered to pre-David 1978 levels by the end of the 1980s. This is explicable in the slower recovery period and unfavorable relative price movements in the 1980s. However, a reversal of the price disadvantage and an assured local market in Dominica Coconut Products (DCP) in the 1990s (see Section 5.2) has apparently had little impact on production, suggesting other restraints (Figure 5.1 and Table A 5.1.2).

Roots crops or ground provisions have proved resilient to disaster impacts (Figure 5.1). A relatively more favorable local and regional market situation has been associated with a gradual increase in production.

Overall, it should be emphasized that Dominica has one of the more diverse agricultural sectors within the Eastern Caribbean and probably the highest proportion of local sourcing of fruit and vegetables. This diverse sector has survived both disaster shock and the relatively favored position of banana production up to the late 1980s.

Livestock

The livestock sub-sector is relatively small. Poultry and pigs are traditionally the most numerous. Small flocks of goats and sheep are kept by rural families. A few head of cattle are often kept as a 'store of wealth', readily

convertible to cash for emergencies. Dominica's high rainfall, rugged terrain and limited all-weather access roads constrain production.

Hurricanes have had their most severe impact on the poultry industry. Entire flocks have been lost in major events and the associated poultry production infrastructure destroyed. Losses of pigs, cattle, sheep and goats tend to be less dramatic since there are very few large herds and the animals are often left untethered in severe weather.

The greatest expansion in livestock has been in pig production. Pigs are hardier and can survive on the fruit waste generated after a hurricane. In contrast, commercial poultry is highly vulnerable to a breakdown in normal food rations and power supply.

In this sub-sector, the main discernible statistical impact of the major hurricanes has been an increase in imports of meat and meat products in the following year. This suggests that a temporary reduction in domestic supply is made good through imports.

Fisheries

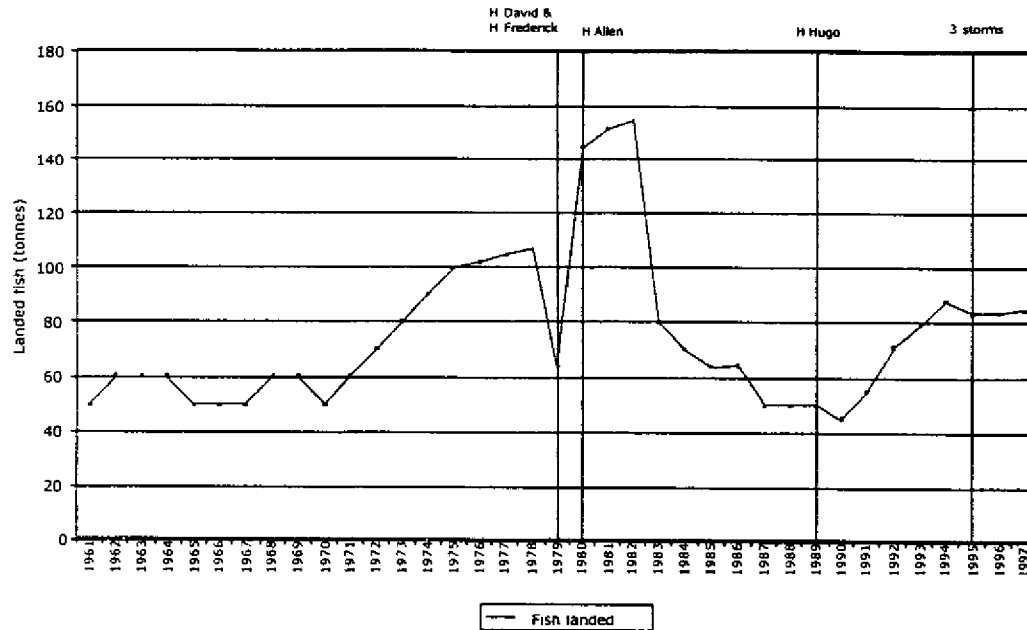
The fisheries sector is 'extremely vulnerable to hurricanes and storms. There are no naturally secure harbors and fisheries infrastructure is squeezed in between the coasts and the sea.'²⁴ Consequently, capital losses are high in every major storm.

Reports of damage to the fisheries sector prior to Hurricane Lenny were often not as comprehensive nor as detailed as those for crop production. Nevertheless, the picture that emerges from the reports that were compiled is of very severe impacts. In Hurricane David in 1979, approximately 75% of the boats were destroyed and 25% of engines were lost. Information was not available for losses caused by Hurricane Hugo, but it is known that some losses were sustained. The three storms that affected Dominica in 1995 are estimated to have wrought EC\$3.5m in damage. Hurricane Luis alone destroyed 10 fishing boats and set back the completion of the Roseau Fisheries Complex by six months, at an additional cost of EC\$2m. In 1999, a fuller assessment for Hurricane Lenny estimates infrastructure and equipment damage at EC\$4.9m, including EC\$3.4m at the Fisheries Complex in Roseau.²⁵ The assessment also reports other categories of loss, including employment at EC\$0.5m and environmental resource damage to coral reefs and sea grass beds at EC\$2.2m (GoCD, 1999c).

The full economic consequences of disaster impacts on fisheries are difficult to quantify because, according to expert opinion, the landed catch is under-reported. However, production is clearly impacted and recovery is slow and weak from each major hurricane (Table A2.1 and Figure 5.2). The sector appears to be in decline. Some fishermen, lacking insurance, fail to replace damaged boats and equipment. Other longer-term factors such as higher wages elsewhere and falling fish stocks may also be contributing to the decline. Nevertheless, this sector is important to a diversified economy and provides the main livelihood of many poorer families (Box 12.1).

²⁴ Andrew Magloire, Fisheries Officer, Fisheries Development Division, personal communication.

²⁵ Hurricane Lenny demonstrated the extreme vulnerability of the Roseau Fisheries Complex. The entire ground floor of the complex was inundated by storm waves because of the facility's proximity to the sea. The siting immediately south of the Roseau River mouth, affected by siltation, may be another factor in the facility's vulnerability to high waves. Expensive and sophisticated storage, marketing and processing equipment were rendered inoperable.

Figure 5.2: Dominica - Fisheries production, 1961-1997 (tonnes)

Forestry

The direct economic exploitation of the forestry sector is circumscribed by restrictions on logging. Even before that, the level of activity was economically insignificant and so the sector is not considered in detail (Table 5.1). However, there are many issues related to environmental damage and vulnerability that have economic implications as noted above in Section 3.2. In addition, the use of forestry resources, including for hunting, is still important to rural groups, including some of the poorest, and should be considered in any social and poverty analysis (see Chapter 12).

5.2 Manufacturing

In most countries at least some aspect of the manufacturing sector is vulnerable to natural hazards, primarily via their impact on plant, equipment and inputs. Temporary breakdowns of electricity, telecommunications and transport networks, including shipping, can cause further disruption to productive and marketing activities. In addition, disasters can affect patterns and levels of consumption and thus demand for manufactured products. However, the precise nature and magnitude of all such impacts is dependent upon a number of factors, including the structure of the manufacturing sector, existing stock levels, price elasticities of demand and supply for intermediate and final consumer goods, alternative sourcing and marketing options, as well as the scale and nature of any structural mitigation measures. The extent of insurance coverage also plays a role.

The manufacturing sector realized an average real annual growth rate of 7.1% between 1977 and 1998, although declining by a provisional 17.9% in 1999. However, this growth was achieved from a very modest base, with the manufacturing sector as a percentage of GDP rising from 3.9% to 8.2% over the same period (and to a provisional 6.9% in 1999). Indeed, despite continued government incentives to encourage the development of the manufacturing sector, the GoCD (2000: 5) reports that 'the manufacturing sector is in an embryonic state', with activities heavily concentrated around the soap and detergent production by a single producer, DCP.

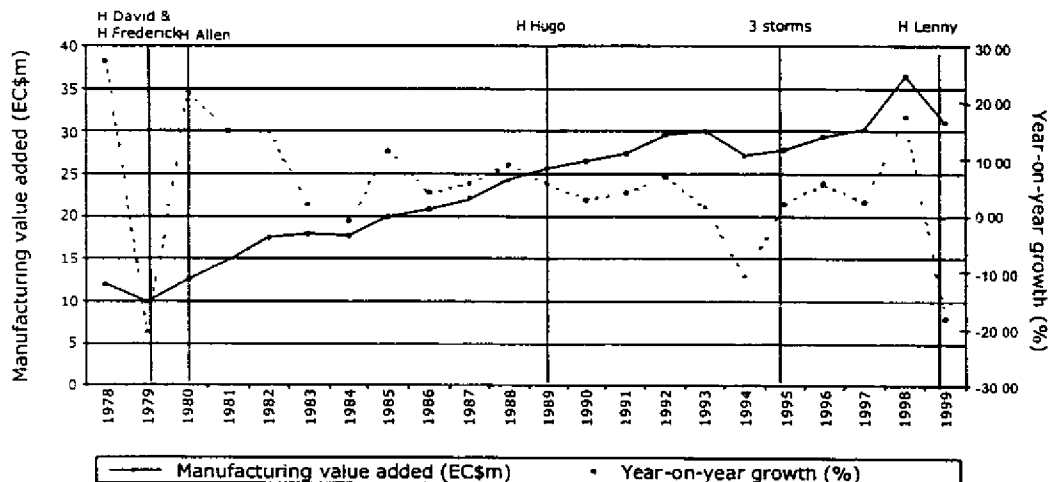
Soap and dental products, which are based on coconut processing, emerged as the island's single largest merchandise export (in value terms) in 1996, overtaking bananas. Toothpaste production also began in late 1997,

with dental cream already accounting for 12.0% of total domestic exports in value terms by 1999 (according to GoCD provisional data). Other manufacturing activities include beverage manufacturing and other agro-processing industries, a water bottling operation plant and a cardboard box production plant. The latter was initially established to provide packaging for bananas and soap but Dominica has now begun to export the boxes themselves. Activities are focused primarily around Roseau, providing relatively easy access to shipping facilities (reflecting the importance of export markets for manufacturing output) and labor markets.

The GoCD (1998) has identified a number of constraints to growth in the manufacturing sector including small domestic market size, the unavailability of international transport at competitive prices and the proliferation of sole proprietorships and partnerships. The manufacturing export sub-sector has also been discouraged by the country's external trade regime (see Chapter 7). However, natural disasters are not viewed as a major constraint to the growth of the manufacturing sector.

Manufacturing recorded a sharp fall in output in 1979, 20.6% year-on-year (Figure 5.3). This partly reflects political turmoil as well as the impact of Hurricane David. Minimal direct impacts were reported, with interruption to business of only about one week. This reflected the open design of the DCP facility which allowed winds to pass directly through its buildings, continued power supply from its independent source; and continued functioning of its private jetty.

Figure 5.3: Dominica - Manufacturing activity, 1978-1999 (at real 1990 prices)



Despite the importance of agro-processing within manufacturing overall, subsequent disasters have apparently had relatively little impact on the sector. In 1989, the year of Hurricane Hugo, a 5.7% real rate of growth was achieved, with particularly strong performance reported in soap production, although overall manufacturing growth was somewhat lower than that in the previous year.²⁶ The manufacturing sector also achieved a positive real growth rate of 2.2% in 1995, after a 10.6% decline in 1994 due to a sharp reduction in soap production as competition in Jamaica, Dominica's main market, had strengthened. Manufacturing output early in 1995 was boosted by the production of a new line of soap, following the takeover of DCP by Colgate Palmolive early in the year, and the opening of a brewery in November. That the 1995 hurricanes had little impact on the overall manufacturing sector is confirmed by the GoCD (1995) in the post disaster assessment, which did not envisage a significant impact on the sector. There had been some initial concern that the destruction of coconut trees would lead to a shortage of copra for Dominica's largest producer, DCP. However, DCP had already begun sourcing copra from Saint Lucia because of higher domestic prices, so that the 1995 hurricanes had little impact either directly or indirectly. DCP has continued to

²⁶ In 1990, manufacturing sector growth declined to 2.9%. However, this was primarily due to strong competition in the soap sub-sector, rather than any lagged effects of Hurricane Hugo (ECCB, *Quarterly Bulletins*, 1990)

import copra as domestic production is insufficient to satisfy needs of rising soap production. Around 40% of copra requirements are now imported, from Saint Lucia and Guyana.

Provisional data for 1999 indicate a 17.9% fall in manufacturing output, but due principally to a non-disaster related decline in soap production. However, Lenny occurred in mid-November and so its impact may be reflected in reduced manufacturing output for 2000 instead. DCP's privately owned jetty was badly damaged by Hurricane Lenny and was still out of commission over six months later. DCP has been forced to rely on the main Roseau deep-water port instead, increasing shipping and port costs as well as domestic transportation costs from the factory, with associated problems of reduced output.

A more detailed examination of other individual products also indicates some sensitivity to weather conditions. For example, cardboard box production is in part dependent on the volume of bananas produced. In the first quarter of 1997, for example, a partly drought-related 36% fall in the banana production in volume terms, compared to the first quarter of 1997, led to a decline in cardboard box production.

As regards risk management, there is some evidence of structural mitigation measures. For example, DCP's jetty was constructed to withstand 20-foot (6-meter) surges – the prevailing standard at the time of construction. DCP also reports some consideration had been paid to mitigation in the design of its plant and that modifications were made because of structural flaws indicated by Hurricane David. Other physical protection measures are also in place. For example, one producer reported bunker storage of stainless steel sheets.

The Dominica Association of Industry and Commerce (DAIC) points to inadequate insurance cover as a major failure in risk management. The DAIC estimates that around 60% of the formal sector has some form of insurance, with the remainder relying on 'self-insurance' measures such as physical protection measures and the setting aside of adequate reserves. Some 10% also had business interruption insurance. There is also widespread under-insurance. The DAIC takes a proactive role in trying to increase awareness of risks and encourage better practice amongst its members (e.g., see Box 3.1).

5.3 Tourism

The progressive expansion of the tourist sector has been part of the development strategy for Dominica since the early 1980s. Assessing the impacts of natural disasters on this sector and drawing lessons for mitigation in the future are therefore especially important. The available statistical data on visitors make it difficult to isolate and quantify the effects of tropical storms.²⁷ Nevertheless, these data, combined with interview evidence, provide a qualitative assessment of the impact of natural disasters on tourist numbers and the growth of the industry between 1976 and 1998. This is complemented by a provisional assessment of the impact of hurricane Lenny, based on preliminary reports of damage and the views of informants. On the basis of these findings the longer-term consequence of natural disasters for the tourism and issues of mitigation are considered.

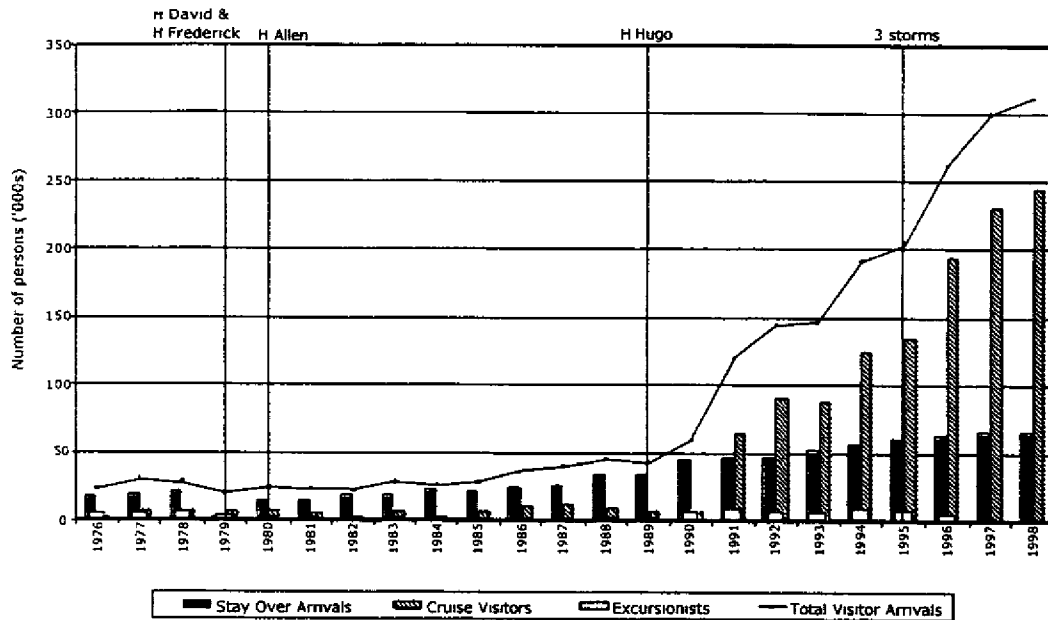
Shocks and Trends 1976-1998

Hurricane David, unsurprisingly, had a severe impact on the still-small tourist sector in 1979. It did much damage to infrastructure and facilities, putting the largest hotel in Roseau and many other guesthouses out of action. The adverse effects of this hurricane are readily visible in indicators of performance, such as visitor numbers and expenditure. In contrast, the effects of later events are more difficult to discern.

²⁷ There are annual series since 1976 for visitor arrivals, distinguishing between stayovers, day excursionists and cruise ship passengers and, more recently, students (GoCD, 1999a, Tables 13 and 16). Estimates of expenditure for each category in terms of average daily expenditure and total expenditure are also available. Stayover visitors are distinguished by type of accommodation - hotel, guesthouse and private homes - as well as students. The latter include those attending the medical school in Portsmouth since 1993. At the time of study data for 1999-2000 were not available. There are also statistics for visitor arrivals by mode of transport, sea or air.

Total visitor numbers provide a very crude measure of tourist activity (Figure 5.4).²⁸ Prior to Hurricane David there had been an increase in all categories, reaching a peak in the independence year, 1978. Subsequently, numbers of visitors in all categories declined in 1979 and 1980. The full impact of Hurricane David is probably underestimated because many visitors were involved in disaster-related travel. Visitor numbers declined by around 30% between 1978 and 1980 and did not reach 1978 levels again until 1986. Since then there has been a substantial increase in numbers, with checks in growth in 1989, 1993 and 1995 that are explicable in terms of external circumstances rather than direct effects of storm damage or disruption.

Figure 5.4: Visitors to Dominica by type, 1976-1998 (thousands)



Stay-over visitor numbers by accommodation type confirm the massive and continuing setback to tourism caused by Hurricane David and indicate the potentially devastating effect of an extreme hurricane. Numbers of visitors in private paid accommodation only again exceeded 1978 levels in 1984. The hotel sector exhibited no substantial growth in numbers between 1979 and 1989. This delayed recovery is partly explained by the slow repair to facilities. The largest hotel in Roseau was only refurbished by 1988. In addition, only one of three eco-tourist lodges, totally wrecked in 1979, was rehabilitated, returning to business in 1989 (Pattullo, 1996). The wider damage to Roseau, other amenities, cultural and ecological tourist sites reduced the island's attractiveness to visitors for several years.

Since the beginning of recovery in 1981 the number of stay-over visitors in different categories of accommodation has grown unsteadily with falls in 1985 and 1989 and stagnation in the late 1990s. But again, the timing of each downturn in numbers does not appear to be directly related to hurricanes affecting Dominica, except Hugo. However, industry informants suggested that Dominica was affected by more general uncertainty about the Eastern Caribbean as a destination caused by disasters elsewhere, so that 1989 and 1998 were relatively depressed years, with a decline in all categories of visitors except cruise ship passengers (Figure 5.4).

²⁸ Tourist expenditure as reported by the ECCB is estimated as the sum of visitor numbers in various categories, such as stay-over hotel and guest houses, day excursionists and cruise ship passengers, weighted by average expenditure in each category (ECCB, Quarterly Reports, various). These weights are of uncertain reliability and were also changed in 1984, precluding comparisons with earlier years. Because of the doubtful reliability of these values, the analysis is largely restricted to comparing numbers of visitors by category over time.

Cruise ship passengers represent the tourist category that has expanded the most, especially since the new facilities became available in Roseau and Portsmouth in 1991. Until then, numbers were small and subject to large fluctuations, almost halted after Hurricane David. The deep-water facilities were consciously constructed with a relatively high level of storm resistance. That successful investment is reflected in the number of vessels and passengers during the 1990s (GoCD, 1999, Table 17). The temporary dislocation in 1995 seems to have had minimal effect with the lowest rates of growth in 1993, minus 2.2%, and in 1998, plus 6.1%, again explicable in terms of factors other than direct hurricane impacts on Dominica.²⁹

The lower growth in 1998 in tourism numbers generally, as well as cruise ship visits, was thought to reflect the wider effects of Hurricanes Georges and Mitch on the Caribbean tourist industry, with severe dislocation to Antigua and St Kitts. Dominica is an indirect destination for many tourists, especially from Europe, and it is only one of many cruise ship ports of call.

In the 1990s an increasing proportion of visitors, apart from cruise ship passengers, arrived by sea, mostly on the ferry services linking Guadeloupe, Dominica, Martinique and St Lucia, and numbers also appear little affected by storms impacting on Dominica, indicating the success of the new terminal.

The growing importance of tourism to the economy is indicated by a comparison of estimated expenditure with GDP. Tourist expenditure increased from an estimated EC\$ 27m in 1984 and 1985, equivalent to 9 % of GDP, to EC\$ 107m in 1997, equivalent to 16%. As noted in Chapter 5 tourism also contributed around a third of external earnings by the late 1990s. A comparison of growth rates in visitor numbers over the period 1976-98 also provides some indication of the reduction in growth caused by Hurricane David. The rate of growth in stopover visitors, who proportionately generate the most local expenditure, was only 3.5% from 1976-1987, but 7.8% per annum between 1987 and 1998. There was also a massive increase between the two periods in the growth rate of cruise ship visitors from an insignificant 6.1% to 35.7% (Figure 5.4)³⁰

Hurricane Lenny

The potential vulnerability of this important and expanding sector has been most recently underscored by the still not completely documented effects of Hurricane Lenny (Map 3 and Annex A.4). In the absence of statistical information the effects of Lenny were surveyed qualitatively during the visit.

This storm caused severe damage to several west coast hotels, their private sea defenses, and boating and diving facilities. There was limited, quickly repaired damage to the cruise ship terminal. Road communications along the coast were also disrupted affecting communications with some tourist sites and commercial facilities. There was no storm warning allowing time for preparedness (these focus on wind strength not wave height and swell).³¹

The Dominican Hotel and Tourist Association (DHTA) initially undertook its own assessment of the impact of Hurricane Lenny, estimating the damage to facilities at around EC\$5m.³² This internal survey involved three civil engineers and was not dependent only on information provided by hoteliers. Subsequently, the government assessed the damage to buildings in the sector as EC\$ 0.67m, which is substantially less than hoteliers' estimates of

²⁹ The GoCD's (1995) assessment indicates that hoteliers were able to embark on rapid rehabilitation in 1995 because generally they were insured (see below Section 8.3).

³⁰ The findings of this review of visitor numbers in different categories are confirmed by regression analysis using independent dummy variables to point the main disaster shocks, in 1979, 1989 and 1995. Focusing on growth rates, or inter-year changes in stay-over visitor numbers, the number of stop-over visitors is negatively associated with dummy variables indicating all the major storms affecting the island in the year of impact and positively in the following year. In terms of individual events, only Hurricane David, and to a much more limited extent, Hurricane Hugo are associated with a decline in visitor numbers. Prior to Hurricane Lenny, there is no significant association between cruise ship passenger numbers and storm events. Excursion visitor numbers have been highly variable, presumably explained by external factors. See Appendix B for a description of the method of analysis.

³¹ Only one owner of tourist dive-day cruise boats took preventative action, on the basis of information which he obtained from the internet on the likelihood of very high seas.

³² *The Chronicle*, Roseau, 19 November 1999.

damage and insurance claims (GoCD, 1999d). Interviews with hoteliers and others in the tourist sector also indicated that there was substantial disruption to business activity in directly affected properties and on the west coast more generally, heavily dependent on diving and eco-tourism. Furthermore, there was a slow recovery in business because of uncertainty amongst some customers throughout the winter tourist season.

The sector is, in contrast to some other islands such as St. Lucia or Antigua, composed entirely of locally owned sole proprietorships and partnerships. Practice on insurance is inconsistent. Several of those affected in 1999 were underinsured and without business disruption cover because of perceived high premium costs. That practice makes the sector especially vulnerable to an extreme event. At a sectoral level, it is also too easy to focus on the impacts on and responses of businesses to damage and disruption. There were also less visible impacts on employment of full, part-time and seasonally employed staff in 1999-2000, which could not be quantified. As suggested below (Chapter 12), this highlights the need for a complementary social assessment of disaster impacts.

Volcanic Hazard and Business Uncertainty

The volcanic alert, beginning with earthquake swarms in October 1998 that continued until March 1999, provides another example of the problem of uncertainty. Informal reports and actual disaster preparedness measures were thought to indicate that the whole area south of Roseau, where business opportunities are largely in tourism, was under threat of eruption. Some business people reported that this had led some insurers to refuse cover. Some international banks, mindful of the nearby Montserrat emergency ongoing since 1995, were also reluctant to fund investments.

The DHTA felt impelled to request a meeting in October 1998 with the visiting scientists from the SRU responsible for monitoring the volcanic-seismic situation and advising the government on volcanic risk. There were expressions of continuing concern and uncertainty about volcanic hazard at the time of the study. There are no mechanisms in place or in-country scientific capacity to ensure that scientific information and advice on natural hazards are regularly provided directly by scientists through official channels or through the media on such issues (see Box 13.2).

Longer Run Costs of Natural Disasters

The major negative impact was Hurricane David, halting growth for 5 to 6 years after independence in this sector critically important to the diversification strategy of all governments. The longer run costs of that lost opportunity up to the mid 1980s are now more apparent when Dominica is confronted with the difficult adjustment to a rapidly declining banana export sector. However, the evidence is inadequate to quantify in any convincing way the overall costs of natural disasters on tourism.³³ The lack of growth in the 1980s can be partially attributed to the slow recovery in the hotel sub-sector and massive environmental damage initially reducing tourist demand, as well as poor marketing.

The infrastructure investments incorporating mitigation measures were relatively successful in supporting quite rapid growth from the late 1980s, especially in cruise ship business and sea arrivals as an alternative to restricted air access. The relatively better performance of the guesthouses and private accommodation compared with hotels also suggests that Dominica was establishing itself in the niche market of eco-tourism. Apparent under-insurance contributes to the sector's high vulnerability and a potential lack of resilience an extreme Hurricane David type event. Uncertainties and the seasonality of employment in the tourism sector may also contribute to the difficulties of building and retaining a skilled workforce, essential for competing internationally in this service industry. Another factor is the perception of low status, so that, for instance, young women would prefer to work for the banks rather than train as hotel managers.

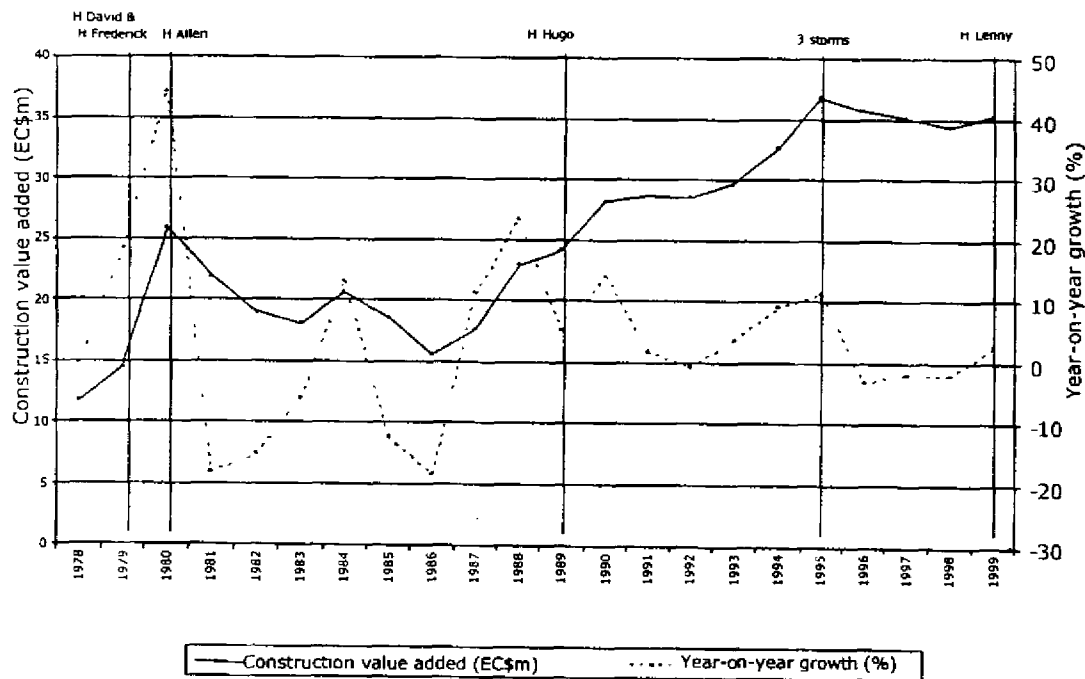
³³ The estimated visitor expenditure (Table A.5.3.1) when deflated by the CPI suggests that there was no real increase between 1978 and 1983 in the old series and between 1984 and 1986 in the new series. From 1987 to 1997 there was apparently an 11% a year real growth rate. However, that high growth rate is dependent on the accuracy of assumed cruise ship passenger expenditure on which a survey is needed.

5.4 Construction

Construction is the one industry most likely to be beneficially impacted, at least in terms of increased activity, by an actual disaster. Natural hazards potentially cause severe damage to buildings and infrastructure, resulting in considerable post-disaster construction. Some argue that in the longer term a major natural disaster can even generate a construction-led economic boom (e.g., Albala-Bertrand, 1993). However, the precise impact of a disaster depends on a number of factors, including the extent to which the reconstruction process draws on local materials and labor.

In Dominica, construction sector activity has varied considerably between years, in part reflecting the country's small size and thus the significant impact that the start or completion of individual projects can have on the overall level of activity (Figure 5.5). Intermittent storms have boosted activity, thereby playing a role in sustaining post-disaster income generating opportunities. However, there is no evidence of any wider post-disaster construction-led boom, in part perhaps because the building industry relies largely on imported materials (with the notable exception of some local stone).³⁴

Figure 5.5: Dominica - Construction activity, 1978-1999 (at real 1990 prices)



As already noted, the hurricanes affecting Dominica since independence have varied in terms of the nature as well as level of damage they have caused. In terms of damage to housing and infrastructure, the most serious disasters have been Hurricane David in 1979, cumulatively, the three storms in 1995 and Hurricane Lenny in 1999 (see Chapter 6). Initial estimates suggested that some 60,000 people, equivalent to almost three-quarters of the pre-hurricane (1978) population, were left homeless and 13% of structures on the island totally destroyed as a consequence of Hurricane David. Subsequent surveys indicated that 8,670 of the 15,100 dwellings on the island had

³⁴ In the past there was a domestic timber company but, under its environmental policy, the GoCD no longer permits access to local forest resources. Imported materials therefore include timber.

lost their roofs. Considerable damage was also incurred to public infrastructure (see Tables 6.1, 6.2 and Annex A.3.1). In consequence, there was an 18.5% increase in construction value added in 1979, with a further 44.2% rise the following year.³⁵ The construction sector accounted for 10.7% of GDP in 1980, compared to an average 5.0% in 1977 and 1978. Imports of wood and lumber, cement and metals and metal products increased from 8.0% (in value terms) of total imports in 1978 to 17.1% in 1980, equivalent to EC\$42.9m at real 1990 prices. Fallen timber was also salvaged for use in the reconstruction process. Taxes on building materials were temporarily waived to facilitate the rehabilitation process.

The 1995 hurricanes and storms resulted in estimated losses of EC\$4.3m to the housing sector alone. 876 housing units were damaged or destroyed, most of which were inadequately insured small wooden structures belonging to low-income families (GoCD, 1995). There was an 11.3% increase in construction value added in 1995, in part reflecting post-hurricane reconstruction.³⁶

Hurricane Lenny in November 1999 inflicted considerable damage, largely along the western coast, assessed at EC\$ 2.7m to housing, EC\$ 0.65m to tourist infrastructure and hotels and EC\$ 4.2m to commercial and government buildings. The effects on the construction industry are too recent to quantify in this study, but there was widespread agreement that this event had led to substantial post-disaster reconstruction, combined with work to repair and strengthen other infrastructure.

5.5 International Financial Services

Since the mid-1990s the GoCD has been trying to establish the country as an offshore financial center, as part of its broader program of economic diversification and expansion of the island's economic base. An International Business Unit was established within the Ministry of Finance in 1996 with the initial task of establishing the necessary administrative and legislative framework for implementing, regulating and managing international financial services.

The sector has achieved rapid growth, generating government revenue in the form of fees and licenses of EC\$9.7m by 1999.³⁷ Services now offered include an economic citizenship program, offshore banking, exempt insurance and international trust services. To date the economic citizenship program has generated the most revenue, accounting for 89% of inflows to the sector and for some 15% of non-tax revenues (GoCD, 2000).

Hazard vulnerability reduction was not a factor considered by the GoCD in deciding to develop Dominica's international financial services. But as the sector is likely to be largely unaffected by natural disasters—even extreme events, it should offer some form of continued government revenue in the aftermath of disasters. This partly reflects the nature of the sector, with little reliance on physical infrastructure. The main natural disaster related threat concerns the temporary disruption of telecommunication services (see Section 6.5). Otherwise, any short-term economic shock, whether resulting from a natural disaster or some other external source, seems unlikely to affect demand for Dominica's international financial services because the sector is not linked to the domestic economy.³⁸ Moreover, under the Offshore Banking Act, offshore and onshore accounts must be kept entirely separate, effectively implying that offshore revenues are protected from any pressures on domestic financial markets.

³⁵ Data on construction activity is based on the number of housing starts, the level of construction material imports and bank lending data. However, CCA (1991) cites a 1990 GoCD estimate that indicated that only around 75% of actual building starts are authorized and recorded, with a considerable amount of unauthorized construction therefore occurring, particularly of small buildings in rural areas. Thus, true figures may be higher, especially in the aftermath of hurricanes when considerable home repairs may be undertaken.

³⁶ Ongoing work on commercial and public sector projects, which had already been reflected in a 9.1% increase in construction activity in 1994, as well as the commencement of construction of an 80-room hotel the previous year, also boosted growth in the sector (ECCB, *Quarterly Bulletins*, 1993, 13(3)).

³⁷ The contribution of the sector to GDP is not adequately captured because economic survey forms covering international financial services have yet to be drawn up.

³⁸ Under the economic citizenship program, citizens are not required to migrate to Dominica.

5.6 Sectoral Trends and Disaster Vulnerability

The economy's main area of vulnerability is agriculture. In contrast, manufacturing, international financial services and also tourism, after investments in mitigation from the mid 1980s, have been comparatively less affected by disasters. Consequently the relative decline in agriculture's share of GDP and employment should imply some reduction in economic vulnerability to any except the most extreme, catastrophic event such as a direct hit by a Category 4, Hurricane David type storm, an intense earthquake or a major volcanic eruption. There is, however, some uncertainty surrounding agriculture with the decline in banana cultivation. This crop is both highly sensitive to storm damage but also resilient and has had a substantial element of producer and macro-economic risk spreading through WINCROP and STABEX and a protected export market. Other agricultural and natural resource sub-sectors lack these risk spreading arrangements. Tourism is possibly more sensitive now to natural disaster impacts on the wider Caribbean regional tourism market. Critical factors in reducing potential economic impacts of disasters include actions to limit exposure at a sectoral level by building disaster mitigation into facilities and risk spreading through insurance (See Chapter 9). The protection of lifeline infrastructure also becomes, as discussed in Chapter 6, the key to effective disaster risk reduction.