Chapter 10.

Public Finance

This chapter analyzes the effects that natural disasters have on the public finances. It begins by providing the background of severe fiscal constraints. Next it looks at the evidence of impacts of severe storms on both revenue and expenditure. Next it considers the implications of findings that suggest the budget is apparently relatively insensitive to disaster shocks. Finally, there is an examination of the disaster related constraints on road development. The analysis is supported by a more detailed review of the budgetary impacts of major storms of 1979, 1989 and 1995 in Annex C.

10.1 Background

Fiscal policy is the major macroeconomic policy instrument at the disposal of the GoCD. As already indicated, the ECCB is responsible for monetary policy for the OECS and there are strict limitations on the ability of member governments to monetize public debt by borrowing from the ECCB, as fiduciary issue is limited by statute.

The GoCD faces particular challenges in achieving a balanced fiscal account, reflecting the great pressure on its limited resources. As the GoCD (2000. 1) states.-

> 'as a result of the size of the country, the intensity of the topography and the settlement patterns, a widely dispersed system of public services is required to meet the basic needs of the population like security, public health, education, recreation and community services. This results in increased pressures on the fiscal account as resources need to be allocated to maintain the provision of services which, in other cases, would not have been economically justifiable'.

The GoCD also faces an additional burden in the form of natural disasters However, the GoCD has never tried to document the public finance implications of the island's hazard vulnerability, although it recognizes the potential usefulness of such an exercise.

In part reflecting high per capita costs in servicing its dispersed and small population, the central government has historically run only a marginal surplus, if at all, on its recurrent fiscal account (Table A.10.1). Moreover, external concessionary and grant inflows have financed a large proportion of public investment as well as some recurrent expenditure. For example, local duty accounted for only around 60% of total government revenue over the period 1978/79 to 1997/98 (Table A.10.2).[73]

The strengthening and stabilization of the public finances has been a key stated objective of the GoCD since Independence and there have been continuous efforts to restructure the public finances, both via tighter controls on expenditure and efforts to increase revenue generation. Recurrent expenditure has been high, accounting for some 77% of total expenditure between 1979/80 and 1997/98. The public salaries and wages bill alone has typically accounted for over half of total recurrent central government expenditure The GoCD also has faced increasing external indebtedness. Public debt servicing gradually increased, from 5.3% of recurrent expenditure in 1977/78 to 15.2% by 1995/96, with further growth in subsequent years

[73] The GoCD uses the term 'local duty', rather than the more conventional 'domestic duty'; and 'local expenditure' rather than 'domestic expenditure' This report follows GoCD practice

10.2 Impact of Natural Disasters

In theory, natural disasters may have several potentially significant impacts on public finance. They can result in either additional expenditure or partial redeployment of planned expenditure, both to meet the costs of repair and rehabilitation of public property and to provide support to the victims of disasters. They can also cause a fall in domestic revenue, reflecting reduced economic activity. Although such losses may be partly offset by increased flows of official external assistance, they are unlikely to be entirely so. Publicly owned enterprises may also experience disaster-related losses, placing an additional burden on government resources.

In consequence, the government may face intensified budgetary pressures which it will be obliged to meet by increasing the money supply, running down foreign-exchange reserves or raising levels of domestic and/or external borrowing. These financing options, in turn, have potentially significant knock-on effects. The creation of base money is inflationary. Domestic borrowing exerts upward pressure on interest rates and can result in a credit squeeze. Foreign borrowing can result in an appreciation of the exchange rate, reducing the price of imports and increasing that of exports, and create future economic pressures via higher debt-servicing costs. Natural disasters can also trigger an increase in interest rates charged on external debt by increasing the risk premia associated with a country's assets. Another option, the run-down of foreign-exchange reserves is limited by the very size of those reserves and entails an appreciation in the exchange rate, with possible associated risks of capital flight and a balance-of-payments crisis (Fischer and Easterly, 1990).

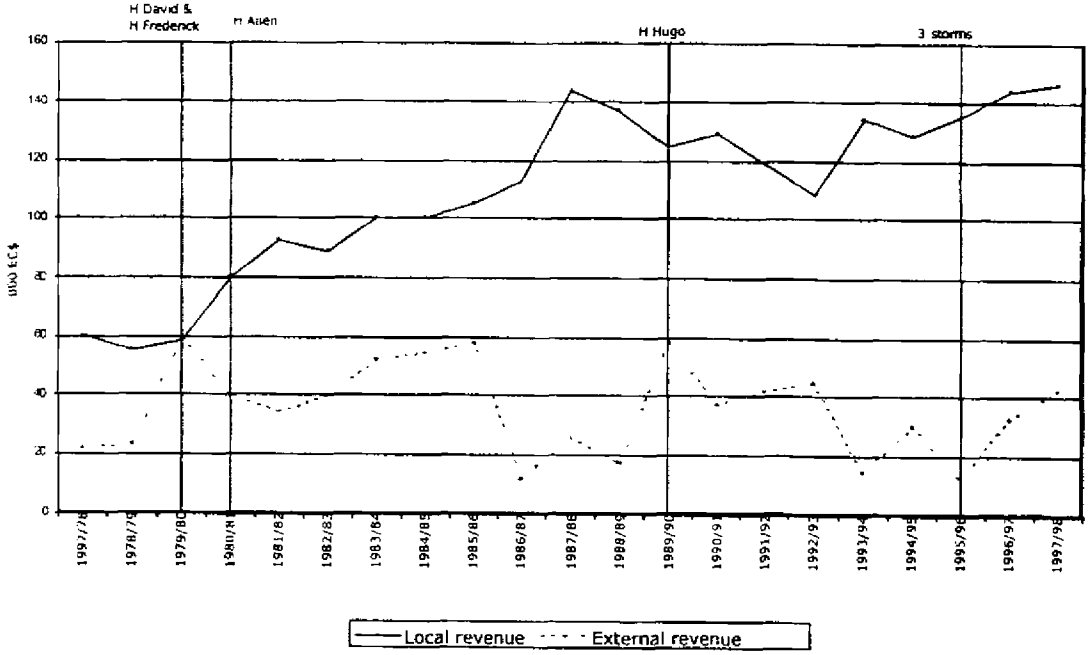
Disasters can also impose more permanent pressures on public finance to the extent that governments undertake disaster mitigation and preparedness measures, costs which governments in less disaster-prone countries do not have to bear.

In the case of Dominica, however, an inspection of aggregate budgetary statistics suggests that disasters have had little apparent impact on the public finances, except in the most severe events. Until the 1990s, public expenditure on disaster mitigation and preparedness also appears to have been relatively low, although, as discussed in further detail in Annex C, this may partly reflect problems in the way expenditure is categorized.

Partly in response to Hurricane David, but also because of civil service wage increases on an already inflationary situation, recurrent expenditure rose by 31.3% in real terms in 1979/80 and by 11.8% in 1980/81[74]. In contrast, more recent hurricanes have had little discernible impact on total recurrent expenditure. Indeed, despite Hurricane Hugo, recurrent expenditure actually fell 2.7% in real terms year-on-year in 1989/90 (Figure 10.1). Instead, natural disasters have largely resulted in changes in the composition of recurrent expenditure due to ex post reallocations of resources, although the full extent cannot be easily gauged because such re-allocations have not been recorded. Some re-allocations have probably occurred between, as well as within, ministries effectively facilitated by the fact that allocations to individual sections of government are not ring fenced for their specific use.

[74] As explained in further detail in Annex B, the finalization of the 1979/80 Budget allocations was significantly delayed and so took into account additional requirements arising as a consequence of Hurricane David.

Figure 10.1: Dominica - Central government local and external revenue, ('000 EC$ at real 1990 prices)



It is even more difficult to measure the impact of natural disasters on the overall level of capital expenditure. Capital investment projects relating to post-disaster rehabilitation and reconstruction are typically not identified as such in annual budget statements, whilst post-disaster reconstruction can also be significantly delayed and prolonged. For example, a large part of the increase in capital expenditure that occurred between 1983/4-1985/6 – that is, up to seven years after Hurricane David - could be attributed to major road investment projects in part necessitated by the hurricane (see Annex A) There are further difficulties in relating all this expenditure to Hurricane David because much of the country's infrastructure was already in a poor condition due to years of inadequate maintenance and low investment (CDB, 1980). Thus, part of the increase in capital expenditure that occurred in the first half of the 1980s would have been required in any case. Finally, measurement difficulties are further complicated by the fact that reconstruction can also involve some upgrading of services.[75]

However, it would be reasonable to conclude that disasters have displaced planned investment projects by creating more urgent needs T his observation is confirmed by GoCD (2000: 4) which states that 'the fiscal burden (of natural disasters) has been significant necessitating the diversion of scarce resources from programmed activities'. Moreover, even when additional external financing has been made available in the aftermath of a disaster, the GoCD has sometimes been unable to use these funds because it has been unable to meet associated local counterpart financing requirements – as, for example, in the aftermath of the 1995 storms (see Annex C.3).

As regards revenue, aggregate data on both local and total central government revenue on the recurrent budget again suggest that disasters have had relatively little impact, other than in generating additional external budgetary support in the aftermath of Hurricane David The apparent insensitivity of local revenue to natural disasters, and

[75] There are also further problems in examining the relative allocation of the capital budget to individual government departments This is because detailed sectoral data on actual capital expenditure, as reported in annual budget statements (relating to expenditure in the years immediately preceding that specific budget year), typically exceed total capital expenditure as subsequently reported. for example, in the 1999 Statistical Digest (GoCD, 1999a)

associated economic decline, is to some extent explained by coincidental, non-disaster related changes in the tax structure that have offset the impact of particular disasters (see Annex C). Local revenue has also been relatively insensitive to natural disasters because there is no direct taxation on agricultural production in Dominica ,whilst export taxes have been a relatively unimportant source of revenue, accounting for well under 1% of total local revenue since 1979/80.[76]

Meanwhile, as already noted on the capital expenditure side, the limited discernible impact of disasters on capital funding largely reflects the lagged responses by donors and extended nature of external assistance, which accounts for most public capital funding in Dominica. However, it is also worth remarking that in each of the years 1979/80, 1989/90 and 1995/96, the contribution of local duty to capital expenditure dropped significantly, presumably as available local resources were diverted into the recurrent budget to meet increased disaster-related costs.

There are five non-financial public sector enterprises in Dominica: the Dominica Banana Marketing Corporation, Dominica Export Import Agency, the Dominica Water and Sewerage Company, the Dominica Port Authority and the Dominica Broadcast Corporation. Information on their finances and central government subvention is not included in government statistics or budget estimates and further detailed investigations were beyond the scope of this study. Nevertheless, it is apparent that disasters have had a severe negative impact on several of the public enterprises (see Sections 6.3, 6 4 and 6.6) More generally, the World Bank (1985) reported that the consolidated current account of the non-financial public enterprises fell into deficit following Hurricane David and remained in the red until FY 1983/84. A deterioration in the DBMC's finances was again reported in FY 1989/90, a consequence of Hurricane Hugo and related rehabilitation expenditure (World Bank, 1992) and it was recently adversely affected in 1999 by Hurricane Lenny (DMBC, 2000)

10.3 Implications

The above analysis highlights the complexity in measuring the budgetary impacts of disasters. A review of data on total annual revenue and expenditure suggests that disasters have had little apparent impact, except in the case of the most extreme events. However, this apparent insensitivity to disaster shocks partly reflects the government's response of reallocating available budgetary resources in support of disaster relief and rehabilitation. The extent of ex post reallocations is exacerbated by the fact that the GoCD does not set aside any calamity reserves. Indeed, the practice of reallocating expenditure in this way is apparently an annual occurrence, as unanticipated expenditure on landslides and storms crowds out routine maintenance every year.

In reality, the hidden cost of disasters is substantial. Indeed, their budgetary implications have been so severe that they have been a contributory factor behind Dominica's adoption of a structural adjustment program in FY 1986/87 and, in the more immediate aftermath of Hurricane David, certain reforms under an IMF-supported program. There was further pressure for adjustment following the 1995 storms.

Disbursement of external post-disaster capital rehabilitation assistance have also been slow, effectively delaying recovery both because of continuing infrastructural problems and because the implied multiplier effects of major reconstruction efforts have not been felt. Delays in the receipt of external resources, in turn, have partly reflected local counterpart financing difficulties. Faced with increased disaster-related budgetary difficulties, the government has been even less able to meet local counterpart funding requirements, upon which the receipt of external aid may be conditional.

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[76] The program agreed with the IMF in November 1981 sought to increase recurrent revenue, but nevertheless recognized that although farmers had not paid income tax since 1974, the state of the agricultural sector was such that it could not be expected to provide a direct contribution to revenue yet (GoCD, 1981) No subsequent agricultural tax has been introduced although a banana development levy was collected until 1992/93 (known until 1984/85 as an estate levy). This levy was based on the banana export price and paid directly by the DBMC. At least from 1977/78, it was not a particularly significant source of government revenue, accounting for 3.4% of local and 4.4% of total central government revenue at its peak in 1991/92. Nevertheless, it is worth noting that it was suspended in FY 1992/93, in part as a consequence of Hurricane Hugo.

In the longer term, disaster shocks have had an adverse impact on the very pace and nature of economic development in Dominica In aiming to achieve one of its principal goals of economic diversification, the GoCD has placed particular emphasis on the provision of infrastructure to support growth in agriculture, manufacturing and tourism. However, the weak infrastructure base has been consistently identified as a critical constraint (e.g , GoCD, 1998 and 2000), limiting the country's ability to attract and sustain new productive investment. Part of this weakness relates to the continuing vulnerability of the internal transport and communication network to adverse weather systems, as illustrated below in the context of the road system (see Sections 6.4 and 10.4), necessitating additional expenditure to rehabilitate the roads in the aftermath of storms The indirect fiscal impact of disasters has been an additional factor behind the island's weak infrastructural base, contributing to limited government saving and restricting the availability of counterpart financing. As the GoCD (1998: 24) states, 'the lack of counterpart financing has also led to the non-implementation or the deferral of important projects in the social sector, notably in housing, water and sewerage'

It is essential that the budgetary impacts of disasters are measured more explicitly, in order to emphasize the importance of integrating hazard risk reduction concerns into medium- and long-term economic and financial planning This will also contribute to a more rational response to disasters, including in the reallocation of public resources, in the identification of the most appropriate forms and levels of external assistance and in assessing the GoCD's ability to raise local counterpart funding. Moreover, disasters have effectively resulted in unplanned and unevaluated budgetary reallocations, in part relating to their timing relative to the financial year. Dominica's financial year begins in July, just at the start of the hurricane year. Thus, most immediate post-disaster expenditure falling under the recurrent budget is not anticipated. Subsequent budgetary reallocations can then force planned development off course and imply that short-term targets are not met.

Careful and detailed reviews of the fiscal implications of individual disasters, undertaken in their immediate aftermath, would also help make the reasons underlying any failure to reach planned targets more transparent – an ever more pertinent exercise in the face of declining aid resources and increasingly stringent donor conditionality. Explicit monitoring of annual expenditure on disaster and storm-related damage would also provide invaluable data for use in appraising potential projects, not only those explicitly labeled as disaster mitigation or preparedness but also others potentially including mitigation or preparedness components as part of broader projects or for which the level of quality of infrastructure invested in could play a role in determining hazard vulnerability

Improved measurement of the financial impacts of disasters is particularly important as the GoCD again enters a period of increased budgetary constraints. As of 1998, discussions were being held with the EU for budgetary support and subsequently some STABEX funds have been used for this purpose. Rises in debt service commitments are also anticipated as additional commercial borrowing is expected to be required to meet statutory commitments on a timely basis Increased debt repayment requirements are expected to curtail future new borrowing options, implying that the current account will have to meet an increased share of the capital expenditure program, which in turn is required to play a critical role in the overall restructuring process. The GoCD (2000) has identified three particular areas of government expenditure at risk in such an environment including the country's capacity to provide short-term responses to natural disasters.

10.4 Road Development and Disaster-Related Public Finance Constraints

The importance of infrastructure to economic and social development is widely recognized, reducing costs of goods and services and increasing access to markets and basic services. Internal transport in Dominica is entirely reliant on the road network. As of the mid-1990s, Dominica had a total 787 km of roads, of which 74% was paved, equivalent to a relatively high 8,041 km per million people . Although the volume of traffic is low on many roads, the network is essential for serving the island's scattered population, the two ports, airport (by road some 50 km from the capital, Roseau) and areas of agricultural production. Some 46% of the road network is estimated to be in good condition (CDB/IADB, 1996).

The road system has placed a constant strain on the public finances, in part because of the damage inflicted by natural disasters, as already documented in Chapter 6. There has been substantial capital investment in roads since the early 1980s, totaling almost EC$223m (at constant 1990 prices) between 1979/80 and 1997/98, equivalent to 31% of total capital expenditure over the same period However, investment requirements still remain considerable. Indeed, the GoCD (1998) stated that 'at 15.5% of the (most recent) Public Sector Investment Program (PSIP) allocation ($31.6m), the investment in transportation infrastructure represents a very small portion of transportation investment needs'.

Annual expenditure on road maintenance has also been relatively high, averaging EC$5.1m per annum (at constant 1990 prices), or 4.3% of total recurrent expenditure, between 1979/80 and 1997/98. As the CDB/IADB (1996: 60-61) comments, 'a major implication of small populations and fractured geography is the high per capita cost of maintaining most road networks in the Caribbean'. However, evidence suggests that additional maintenance tasks created as a consequence of hurricanes and storms have resulted in the reallocation of funds away from routine activities such as patching, culvert and ditch cleaning and cutting of roadside vegetation, compromising the ability of the road authority to maintain the overall road network to an acceptable standard and, in the long run, increasing the cost of future disasters.

For the purposes of this study, it has not been not possible to estimate the proportion of total public recurrent expenditure on the road network that has been necessitated as a direct consequence of natural disasters. Indeed, the GoCD has made no effort to track such expenditure. However, during an interview for this study, it was suggested that perhaps 30% of the annual roads maintenance budget is spent repairing damage from slides and floods.

There are also difficulties in isolating the proportion of capital road expenditure that has been necessitated as a consequence of natural disasters. Nevertheless, available evidence on the estimated cost of post-disaster rehabilitation suggests that the figure must be substantial (see Section 6.5). For example, considerable damage was sustained as a consequence of Hurricanes David, Frederick and Allen in 1979 and 1980, exacerbated by years of inadequate maintenance and aged pavement and drainage systems. A subsequent GoCD Road Maintenance and Rehabilitation Programme for the period 1982-85 called for the rehabilitation of 227 km of main road and 14 bridges as well as the reconstruction of 43 km of feeder roads. This program was estimated at a total cost of US$36m (EC$97.2m) or 27% of the PSIP (World Bank, 1982), although even in the absence of the hurricanes some of this expenditure would have been required in view of the extended period of under investment in road maintenance. Meanwhile, rehabilitation and reconstruction costs following the 1995 hurricanes and storms were estimated at EC$11.75m (GoCD, 1995). The road rehabilitation costs as a consequence of the impact of Hurricane Lenny, including strengthening of sea defenses to mitigate further damage, were estimated at EC$110-125m (GoCD, 2000; Liautaud, 2000). The road network also suffers storm damage on a lesser scale on an annual basis. For example, unseasonable heavy rains over Easter 1980 were reported to have caused several million dollars' damage to the roads (GoCD, 1980).

Tight budgetary constraints, a scattered population and high hazard vulnerability create particular difficulties in defining appropriate road standards. According to the GoCD, it is relatively difficult to secure external funding for major road projects because in much of Dominica roads have low ERRs. In the same vein, cost-benefit analysis could suggest that low standards are appropriate in view of the volume of traffic. However, such analysis may fail to take into account the implications of road quality for maintenance costs and natural hazard vulnerability. Indeed, during this study, government officials cited an example of a recently completed road across the interior of the island that had already deteriorated significantly, because the quality of the road was determined on the basis of the projected volume of traffic rather than weather conditions.[77]

[77] Concerns about the appropriate standard of roads were also raised in the context of a World Bank road maintenance and rehabilitation project approved for Dominica in 1982. This project was designed on a least-cost approach in order to rehabilitate, rather than upgrade, roads and thus to achieve considerable short-term gains in road conditions. The project included drainage improvements that, although not formally quantified, were estimated to have an economic return of over 50% by reducing requirements for emergency maintenance (World Bank, 1982). Nevertheless, during project implementation the GoCD raised

Post-disaster repairs are also typically undertaken on a least-cost basis, with roads simply patched up to re-establish access as quickly as possible. Once this task has been completed, the Ministry of Communications, Works and Housing reviews the funding available for further repairs but, in reality, no additional work is sometimes done. This, in effect, minimal basic maintenance approach again leaves roads more vulnerable to future storms. Thus, although already substantial, road maintenance expenditure may not be sufficiently high.

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concerns that the project's overall least-cost approach would result in high future maintenance costs. The World Bank's project performance audit report also subsequently discussed the possibilities of relatively high future maintenance costs and further hazard-related damage, indicating some doubt that adequate government funding would be available for an appropriate level of maintenance in the future (World Bank, 1986). However, the same document concluded that the application of least-cost solutions to the rehabilitation efforts had been a sound decision under the circumstances, including the urgency of the task at hand and level of funding available.

Chapter 11.

External Assistance and Macro Variability

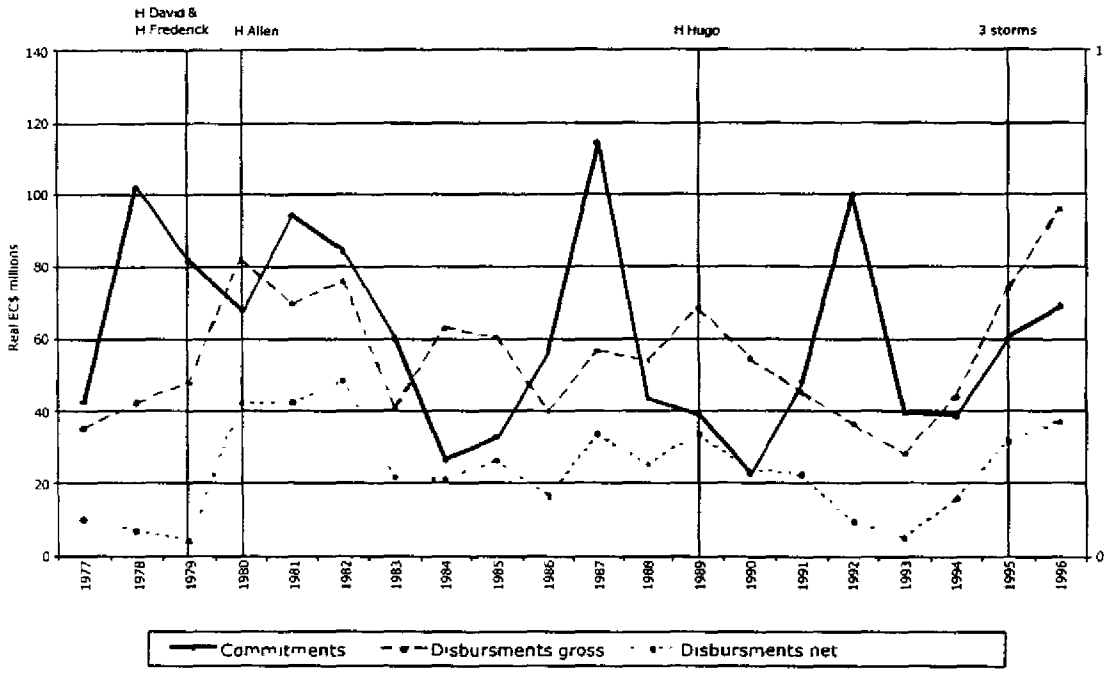
External assistance accounts for a large proportion of the GoCD's public capital expenditure and also for intermittent recurrent budgetary support. As such, the impact of natural disasters on aid disbursements has already been touched upon in Chapter 10 of this report. However, it is also worth undertaking a separate examination of external assistance to consider the impact of disasters on aid commitments as well as disbursements; to explore the behavior of individual donors in more detail; and to investigate other factors determining aid flows and, where relevant, how these have interacted with disaster events. Disasters also impact negatively on the external sector through reduced export earnings and some temporary increase in imports, raising the additional issue of the extent to which external assistance has provided compensatory capital flows (see Chapter 7) To explore these issues a statistical analysis of aid flows over 20 years since 1979 was undertaken, using the OECD's Development Assistance Committee's (DAC) database. Neither GoCD official statistics nor documentation available during the visit offered a complementary source of information on official flows covering such an extended period. When examined, the data reported to the DAC on sectoral and other uses of aid were found to be incomplete and sometimes misleading. It was, therefore, decided not to proceed with a statistical analysis of the composition of aid flows

Total development assistance as commitments and gross and net annual flows in real terms between 1977 and 1996 is shown in Figure 11.1.[78] There are no discernible trends in the level of total aid flows in real terms since Independence, but considerable short-term variability. There is also no discernible pattern in aid commitments that can be related to the major hurricanes shocks, the exception once again being Hurricane David. Gross and net disbursements, which are only loosely related to commitments with a 1 – 2 year lag, are also not closely associated with shocks that impact on the balance of payments and the budget, including natural disasters, total exports or banana export earnings. This result confirms the pattern indicated in Chapter 10 in relation to individual disasters – namely, that receipts of external disaster-related assistance are delayed, prolonged and to some extent may divert resources away from non-disaster related projects, together implying that natural disasters typically have little discernible impact on aggregate annual levels of aid disbursement.

Instead, the time pattern of total aid flows appears to reflect a sequence of 'policy' outcomes involving the small number of important donors, both individually and in concert. There was a cluster of aid commitments at around Independence in 1978, particularly by the departing colonial power, the UK. Canada and the European Commission (EC) also made substantial allocations Following Hurricanes David and Allen, there were new commitments of relief and reconstruction assistance peaking in 1981, perhaps also in part stimulated by increasing political stability in the country. Rapid disbursement in support of the relief and reconstruction efforts, as well as slow disbursement of earlier commitments made in 1978 (this delay itself possibly due to the hurricanes) resulted between 1980 and 1982 in the highest sustained levels of disbursement before the late 1990s. A high level of net disbursement reflected the high proportion of grant assistance for relief and reconstruction and official debt written off by the UK.

[78] Aid flows are analyzed after being converted to real 1990 ECS using the DAC aid deflator.

Figure 11.1: Total aid flows to Dominica, 1977-1996 (million EC$ at real 1990 prices)



The subsequent peaks in aid commitments in 1987 and 1992 were linked to structural adjustment agreements. Later disaster shocks are less obviously related to increased disbursements, although in 1989 and 1995 there were increased disbursements. When the relationship between changes in aid flows (both in terms of commitments and disbursements) and hurricane shocks is explored using regression analysis, this confirms only the clearly visible response to Hurricane David. There is also no statistically significant relationship between aid flows and fluctuations in exports or banana export prices, the main source of external shocks (see above Chapters 5 and 7).

Highly aggregated flows encompass quite diverse behavior at a donor agency level. A review of donor commitments and disbursements over a 20-year period suggests a variety of influences on donor actions. Initially the UK and the CDB were the main source of external assistance From 1979 the EC, Canada and, to a lesser extent France and Japan, became important sources of support. The only reported direct US assistance was after Hurricane David, but USAID also channeled funds through the CDB (Section 6.4) and the OAS The IMF provided support through both its Emergency Assistance arrangement and its Compensatory Financing Facility (CFF) in December 1979. Dominica again borrowed from the CFF, but only in 1992, in response to loss of export earnings resulting from Hurricane Hugo in 1989. The World Bank was not an important source of development lending. The involvement of individual UN agencies was modest because of Dominica's small claim and middle-income status. Individual donor and agency actions reflect the consequence of discrete development, usually capital investment, projects that are relatively lumpy in the case of this very small economy. In the late 1990s the EC emerged as an especially significant donor (Cox and Chapman, 1999), providing even budgetary support from ACP-Lome long-term development and STABEX funds in relation to the Barbados Programme of Action (Commonwealth Secretariat/World Bank, 2000). This support was extended in the context of declining export earnings from bananas, which is as much a result of a sustained decline in profitability as the effects of hurricane and drought shocks. In the Caribbean region donor agencies are typically organizing development co-operation through regional offices with responsibility for a relatively large number of countries. So a disaster may temporarily ensure greater attention to the management of aid to the affected countries.

This may contribute to accelerated disbursement of already committed aid as well as new actions. That could explain some evidence of increased disbursement after disaster shocks.

The main conclusion of this relatively superficial analysis is that neither aid commitments nor disbursements have been very responsive to the considerable short-term external account public expenditure pressures that resulting from external shocks and natural disasters. The important exception is the concerted response in the most extreme case, the catastrophic effects of Hurricane David, which became an international disaster in the full glare of media scrutiny.

Chapter 12.

Social Issues and Poverty

Issues of social vulnerability to natural hazards and their impacts at a community and household level are outside the scope of this study. Nevertheless, this is an extremely important area that we have found to be little researched, meriting further investigation. Such issues need to be better understood in order to formulate an appropriate disaster management strategy, including both mitigation and preparedness and the strengthening of broader social policy to make it more sensitive to problems of vulnerability and poverty caused or exacerbated by natural disasters.

This chapter draws attention to areas that should be explored in further depth. Attention is also drawn to more specific issues that have been highlighted in the course of our investigations

12.1 Demography and Human Capital

Hurricane David resulted in the exodus of almost 20,000 people, equivalent to about a quarter of the pre-Hurricane (1978) population (Chapter 1) This outflow included many school-aged children. There was also anecdotal evidence of skill shortages as many of those with marketable skills migrated to other islands. The government subsequently encouraged the return of farm workers from North America, with the largest numbers returning between 1981 and 1989, during the period of rehabilitation and subsequent banana boom (GoCD, 1999a, Table 28). However, twenty years later the population had still not recovered to its 1978 level.

12.2 Education

Successive hurricanes have caused physical damage to school buildings, but their full effects on education have not been documented.

The effect of Hurricane David was also apparently felt in terms of its impact on the school population. Data on enrolment in primary schools indicate a 12.8% drop, equivalent to 2,682 pupils, between academic years 1978/79 and 1979/80, with a further 9.8% fall the following year, apparently reflecting post-David related out-migration of families with primary-aged children. The primary school population temporarily increased again in 1981/82, to 91% of its 1978/79 level, but has since entered a period of long-term decline. The high school population, although equivalent to only 11.5% of the primary school population in 1978/79, was more resilient, increasing marginally in 1979/80 and again in 1980/81 and 1981/82.

12.3 Healthcare

Successive hurricanes have caused physical damage to hospital buildings. This impact is captured to some extent by the 35% decline in hospital beds from 240 in 1978 to 156 in 1980, presumably as a direct consequence of Hurricane David.

At least in recent history, there have been relatively few deaths as a consequence of natural disasters in Dominica. A reported 42 people were killed as a consequence of Hurricane David and around 3,000 treated for injuries. However, there have only been two subsequent deaths associated with hurricanes (one in 1995 and one in 1999)

There is no statistical or other evidence of any major increase in disease related mortality or morbidity in the aftermath of recent disasters. There was an outbreak of bacillary dysentery in the aftermath of Hurricane David,

which peaked in the second and third month after the storm It was thought that this may have been associated with the destruction and slow repair of latrines and a reported increase in the disease-carrying insect population. Diarrhea cases occurred in 7.3% of surveyed households. However, a survey undertaken eight months after Hurricane David found that health problems were 'relatively unimportant' (Lechat and others, 1981: 1). In fact, the number of deaths from most reported causes declined in 1979-80, probably due to the mass movement of people off-island.

12.4 Rural Livelihoods and Informal Labor Markets

Several highly vulnerable sectors of the economy are important in the livelihoods of poorer households. Banana growing involves a relatively large number of extremely small marginal producers and a small number of dominant larger scale farms. The latter would benefit disproportionately from the WINCROP insurance scheme, which pays out on about 20% of estimated damage, covering a substantial part of production costs (Box 5 2). They can also lay-off labor to reduce costs. Bananas have also apparently provided a way for many poorer households to re-establish a post-hurricane source of income.

Some evidence of the impact of hurricanes on informal labor markets is indicated by their effects on hucksters. Hucksters (also known as higglers or traders) form an important part of the informal labor market in Dominica, mainly trading in agricultural products with surrounding islands. They are primarily women, often wives of small farmers, from poor rural households and in some cases heads of single parent families. Huckstering can be quite profitable. Some individuals make between EC$200 and EC$4,000 (US$74 – US$1,480) per week, equivalent to around 40% of the value of their produce (World Bank, 1996).

Huckstering is highly vulnerable to natural hazards both via potential disruptions caused to agricultural production (which also have an adverse impact on local market vendors) and damage to transportation, shipping and storage facilities There is no insurance currently available for huckster consignments Even the issue of a storm warning, whether for Dominica or neighboring countries, can temporarily disrupt trade. Moreover, vulnerability is not limited to storms alone. For example, the Layou-Carholm landslides also had an adverse impact, initially forcing some hucksters to use an alternate transport route, so increasing transport costs, and forcing them to endure longer waiting times at the port, again increasing costs. Hucksters also face potential loss of markets in the event of any disruption to their operations, as they operate in a highly complex environment.

Fisheries is another extremely vulnerable sector (Box 12.1). This was most recently shown in the effects of Hurricane Lenny. The assessed damage to boats, gear and sheds and disruption to fishing marketing was considerable However, at the time of the field visit for this study, seven months after Lenny, nothing had apparently been done to recompense and rehabilitate affected households

The use of forestry resources, including for hunting, is also still important to rural groups, including some of the poorest such as the Carib community, and should be considered in a social and poverty analysis.

Box 12.1: Fisheries – a vulnerable livelihood

The fishermen are probably the producer group most vulnerable to natural hazards Approximately 3,000 people are economically engaged in the fishing industry. About 1,200 are considered full-time fishermen. It is almost impossible to relocate boats and gear when a hurricane threatens. Many are forced to leave boats and engines at sea. Fish sheds are especially vulnerable since the majority are simple shacks of timber and galvanized metal sheeting, without concrete footings or hurricane-resistant reinforcement.

Fishermen typically operate pirogues that are less than 20 ft long and 8 ft wide, often powered by a single outboard engine Many fishermen do not consistently use life vests nor do they routinely own communications equipment such as radios.

They are often the first group whose income is reduced by hurricanes A Storm Warning and Small Craft Advisory may be in effect for many days before a hurricane affects Dominica. The lack of on-shore electricity and refrigeration after a hurricane sometimes dramatically reduces the demand for fresh fish. The beach erosion that frequently accompanies hurricanes also creates access problems for those fishermen whose boats survive the storm.

Vulnerability is exacerbated because fishing is typically a family activity Fishing households often seek to supplement their income by producing crops or raising livestock, activities which are also vulnerable to storms. Thus, a hurricane can easily reduce or temporarily eliminate all sources of income for a fishing family.

Fishermen often equip themselves with boats and engines through loans. A typical level of investment is EC$60,000 This may be lost entirely in a hurricane, but the debt must still be repaid It is rare for them to be able to obtain insurance on fishing assets. Even if insurance is theoretically available, because of the high cost of premiums linked to high risks, it may be out of reach for most fishermen.

12.5 Housing

The social distribution of housing losses is another aspect of differential vulnerability. The poorest, in their choice of both material and building standards, are less likely to adhere to building codes for storm resistance. But there may also be urban–rural differences Much of the construction in Roseau and other West coast settlements has been relatively recent. At least before Hurricane David many of these houses were less storm resistant than traditionally constructed older houses. So possibly this was why much of the destruction of housing in 1979 occurred in urban areas rather than rural localities, such as the Carib Reserve.

Various studies have also highlighted the appropriate provision of support for low cost housing as one of the least satisfactory aspects of post-disaster response. For example, a review of a variety of initiatives for low cost housing provision and innovations in housing after Hurricane David found that projects were unable to provide support to housing that was sufficiently low cost so as to be accessible for the poorest. T he only successful surveyed scheme provided finance for self-build housing (Coit, 1988).

12.6 Anti-Poverty Strategies and Natural Disasters

At the household level, poverty is, as the above examples suggest, the single most important factor determining hazard vulnerability, in part reflecting location of housing, choice of building materials and primary source of income generation and lack of access to risk spreading financial mechanisms. Disasters, in turn, can play a significant role in reinforcing poverty.

Tackling hazard vulnerability should therefore form an important part of any poverty reduction strategy in Dominica, given the island's proneness to natural hazards combined with its relatively high level of poverty Some 28% of the

population was estimated as living at or below the poverty line in 1995 (Bonnerjea and Weir, 1995)[79]. The incidence of poverty is particularly high amongst the indigenous Carib community (World Bank, 1996). There is also a high incidence of unemployment in parishes where banana production has been the major source of income (GoCD, 2000).

The links between natural hazard vulnerability and poverty are only now being accepted as raising an important issue for the development agenda. Thus, a 1996 World Bank overview report on poverty in the Caribbean region did not pay attention to natural hazard vulnerability reduction in either reviewing the coverage and effectiveness of poverty alleviation efforts and coping mechanisms or in identifying key areas for strengthening such efforts. T his was despite the fact that the same report did acknowledge the vulnerability of countries in the region to natural disasters, specifically commented on the vulnerability of small farmers and indirectly noted the role of natural disasters as a factor causing poverty [80] More positively, a more recent report (Bonnick, 2000) does outline a poverty reduction agenda for the Caribbean that include mitigating the impact of disasters on the poor. More generally, the World Development Report 2000/01 (World Bank, 2000d) also clearly recognizes that natural disasters are a source of transient hardship and distress and a factor contributing to persistent poverty.

The development of strategies for hazard vulnerability reduction in Dominica will require careful investigation into the links with poverty. Although poverty is reported to have increased in recent years, due to the decline in the banana sector in particular, there is limited available information on either the extent or nature of poverty in the country or on how it relates to hazard vulnerability (GoCD, 2000). The GoCD has already identified the need for further investigation into the nature of poverty in Dominica .

More specifically relating to disaster management, the undertaking of post-disaster social assessments would be most valuable in highlighting needs. For example, Hurricane Lenny is known to have caused some temporary loss of employment in the hotel trade but it is not clear whether or not those laid off were able to secure alternative forms of income generation. Similarly, fisheries, which is an important element in the livelihood of one of the poorer social groups, was also seriously impacted by Hurricane Lenny (see Box 12.1)

[79] The survey on which this figure is based was undertaken prior to Hurricanes Luis and Marilyn.

[80] The report stated that 'Poverty has increased in countries that have had low or negative growth rates for protracted periods such as Guyana, Haiti, Jamaica, Suriname and Trinidad and Tobago. The low growth is attributed in part to external shocks, such as adverse changes in a country's terms of trade, changes in global demand for a country's exports, changes in the global interest rate on a country's external debt, and hurricanes, and in part to inadequate domestic policy responses, including sharp increases in external borrowing and expansionary monetary and fiscal policies.' (World Bank, 1996: ix)