

SPECIAL REPORT

FAO AGRICULTURAL DAMAGE ASSESSMENT MISSION TO DOMINICA FOLLOWING HURRICANE DEAN

18 October 2007



FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME

This report has been prepared by Jerome Thomas and Mario Zappacosta under the responsibility of FAO/GIEWS with information from official and other sources. Since conditions may change rapidly, please contact the undersigned for further information if required.

*Henri Josserand
Chief, GIEWS, FAO
Fax: 0039-06-5705-4495
E-mail: giews1@fao.org*

Please note that this Special Report is also available on the Internet as part of the FAO World Wide Web (www.fao.org) at the following URL address: <http://www.fao.org/giews/>

*The Special Alerts/Reports can also be received automatically by E-mail as soon as they are published, by subscribing to the GIEWS/Alerts report ListServ. To do so, please send an E-mail to the FAO-Mail-Server at the following address: **mailex@mailex.fao.org**, leaving the subject blank, with the following message:*

subscribe GIEWSAlertsWorld-L

To be deleted from the list, send the message:

unsubscribe GIEWSAlertsWorld-L

Please note that it is now possible to subscribe to regional lists to only receive Special Reports/Alerts by region: Africa, Asia, Europe or Latin America (GIEWSAlertsAfrica-L, GIEWSAlertsAsia-L, GIEWSAlertsEurope-L and GIEWSAlertsLA-L). These lists can be subscribed to in the same way as the worldwide list.

TABLE OF CONTENTS

	<u>Page</u>
Mission Highlights	1
1. <u>OVERVIEW</u>	1
2. <u>NATURAL RESOURCES AND SOCIO-ECONOMIC SITUATION</u>	2
2.1 Geography and climate	2
2.2 Macro-economic situation	2
2.3. Population	3
2.4 Poverty	3
3. <u>THE AGRICULTURAL SECTOR</u>	4
3.1 The crop sub-sector	5
3.2 The livestock sub-sector	6
3.3 The fisheries sub-sector	7
3.4 The forestry sub-sector	8
4. <u>DAMAGE TO AGRICULTURAL SECTOR BY HURRICANE DEAN</u>	9
4.1 The crop sub-sector	9
4.2 The livestock sub-sector	11
4.3 The fisheries sub-sector	12
4.4 The forestry sub-sector	14
4.5 Most affected population	15
5. <u>RECOMMENDATIONS</u>	16
5.1 Immediate	16
5.2 Short-term intervention	17
5.3 Medium-term intervention	18
6. <u>PROJECT IDEAS</u>	19
7. <u>PROJECT PROFILES</u>	20
7.1 Commercialization and coffee production	20
7.2 Study of habitat degradation and impact on fisheries	21
7.3 Development of a comprehensive land use management plan	22
7.4 Conduct agricultural census	24
APPENDIX 1: PRACTICES FOR REDUCTION OF LIVESTOCK FARM LOSSES RESULTING FROM THE PASSAGE OF A HURRICANE	26
APPENDIX 2: FOREST REHABILITATION COSTS	27
APPENDIX 3: LIST OF PERSONS MET BY THE FAO MISSION	29
APPENDIX 4: PRELIMINARY SUMMARY REPORT MEETING WITH MINISTRY OF AGRICULTURE STAFF – LIST OF PARTICIPANTS	30

Mission Highlights

- Hurricane Dean on 16-17 August 2007 destroyed totally over 90 percent of the area under banana, a major foreign exchange earner commodity.
- Other important export crops such as citrus, avocado, mango, cocoa and hot peppers also suffered important damage.
- The main agricultural losses were reported in the south, southeast and the east areas, which concentrate over a third of the country's poor population, as well in the west part of the island.
- Reduced availability of food crops in the main Dominica markets, coupled with rising prices, is expected in the coming weeks with reduced access to food for the poorest consumers.
- The livelihood systems of about 3 000 farming families and 3 000 fishing families, representing over 40 percent of the country's population, have been seriously affected and will need several months to recover.
- There is urgent need to provide agriculture rehabilitation assistance to the affected population to enable them to restore their productive activities in the short term.

1. OVERVIEW

In response to a request by the Minister of Agriculture of the Commonwealth of Dominica, an FAO Assessment Mission visited the country from 3 to 20 September 2007 to assess damage and losses to the agricultural sector caused by the passage of Hurricane Dean on 16-17 August 2007. The Mission was also requested to propose immediate and medium-term rehabilitation measures aiming to the recovery of the productive capacity of the agricultural sector and livelihood of the affected populations.

The Mission comprised four national consultants along with a team coordinator and two FAO staff members. The team commenced its work in Rosseau, where it visited various national and international institutions to collect available information and data on agriculture, the economy in general, poverty and vulnerability, as well as to hold consultations on the impact of the Hurricane Dan on the different agricultural sub-sectors. In particular, the Mission had extensive meetings with staff of the Ministry of Agriculture, Fishery and the Environment, the Ministry of Finance and Planning, the Disaster Management Unit, the OECS Export Development Unit, the Dominica Banana Producers Limited, the Winward Islands Crop (WINCROP) insurance company, the Agriculture and Industry Development (AID) bank, the Dominica Export Import Agency (DEXIA), the Dominica Hucksters Association, the Fair Trade Association and the USAID. The Mission then undertook field visits to audit the damage assessment data previously collected by the Ministry of Agriculture and to evaluate the impact of the hurricane on the most vulnerable groups. During about ten days of field work, the Mission interviewed farmers, fishermen, community leaders and other key informants, and directly observed damage and losses caused by the hurricane and their impact on the most vulnerable groups. Organized into four teams, each of them led by a national expert on crops, livestock, fishery and forestry, the Mission visited all the most affected areas of the island, cross-checking the available information. The main food market of the capital city was visited in order to observe the availability of products and the prevailing prices. During the last week in Roseau, the Mission briefed senior staff of the Ministry of Agriculture, presenting the preliminary findings and recommendations of the assessment, including the most urgent agricultural emergency and rehabilitation interventions.

Hurricane Dean hit Dominica with strong force winds and torrential rains, severely affecting all sectors of the Dominican economy including agriculture. Wind gusts of up to 170 km/hr and rainfall in excess of 200 mm over a period of 18 hours resulted in swollen rivers, flash floods and landslides that caused damage to housing, infrastructure, crops, and livestock. Wave action coupled with wind forces along sections of the coastline, the south and south east in particular, caused partial destruction of land base fisheries structures and ruptured an isthmus that perpetuated ecosystems of significance to the fishing and dive-tourism sectors. Over 4 000 farmers reported some level of damage to their crops and livestock, especially in the south, south-west and east regions which concentrate the poorer and more vulnerable communities. Over 90 per cent of the estimated 970 hectares under banana cultivation were destroyed, while about 66 per cent of the 668 hectares with plantains suffered some damage. The production of other major tree crops such as coconuts, oranges, avocado and mango was also severely affected with losses of fruits and broken branches. Production of vegetables as hot peppers and tomatoes, in both open fields and greenhouses, was almost completely lost. About 140 fishermen reported losses and damage to their fishing infrastructure.

The Mission's recommendations for the rehabilitation of the affected sub-sectors include immediate, short and medium term responses. In addition, four project profiles aiming at improving the mitigation plans for the agricultural sector and at monitoring the medium term impact of the hurricane on the marine habitat have been prepared.

2. NATURAL RESOURCES AND SOCIO-ECONOMIC SITUATION

2.1 Geography and climate

The Commonwealth of Dominica is the largest and most mountainous of the Windward Islands in the Eastern Caribbean with an area of 750 square kilometres and measures 47 km in length and up to 25 km in width. The country has an estimated population of 71 000 people and close to 40 per cent live in and around the main towns of Roseau and Portsmouth.

The total land area is approximately 75 000 hectares, of which over 30 per cent is covered with forests. The topography is characterized by very rugged and steep terrain with the ground steeply rising from the sea. The northern half of the island is dominated by the cone of its highest mountain, Morne Diablotins, which is 1 447 m above sea level. The topography is also characterized by a large number of ridges and deep narrow river valleys. Level ground for crop production is scarce and largely confined to river flood plains and coastal strips. As a result, much of the arable and tree crop areas are located on steeply sloping ground. Only about two percent of the surface area has a slope of less than five percent, thirteen percent of the area is between five percent and thirty percent slope and the remainder is steeper than thirty percent¹.

The climate of the country is classified as humid tropical marine with average temperatures of 27°C. Due to the island's rugged topography, micro-climate variability exists within very short distances and this is influenced by the high moisture content of the air masses that enter the region from the Atlantic Ocean. This makes Dominica a very high rainfall country. Rainfall increases from the leeward (or western) side eastward towards the central part of the island and ranges from 200 to over 625 mm per year. Most of the rain falls between June and October which is the peak period for tropical storm activity.

Dominica's natural vegetation covers an estimate 51 770 hectares or over 69 per cent of the land area. Of that figure about 31 060 hectares or 60 per cent are privately owned. Private forests cover an extensive area and play a significant role in hurricane impact mitigation. State lands include 9 224 hectares of forest reserve, 6 475 hectares of national park and 5 369 hectares of unallocated State lands.

2.2 Macro-economic situation

Dominica is classified as an upper-middle-income developing country and, according to the 2006 Human Development Report of the United Nations Development Programme (UNDP), it is ranked 68th out of 177 countries in the Human Development Index, with a per capita GDP of US\$ 5 643 (at purchasing parity power). Value added in agriculture (including crop production, livestock, forestry and fishery) accounted for 17.6 per cent of GDP in 2006, down from 25 per cent in 1990, and the primary sector employs an estimated 26 per cent of the economically active population. From 2000, Government Services became the main sector of the economy, with almost 20 per cent of GDP and being the principal employer.

The country experienced a relatively stable economic growth between 1986 and 1993, with an annual average real growth of 3.7 per cent, mainly as a result of the banana industry, the main source of the country's exports and the largest contributor to agricultural employment. However, with the introduction of the phased elimination of preferential access to the European Union for banana exports in 1992 the economic growth slowed down over the decade 1994-2003. The economy contracted by 4.2 per cent in 2001, 5.1 per cent in 2002 and a further 0.4 per cent in 2003. The unemployment rate increased from 11.6 per cent in 2001 to about 14 per cent in 2003. Government revenues (excluding grants) declined by 2.7 per cent and public sector debt stock increased, representing 122 per cent of GDP in 2003 from 81 per cent of GDP in 2000, This situation resulted in a sharp deterioration of the nation's fiscal position.

¹ Division of Agriculture Brief Situational Analysis, 2007

Table 1 - Selected macro-economic indicators

	2002	2003	2004	2005	2006*
Real GDP growth (%)	-5.1	0.1	3.0	3.4	4.0
Consumer price inflation (%)	-0.5	1.5	2.4	1.7	1.9
Exports (US\$ m)	43.6	41.0	42.6	43.3	42.6
Agricultural exports (US\$ m)	14.4	11.7	13.7	12.7	n.a.
Banana exports (US\$ m)	8.4	6.2	8.2	7.9	8.3
Imports (US\$ m)	102.4	104.9	127.7	145.5	146.6
Current account balance (US\$ m)	-44.8	-42.0	-60.6	-93.4	-63.9

*Economist Intelligence Unit estimates

In 2003, the Government launched an Economic Stabilization and Adjustment Programme with the aim to restart growth and reduce un-employment through significant strengthening of the fiscal position and a comprehensive debt-restructuring programme. Results of the Programme have been quite positive at macroeconomic level, with real GDP growth rates estimated at 3.0, 3.4 and 4.1 per cent in 2004, 2005 and 2006, respectively. The country's fiscal position has considerably improved due to the introduction of a value added tax in March 2006, the reduction of current expenditure and the strong inflow of grants. In particular, official grants are estimated at about 14.5 per cent of GDP during fiscal year 2006/07 and they have been essentially used to finance infrastructure projects.

Although banana exports have decreased by approximately 75 per cent over the last ten years, they still account for over half of the value of all agricultural exports. An increasing supply of organic bananas, under the "Fair Trade" label, is gaining some niche markets, especially in the UK. Other export crops as plantains, dasheen, yams, coconut, avocado, citrus fruits, grapefruit, pineapple and hot peppers are exported to the CARICOM nearby island states, as well as to the European overseas territories of Martinique, Guadeloupe and St. Martin. Important non-agricultural exports are soap and dental cream that represents about 40 per cent of total exports value.

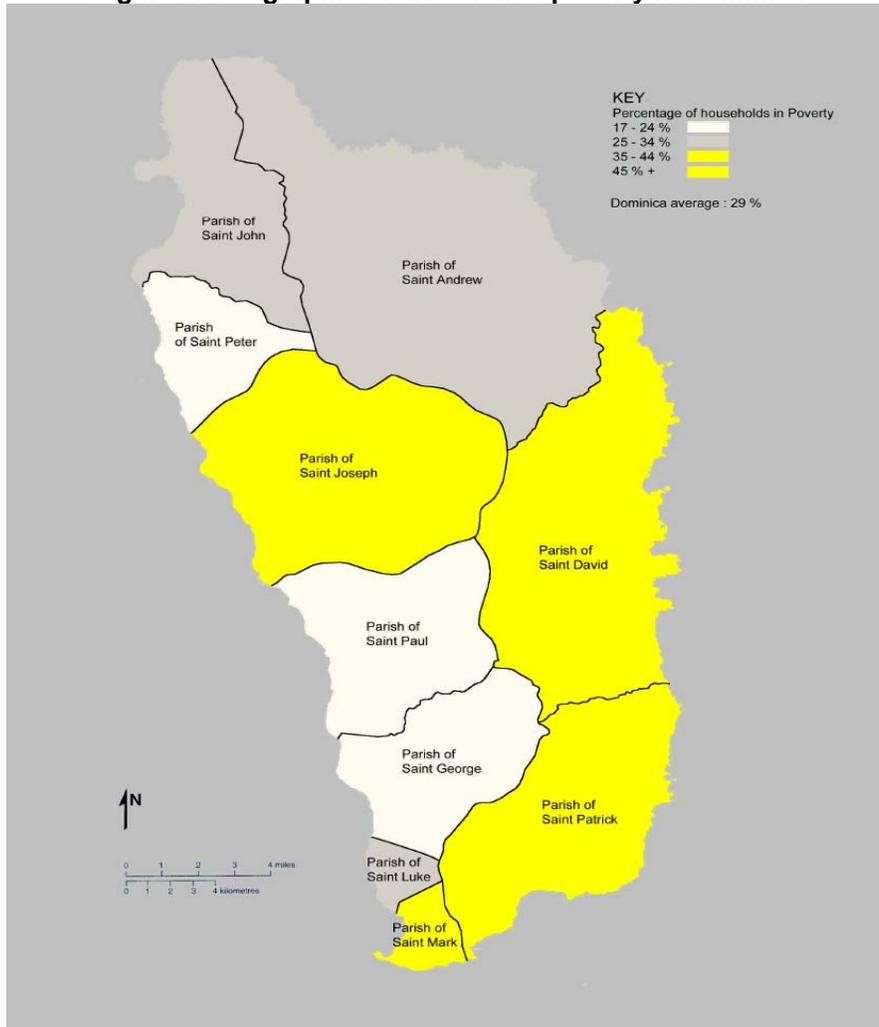
2.3 Population

The current population is around 71 000 and shows very little change from 1981 essentially as a consequence of the high level of emigration. The emigrants are mainly adults who are in the prime working age groups of 20 to 34 years. The high level of emigration appears to have resulted from a marked decline in the agricultural sector and a lack of significant growth in the other sectors. The static population growth has also resulted from a sharp decrease in the number of live births over the past 10 years. Approximately 40 per cent of the population lives in and around the main towns of Roseau and Portsmouth and the Carib population, an indigenous community that lives in the northeast of the country, is estimated at around 4 per cent of the population.

2.4 Poverty

According to 2002 Country Poverty Assessment report, poverty in Dominica is high in comparison to other Caribbean state islands, with around 29 per cent of households and 40 per cent of the population considered to be poor. Three quarters of poor households are in rural areas and it is correlated to the decline of the agricultural sector and, in particular, of the banana industry. The parishes with highest rates of poverty are all on the east coast, namely from north to south St. Andrew, St. David and St. Patrick. The incidence of poverty among the Carib population is extremely high, with about 70 per cent of people classified as poor and almost half of them as indigent. Although poverty trends can not be accurately ascertained due to lack of comparable data for the past, it is generally accepted that poverty has increased in recent years due to the continuing decline of the agricultural sector and the banana industry in particular.

Figure 1. Geographic distribution of poverty in Dominica



Source: Country Poverty Assessment Report, 2003)

3. THE AGRICULTURAL SECTOR

The agriculture sector contribution to GDP has shown steady decline from 26.6 per cent in 1980 to 16.7 per cent in 2006 (Table 2). This trend has been attributed to declines in the crop production due to natural disasters occurred between 1989 and 1995 as well as the gradual loss of preferential access to European markets, especially for bananas, from 1992. The decline in agriculture has contributed to rural unemployment and under-employment, affecting not only banana farmers, but also agricultural workers who had to seek alternative employment. However, the sector continues to employ about a quarter of the active population and cover about 60 per cent of the domestic food needs.

Table 2 - Contribution of agriculture to GDP

Sectors	1980	1997	2000	2004	2005	2006
Agriculture	26.62	20.04	17.96	17.76	17.09	16.71
Crops	22.06	15.76	13.76	13.06	12.48	12.21
Livestock	1.28	1.65	1.63	1.80	1.76	1.71
Forestry	0.70	0.77	0.75	0.82	0.79	0.76
Fishing	2.57	1.85	1.83	2.09	2.05	2.03

Source: Central Statistics Office Note; 2006 figures are preliminary

Within the agriculture sector, crop production is of greatest economic importance as it is the primary foreign exchange earner. Crop production accounts for a significantly higher percentage of total agricultural production than that of livestock, forestry and fisheries combined. These sub-sectors generally contribute very little to foreign exchange earnings, but their economic importance is related to food security, as sources of protein for home consumption as well as employment in rural areas.

3.1 The crop sub-sector

In Dominica, crop cultivation is strongly limited by the rough geography of the island. According to the 1995 Agricultural Census, only 15 000 hectares were classified as agricultural land, representing less than 20 per cent of the whole island's territory. In addition, flat land is extremely scarce in Dominica and agricultural production has to compete for land with housing, tourism and other infrastructural and commercial developments. As a result, the vast majority of crops are cultivated on very steep slopes, often more prone to soil degradation. Eighty per cent of the agricultural land is devoted to permanent crops as banana, coconut, plantains, grapefruit, oranges and cocoa, while the rest is cultivated with temporary crops (mainly tubers, hot pepper and tomatoes) and pasture. The size of almost seventy per cent of total farms is less than 2 hectares, while a third of them do not reach 0.4 hectares.

Banana is the dominant crop, but its output has declined from 60 000 tonnes in early 1990s to less than 21 600 in 2006 due to both the phased elimination of preferential access to European markets and destructive hurricanes and storms between 1989 and 1995. There has also been an even more marked decline in the number of banana producers from over 6,600 in 1990 to less than 900 in 2006. Banana exports to Europe have fallen from a peak of 74 200 tonnes in 1988 to 12 827 in 2006, while the revenue earned has declined substantially from US\$ 17.2 million in 1997 to US\$ 7.5 million in 2006. Land under banana cultivation for the European market has declined from 3 600 ha in 1996 to less than 1 000 hectares in 2006.

The production of non-banana crops is also significant and provides employment for over 3 000 farmers. The level of non-banana crop production is dominated by root crops, plantain, citrus and tree crops (Table 3). Crop cultivation is distributed throughout the island, with areas of specialization, (Table 4). For example, sweet potato production is concentrated in the central part of the island, while yams are mainly found in the north and mango in the North-west. Exception to this is bananas, grapefruit and dasheen which are cultivated in all regions

Table 3 - Estimated annual domestic production of selected crops (tonnes)

Category	1997	2000	2003	2004	2005	2006
Banana	43 805	43 044	21 163	24 448	21 484	21 601
Citrus	33 958	32 559	28 519	28 238	25 921	21 514
Cut Flowers	221	342	423	212	237	205
Fruit Crops	546	913	640	655	601	636
Plantain	28 918	28 683	28 186	28 350	28 109	27 909
Root Crops	30 886	28 345	30 251	30 598	30 233	30 109
Tree Crops	15 180	37 280	37 237	37 348	14 816	14 662
Vegetables	2 747	2 935	2 917	2 600	2 367	2 384

Source: Division of Agriculture Brief Situational Analysis, 2007

The export of non-banana crops is also a significant contributor to foreign exchange and employment. Up to 250 hucksters are actively involved in the export of non-banana crops to the nearby French and English speaking islands. The hucksters purchase their produce from local farmers but about half of them are also crop producers. The FOB value of the non-banana crop exported in 2006 was US\$5.81 million or about 78 per cent of the US\$7.5 million for banana. Plantain and root crops are the most significant non-banana exports, followed by avocado and bay oil (Table 5). Both banana and non-banana crops contribute also significantly to national food security and provide the resource base for several agro-processing establishments and products.

Table 4 - Major food crop production areas in Dominica

Crops	Main areas of production
Avocado	North east
Bananas	Island wide
Cocoa	North east / Central / West
Coffee	North west
Dasheen	Island wide
Grapefruit	Island wide
Hot pepper	North
Limes	North and North east
Mango	North west
Orange	North west and Central
Passion fruit	North
Plantain	North east and South east
Spices	South east
Sweet potato	Central
Tannia	North east
Vegetables	North west / Giraudel / Morne / Prosper / Bellevue
Yams	North

Table 5 - Annual value of main crop exports

Export Commodity	FOB (US\$ '000,000)		
	2004	2005	2006
Banana	7.26	6.45	7.48
Avocado	0.74	0.93	0.89
Citrus	1.00	0.89	0.70
Bay Oil	0.52	0.52	0.89
Plantain	1.59	1.37	1.33
Root Crops	1.78	1.56	1.37
Vegetables	0.48	0.41	0.41
Passion Fruit	0.07	0.07	0.07
Pineapple	0.15	0.11	0.15
Total non-banana	6.33	5.86	5.81

Source: Division of Agriculture Brief Situational Analysis, 2007

Several programmes aiming at diversifying the production base and seeking alternatives to banana production have been implemented since early 1990s. These programmes tend to improve production and marketing of traditional crops such as citrus, coconut, coffee, cocoa, mango and avocado, while encouraging the cultivation of non-traditional crops such as ginger, spices, passion fruit, hot peppers and cut flowers and promoting agro-processing for the manufacturing of value-added products.

3.2 The livestock sub-sector

The livestock sub-sector is relatively small and contributed an estimated 1.7 per cent of GDP in 2006. Livestock production is mainly undertaken by small farmers. The 1995 Agricultural Census data indicate that up to 3 000 farm families were involved in livestock production (Table 6). The major domesticated species reared commercially for meat are poultry, pigs, goats and sheep. Traditionally livestock has contributed to farm family protein requirements as animals are raised by the farm family for food with surplus being sold to neighbours. There are also a significant number of producers who earn an income by supplying the towns of Roseau and Portsmouth as well as Marigot and outlying villages with locally produced meat and eggs. Farmers also raise small numbers of rabbits, indigenous chickens and ducks. These animals provide a significant portion of rural family nutrition.

Poultry production forms the most significant part of the sub-sector and local production meets the domestic demand for eggs. Within recent times the broiler production has increased significantly and is estimated to meet 11 per cent of the domestic demand. Pig production satisfies about one half of the domestic demand Large and small ruminant production is limited and so is the dairy industry.

The livestock sub-sector contributes very little to foreign exchange earnings but makes a significant contribution to food security, employment in rural communities and a vital source of protein for home consumption.

Table 6 - Selected 1995 livestock data

Livestock species	No. of animals	No. of farms/Livestock owners
Poultry (layers & broilers)	67 300	2 800
Pigs	4 600	1 100
Cattle (beef & dairy)	3 600	1 100
Goats	12 200	2 200
Sheep	3 700	800

Source: Dominica Agricultural Census 1995

3.3 The fisheries sub-sector

The fishing industry is relatively small and artisan in nature, employing just over 3 100 fishers and vendors with about 1 000 on a full-time basis. There are about 40 identifiable fishing communities disseminated around the island (Fig. 2). The sector contributes about 2.0 per cent to GDP and has shown marginal declines since 2003. Fishing is dominated by men who engage in all the components of the industry including fishing, vending, boat building and gear construction operations among others. Women's involvement at the family level as vendors and secondary processors of fish are emerging in the more prominent fishing communities. The sector has changed from an ageing population of operators to an influx of new entrants most of which are receiving basic training in fishing and engaging in new fishing techniques.

The fishing fleet consists of traditional floating rafts, dug-out canoes and variations of wood and fibre-glass vessels ranging from 4.3 to 9.2 meters in length. These vessels are characterized as day-boats because of their open hull structure, limited space and an absence of navigational aids and amenities to allow longer fishing trips beyond 12 hours. The fleet consists of about 735 registered pirogues made of wood encased with fibreglass and fibreglass vessels. Fishing operations are mainly within the 19.3 km territorial waters, however with the re-introduction of fish aggregating devices (FADs) in the late 1990s, increasing effort is now being made up to 72 km from the coastline.

The quantity of fish landings during the past six years has declined from a high of 708 000 kg in 2002 to 523 000 kg in 2005 (Table 7). The value of the fish landed has also decreased from US\$ 2.9 million in 2002 to US\$ 2.1 million in 2005. The sites recording the highest fish landings in 2006 were Portsmouth, Marigot, Fond St. Jean, Dublanc, Scotts Head, San Sauveur and Colihaut (Table 8). Most of the fish landed is consumed locally thus making a significant contribution to national food security. A relatively small percentage of the catch is however exported and the potential appears to exist for increasing the exports.

Table 7 - Annual value of fish landings

Year	Landings ('000 kg)	Value (US\$ million)
2000	611	2.5
2001	644	2.6
2002	708	2.9
2003	473	1.9
2004	504	2.1
2005	523	2.1

Source: Division of Agriculture Brief Situational Analysis, 2007

Table 8 - Estimated fish landings for the major landing sites in 2006

Landing Sites	Landings (kg)
Portsmouth	96 400
Marigot	95 460
Fond St. Jean	53 200
Dublanc	49 000
Scotts Head	45 300
San Sauveur	30 200
Colihaut	29 700
Layou	26 100

Figure 2. - Fish landing sites and fisheries extension districts in Dominica



3.4 The forestry sub-sector

Dominica's natural vegetation ranges from low scrub woodland on the arid leeward coast to littoral woodland on the exposed windward coast and tropical rainforest on the deeper sheltered soils of the interior. As elevation increases, the tropical rain forest is gradually replaced first by montane rain forest and then by montane thicket and palm break. The summits of the tallest peaks are covered with elfin woodland or cloud forest. Dominica's mature rain forests, of which 58 per cent are State-owned, are characterized by an abundance of trees of large diameter in an association dominated by Gommier, Chataignier (4 species of *Sloanea*), and Carapite (*Amanoa*)

caribaea Kr&Urb). The gommier is reported as being the most important species forming up to 24 per cent of the growing stock.

The forest of Dominica is comprised of the Eastern or La Plaine Forest Range, Central Forest Range, Northern Forest Range and Southern or Roseau Forest Range. The island has two forest reserves and they are found in the Northern and Central forest ranges. The two forest reserves have a combined area of 5 688 hectares. The island also has three national parks with a combined area of 10 746 hectares. The Morne Trois Piton National Park is 6 880 hectares in size and is the largest of the three national parks. It is a world heritage site.

4. DAMAGE TO AGRICULTURE SECTOR BY HURRICANE DEAN

4.1 The crop sub-sector

The crop sub-sector was severely affected by high winds, torrential rains, flash floods and landslides as a result of Hurricane Dean. Crop damage was extensive across the country and characterized by uprooted plants, broken branches, defoliation and loss of fruits. Over 4 000 farmers and farm families have reported some level of damage to their established plots. The worst affected areas were in the south, south-west and east regions and they almost coincide with the more vulnerable communities.

Over 90 per cent of the estimated 970 hectares under banana, grown by 730 farmers, was destroyed, while 66 per cent of the 668 hectares planted with plantain suffered damages, adversely affecting 883 farmers. Banana is the major export crop earning over US\$ 7.5 million annually, which is more than half of the total foreign exchange generated in the agriculture sector, while the export of plantain generates about US\$ 1.4 million annually. The other major tree crops including citrus, avocado and mango also suffered significantly through loss of fruits and broken branches, while coconut trees suffered extensive damage to their tops as a result of the high winds. These crops are also significant foreign exchange earners and are exported primarily by the local hucksters to the nearby islands. The export of these tree crops generates over US\$ 2.0 million annually and provides employment for about 250 hucksters. Significant losses to fruit trees, mainly resulting from fruit loss, broken branches and uprooting, were reported for 88 per cent of the area under passion fruit, 63 per cent of that under oranges, 54 per cent of that under avocado and 33 per cent of that under limes (Table 9).

Dominica is also a major producer of root crops, cultivated in over 1 000 hectares and generating an export value of about US\$ 1.4 million annually. Damage to the root crops resulted mainly from the high winds, heavy rainfall and land slides. Some 58 per cent of the area planted with sweet potato suffered damage, while 42 per cent of that under yams, 39 per cent of that under tannia and to 31 per cent of that under dasheen also were severely damaged. Other crops of significance that suffered high losses include hot pepper and breadfruit. Damage as a result of uprooted trees, broken branches and fruit drop was reported for 70 per cent of the area cultivated with hot pepper. A fruit crop of significance that suffered minor damage was pineapple. Coffee and the bay plant, that is used to produce an essential oil, were not significantly damaged.

Table 9 - Summary of food crop damage

Crop	Estimated Area Planted (ha)	Area reported damaged (ha)	Area reported damaged (%)	Main region reporting damaged*
Banana	970	873	90	Island wide
Passion fruit	33	29	88	Island wide
Hot pepper	19	13	69	N
Plantain	668	440	66	Island wide
Orange	380	239	63	Island wide
Sweet potato	17	10	59	N
Avocado	162	88	54	Island wide
Yam	209	88	42	N, W, E, C
Tannia	93	36	39	NE, N, E, C
Lime	81	27	33	C, S
Dasheen	408	124	30	Island wide
Mango	97	19	20	W,N,C
Grapefruit	607	121	20	W, C, S
Coffee	21	4	19	W
Cocoa	167	21	13	E, C

*Legend: N =North; W =West; C = Central; E = East.

Vegetable production in the open field occupied only 30 hectares when the hurricane arrived and over 90 per cent of the area was lost. Also of importance is vegetable production in the soil but under a plastic/shade cloth covered tunnel often referred to as greenhouse production. An estimated 185 greenhouses were established prior to the hurricane and a total of 60 suffered damages. Thirty five of the houses suffered structural damages mainly because the plastic cover was not removed while the plastic was damaged for 56 houses and saran netting for 8 houses also suffered losses (Table 10). Water supply lines to several greenhouses also suffered damage.

Table 10 - Summary of greenhouse damage

Region	No. of greenhouses	No. of shadehouses	Level of damage		
			Structural	Plastic	Saran Netting
Central	45		18	24	4
South	36	3	5	9	2
West	59		6	8	
North East	14		0	5	
North	28		6	10	2
Total	182	3	35	56	8

Significant damage also occurred to farm access roads, feeder roads and on-farm roads. Over 30 km of farm access and feeder roads were rendered impassable by landslides, mass debris, tree blockages, edge failures and road surface damage. There was also damage to farm buildings ranging from minor to total devastation. The farm buildings were mainly used for packing and storage. The estimated cost for repairs to feeder roads is US\$ 3.7 million and for infrastructure is US\$ 0.93 million.

Dominica has a significant level of agro-processing using local raw materials, including green papaya, passion fruit, hot pepper, grapefruit, orange and lime. The passage of the hurricane resulted in the complete loss of production of the local raw materials resulting in the need of importing with the consequent expenditure of foreign exchange. The main agro-processor normally purchases from about 200 farmers. The small scale rural based agro-processing enterprises were affected by structural damage inflicted on physical plants and loss of stocks, while the major processor did not report any damages.

4.1.1 Economic and livelihoods impact

The passage of Hurricane Dean is having a significant negative impact on agricultural production and livelihoods in Dominica. The crop destruction has resulted in the immediate suspension of banana exports to the United Kingdom and limited the export of non-banana crops to the regional markets resulting in the loss of foreign

exchange earnings estimated in excess of US\$ 11.0 million on an annual basis. The destruction is adversely affecting the livelihood of over 4 000 farmers and their farm families who have suddenly lost their main source of income. The livelihood of over 250 hucksters who sell non-banana food crops to the neighbouring islands has also been adversely affected as the volume of export has fallen dramatically. Also adversely affected are the traders in the local market. This loss of income is expected to affect the current standard of living of the affected populations by reducing their purchasing power, their food intake and their ability to pay loans and make utility payments.

The passage of the hurricane has virtually destroyed food crop production and is also expected to adversely affect food security at national level. Following the storm farmers have been able to rescue some food crops and make them available for sale on the domestic market. Consequently, severe food shortages have not yet been experienced. However food availability in local markets is already diminishing, with prices starting to rise and the situation is expected to deteriorate in the next few weeks.

4.1.2 Farmers' coping strategies

Some farmers have started to rehabilitate their farms and are using their savings, where available, for survival until the resumption of harvesting. Some farmers are expected to seek alternative forms of employment to generate some financial remuneration until their rehabilitated fields are back into production. The coping strategies by the farmers to supplement their income during the period of rehabilitation include fishing or employment in tourism or construction. However, it is likely that if appropriate assistance is not provided in a timely manner farm operations will be compromised, area planted will be reduced and a high level of migration to neighbouring islands will occur.

4.2 The livestock sub-sector

Hurricane Dean caused substantial damage to the livestock sub-sector, mostly to poultry. Damage was distributed island wide and the most affected areas extended from the south eastwards along the entire eastern side of the island. Most significant losses were farm infrastructure including structural damage to roofs and super structure of animal housing. There was also absence of pre-hurricane precautionary measures such as the trimming of large trees that are in close proximity to the farm buildings (Appendix 2). Uprooted trees disrupted roads, livestock fencing and water supply pipelines. Debris blocked drains and culvert crossings resulting in water washing over farm roads, gouging out canals and disrupting farm access.

Forty two farmers reported losses of 4 330 birds (both layers and broilers) and several sustained structural damages (Table 11). All farmers reported an immediate fall in egg production of 30-40 per cent in younger flocks and as much as 70 per cent in the older birds. This was due to trauma as a result of the hurricane. It is anticipated that production in older birds (over 10 months in production) will not return to pre-hurricane production levels. However younger birds (3 to 6 months in production) can be expected to return to full production in 6 to 8 weeks if properly fed and given the required vitamins and other husbandry practices. On broiler farms with young chicks, one to two weeks old, there were as much as 20 per cent deaths due to exposure, cold resulting from electricity failure, rain and wind blowing into brood pens and drowning as a result of flooding. Older broiler bird loss was small at less than 5 per cent. However there were a few exceptions of 70-80 per cent loss resulting from a roof falling in on birds or where the buildings were flooded and the birds drowned. Farms that do processing suffered loss of electricity for up to three weeks and in some cases failure of their standby generator resulted in loss of power. As a result slaughtering had to be discontinued and many birds grew oversized and were fed for longer periods than normal.

Table 11 - Death of livestock due to Hurricane Dean

Species	No. Farmers reporting	No. Animals	Value (US\$)
Pigs	29	104	19 300
Poultry	42	4 330	32 100
Cattle	10	19	14 100
Goats	63	189	14 000
Sheep	8	26	1 300
Rabbits	8	103	600
Total	160	4 771	81 400

Farmers reported loosing about 19 cattle (beef type animals) due mainly to fallen trees and in a few cases where the animals were tethered in low lying areas and the swollen rivers washed them away. Damage to the dairy farms was mainly structural to sheds with little or no loss of animals. For both beef and dairy farms there was serious structural damage of fencing, both wire and live posts, that were blown down by the wind. Housing structures for pigs suffered significant damage. Roof damage was mainly due to inadequate investment in roofing material and poor construction. On some farms the pillars and concrete work were damaged when roofs were ripped off by the high winds. Water supply lines were also damaged.

Table 12 - Preliminary estimate for repairs to livestock farm structures

Farm Type	Estimate (US\$)
Poultry	37 000
Pigs	13 000
Cattle	1 500
Goats and Sheep	3 700
Rabbits	750
Bees	1 900
Farm roads	3 700
Fencing	3 000
Total	64 550

Farmers reported loosing 189 goats and 26 sheep due mainly to trauma after trees fell on tethered animals. Damage to fencing was observed in several pastures. The south, southeast and northeast experienced the worst fence damage. There was minimal damage to fencing on pastures where live *Gliricidia sepium* plants were used for posts and regularly trimmed. In the central areas and in the east there was damage to rabbit cages but the loss of animals was minimal. There was also serious damage to the housing for indigenous chickens and ducks due mainly to inadequate construction. The preliminary estimated for repairs to livestock farm structures is US\$ 64 500 (Table 12).

4.2.1 Impact on livelihoods

Livestock production on the island is generally marginal in terms of financial profitability. However livestock provides protein for the household and is thus essential for food security. Livestock production also acts as a safety net for the poor as goats, sheep, rabbits and at times local pigs, are produced on locally grown feeds with very little imported grain. Animals play an important role in soil amelioration (manure) for the production of vegetables and other food crops. Livestock production is also a substantial employment and income earner for women. This is particularly so for small animals such as rabbits, poultry and the common fowl whose losses occurred but were not reported. It is also important to note that some older rural people rely entirely on income from animal production for living.

Loss of production from livestock enterprises will adversely affect income and place many farm families in a position of being unable to purchase adequate food, pay loans and bills while still trying to rebuild their farms. Already several families have been complaining about the lack of funds to be able to adequately prepare their children for the new school year. It is expected that within a month to six weeks the loss of animals will result in food shortages at household level, especially animal protein that would be expensive to purchase.

4.3 The fisheries sub-sector

The passage of Hurricane Dean caused a high level of damage to the fisheries sector as a result of storm surges and high winds that ravaged boat sheds, destroyed fishing boats and equipment and rendered a number of landing sites inaccessible to fishers. The damage varied according to the landing site location and the quality of the infrastructure. Severe signs of sub-marine habitat destruction were also apparent in certain areas along the coast. Surface water runoffs, particularly in areas along the west coast where quarrying activities are being undertaken, transferred huge volumes of debris and quarry waste onto the ocean floor. Aquaculture also suffered badly and the island's main prawn hatchery facilities and production units were destroyed by floods.

Stowe and Fond St. Jean on the south-east coast, Scotts Head in the south and San Sauveur on the east were the landing sites that were most badly affected. At Stowe and Fond St. Jean the sites were rendered inaccessible to any type of fishing activities for a period of two to three weeks. At Fond St. Jean the landing site

was inaccessible to fishers from both land and sea as a result of deposition of large boulders from the wave action. In San Sauveur the breakwater which served to reduce wave action reaching fisheries structures sustained moderate damage. In the south western communities of Mahaut and Salisbury, as well as in Capuchin in the north, concrete structured jetty plankings were completely removed.

Table 13 - Damages to the fisheries sector and the estimated replacement value

Type	Quantity	Estimated value (US\$)
Gear: Pots	1134	83 800
FADs	3	4 500
Fishing gear: Outboard motor	12	39 200
Fishing boats	18	48 200
Boat sheds	30	32 700
Aquaculture facilities	4	31 300
Buildings	9	58 700
Locker rooms	9	28 000
Landing sites	4	50 400
Others		140 900
Total		517 700

A total of 139 fishermen and fisher organizations reported losses as a result of the hurricane. About 55 of the total number of fishermen who suffered losses are registered with the Fisheries Division. It is estimated that about 60 per cent of the non-registered fishermen are also farmers and would have suffered crop losses as well. Island wide fishermen reported a significant loss of fishing gear, mainly fish pots (traps) and it is estimated that over 1 100 were lost (Table 13). The severe losses were mainly due to the inability of fishermen to retrieve the gear in a timely manner. In the case of the pot fishery, many of the part-time / farmer fishers live on holdings that are far inland and away from the sea. This is reported as being typical in the rural communities where pot losses were the highest. Also many of the users of fish pots do not have their own boats and have to depend on the availability of a craft to engage in individual retrieval of fish pots.

Losses suffered by fishermen also included boats, outboard motors, boat sheds and other fishing gear. Fishing boats and outboard motors, although removed to locations that were considered safe, also suffered damages. Fishermen reported damages to 18 boats and 12 outboard motors. At Fond St. Jean Fisheries Cooperative outboard motors that were stored indoors were submerged for up to 48 hours. Outboard motors were either physically broken or swamped with sea water and dependent on the length of time before retrieval can be considered a total loss. Losses of that nature were most prevalent in the south and south-east where the impact of the hurricane was the greatest.

Boat sheds are generally individually owned and are built to partially protect landed boats from direct sunlight. Damage to these sheds ranged from loss of roofing material to total loss as a result of wave and wind action. Many of the locker rooms withstood the impact of the hurricane mainly because of their concrete sides and in some cases concrete roofs as well. However where the roofs were made of other materials there was significant damage by the high winds. In some localities such as Stowe and Fond St. Jean on the south-east the buildings were severely damaged. Some Co-operative buildings that are used for administration and sales also suffered damages from wave action while others that were situated away from the reach of the waves suffered damages to their roofs. Fond St. Jean was one of the areas that suffered the greatest damage.

The passage of Hurricane Dean resulted in the severing of the isthmus leading to Scotts Head. This can result in the mixing of the waters from the Atlantic Ocean with that of the Caribbean Sea in the Soufriere/Scotts Head bay. It was also observed that the intense rainfall associated with the passage of the hurricane resulted in the transport of large volumes of rubble and quarry generated waste along the western coast. Also of concern is the leaching and runoffs of agrochemicals from farm lands to the coast via rivers and other transport medium.

Aquaculture facilities were severely affected. The aquaculture facilities are operated privately and are supported by a prawn hatchery that is the property of the Government. The private holdings as well as the government facility had their entire water intake system demolished. The intake system consisted of structures that collected and channelled water from the river through gravity flow into decantation tanks and fish and prawn grow-out ponds. The actual ponds in all instances were not directly affected by the flooding rivers but the absence of water flowing into the facilities resulted in massive death to the prawns and fish that were contained in the

ponds. Substantial losses were sustained as a result. The Government prawn farm hatchery suffered additional damage to its roof which was blown off. The roof of the laboratory and processing building was also blown off. Consequently operations at these facilities are now at a standstill.

4.3.1 Economic and environmental Impact

The passage of the hurricane negatively impacted the level of production of the sector. Officials of the Fisheries Division as well as Fisheries Data Collectors stationed in 12 landing sites around the island have confirmed that there was a lull in fishing activities up to about 2 weeks following Dean's passage. Fishing activities recommenced in the third week after the hurricane, but remained low-keyed and reports from data collectors indicate that production was approximately 70 per cent lower than normal. In areas where the hurricane's impact was lowest and access to the sea was unimpeded, there were renewed efforts whereby fishermen constructed small quantities of fish pots with whatever resources they have and began deployment.

Typically, some fishermen use the opportunity after a hurricane to test new ways to increase earnings. Fishing effort increases whereby the "soak-time" for fish pots is reduced and the number of fishing trips per day is doubled. This is usually accompanied by the use of undersized wire mesh resulting in smaller fishes being landed thus adding pressure onto the targeted resource base.

The severing of the isthmus leading to Scotts Head is a matter of grave environmental concern as it will generate mixing of the water from the Atlantic Ocean with the Caribbean Sea in the Soufriere/Scotts Head bay. Such action threatens the ecosystems contained therein that are part of a web and habitat to coastal pelagic species. The severing of the isthmus is likely to affect some of the best scuba sites in Dominica that are located within the bay's enclosure. Also of concern is the impact of surface water runoffs, particularly in areas along the west coast where quarrying activities are being undertaken, on the near shore marine environment. The impact of leaching and runoffs of agrochemicals from farmlands to the coast via rivers and other transport medium is expected to result in alga blooms. These have serious implication for juvenile fish, coral and other marine organisms and will therefore impact negatively on production.

4.3.2 Impact on livelihood

Fishermen are generally not participants or beneficiaries to unemployment or social security schemes. Following such natural disasters they are left to be creative to earn a living and support their families. In some areas on the south-eastern corridor where fishermen were hard hit, alternative means of employment were being sought as a means to earn quick cash. Some fishermen turned to subsistence agriculture on whatever holding possible, some engaged in harvesting of bay leaf for the production of bay oil, while others sought employment in the post-hurricane reconstruction efforts as labourers.

Fishermen interviewed also indicated that they have problems meeting their regular consumption needs and anticipate defaulting on loan payments at lending institutions. Migration was an option opened to many who felt desperate. Many older fishermen contacted were expecting assistance to come to them from relatives overseas. Some conservative fishermen indicated that such phenomenon whereby their livelihoods can be shattered at such short notice, justifies that one should not acquire loans for fishing activities. They were concerned that the lending institutions do not consider their inability to service their loans under such circumstances.

4.4 The forestry sub-sector

The passage of Hurricane Dean resulted in a significant amount of damage to Dominica's forest ecosystem. The high winds and heavy rainfall resulted in defoliation, broken tree limbs, uprooted trees and landslides. The defoliation was extensive while the damage to trees was not excessive and not concentrated in any one area.

The Eastern or La Plaine Forest Range was the most affected and suffered damage and destruction of up to 35 per cent of the forest cover. There are some relatively small areas mostly in valleys and some ridges where a high percentage of the trees were damaged. This range consists of some popular tourism sites including the popular Emerald Pool, Sari Sari Falls and Victoria Falls. The sites were not significantly affected but the trails suffered defoliation and broken branches resulting in forest cover loss of up to 29 per cent.

The Central Forest Range was not so seriously affected. The nature of the destruction ranged from fallen or uprooted trees, small landslides, and minimal damage to the lumber storage shed and nurseries in two forest stations. The range also experienced some flooding in the "Wet Area". In general damage to the Central Forest Range was sporadic and concentrated in small patches. Damage was similar for the Northern Forest Range. However the Woodford Hill swamp suffered extensive damage with 90 per cent damage of trees along the entire length from the estuary to about 1.5 km upstream. There was however minimal damage to the surrounding forest outside the immediate area of the swamp². The nature trails in the Northern Forest Range became blocked as a result of uprooted trees and broken branches.

In the Southern or Roseau Forest Range there was significant damage to the Soufriere Sulphur Springs, the area around the Middleham Falls, the Trafalgar Falls and other areas within the major tourist attraction sites in southern Dominica⁷. The trails in the Middleham Falls, Boiling Lake, Trafalgar Falls and other tourism related sites within this range were severely affected by fallen branches, water erosion, flooding and uprooted trees. The forests in this range suffered greatly with many more localized areas of damage, particularly in the south and southeast, than the other ranges.

Similar damages occurred on private forest lands. However higher incidences of landslides and landslips into major and minor roads were observed on private lands. This appears to have resulted because of the proximity of private lands to the roads and also poor land use practices on these lands.

Damage to the forest cover is expected to be associated with accelerated erosion of the top soil; inappropriate management practices of watersheds and water catchments; increased flash flooding and landslides and the resulting negative impact on lives and properties downstream, as well as with adverse effects on the marine environment. Damage to the forest is also expected to impact on the wildlife habitat and the availability of food sources. The wildlife depends on seeds, fruits and young shoots for food and on the forest cover for protection and opportunities for nesting. As a result of the damage to the forest, the wildlife will be subjected to tremendous amount of pressure for survival and is expected to turn to agricultural crops for food, resulting in further losses and hardships for farmers. Damage to the forest can also affect revenue generation for eco-tourism related activities that is an important selling point for tourism promotion to the island.

4.4.1 Forest rehabilitation

Rehabilitation and restoration of the forests and various eco-tourism sites is essential to ensure their quick recovery particularly given their role in environmental sustainability. The costs for rehabilitation of forest ranges and eco-tourism sites have been estimated at US\$ 1 133 600 as summarized in table 14. The detailed estimated costs are presented in Appendix 3. It is important to note that a significant portion of the affected forest will resuscitate by natural regeneration. However in a number of instances there is a need for the removal of precariously poised trees that are either leaning on other trees or are already dead or dying. These trees are potentially dangerous to the users of the forest particularly in the eco-tourism sites.

Table 14 - Summary cost for forest rehabilitation

Location	Estimated cost (US\$)
Eastern Forest Range	115 500
Central forest Range	115 300
Northern Forest Range	385 200
Southern Forest Range	267 400
Botanic Gardens	250 200
Total	1 133 600

4.5 Most affected population

The areas of the country worst affected by the passage of Hurricane Dean were on the south and east of the island. These areas coincide with the most vulnerable communities which have shown the highest poverty levels as presented in the 2003 Country Poverty Assessment Report. Thirty five percent of the island's poor live in the most vulnerable communities of St. Mark, St. Patrick and St. David (Fig 2). Over a third of all poor households in

² Assessment of damage to the forests and national parks sector caused by Hurricane Dean, Forestry, Wildlife and Parks Division, 2007

the country are to be found in these three parishes yet they contain less than a quarter of all households³. Employment opportunities in these areas are low and mainly involve agriculture or fishing. In these rural areas dependence on agriculture or fishing for livelihood is very high not only for income but as a source of food. The high level of damage caused by Hurricane to the south and east of the country is therefore a major threat to the livelihood of the families in these areas and can be expected to exacerbate the levels of poverty.

5. RECOMMENDATIONS

Recommendations for rehabilitation of the sector are proposed for immediate (0 to 3 months), short (3 to 12 months) and medium term (1 to 2 years) responses.

5.1 Immediate

Immediate relief is recommended as follows.

(i) Crops

- Provision of appropriate inputs required for urgent rehabilitation including planting materials, seeds, fertilizers, soil ameliorants, agricultural chemicals, small farm machinery and equipment;
- Supply of plastic / shade cloth for greenhouse farmers;
- Material assistance for repair of irrigation lines and intakes;
- Supply of chainsaws for farm rehabilitation activities;
- Provision of pruning tools for the heights management (e.g. breadfruit);
- Provide crushed aggregate to farmers for the repair of farm access roads;

(ii) Livestock

- Provide poultry feed, medication, vitamins and other needed supplies to bring poultry back into production;
- Supply material assistance for the repair of water supply lines;
- Provide materials for emergency repair to damaged livestock housing;
- Supply chain saws for agricultural land rehabilitation;
- Conduct training workshops on safe use of chainsaws;
- Provide crushed aggregate to farmers for the repair of farm access roads;
- Supply chicks and small ruminants to livestock farmers to replace lost animals;
- Provide twenty-five 2-week old broilers and feed to selected small farm families to enable them to produce their own protein food during the first 6 months after the hurricane;
- Provide older farmers and women-headed households with food aid until farm production is restored.

(iii) Fisheries

- Provide materials for the construction of fish pots, FADs and other fishing materials;
- Provide materials for the repairs to fishing boats, engines and boat houses;
- Provide assistance to ensure that water can be harnessed and transported to the aquaculture ponds using gravity flow.

(iv) Forestry

- Supply chainsaws for forest rehabilitation;
- Conduct training workshop on the maintenance and safe use of chainsaws.

³ Medium-Term Growth and Social Protection Strategy, 2006

5.2 Short-term intervention

(i) Crops

- Improvement of cropping practices to expand the use of wind breaks, grass barriers, storm drains, contour planting and pruning;
- Promotion of cropping cycles to ensure maturity of selected food crops (e.g. sweet potato, tannia and pumpkin) during the peak period of the hurricane season;
- Development of hurricane disaster plans for crop farmers;
- Improvement of the agricultural information system;
- Improvement of agro-meteorological data collection;
- Development of crop insurance scheme for non-banana farmers;
- Documentation of best practices to minimize hurricane damages.

(ii) Livestock

- Develop designs for farm structures that are more resistant to hurricanes;
- Encourage the use of hurricane straps in roofs during rebuilding;
- Provide subsidized material to farmers for rebuilding;
- Develop hurricane disaster plans for livestock farmers;
- Assist farmers to replace lost rabbits and hutches to provide protein food;
- Provide beekeepers with wax foundation and frames to re-establish what fell and got blown away;
- Documentation of best practices to minimize hurricane damages as shown in appendix;
- Encourage farmers to invest in secure feed and shaving storage construction;
- Seek to provide special grant investment funding through a farmers organization for re-establishment of farm structures.

(iii) Fisheries

- Development of disaster management plans for each landing site;
- Documentation of best practices to minimize hurricane damages.
- As a priority, work should be initiated at Fond St. Jean and Stowe landing sites to be continued into the Medium Term. Reconstruction should be geared to provide safe anchorage to vessels at these sites, as well as proper landing facilities and adequate boat parking. This can be accomplished by the extension of the headlands using concrete tetra-pods or rock armour (> 5 tons) to create calm waters within the two extensions
- Encouragement of fishing techniques to remove dependence on fish pots during the hurricane season. Fishermen should be introduced to new fishing techniques that will make their susceptibility to events such as hurricanes less critical. There should be provisions for a budget as an aid package for training initiatives that would teach fishermen to target the same resources harvested with fish pots using multiple hook vertical and bottom long lines.
- Introduce fishers to the use of biodegradable panels in their fish pots to be implemented as part of the support to replace lost traps;
- Retrofitting of all boat sheds, buildings and aquaculture facilities should be undertaken;
- Conduct rehabilitation of landing sites to improve protection from high seas;
- Improve and expand locker room facilities;
- The rehabilitation, development and retrofitting of the isthmus of Scotts Head point is recommended as a priority. The deployment of rock armour along the eastern part of the isthmus is required. This should be complemented with 15-metre long groins at intervals. These would act as wave breakers, dissipate wave energy and serve as sand accretion points. The rehabilitation should start in the short term and could continue in the medium term. The coordination of such undertaking should be in consultation with the Local Area Management Authority (LAMA) of the Soufriere / Scotts Head Marine Reserve (SSMR).

(iv) Forestry

- Manipulation of canopy in parrot habitats to induce growth of wild life trees where seeds have fallen onto the ground;
- Implement maintenance and utilization work to remove fallen and vulnerable trees;
- Employment of chainsaw teams for maintenance and utilization within the forest reserve and national parks;
- Implement regular maintenance of forest trails;
- Develop a plan for the management of private forestry lands;
- Documentation of best practices to minimize hurricane damages.
- Develop and conduct training for safety measures to be adhered to by staff, farmers, tour guides and all visitors to the forest;
- Conduct research on crop depredation by forest wildlife;
- Development of agro-forestry practices for steep slopes;

5.3 Medium-term Intervention

(i) Crops

- Strengthening of farmer groups and associations to assist with disaster management;
- Market development and expansion of selected crops that have shown greater tolerance to hurricane force winds;
- Conduct an agricultural census;
- Development a comprehensive land use management plan.

(ii) Livestock

- Establish and maintain a database for livestock farming activities;
- Assist farmers and farm families to develop their individual farm and household disaster preparedness plan.

(iii) Fisheries

- The impact of hurricane Dean and other such events goes beyond the period of visible recovery particularly when it has to do with the ocean floor. Based on the excessive amount of quarry material that flooded the west coast it is recommended that a research programme be implemented to study the level of habitat degradation and recovery.
- Strengthening of fisher groups and associations to assist with disaster management;
- Develop and implement appropriate policies and management for land based facilities including quarries and dumps that affect the marine environment.
- Conduct research and training in the construction and deployment of FADs for reef species. This should target the younger component of the fishing population.
- Review the relatively large number of landing sites with an aim to develop 6 to 8 major protected sites for use during inclement weather;

(iv) Forestry

- Seek assistance for a project to conduct a study of current forestry ownership, land use practices and boundary demarcation.

6. **PROJECT IDEAS**

Three project ideas for the forestry sector and one for documenting best practices are submitted as follows.

(i) **Management of private forest lands**

Objective: To develop a project calculated to involve the owners of private forests in the proper management of forested lands especially those of steep slopes, particularly when located adjacent to public roads and water catchments.

Justification

It has been observed that most of the landslides and landslips which occurred during and immediately after Hurricane Dean were on privately owned land. These events resulted in significant damage to the public roads rendering them impassable to vehicular traffic for extended periods of time. Communities are sometimes made inaccessible due to landslides. It is generally believed that one of the main or common factors contributing to the occurrence of landslides is poor land use practices.

The owners of private lands, or forests should be made to understand that they have a critical role to play in the protection of the island's land masses. One of the most astute ways to do so is to involve them in the decision making by providing them with the opportunities, as would be afforded by such forums as workshops, symposiums and seminars, in order to do so. These land owners forums would also provide them with a platform to engage in open discussions where by they will voice their views, queries, suggestions, etc. This form and level of participation will be expected to stimulate a sense of a greater awareness of their responsibilities as land owners, and consequently bring about an awareness of a more intimate sense of ownership of the island as a whole.

Such a project will also lay the platform for an improved relationship between government and owners of private lands. At present, there is much need for improved mutual relationship between the two parties.

(ii) **Research on crop depredation**

Objective: To conduct research on crop depredation by wildlife, mainly agouti and birds (mainly parrots).

Justification

Over the years, the attack of agricultural crops by wildlife (especially parrots on citrus, and agoutis on pumpkins, cucumbers, yams, etc.) has proven to be a great challenge to crop farmers. Farmers who are victims to such wildlife attacks are faced with frustration and loss of income due to high levels of crop losses. Moreover since it is illegal to kill wildlife out of season, farmers have become very vulnerable when faced with such attacks.

The passage of Hurricane Dean has exacerbated the situation as a very high percentage of wild life food was blown to the ground by the storm. As a result, crop depredation of food crops can be expected to increase significantly. A greater understanding of crop depredation under local conditions should assist the development of control measures.

(iii) **Development of a biosphere reserve**

Objective: Establishment of a biosphere reserve on Dominica.

Justification

The concept of a biosphere reserve is somewhat between a forest reserve and a national park. While a biosphere reserve allows for agricultural practices or other activities, these must all be conducted within clearly laid out standards, guidelines, and policies. A biosphere reserve will complement the nature isle concept of the island and the eco-tourism concept. There will be a need for regulations and legislations to facilitate the management of a Biosphere Reserve.

Within a biosphere reserve, for example, regulations governing terracing across the slopes (or along the counters), the prohibition of the use of chemicals, selective felling of trees, specifically selected trees to be planted on slopes say above 20 per cent, must all be strictly adhered to. In a biosphere reserve, one ought to be able to drink water without fear of pollution. The development of a biosphere reserve will help to improve land use practices.

(iv) Documentation of best practices

Objective: To document best practices that can be used by farmers and fishers to minimize hurricane damages

Justification

Farmers and fishers suffered substantial damage as a result of the passage of Hurricane Dean. Crop farmers suffered loss of crops, damage to storage sheds, greenhouses and water distribution lines as well as access roads. Livestock farmers suffered significant losses to animal housing, fencing, water supply lines, farm animals and access roads. Several fishers lost fish pots and FADs as well as suffered damage to their boats and outboard motors.

Discussions with farmers and fishers indicate that many of them did not implement timely risk management measures in an attempt to minimize the adverse effects of the hurricane. However there are several best practices that can be implemented to reduce damages to farming and fishing activities. These risk management practices are not documented and not readily available to farmers and fishers. There is an urgent need to identify and record disaster risk management practices for use by farmers, fishers and extension officer.

7. PROJECT PROFILES

7.1 Commercialization of coffee production

(i) Introduction

Agriculture, primarily banana production, has dominated the economy of the Commonwealth of Dominica for several decades. However within recent time the contribution of agriculture to GDP has declined sharply from about 21 per cent in 1996 to less than 17 per cent in 2006 and its position as the country's dominant sector has been overtaken by Government services. Production of bananas has declined from 60 – 70 000 tonnes in the late 1980s / early 1990s to under 22 000 tonnes in 2006 due both to the impending loss of preferential European markets and destructive hurricanes and storms in 1989 and 1995. The number of banana producers for the export trade has also declined sharply from over 6 000 in 1990 to less than 1 000 in 2007.

As a result of the marked decline in banana production and the subsequent adverse effect on foreign exchange generation and rural employment, the Government has been attempting to diversify the agricultural sector. Significant efforts have been placed on non-banana crop production including citrus, avocado, dasheen and coconuts for the export market along with increasing the production of vegetables and livestock for the domestic market. These efforts have met with some success and Dominica has become a major supplier of fruits and root crops to the surrounding French and English speaking countries.

Crop production was severely affected by the passage of Hurricane Dean on August 16 and 17, 2007. A review of the damage indicates that over 75 per cent of the crops were lost as a result of the high winds, intense rainfall and landslides. It was however observed that at least three crops viz. coffee, pineapple and bay leaf suffered significantly less damage than the other crops. It would therefore appear that if markets can be accessed, increased production of these crops should be targeted so as to reduce farm losses that frequently occur from tropical weather disturbances.

Coffee is a crop of significance to several farmers in at least two locations in Dominica known as Aupiton and Syndicate where it is grown at elevations above 300 m. The crop has been grown by farmers for several decades and in the late 1980s the British Development Division facilitated the development of a road network to serve the potential coffee growing areas. During that period coffee production received significant support from the Government and the area planted was expanded by farmers.

The Arabica coffees are the unique quality coffees that command the highest prices internationally. Jamaica is an outstanding example in the production of its world famous "Blue Mountain Coffee". In consuming countries the demand for Arabica coffee has increased markedly since the late 1980s. The Arabica thrive best at higher elevations where the flavour development appears to be enhanced by the wet humid conditions. It appears as though the growing conditions in the higher elevations of Dominica are conducive for the development of high quality coffee. Reports from previous Ministry of Agriculture staff have advised that tests conducted on the Dominica Arabica coffee have identified it as been of excellent quality and similar to the Jamaican "Blue Mountain Coffee".

Primary processing of locally grown coffee is done by farmers using the wet processing method in preparation for further processing by individual processors or the agro-processing plant. The existing coffee production is minimally processed by the farmers and sold either to a local processor or to hucksters for sale in the nearby French islands. The prices paid to the farmers are relatively low and have not encouraged further expansion in coffee production. Market penetration would be essential for further expansion of production by the local farmers. For maximum returns coffee would have to be marketed as a high quality specialty product that targets the gourmet, premium market. There would therefore be a need for support in the areas of production, manufacturing and marketing.

(ii) Objective

The objective of the project is to develop and market the Dominican coffee as a high quality specialty product in the international market. A second object is to provide farmers with an alternative crop that can show a high level of tolerance to winds of up to category 2 hurricane.

(iii) Project description

The project will involve the following components.

- Explore market opportunities for high quality Arabica coffee.
- Evaluate the current production practices with a view to improve where necessary.
- Develop and test market the product.
- Develop pilot facility for the production of specialty coffee.

(iv) Indicative costs

The indicative cost is US\$ 1.0 million.

(v) Beneficiaries

The beneficiaries would include the farmers of Dominica, the investors and the Government.

7.2 Study of habitat degradation and impact on fisheries

(i) Introduction

Dominica's fishing industry is relatively small and artisanal in nature employing just over 3 100 fisheries with about 1 000 on a full-time basis. The fisheries sub-sector contributes about 12.1 per cent to agricultural production and remains extremely important to food security and rural employment. It also provides a vital source of protein for local consumption particularly for many vulnerable groups. The annual quantity of fish landed has ranged between 500 000 and 700 000 kg with estimated values of US\$ 2.0 to US\$ 2.9 million. The majority of the fishers operate on a part-time basis targeting various species within the 19.3 km territorial sea limit.

The fishing fleet consists of traditional floating rafts, dug-out canoes and variations of wood and fibreglass vessels ranging from 4.3 to 9.1 m in length. These vessels are characterized as day-boats because of their open hull structure, limited space and an absence of navigational aids and amenities to allow for longer fishing trips beyond 12 hours. In most cases fishing operations are cantered along coastal communities where land base sea

access is feasible. Fishing activities have dominantly occurred within the 19.3 km territorial waters but with the introduction of the use of Fish Aggregating Devices (FADs), fishers have been spreading beyond that limit.

Fish landings have been increasing in recent years but the volume of landings is unable to meet the domestic demand for fish. This results in considerable importation of fish and fish products. The fisheries sector is poised for expansion because of Government's commitment to improving the basic fisheries infrastructure through the development of seven zonal centres. However a number of factors can adversely affect the expansion. One challenge is the potential rapid rate of habitat degradation from multiple factors including land based activities.

The passage of Hurricane Dean and other tropical events are believed to have resulted in significant habitat degradation due primarily to runoff from land based activities including quarrying, run off from rivers and the dumping of soil on the coast. It is known that these activities have been adversely affecting the marine environment but the extent of the damage and the level of impact are unknown.

(ii) Objective

The objective of this project is to conduct an assessment of marine habitat degradation and its impact on fish production.

(iii) Project description

The project will consist of the following components

- Conduct rapid assessment of the current level of habitat degradation following the passage of Hurricane Dean.
- Monitor impact on habitat for a period of two years.
- Develop recommendations for improved management of land based activities that adversely affect the marine environment

(iv) Indicative cost

The indicative cost is US\$ 0.5 million.

(v) Beneficiaries

The primary beneficiaries would be the fishers of Dominica.

7.3 Development of a comprehensive land use management plan

(i) Introduction

The Commonwealth of Dominica is the largest and most mountainous of the Windward Islands with an area of 751 square km and measures 47 km in length and up to 25 km wide. The total land area is approximately 75 000 ha with over 30 per cent of the land being covered with forest. The topography is characterized by very rugged and steep terrain with the ground steeply rising from the sea. The northern half of the island is dominated by the cone of its highest mountain, Morne Diablotins, which is 1 447 m above sea level. A chain of seven other mountains extend from the island's centre to the south. Four of Dominica's mountains rise above 1 200 m. The topography is also characterized by a large number of ridges and deep narrow river valleys. The higher peaks are volcanic in origin and support a more or less radial drainage system.

The climate of the country is classified as humid tropical marine with average temperatures of 27°C. Due to the island's rugged topography, micro-climate variability exists within very short distances and this is influenced by the high moisture content of the air masses that enter the region from the Atlantic Ocean. Consequently, this makes Dominica a very high rainfall country. Rainfall increases from the leeward (or western) side eastward towards the central part of the island and ranges from 200 to over 625 cm per year. Most of the rain falls between June and October which is the peak months for tropical storm activity.

Dominica's natural vegetation covers an estimate 51 770 ha or over 66.0 per cent of the land area. Of that figure about 31 060 ha or 60 per cent are privately owned. State lands include 9 224 ha of forest reserve, 6 475 ha of national park and 5 369 ha of unallocated State lands. Private forests cover an extensive area and play a significant role in hurricane impact mitigation. The country has seven major watersheds that are found mainly in the central region of the island on both the windward and leeward sides. It is important to note that almost all of the 43 water catchments areas are located on privately owned lands.

Dominica is extremely vulnerable to natural disasters and economic shocks and it is rated as the seventh most vulnerable country in the world⁴. The environmental vulnerability has meant that the cost of maintaining infrastructure has been higher than in most countries. The country experiences frequent landslides and erosions caused by extreme weather conditions.

The Government of the Commonwealth of Dominica has recognized the extreme vulnerability of the country to natural disasters and in the 2006 Medium-Term Growth and Social Protection Strategy has identified measures that will reduce environmental vulnerability. The measures include approval and implementation of the OECS Physical Planning Act and its National Environmental Management Strategy and Action Plan. The Plan articulates the environment management priorities of Dominica and aims at improved management of land and sea space. It contains the steps, resource requirements and time frames for implementation and envisages the use of environmental impact assessments for large public and private investment projects.

One critical step to achieve successful management of this extremely vulnerable island is a comprehensive land use management plan that would guide all land uses in the country. The government is cognizant of the need to effectively manage its resources and in the 2007/2008 Budget Address the Hon. Prime Minister indicated the intention to address the following:

- Sustainable development and environmental management;
- The use of risk reduction and disaster mitigation in development planning; and
- The identification of key issues for comprehensive physical planning to include zoning and land use practices.

The 2006 Medium-Term Growth and Social Protection Strategy identifies that development in the agricultural sector relates to land use, availability and ownership. A critical impediment to the development of agriculture, tourism and housing has been identified in the Strategy as the lack of land use planning or a wider human settlement policy.

A significant level of the damage that occurs following a tropical disturbance can be attributed to improper land use management practices over an extended period of time. There is therefore an urgent need for a comprehensive land use management plan to be used in the mitigation efforts for natural disasters. The need for a land use plan has been identified by several stakeholders and the Planning Unit has recently received a consultant's report that developed terms of reference for a national land use plan⁵. The report can be used as a reference for the implementation of this project

(ii) Objective

The objective of the assistance is to develop a comprehensive land use management plan for use by all sectors in national development.

(iii) Project description

The project will involve a study of current land use and development activities in Dominica taking into account the country's strong tradition in private land ownership. The project will take into account prime agricultural lands and environmentally sensitive areas that are in private ownership. The socio-cultural values relating to land including a strong tradition of family land ownership and communal land ownership among the Caribs will also be considered. The project will also evaluate the varying land use capabilities and develop strategic options.

⁴ 2006 Medium-Term Growth and Social Protection Strategy

⁵ Terms of Reference for a National Land use Plan Final Report, 2006

(iv) Indicative costs

The indicative cost is US\$2.0 million

(v) Beneficiaries

The beneficiaries will be the Government and people of Dominica.

7.4 Conduct agricultural census

(i) Background

An agricultural census was last held in the Commonwealth of Dominica during 1995. Since then the process of collecting and processing of agricultural data has not been highly organized. As a result agricultural planning, particularly non-banana agriculture, is still highly dependent on the 1995 census data. It has been recognized by the Ministry of Agriculture that the current methods employed in the collection, organization, analysis and dissemination of agricultural statistics results in the availability of very limited current information. A major constraint to the effective implementation and management of Government's policy for the diversification of the agricultural sector has been related to deficiencies in marketing intelligence and agricultural statistics. The 2006 Medium-Term Growth and Social Protection Strategy recognizes the importance of data collection and proposes that improvements will continue to be made to Government's capacity for data gathering, analysis and utilization to inform and facilitate policy formulation and planning in the sector.

The Government is currently implementing a Special Framework of Assistance (SFA) programme which is designed to assist traditional ACP producers of bananas to adapt to new market conditions for their respective banana industries. As part of this assistance a Ministry wide Agricultural Information System (AIMS) is being established. The system is expected to include collection, organization, analysis, generation and dissemination of comprehensive and readily available data on all aspects of production, marketing, income, expenditure and capital formation in agriculture. The expected output of the AIMS is the provision of more targeted, effective, reliable, timely and commercially applicable agricultural information to stakeholders in the sub-sector.

The recent assessment of Hurricane Dean's impact on the agricultural sector has been made very difficult due to the absence of current data. The ability to quantify production levels immediately prior to the hurricane has been quite a challenge and in many instances only export data was available. The proposed establishment of AIMS would address this critical shortcoming for current data in the agricultural sector. The effective operation of the AIMS would require access to an updated agricultural database to determine the current state of agriculture in Dominica. This can best be achieved through the conduct of an agricultural census. The conduct of the census will compliment the current SFA initiatives to develop an AIMS and will give much needed support to the Agricultural Diversification Programme and the Medium-Term Growth and Social Protection Strategy.

(ii) Objective

To provide technical assistance for the conduct of an agricultural census in Dominica.

(iii) Project description

The project will consist of the following components.

- Census preparatory activities
- Conduct of a pilot census to evaluate the proposed methodology and make adjustments where necessary;
- Conduct of the actual census
- Preparation of the census report.

(iv) Indicative cost

The indicative cost is US\$1.0 million

(v) Beneficiaries

The Government and in particular the Ministry of Agriculture would have access to current baseline data that would facilitate planning and the implementation of the AIMS.

**PRACTICES FOR REDUCTION OF LIVESTOCK FARM LOSSES
RESULTING FROM THE PASSAGE OF A HURRICANE**

1. Pruning and trimming of large trees close to facilities prior to the hurricane season.
2. Pruning of trees in close proximity to buried water lines so that the tree would not topple over and break the piping system buried beneath them.
3. Release tethered animals prior to the storm.
4. Maintain 20-foot container, bolted down or a concrete structure, sides and roof, for storage of feed and shavings for broilers.
5. Water storage capacity for up to two weeks after hurricane
6. Disseminate information on water sterilization using chlorine bleach to ensure that stored water is fit for drinking (1/4 teaspoon per gallon)
7. Generators on broiler farms should be capable of running on farm refrigeration. The generators should be serviced prior to the hurricane season.
8. Use pro gas heaters for young animals, both chickens and piglets.
9. Rabbit hutches should be removed from stands and placed on the ground, away from areas prone to flooding.
10. Trimming/pruning of live fence posts.
11. Cleaning of drains around animal buildings, farm access roads, pasture/fields.
12. Veterinary Department should be on the alert to deal with possible disease outbreaks

APPENDIX 2

FOREST REHABILITATION COSTS

1. EASTERN FOREST RANGE

US\$

I. Evaluation of forest affected (this includes National Parks lands): minor reforestation, mainly maintenance work:	74 000.00
II. Watershed: major watershed within National Parks: replanting stabilizing;	29 700.00
III. <u>Eco-Tourism Sites</u> :	
• Emerald Pool: Salvaging lumber and maintenance:	500.00
• Sari Sari Falls: clearing trail:	1 300.00
• Victoria Falls: maintenance:	1 300.00
• Chemin Letang Road: maintenance:	1 300.00
• Delice Forest Station: restoration works:	7 400.00

Sub-Total	<u>\$115 500.00</u>

2. CENTRAL FOREST RANGE

• Forest Reserve: Maintenance canopy manipulation:	28 900.00
• Forest Plantation: Replacement planting maintenance:	24 400.00
• D'leau Gommier lumber storage shed: Damage roof and siding (i.e. external):	12 400.00
• Infrastructural damage (e.g. landing trail):	1 400.00
• Damage to Pond Cassé Nursery:	3 700.00
• Pond Cassé Forest Station: complete replacement:	44 500.00

Sub Total -	<u>\$115 300.00</u>

3. NORTHERN FOREST RANGE

Forest Reserve:

• Woodford Hill: Water catchment area and elsewhere inclusive of plantation and parrot habitat: maintenance replanting (e.g. line and patch planting) canopy manipulation etc.:	55 600.00
• Bense Heights (water catchment and parrot habitat):	22 300.00
• Blenheim Calibishie and elsewhere (inclusive of parrot habitat) similar treatment as above item	103 700.00

Sub Total -	<u>\$181 600.00</u>

Eco-Tourism Sites and Facilities

US\$

• Cabrits National Parks: trail renovation and maintenance:	64 800.00
• Cabrits Visitor Centre: roof damages:	400.00
• Indian River: cleaning maintenance:	1 900.00
• Syndicate Nature Trail And Forest: removal of dangerously poised trees salvaging maintenance:	133 400.00
• Syndicate to Picard Trail: cleaning general maintenance:	1 900.00
• Cold Soufriere: cleaning maintenance:	1 200.00

Sub Total -	<u>\$203 600.00</u>

4. SOUTHERN OR ROSEAU FOREST RANGE

• Bagatelle Forest (reserved): replacement (on steep slopes) Removal of fallen trees cleaning etc.:	31 900.00
• Petite Savanne (National Parks): Reforestation on steep slopes:	27 800 00
• Laudat (I.L.O. Reforested) L'riviere Murel forest: removal of fallen trees cleaning line planting patch planting (reforestation programme required):	129 700.00
• Other areas:	29 700.00

Sub Total -	<u>\$219 100.00</u>

Eco-Tourism Sites and Facilities

• Soufriere Sulphur Springs: cleaning maintenance renovation works:	20 000.00
• Middle Ham Falls (complete trail from Cockrane to Providence) removal of fallen trees cleaning maintenance:	3 700.00
• Trafalgar Falls: cleaning renovation works to the trail:	2 300.00
• Fresh Water Lake: cleaning and maintenance surrounding forest:	1 900.00
• Trail from Fresh Water Lake to Boeri Lake: maintenance renovation:	3 700.00
• Trail from Titou Gorge to Breakfast River: removal maintenance renovation:	7 400.00
• Trail from Breakfast River to Morne Nicholls: similar to above:	3 700.00
• Trail from Morne Nicholls to Boiling Lake: similar above:	5 600.00

Sub Total -	<u>\$48 320.00</u>

5. BOTANIC GARDENS:

• Replacement of two nurseries:	74 000.00
• Procuring of planting materials for the replacement of exotic plants destroyed by Hurricane Dean and lost over the decades by successive hurricanes:	22 300.00
• Special labour skills required and extra labour:	64 900.00
• Maintenance: For a two year period (labour):	55 600.00
• Tools and equipment:	33 400.00

Sub Total -	<u>\$250 200.00</u>

TOTAL - \$1 133 600.00

LIST OF PERSONS MET BY THE FAO MISSION

Hon. Dr. John Collin McIntyre – Minister of Agriculture, Fisheries and the Environment
Mrs. Claudia Bellot – Permanent Secretary Agriculture, Fisheries and the Environment
Mrs. Ruth Allport – Acting Permanent Secretary Agriculture (September 3 to 14, 2007)
Mr. Oliver Grell – Director of Agriculture
Mr. Minchinton Burton – Director of Forestry
Mr. Andrew Magloire – Chief Fisheries Officer
Mr. Lloyd Pascal – Director, Environmental Coordinating Unit
Dr. Reginald Thomas – Veterinary Officer
Mr. Adolphus Christian – National Consultant, Forestry
Mr. Errol Harris – National Consultant – Livestock
Mr. Nigel Lawrence - National Consultant – Fisheries
Mr. Urban Zamore - National Consultant - Crops
Mr. Richard Allport – Technical Officer (Ag), MOA
Mr. Manley James – Technical Officer, MOA
Mr. Vincent Little – Regional Project Specialist, IICA
Mrs. Hernica Ferreira – Manager, Winward Islands Crop Insurance
Mr. Nicholas Bruno – Acting Financial Secretary
Mr. Sam Carrette – Chief Development Planner, MOF
Mr. Michael Norris – Economist, MOF
Mr. Raymond Austrie – General Manager, Dominica Banana Producers Ltd.
Mr. Garner Eloi – Secretary/Manager, Dominica Essential Oils and Spices Cooperative
Mr. Trevorne Douglas – Agricultural Officer, MOA
Mr. Michael Taylor – Programme Development Specialist – Trade, USAID
Dr. Efrain Laureano – Caribbean Open Trade Support
Dr. Emaline Harris-Charles – General Manager, AID Bank
Mr. Clement Carty – AID Bank
Mr. Franklyn Fabian – Project Officer – AID Bank
Mr. Collin Bully – Executive Director, OECS Export Development Unit
Mr. Gregoire Thomas – General Manager, Dominica Export Import Agency
Mr. Peter Dominique – Financial Controller, Parry W. Bellot & Co. Ltd.
Mr. Mark John – National Programme Coordinator, Special Framework Assistance
Mr. Stephen Joseph – Agricultural Officer, MOA
Mr. Cecil Joseph – Executive Secretary, Dominica Hucksters Association
Mr. Gregory Robin – CARDI Country Team Leader
Mr. Edward Lambert – National Authorizing Officer, European Development Fund
Mr. Grayson Stedman – Executive Officer, Banana Industry Trust
Mr. Francisco Esprit – Coordinator, Small Projects Assistance Team (SPAT)
Mr. John Fahie – Projects Officer (SPAT)
Mr. Cecil Shillingford – Disaster Preparedness Coordinator
Mr. Norman Norris – Fisheries Officer
Ms. Doreen Joseph – Fisheries Data Collector
Mr. Harry Karam – Crops farmer
Mr. Victor Hesford – Crops farmer
Mr. Clement Charles – Crops/Livestock farmer
Mr. Richmond Shillingford – Crops farmer
Mr. Vincent Gregoire – President Fond St. Jean Fishermen's Cooperative
Mr. Kervin Stephenson – IICA Coordinator, Dominica
Mr. Kelvin Rolle – Chief Physical Planner
Mrs. Annie Edwards – Physical Planner
Mrs. Marcella Harris – Fair Trade
Dr. Don E. Robinson – Agriculturalist

**PRELIMINARY SUMMARY REPORT MEETING
WITH MINISTRY OF AGRICULTURE STAFF**

(SEPTEMBER 16, 2007)

List of Participants

Mrs. Claudia Bellot – Permanent Secretary Agriculture, Fisheries and the Environment

Mr. Oliver Grell – Director of Agriculture

Mr. Minchinton Burton – Director of Forestry

Mr. Andrew Magloire – Chief Fisheries Officer

Mr. Lloyd Pascal – Director, Environmental Coordinating Unit

Dr. Reginald Thomas – Veterinary Officer

Mr. Manley James – Technical Officer

Mr. Vincent Little – Regional Project Specialist, IICA