

Community Profile  
and Livelihood  
Baseline Assessment

# Spring Village

St. Vincent and the Grenadines



# Acknowledgements

The Government of St. Vincent and the Grenadines would like to thank the funding project partners specifically the European Union (EU) and the Caribbean Development Bank (CDB) – Caribbean Disaster Risk Reduction Fund (CDRRF). Thanks also to the other contributing partners including the Food and Agriculture Organization of the United Nations (FAO) and Social Development Commission (SDC) of Jamaica and Social Development Department Livelihood Based Assessment (LBA) participants from the British Virgin Islands (BVI).

The success of this community profile and Livelihood Baseline Assessment (LBA) can only be attributed to the many individuals who contributed their valuable input toward the preparation of the document. Many thanks also to the residents as primary stakeholders within the community of Spring Village for their support, encouragement, and constructive criticisms in making this profile a success. Also, the community leaders who participated in the focus group discussion and accompanied the facilitators are the engagement the wider community in discussions across various locations.

Special thanks, to the Ministry of National Mobilisation, Social Development, Local Government, Gender Affairs, Family Affairs, Persons with Disabilities and Non-Governmental Organisations and its hard-working team of officers who worked tirelessly under adverse weather conditions to gather the primary data and compiled the draft documents without which the profile development would not have been possible. It is also imperative to note the support from the Ministry of Agriculture, Forestry, Fisheries, Rural Transformation, the National Emergency Management Organisation as well as the Basic Needs Trust Fund office.

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# Executive Summary

Pre-disaster information is always a key resource in post disaster response (which includes post disaster assessments). When disaster strikes, it is critical to know how many people are likely to have been affected by the event and how. This requires knowledge of the demographic breakdown of the population and the vulnerability of different people to the disaster. Vulnerability will determine how badly they will be affected, how quickly they can be expected to recover and what kinds of assistance they are likely to need.

In many instances however, pre-disaster planning focuses on immediate response and action to protect human life and infrastructure, but without giving sufficient attention to damage and loss to livelihoods. Yet in the post-disaster period, if people are to recover, they need to restore their livelihoods as quickly as possible. This can only happen if detailed and quantitative information has been collected in advance of potential disasters so that livelihood based contingency plans, can be created and planned for.

In 2019, the Livelihood Based Assessment and Contingency Planning approach was applied in St. Vincent and the Grenadines to provide pre-disaster livelihood information for eleven communities involved in the Volcano Ready Communities in St. Vincent and the Grenadines (VRC in SVG) project.

Spring Village is a village north of the town of Barrouallie and south of Chateaubelair. It is comprised of Mangaroo, Cocoa, Gordon Village, Charles Village, Cumberland, High Road, Ball Ground, Hog Hole, Corner, Top village (Old Road), Middle Village, Gordon Yard, Belle Isle and Hermitage. The village lies approximately 17 miles south of the country's active volcano, La Soufriere and the western side is made of very fertile soil which the community utilizes for farming.

According to the 2012 Housing and Population Census the community of Spring Village has an estimated one hundred and eight (108) households with a population of three hundred and ten (310) persons. Data relating to the wider Barrouallie administrative division is used as an indication of the social realities of the community. These are discussed in detail in Chapter 3.

Based on an earlier conducted Community Engagement Survey funded by the project in September 2018, community development activities are seen as important by a majority of residents of the community but only few play active leadership roles through involvement in an organisation. The vision, mission and objectives of the community groups in Spring Village and other results pertaining to the survey are outlined in Chapter 3. Chapter 4 also provides an overview of the governance structure of the community.

Chapter 5 highlights levels of employment and the occupational groups in the Barrouallie Census Division, as an indication of the economic profile of the community. Chapters 1 through 5 form the Community Profile for Spring Village.

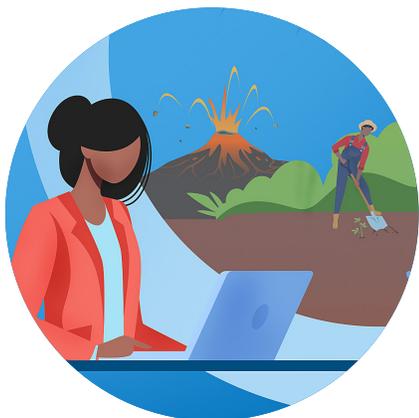
Chapter 6 is a profile of the main hazards that impact the community most directly while Chapter 7 outlines the impact of the April 2021 volcanic eruption.

In Chapter 8, the outcome of the Livelihood Baseline Assessment is detailed and includes a profile of community livelihoods and resources. The focus is primarily on agricultural livelihoods. Chapter 9 looks at the type of coping strategies that are employed to deal with hazard impacts on agricultural livelihoods.

Chapter 10 outlines the key response typologies and contingency measures that should be put in place in the event of any disaster.

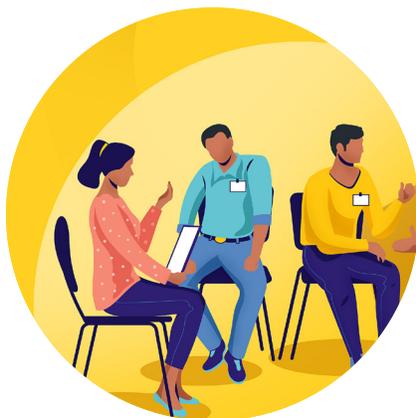
The Annexes present the damage and loss cost estimates for the agricultural assets, should a disaster occur, as well as the sources of information that were consulted.

# Table of Contents



## 1 INTRODUCTION 1

- 1.1 The Need for a Livelihood Baseline and Contingency Plan 2
- 1.2 Objectives of the LBA Process 2
- 1.3 The LBA process in St. Vincent & the Grenadines 2



## 2 METHODOLOGY 4

- 2.1 Primary sources 5
- 2.2 Secondary sources 5



## 3 DESCRIPTION OF COMMUNITY 6

- 3.1 Locational data 7
- 3.2 History/Historical development 8
- 3.3 Nature of Community (Culture, Traditions) 8
- 3.4 Natural Resources (Rivers, Forests, Farming Lands) 8
- 3.5 Land use and distribution 13
- 3.6 Population and age structure 14
- 3.7 Household Size and Household Heads 15
- 3.8 Union Status 16
- 3.9 Educational Attainment 16
- 3.10 Housing Quality 18
- 3.11 Housing and Land Tenure 19
- 3.12 Sanitation 20
- 3.13 Social Services 21
- 3.14 Public Infrastructure 22
- 3.15 Crime & Public Safety and other Developmental Issues 22



## 4 GOVERNANCE PROFILE 23

- 4.1 Political Directorate 24
- 4.2 Social/Civic Organisations 24
- 4.3 Methods of Community Engagement 25



## 5 ECONOMIC PROFILE 26

- 5.1 Poverty Levels 29



## 6 VULNERABILITY AND HAZARD PROFILE 31

6.1	Hurricanes	32
6.2	Flooding	32
6.3	Landslides, Storm Surge and Drought	33
6.4	Earthquakes	35
6.5	Volcanic Hazards	36
6.6	Environmental Issues in Spring Village Hazard Vulnerability in Park Hill	40
6.7	Hazards affecting Spring Village	42
6.8	Volcano ready project and reducing vulnerability	45



## 7 THE 2021 VOLCANIC ERUPTION 48

7.1	Crop Loss	55
7.2	Apiculture	55
7.3	Livestock	55
7.4	Fisheries	57
7.5	Forestry	58
7.6	Agriculture Infrastructure	58
7.7	Vulnerable Groups	60
7.8	Links/interaction with COVID-19	60



## 8 LIVELIHOOD ASSESSMENT AND CONTINGENCY PLANNING 61

8.1	Seasonal Calendars	63
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## 9 COPING STRATEGIES 66



## 10 RESPONSE AND RECOVERY TYPOLOGIES 68

10.1	Immediate Response Needs (next 3 to 6 months)	69
10.2	Medium to Long term Recovery and Rehabilitation Needs (next 6 to 12 months)	69
10.3	Response Typologies Identified for Spring Village	69



## 11 ANNEXES 71

Annx 1	Ministry of Agriculture, Industry and Labour Compensation List for Agricultural Crops and Livestock (2019)	72
Annx 2	Ministry of National Mobilisation - Services Offered under the Social Assistance Programme (XCD\$)	75
Annx 3	Ministry of Agriculture, Industry and Labour – Compensation List for Agricultural and Forestry Crops	76
Annx 4	Cost of Production	79
Annx 5	Images of Destruction in Spring Village along the Banks of the Cumberland River from December 2013 Floods	82
Annx 6	References	84

# Acronyms

<b>BMC</b>	Borrowing Member Countries
<b>BVI</b>	British Virgin Islands
<b>CARDI</b>	Caribbean Agricultural Research & Development Institute
<b>CARIFORUM</b>	Caribbean Forum
<b>CBO</b>	Community Based Organisation
<b>CC</b>	Climate Change
<b>CCA</b>	Climate Change Adaptation
<b>CCR</b>	Community Climate Resilience
<b>CCRIF</b>	Caribbean Catastrophe Risk Insurance Facility
<b>CCRS</b>	Community Climate Resilience Specialist
<b>CCVA</b>	Community Climate Vulnerability Assessment
<b>CD</b>	Census Division
<b>CDO</b>	Community Development Organisation
<b>CDB</b>	Caribbean Development Bank
<b>CDERA</b>	Caribbean Disaster Emergency Response Agency
<b>GDP</b>	Gross Domestic Product
<b>CDRRF</b>	Community Disaster Risk Reduction Fund
<b>CDS</b>	Community Development Specialist (CDRRF)
<b>CDS</b>	Community Development Supervisor (SVG)
<b>CES</b>	Community Engagement Survey
<b>CEWS</b>	Community Early Warning System
<b>CHARIM</b>	Caribbean Handbook on Risk Information Management
<b>CP</b>	Community Profile
<b>CPA</b>	Country Poverty Assessment
<b>CS</b>	Climate Smart
<b>CVA</b>	Climate Vulnerability Assessment
<b>CWSA</b>	Central Water and Sewerage Authority
<b>DDC</b>	District Disaster Committees
<b>DaLA</b>	Damage and Loss Assessment
<b>DLA</b>	Detailed Livelihood Assessment
<b>DRM</b>	Disaster Risk Management
<b>DRR</b>	Disaster Risk Reduction
<b>ECLAC</b>	Economic Commission for Latin America and the Caribbean
<b>ED</b>	Enumeration Division
<b>EU</b>	European Union
<b>EWS</b>	Early Warning System
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FGD</b>	Focus Group Discussion
<b>GAD</b>	Gender Affairs Division
<b>GBV</b>	Gender Based Violence
<b>GEF</b>	Global Environmental Fund
<b>GIS</b>	Geographic Information System
<b>GOSVG</b>	Government of St. Vincent and the Grenadines

<b>GPS</b>	Global Positioning System
<b>HH</b>	Household
<b>HIV/AIDS</b>	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
<b>IICA</b>	International Institute for Cooperation on Agriculture
<b>ILIA</b>	Initial Livelihood Impact Assessment
<b>ILO</b>	International Labor Organization
<b>IWCAM</b>	Integrated Watersheds and Coastal Areas Management project
<b>J-CCCP</b>	Japan-Caribbean Climate Change Program
<b>LAS</b>	Livelihood Assessment Specialist
<b>LAT</b>	Livelihood Assessment Toolkit
<b>LBA</b>	Livelihood Baseline Assessment
<b>LGBTQ</b>	Lesbian, Gay, Bi-Sexual, Trans, Queer
<b>LPG</b>	Liquified Petroleum Gas
<b>M&amp;E</b>	Monitoring and Evaluation
<b>MMI</b>	Modified Mercalli Intensity
<b>MoA</b>	Ministry of Agriculture
<b>MoNM</b>	Ministry of National Mobilisation
<b>NDVI</b>	National Difference Vegetation Index
<b>NEMO</b>	National Emergency Management Organization
<b>NGO</b>	Non-Governmental Organization
<b>NVEP</b>	National Volcanic Emergency Plan
<b>OECS</b>	Organisation of Eastern Caribbean States
<b>PAD</b>	Project Appraisal Document
<b>PM</b>	Project Manager
<b>PVC</b>	Polyvinyl Chloride
<b>RC</b>	Red Cross
<b>RCCVA</b>	Rapid Community Climate Vulnerability Assessment
<b>RDVRP</b>	Regional Disaster Vulnerability and Reduction Project
<b>RR</b>	Risk Reduction
<b>SAP</b>	Social Assistance Programme
<b>SD</b>	Sustainable Development
<b>SDC</b>	Social Development Commission
<b>SDGs</b>	Sustainable Development Goals
<b>SIDS</b>	Small Island Developing States
<b>SMART</b>	Specific, Measurable, Achievable, Realistic, Time-bound
<b>SRC</b>	Seismic Research Centre
<b>STREVA</b>	Strengthening Resilience in Volcanic Areas
<b>SVG</b>	St. Vincent and the Grenadines
<b>UN</b>	United Nations
<b>UNFPA</b>	United Nations Population Fund
<b>UNISR</b>	United Nations Office for Disaster Risk Reduction
<b>UWI</b>	University of the West Indies
<b>VCA</b>	Vulnerability and Capacity Assessment
<b>VINLEC</b>	St. Vincent Electricity Company
<b>VRCinSVG</b>	Volcano Ready Communities in St. Vincent and the Grenadines
<b>VRCP</b>	Volcano Ready Communities Project
<b>WAD</b>	Women's Affairs Division

# 1 Introduction



## 1.1 THE NEED FOR A LIVELIHOOD BASELINE AND CONTINGENCY PLAN

Pre-disaster information is always a key resource in post disaster response (which includes post disaster assessments). When disaster strikes, it is critical to know how many people are likely to have been affected and how. This requires knowledge of the demographic breakdown of the population and the vulnerability of different people to the disaster. Vulnerability will determine how badly they will be affected, how quickly they can be expected to recover and what kinds of assistance they are likely to need.

In many instances however, pre-disaster planning focuses on immediate response and action to protect human life and infrastructure, but without giving sufficient attention to damage and loss to livelihoods. Yet in the post-disaster period, if people are to recover, they need to restore their livelihoods as quickly as possible. This can only happen if detailed and quantitative information has been collected in advance of potential disasters so that livelihood based contingency plans, can be created and planned for.

In 2019, the Community Disaster Risk Reduction Fund (CDRRF) of the Caribbean Development Bank (CDB) partnered with the Food and Agriculture Organization of the United Nations (FAO) to introduce Borrowing Member Countries (BMC) in the region to the Livelihood Baseline Assessment (LBA) process which was pioneered by FAO and the International Labour Organisation (ILO).

The Livelihood Assessment Tool-kit<sup>1</sup> provides well-defined guidelines for the preparation of baselines that can be used to:

- analyse and respond to the impacts of disasters on the livelihoods;
- develop and update contingency plans.

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<sup>1</sup> *The Livelihood Assessment Tool-kit* was published by the Food and Agriculture Organisation of the United Nations and the International Labour Organisation in April 2009.

In March 2019, a one-week training and capacity building session was held in Belize and introduced persons from Belize, British Virgin Islands, Jamaica and St. Vincent and the Grenadines on the use of the LBA methodology for their own planning purposes.

## 1.2 OBJECTIVES OF THE LBA PROCESS

The objectives of the LBA approach are:

- a) To make it possible for countries to compare the livelihood context and activities for residents in the communities and local economies before and after a disaster
- b) To establish a robust basis for making estimates of the impact of disasters on livelihoods, in particular vulnerable groups, that can feed into various appeals for aid required for reconstruction and rehabilitation of the sector(s) affected.
- c) To provide a reliable basis for immediate post-disaster assessments including the initial Livelihood Impact Appraisal (Volume 3 of the Toolkit) and the more in-depth detailed Livelihood Assessment of the impact of disasters on livelihoods and identify opportunities and recovery capacities at the local, community and household levels (Volume 4).

## 1.3 THE LBA PROCESS IN ST. VINCENT & THE GRENADINES

Following the February 2019 capacity building, a total of eleven (11) Community Profiles and Livelihood Assessment reports were prepared in St. Vincent & the Grenadines. These communities included:

1. Colonaire
2. Chateaubelair
3. Rose Hall
4. Fitz Hughes
5. Fancy
6. Owia

7. Magum and Overland
8. Park Hill
9. Sandy Bay
10. South Rivers and
11. Spring Village

This report presents the findings that resulted from the Livelihood Baseline Assessment (LBA) and Community Profile (CP) process that was conducted for the community of **Spring Village**, St. Vincent & the Grenadines.



# 2 Methodology



The Community Profile (CP) and Livelihood Baseline Assessment (LBA) for Spring Village was compiled in October 2019 using both qualitative and quantitative data collection methods. For the community profile sections, data were gathered from government reports and data-sets made available to the public.

The LBA component was compiled using the Livelihood Assessment Toolkit developed by the International Labour Organisation (ILO) and the Food and Agriculture Organization of the United Nations (FAO) and which provided guidelines on documenting the existing vulnerabilities of each community, the main livelihood activities, the projected impact of various hazards on livelihoods and contingency planning. Community representatives and external stakeholders also provided reviews and validation of the information presented in the document.



## 2.1 PRIMARY SOURCES

Field work for the livelihood assessment was conducted in October 2019 and included a focus group discussion, a transect walk for field observations and a livelihood baseline survey. Responses from focus group discussion were used to generate the following tools:

- Livelihood profile
- Hazard calendar
- Seasonal calendar
- Coping Strategies Inventory
- Response Typology Matrix

Responses from the livelihood baseline assessment survey were analysed and presented separately. Data were collected during the hours of 8am and 4pm October 1st, 2019 using a convenience sample of residents of the community. Forty (40) persons participated in the survey in Spring Village, twenty-six (26) females and fourteen (14) males. Respondents were relatively evenly distributed across age groups. Data were collected and analysed using the KOBO Toolbox application<sup>2</sup>. In addition to the survey and focus group discussion, primary data from the 2018 Community Engagement Survey were used in development of the community profiles. Data for this report were analysed using Excel and SPSS.



## 2.2 SECONDARY SOURCES

Secondary data were reviewed in order to provide the environmental, social and economic context of the community. Sources reviewed included the 2012 Population and Housing Census, 2007/2008 Survey of Living Conditions and Hazards maps provided by the National Emergency Management Organisation (NEMO) and the Physical Planning Unit.

Additionally, secondary data were used from the 2018 Community Engagement Survey (CES) and qualitative information was also obtained from both the preliminary Rapid Community Climate Vulnerability Assessment (RCCVA) (RCCVA) that was conducted in 2016 and the detailed RCCVA that was completed in 2020.

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<sup>2</sup> KoBo Toolbox is a free open-source tool for mobile data collection. It allows users to collect data in the field using mobile devices such as mobile phones or tablets, as well as with paper or computers.

It allows for faster data collection because data does not need to be transcribed from paper to computers before it can be analysed. Some analyses can be applied within minutes of the data being collected. It is more accurate. Enumeration errors are minimised because of the data validation that can occur in real time as data is collected. Transcription errors are entirely eliminated. It is optimised for humanitarian work. It also works offline and is easy to use (requires no technical knowledge to manage and enumerators can be trained within minutes. If all else fails, paper forms can be used as a backup and integrated with other data. (Source: [https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/unhcr\\_kobo\\_guidelines\\_may2016.pdf](https://www.humanitarianresponse.info/sites/www.humanitarianresponse.info/files/documents/files/unhcr_kobo_guidelines_may2016.pdf))

# 3 Description of the Community



### 3.1 LOCATIONAL DATA

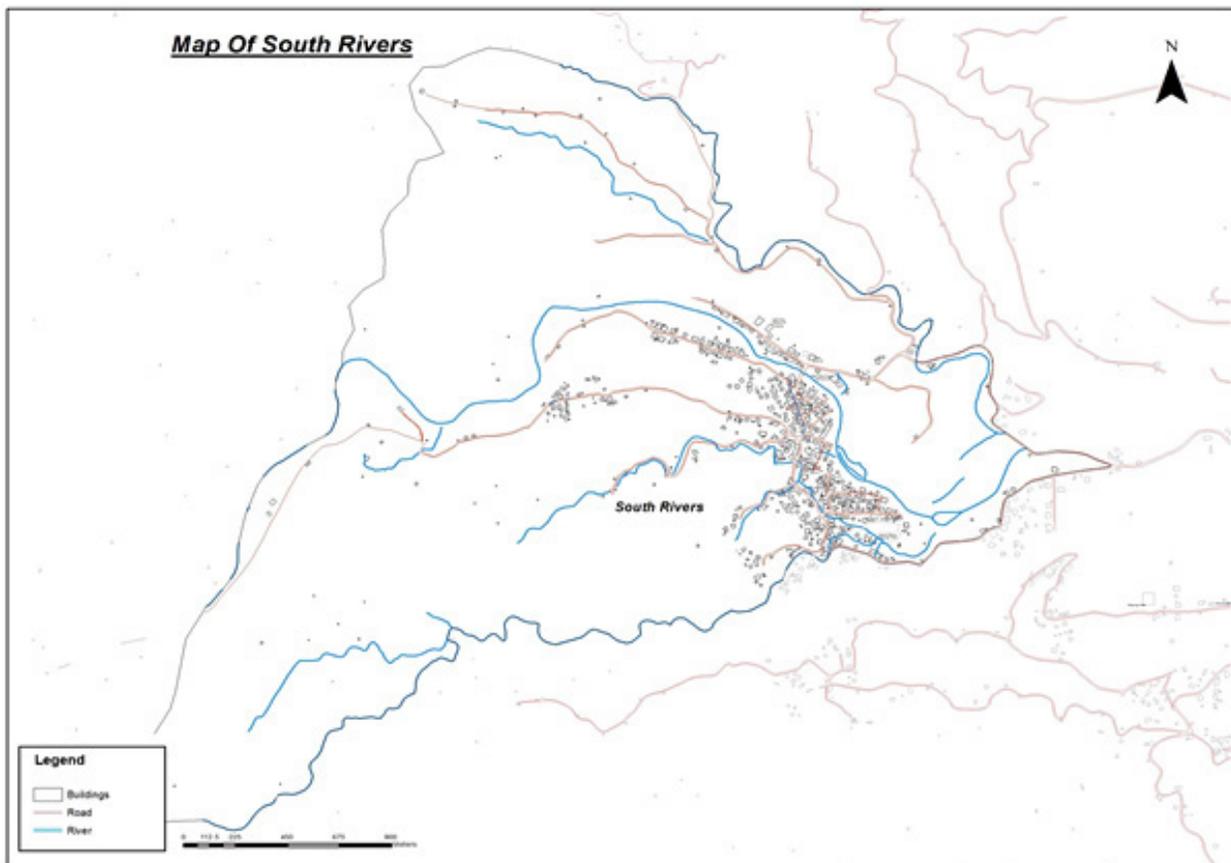
Spring Village is a village north of the town of Barrouallie and south of Chateaubelair. It is comprised of Mangaroo, Cocoa, Gordon Village, Charles Village, Cumberland, High Road, Ball Ground, Hog Hole, Corner, Top village (Old Road), Middle Village, Gordon Yard, Belle Isle and Hermitage.

It is an agricultural community located in the North Leeward side of the island. The Cumberland River which runs through a section of the community, supplies Spring Village and communities in the North Leeward

district with water. A significant amount of this river is used for generating electricity to a small percentage of the Vincentian population. The river also supports community activities such as washing, fishing, bathing, farming, stones for building construction.

Spring Village lies approximately 17 miles south of the country's active volcano, La Soufriere. The western side of Spring Village (or Western section) is made of very fertile soil which the community utilizes for farming. The topography, vegetation and forest cover contribute significantly to the very good water quality.

**Figure 1:** Map of the community of Spring Village (Source: GIS Unit, Physical Planning Division, Ministry of Transportation, Works, Lands and Physical Planning, Kingstown)



### 3.2 HISTORY/HISTORICAL DEVELOPMENT

The lands of Spring Village were once estate lands with the workers residing at the edges of the estate. The main settlement areas were Gordon Village, Top Village, Middle Village, Hog Hole, High Road, Corner and Mangaroo. Ball Ground and Charles became residential areas at a later date.

One of the original families who settled in Gordon village was the Dyers. They owned most of the lands in the village. Two of the first residents of Ball Ground were Elliot Samuel and Ernest 'Papa' De Riggs. One of those two (2) houses is still standing in the village today (see photo below). One resident recalled that most of Ball Ground was once a swamp that pigs occupied. Ball Ground is flood prone, some of the elderly residents recalled that three (3) major floods impacted the village in 1966, September 1983 or 84 and in December 2013. It was said that during the 1980s flood, a female occupier of the house pictured below lost all of her belongings including all the money she had saved in a bag under her mattress. She did however recover the money at the side of the road adjacent to her house hours later. Residents reported that in the December 2013 floods, the same house was washed off its foundation and ended up in the middle of the adjacent road. It was later placed back on its original foundation on the insistence of its owner who now resides outside of the community. Additional photos of some of the flooding are included in Annex 5.

It was reported that Ball Ground as a residential area expanded after the construction of the Spring Village Methodist School which was relocated there from Corner around 1965. The original primary school was housed at the Methodist Chapel which is still in the community. At present, the Spring Village Methodist Pre School is housed at the Chapel.

Charles Village is one of the newer settlements in Spring Village. Its first resident was Ms Audrey Charles who moved there from Hog Hole. In the 1970s, the government built five (5) houses in a new area of Spring Village as a housing project. Ms Charles was the recipient of the first house, so the village was named after her.

First House Built in Ball Ground



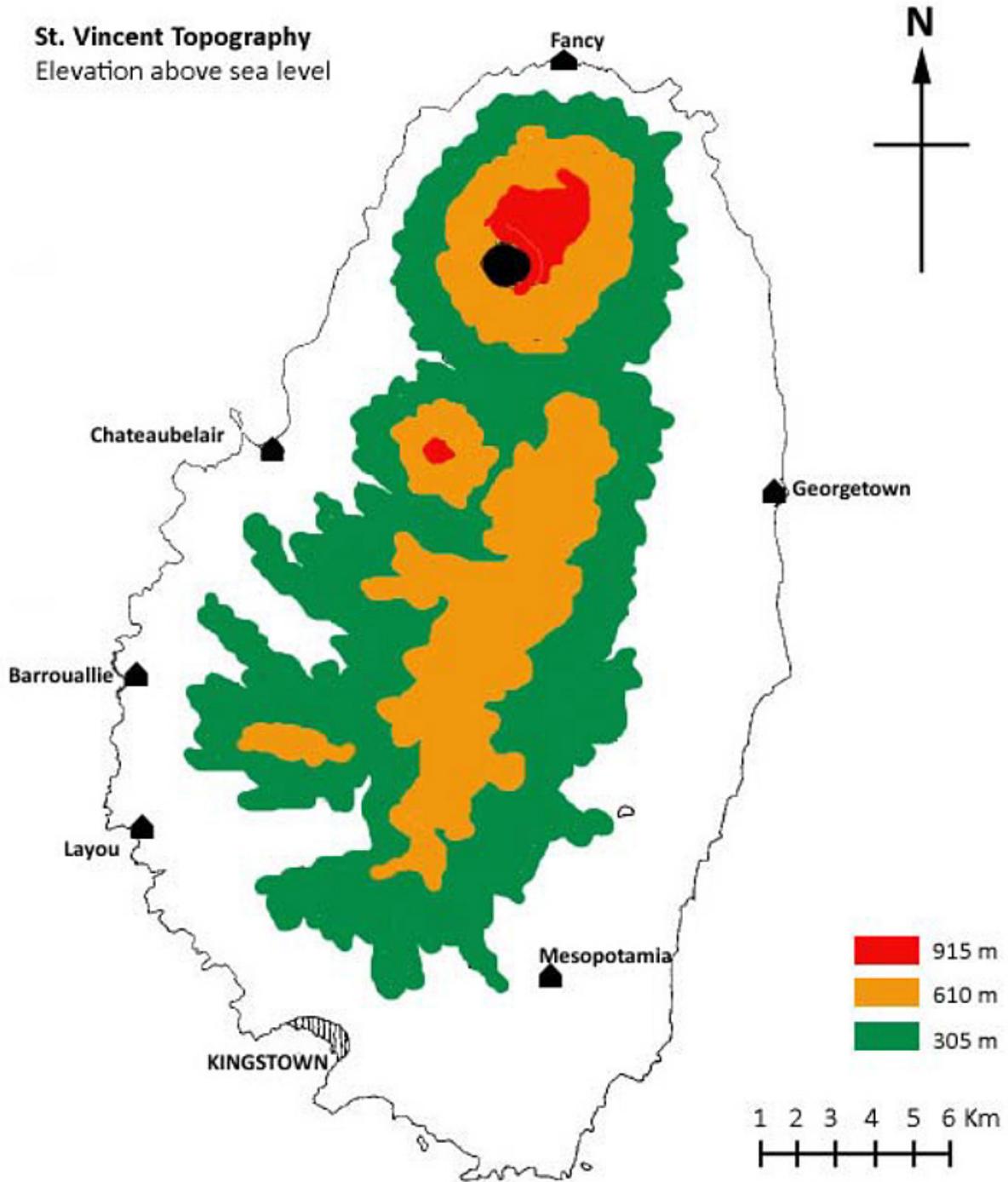
### 3.3 NATURE OF COMMUNITY (CULTURE, TRADITIONS)

Spring Village is primarily an agricultural community that also participates in fishing. Fishing at the nearby Cumberland Bay helps to sustain the village population with a variety of fish. A tasty delicacy called "tri tri" is caught by residents at different periods during the year at the mouth of the Cumberland River which runs through the entire village.

### 3.4 NATURAL RESOURCES (RIVERS, FORESTS, FARMING LANDS)

Spring Village has one of the best sheltered harbours in the country at Cumberland bay which is a haven for yacht men and visitors alike. It also has the Cumberland watershed with its rivers and many streams, forests and fertile farm lands. The largest hydro-electric power plant in the country is located in Spring Village. Table 1 provides the statistics pertaining to this station.

Figure 2: Vincent Topographic Map (Source: SPCR Proposal, 2011)



The river supports community activities such as washing, fishing, bathing, farming and stones for building construction and running water for powering the electricity plant. The river runs through a section of the community and empties at the Cumberland Valley.

**Table 1:** Water Statistics for SVG (Source: FAO 2005, GOSVG 2002)

	M <sup>3</sup>
Total surface water	120,000,000
Storage capacity	5,000,000
Consumption patterns	
Government institutions	1,600,000
Domestic	5,300,000
Unaccounted for water	1,800,000
Leakages	500,000

St. Vincent has sixteen (16) watersheds which generate most of the island's fresh water supply. Four (4) of these watersheds are the main sources of the island's water supply (Figure 2). These key watersheds provide 120,000,000 cubic metres/yr. of the country's total surface water to meet the varying demands (Figure 3).

Communities such as Peters Hope, Barrouallie, Fitz-Hughes and Chateaubelair are supplied domestic water via the CWSA Hermitage intake. In 2015, the Cumberland Watershed received an average of 3006 mm of rainfall which was the most recorded across the country. The average annual rainfall across the mainland was 2063 mm with the Grenadines recording 589 mm (CWSA).

Spring Village supplies many communities of the North Leeward district with water via the Cumberland watershed (Figure 4). The watershed has a number of tributaries which drains into the main Cumberland River. The findings of the 2001 SVG Housing and Population Census indicate that a population of 11,557 access potable water from this watershed.

The Cumberland hydropower scheme (comprises of four inlets: Convent, Hermitage, Grove and Spring Village) is one of three (3) across the country which generates approximately 12-20% of the total electricity produced in SVG (Table 2). The remainder comes from diesel-powered generators (Pilot Vulnerability and Capacity Assessment Study Final Report - St. Vincent and the Grenadines, Compiled By: Ottis Joslyn, November 2008).

**Table 2:** Installed Hydro-generation Capacity (SVG Rapid DALA 2016)

Location	Capacity (kW)
Richmond	1,100
Cumberland	3,664
South Rivers	870
<b>Total</b>	<b>5,634</b>

**Figure 3:** The Sixteen (16) Watersheds of Saint Vincent (Source: GEF-IWCAM, No Date).



Figure 4: Key watersheds and communities in St. Vincent (Source: Forestry Dept. 2005).

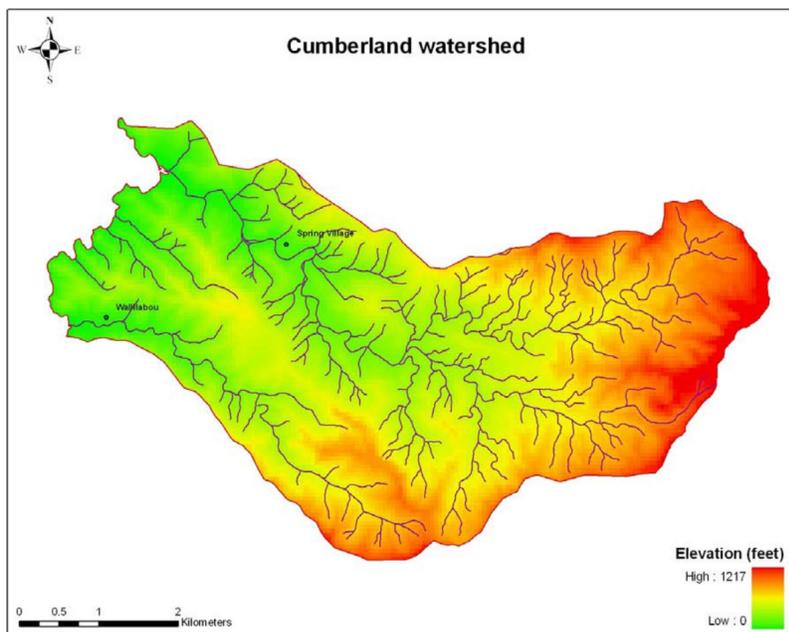
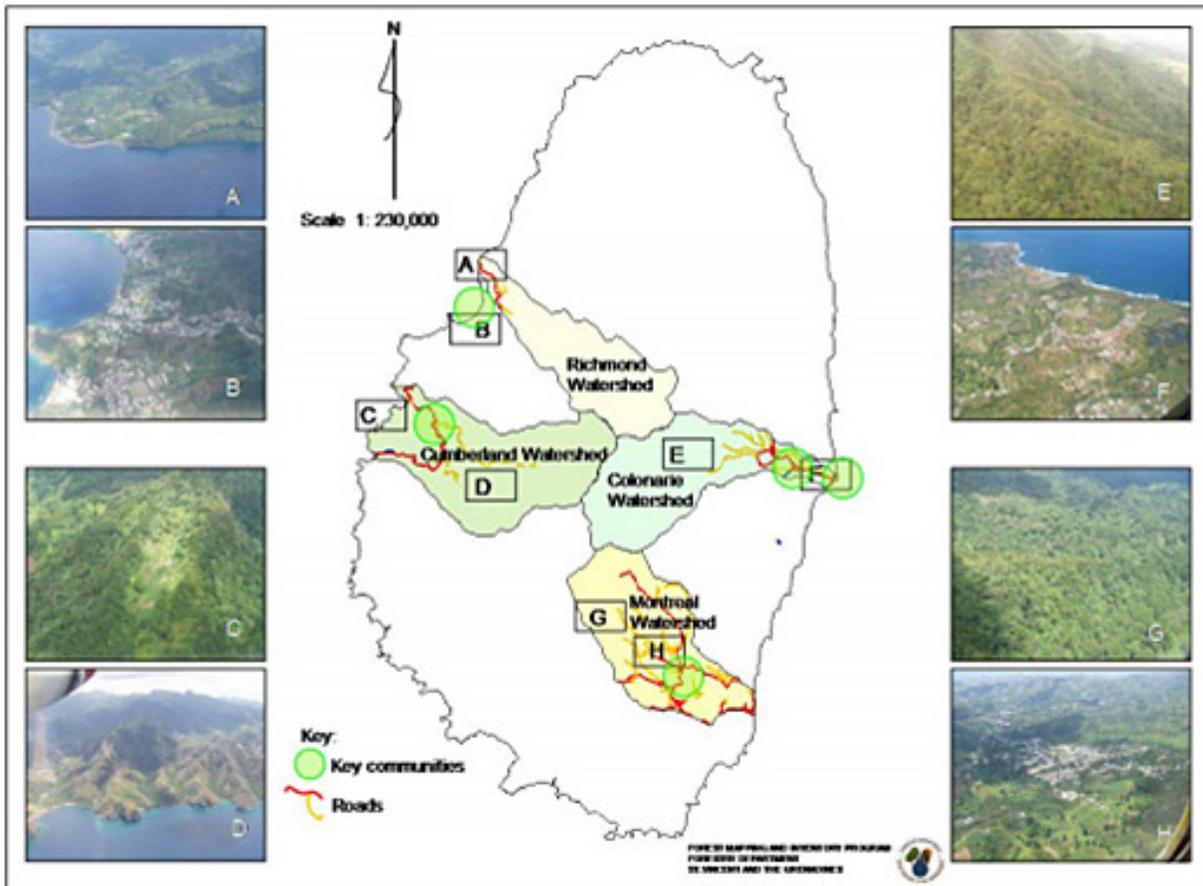
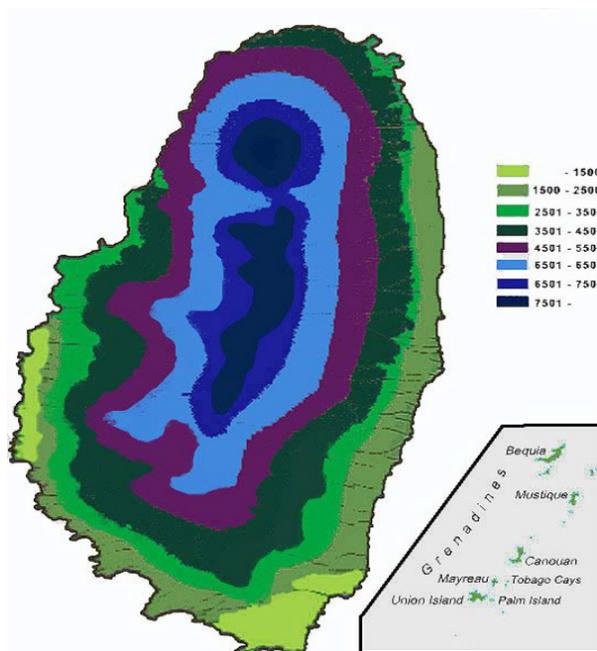


Figure 5: Cumberland Watershed (Source: Government of SVG, 2011)

**Figure 6:** Rainfall Map of the Island of St.Vincent  
(Source: Joyette, 2006).



SVG receives an average annual rainfall of 2190 mm, with two-thirds or 70% of that amount falling during the rainy season - June to November (Joslyn, 2008). As Table 3 illustrates, the annual average rainfall for the community is about twice the national average of 2190 mm. As a consequence of this and the rich volcanic soil, agriculture is a natural fit. Some of the crops commonly grown within the community include ground provisions, Ginger, banana, plantain, pineapple, peas, vegetables and several fruit trees such as oranges and mangoes to name a few.

The following forest trees which are used for lumber are found in the watershed area, 'Mahogany (Swietenia mahogany & Swieteniamacrophylla), Blue Mahoe (Hibiscus elatus) and Caribbean Pine (Pinuscaribaea) are the most common tropical evergreen trees.....' (Joslyn, 2008).

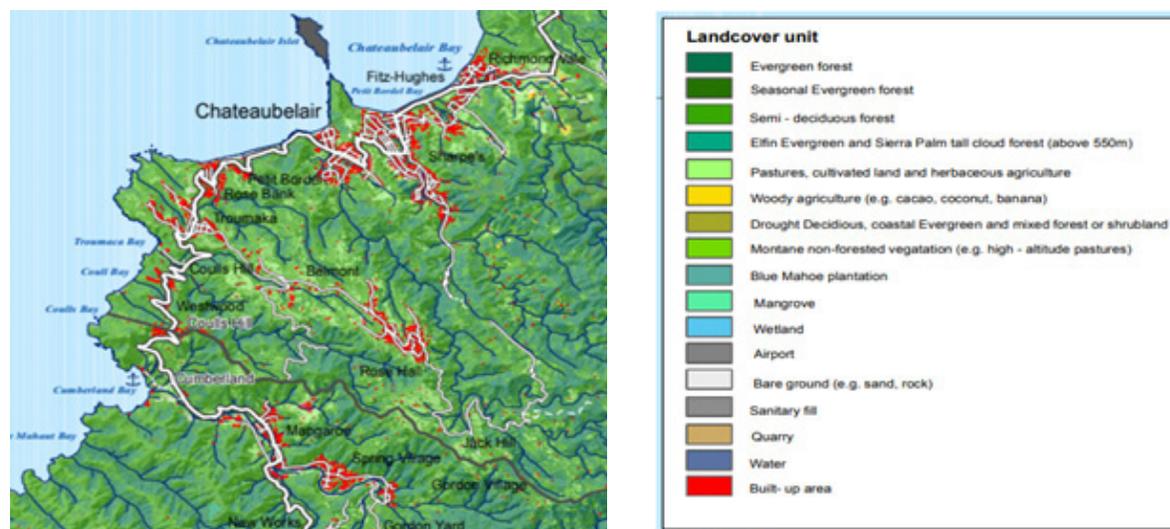
**Table 3:** Annual Rainfall Data at Cumberland and Watershed/Hermitage (CWSA Source)

Year	Rainfall (mm)
1996	5506
1997	4425
1998	5603
1999	4170
2000	3859
2001	3568
2002	3568
2003	3519
2004	3787
2005	4037
2006	3903

### 3.5 LAND USE AND DISTRIBUTION

Figure 6 illustrates that lands in the Cumberland Watershed are predominantly agricultural consisting mainly of forested areas. There are pockets of land comprised of pastures, cultivated land and herbaceous agricultural lands in Mangrove, Spring Village, Gordon Yard and Gordon Village. The built-up or residential areas are concentrated mainly along the banks of the Cumberland River which runs along the southern edge of the community. The main road cuts across and in instances runs along the banks of the Cumberland River. There are no huge areas of woody agricultural (cocoa, coconut, banana) lands as on the outskirts of Barrouallie.

**Figure 7:** Map of the Cumberland Watershed Showing Sprint Village Land Use and Distribution (Source: Westen, C.J. and Sijmons, Koert. 2016)



### 3.6 POPULATION AND AGE STRUCTURE

Spring Village is located within the administrative division of Barrouallie. The socio demographic data that was used to prepare the community profile, came from the 2012 Population and Housing Census. At that time, the population of the administrative division of Barrouallie was five thousand, six hundred and twentyfive (5,625). This figure is inclusive

of the communities Mt Wynne and Peters Hope, Reversion, Barrouallie (town), Keartons and Wallilabou, Cumberland and Spring Village. However, at that time, Spring Village had an estimated population of three hundred and ten (310) occupying one hundred and eight (108) households.

The sex disaggregated data for the community is presented below.

**Table 4:** Estimated Population by District (Source: 2012 Population and Housing Census)

District	Number of Households	Male	Female	Population
Mt Wynne/Peter's Hope	313	492	480	972
Reversion	267	442	384	827
Barrouallie (town)	333	535	496	1031
Keartons/Wallilabou	528	854	812	1666
Cumberland/Gordon Yard	257	428	391	819
Spring Village	108	165	145	310
<b>Total</b>	<b>1,806</b>	<b>2,916</b>	<b>2,708</b>	<b>5,625</b>

The population in Spring Village community was comprised of an estimated one hundred and sixty-five (165) males and one hundred forty-five (145) females. The male to female ratio was 1.14 representing marginally more males than females and was consistent in the wider population 1.05. Population and sex were the only variables for which data could be disaggregated for the Spring Village community.

Examination of the population of the administrative division of Barrouallie revealed that much like the wider population of St. Vincent and the Grenadines, there was a large proportion of young persons. Average age in the administrative division was 30.8 years, compared to 32.7 years nationally. Approximately 41.6% of the population was under 24 years, and children (0-14 years) accounted for 24.7%. The elderly population, above 65 years of age, was 9.2% and the percentage of the working age persons (15-64 years) was 66.2%.

**Table 2:** Distribution of Population by Age and Sex, Barrouallie Division (Source: 2012 Population and Housing Census)

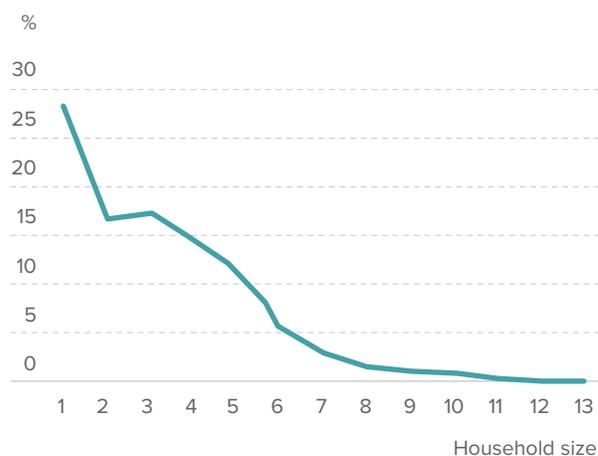
Age Cohort (years)	% Male	% Female	% Total
0-4	4.8	3.9	7.9
5-9	4.7	4.7	7.8
10-14	5.1	4.4	8.9
15-19	5.3	4.6	9.1
20-24	4.1	3.7	7.9
25-29	4.2	3.6	7.6
30-34	3.5	3.6	7.2
35-39	2.8	3.5	6.9
40-44	3.2	2.7	6.6
45-49	3.2	3.2	6.8
50-54	3.3	2.6	6.0
55-59	2.8	2.5	4.6
60-64	1.4	1.3	3.5
65+	3.4	3.8	9.2
<b>Total</b>	<b>52.0</b>	<b>48.0</b>	<b>100.0</b>

Age Dependency ratio, which establishes the number of dependents (children and elderly persons) per 100 persons in the working age population (14-65) was calculated at 51, consistent with the dependency ratio across St. Vincent and the Grenadines.

### 3.7 HOUSEHOLD SIZE AND HOUSEHOLD HEADS

Average age of household size in the administrative division of Barrouallie of which the Spring Village is a part, was 3.1 persons per household, comparable to the national average of 3.0 persons per household nationally. Household size ranged from one to fourteen (14) persons. Single person households were the most common (28.3%), followed by three and two-person households (17.3 and 16.4% respectively). Households of eight or more persons accounted for 3.6%.

**Figure 8:** Household Size, Barrouallie Division (Source: 2012 Census)



Household heads were 60.2% male and 39.8% female with a male to female ratio of 1.5. There were 1.5 times more male household heads than female heads. The average age of household heads in the division was 49.5 years compared to 51 years nationally. Approximately 9.5% were under 30 years, 30.0% were in the 30-44 age group, and 43.2% were between the ages 45 and 64. A further 17.3% of household heads were over the age of 65.

**Table 7:** Distribution of Household Heads by Age Group, Chateaubelair Division (Source: 2012 Population and Housing Census)

Age category	Percent Distribution
Under 15	0.1
15 -19	0.7
20 - 24	2.4
25 - 29	6.3
30 - 34	9.3
35 - 39	10.3
40 - 44	10.4
45 - 49	12.4
50 - 54	12.6
55 - 59	12.1
60 - 64	6.0
65+	17.3

### 3.8 UNION STATUS

Approximately 22.9% of household heads in the division were married and living with spouse and another 16.7% living in a common law union. Twenty-eight point nine (28.9%) percent were not presently in a union and another 17.7% never had a spouse or common-law partner.

**Table 8:** Union Status of Household Heads, Barrouallie Division (Source: 2012 Population Census)

Union Status	Percentage (%)
Never had a spouse or common-law partner	17.7
Married and living with spouse	22.9
Common Law Union	16.7
Visiting partner	16.7
Not in a Union	28.9
Not stated	2.9

### 3.9 EDUCATIONAL ATTAINMENT

Table 8 shows enrolment for education institutions in close proximity to Spring Village. Data for the wider administrative division showed that 29.9% of the population were enrolled in full-time education, 1% enrolled in part-time education and 69.1% were not enrolled in any educational institution. Institutions of enrolment ranged from early childhood to post-secondary and tertiary education institutes and well as professional and adult learning schools.

The Spring Village Primary and Spring Village Preschool are the only educational institutions in the community. For access to secondary education and beyond students journeyed to nearby communities.

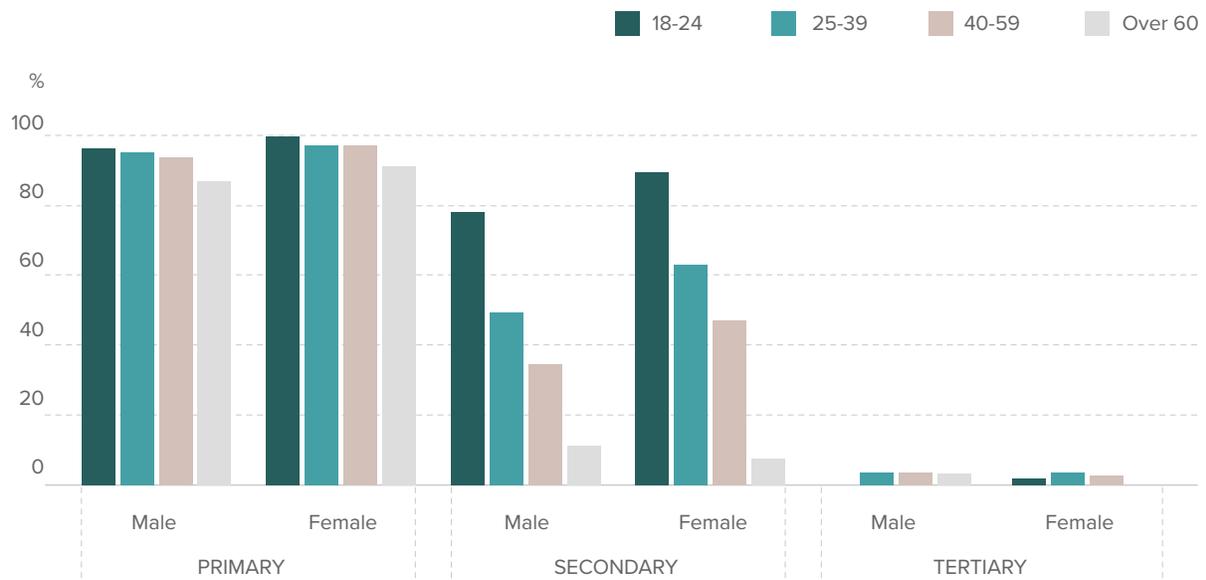
#### 3.9.1. ACHIEVEMENT

Data from the 2012 Housing and Population Census showed a high completion rates for primary education, for adults 18 and over in the division (95.3%). Completion rates for secondary and tertiary education were much lower at 47.1% and 2.4% respectively. There were significantly higher levels of achievement among persons in younger age categories. Additionally, there were higher levels of achievement among females than among their male counterparts, particularly in secondary education.

**Table 8:** Educational Institutions - Spring Village (Source: SVG Educational Statistical Digest 2017/18)

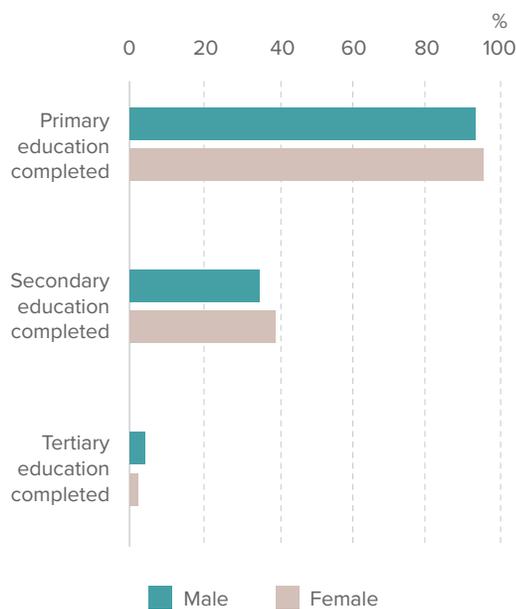
Name of School	Enrolment	No. of Girls	No. of Boys	No. of Teachers	No. of Trained Teachers	Pupil/Teacher Ratio
Park Hill Evangelical (Precious Gems) Preschool	15			2		8
Sunny Hill Pre School	94	48	46	9	7	10
Paul Bess/Park Hill Government School	260	122	138	20	11	13
North Union Secondary School	212	98	114	22	18	10
George Stephens Secondary	547	254	293	34	23	16

**Figure 9:** Education Completion Rates, Barrouallie Division



A similar trend was observed among household heads in the division. Ninety-three point seven (93.7%) percent had completed primary education, but only 36.5% and 2.9% had completed secondary and tertiary education, respectively. There were marginally higher rates of completion among female household heads, except for figures at the tertiary level where older male household heads were more likely to have accessed tertiary education than their female counterparts.

**Figure 10:** Education Completion Rates Among Household Heads, Barrouallie Division

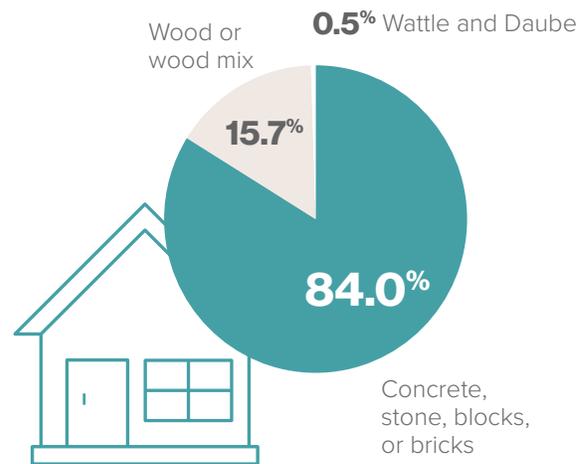


In a priority ranking out of nine (9) for the main social problems within the community that needs urgent attention (Community Engagement Survey of 2018), high number of school dropouts is listed 2nd, high incidence of teenage pregnancy is listed 3rd and Child labour appears not to be an issue of serious concern to the community as it is listed 9th.

### 3.10 HOUSING QUALITY

A large majority of homes in the administrative division were constructed with concrete, bricks, stone or blocks (84.0%) and 15.7% were constructed using wood only or wood mixed with materials such as bricks and galvanize. Less than 0.5% of houses were constructed using wattle and daube or other materials.

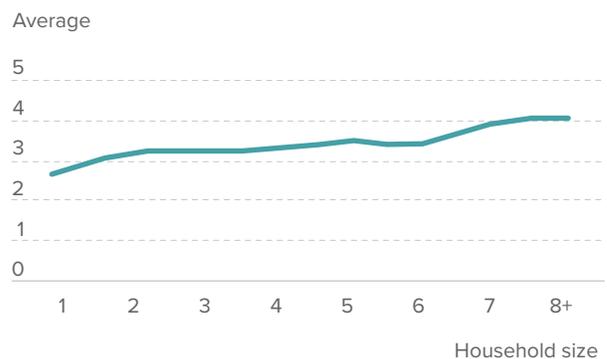
**Figure 11:** Main Material of Outer Walls



#### 3.10.1. BEDROOM FACILITIES

Houses in the division had an average of 3.2 bedrooms and larger households, on average had a higher number of bedrooms. Single person households contained, on average, 2.7 bedrooms and households with eight or more persons, had an average of 4.1 bedrooms.

**Figure 12:** Average Number of Bedrooms by Household Size, Barrouallie Division



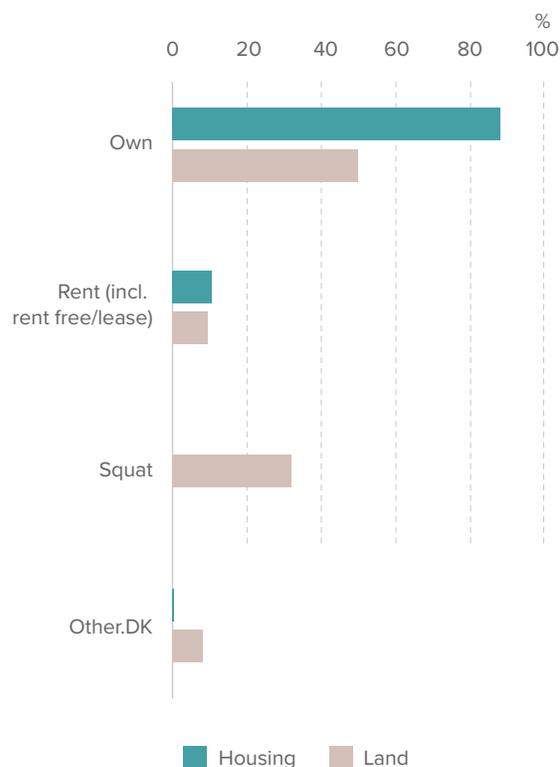
### 3.11 HOUSING AND LAND TENURE

Eighty-eight point four (88.4%) of households in the division widely, were owner occupied and 10.9% were rented (including rent-free arrangements). Fewer than 1% households were squatting or obtained occupancy by means not stated. By comparison only 49.9% of households in the division occupied owned lands. Nine point five (9.5%) occupied lands through rent or lease agreements and 32.2% of households occupied squatter lands.

The community of Spring Village is served by one (1) public health care facility, the Spring Village Clinic. Hospital services are accessible at the Chateaubelair Hospital which is located 5.5 miles north of Spring Village.

Approximately 25.7% of persons in the administrative division reported having at least one chronic illness in the 2012 census, and 6.7% reported having two or more illnesses. Common chronic illnesses were hypertension, arthritis, diabetes, asthma, heart disease, stroke, kidney disease and cancer. Rates of ailments were higher among household heads, an older age category, with 38.8 reporting at least one chronic illness and 13.9% reporting two or more chronic illnesses.

**Figure 13:** Housing and Land Ownership. Barrouallie Division



**Table 9:** Health Care Facilities in Spring Village (Source: LBA)

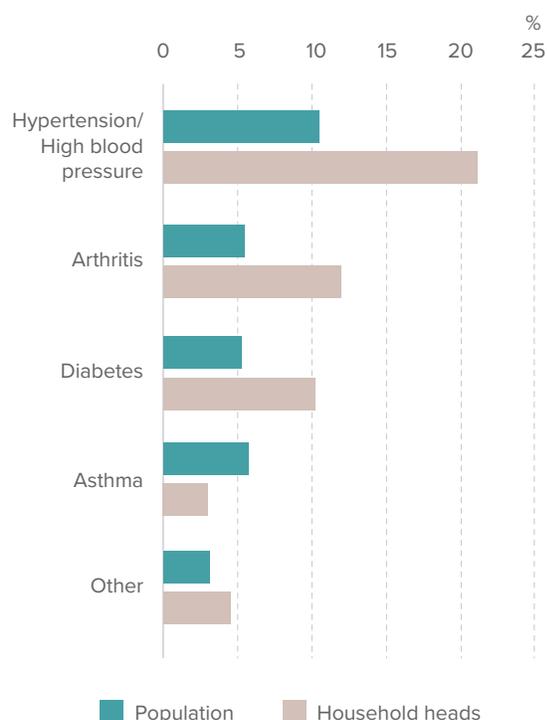
Name of Facility	Services offered	Condition of Building
Spring Village Clinic	Primary health care services: Blood pressure checks Diabetes testing Pap smear Swabs Counselling Adolescent and Diabetic coordination Care for new born and the elderly	Good
Chateaubelair Smart Hospital	Secondary health care services: Casualties Deliveries Admissions Nursing care EKG Nebulisation Dentistry Pharmacy Ambulance Service	Very Good

**Table 10:** Number of Persons Utilizing Medical Facilities within Previous Month by Census Division, 2012 Main Medical Facility

Census Division	Public Hospital	District Health Centres/ Health Clinic	Private Doctor's Office	Pharmacy	Family Planning Clinic	Private Clinic/ Hospital	Not Stated	Total
Colonaire	126	1,081	381	12	3	21	25	1,649

District Health Centres were the facility of choice for persons in the Barrouallie Census Division followed by health care through Doctors' Offices and the Public Hospital.

**Figure 14:** Housing and Land Ownership. Barrouallie Division



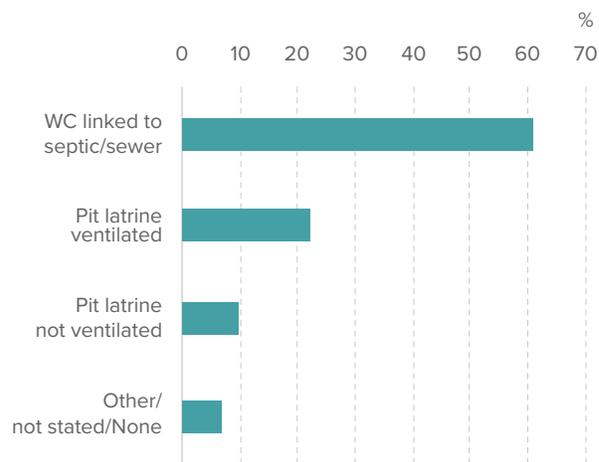
**Table 11:** Students Enrolled in School Feeding Programme 2017/2018 (Source: SVG Educational Statistical Digest)

Name of Facility	School Feeding Enrolment	No. of beneficiaries	% benefiting
Spring Village Methodist School	94	91	96.81

### 3.12 SANITATION

According to the 2012 Housing and Population Census 61.1% of households in the Barrouallie division had flush toilets facilities (WC) either linked to sewers or septic tanks. Approximately 22.1% used ventilated pit latrines and 10% used un-ventilated pit latrines. Another 6.8% had other or unspecified toilet facilities, inclusive of 3.2% which reported having none.

**Figure 15:** Toilet Facilities, Barrouallie Division

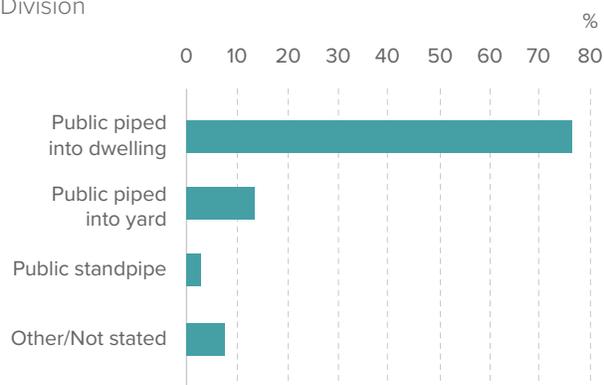


#### 3.11.1. NUTRITION SERVICES (CHILDREN AGE 5+)

For the period 2017/18, approximately ninety seven percent (96.81%) of students attending the Spring Village Methodist Primary School benefitted from the services offered by the School Feeding Programme.

The majority of residents in Spring Village have access to piped water in their yards or dwellings. In the wider division, 92.4% percent of households have access to piped water from a public source; 76.4% piped into dwelling, 13.3% piped into yard and 2.7% access through a public standpipe. Another 8% access water through other means included private catchments.

**Figure 16:** Main Source of Water Supply, Barrouallie Division



In a Community Engagement Survey conducted September 2018, garbage pollution was listed among the top five (5) issues affecting the Spring Village community. Whereas most residents use a once weekly public provided garbage collection system, some residents illegally dump their garbage in the river and streams that meanders through the community. According to the 2012 Housing and Population census, 95.6% percent of households in the administrative division use a public garbage collection system and the remaining 4.4% use other means of garbage disposal including dumping and burning.

### 3.13 SOCIAL SERVICES

There are various social services present in the Spring Village community which include the following: Community Centre, Churches, Schools, Health centre, Recreational facilities, etc. as seen in Table 12.

**Table 12:** Social Services – Park Hill

Types	Name of facility	No.	Location	Condition
Cemeteries	Spring Village Cemetery	1		Good
Churches	Spring Village Methodist	9		
	Seventh Day Adventist			
	Evangelical			
	Pentecostal			
	Anglican			
Community Centre	Spring Village Community Centre	1	Spring Village	Good
Pre-School	Pentecostal Pre School	1		Good
	Spring Village Methodist Preschool	1		Very Good
Primary School	Spring Village Methodist Primary School	1	Spring Village	Good
Health Centre	Spring Village Health Centre	1	Spring Village	Fair
Libraries	Spring Village Library	1		Poor
Parks	Spring Village Playing Field	1	Spring Village	Very Good
Playing Fields	Cumberland Playing Field	1	Cumberland	
Police Station	Spring Village Police Station		Spring Village	Poor. Temporarily housed in rented space.
Heritage/Tour Site	Cumberland Tourism Site	1		Good
	Hermitage Nature Trail	1		Was damaged by the 2013 floods. Not reopened
Post Office	Spring Village Post Office	1	Spring Village	Good

From the Transect exercise conducted in the community during the LBA, no recreational facilities were identified by residents as the number one (1) infrastructure problem within the community.

### 3.14 PUBLIC INFRASTRUCTURE

The main road and its drains are in good condition; however, the subsidiary roads and drains are not. The main bridge to the community from the Gordon Yard side was severely damaged by the 2013 floods and was recently replaced. The drainage throughout the community is poor and negatively impacts some residents. This may be a result of the fact that some settlements and secondary roads in the community are built in the river bed making it difficult for the water to drain properly when it rains heavily.

Data from a Community Engagement Survey conducted in Spring Village in 2018 utilizing a sample size of 50 residents, revealed that 66% of respondents felt that poor roads, drainage and infrastructure was considered to be the #1 issue in the community that needed urgent attention.

The community is well lighted, as there are street lights installed throughout. Most residents are connected to the electricity grid.

Data from a Community Engagement Survey conducted in Spring Village in 2018 utilizing a sample size of 50 residents, revealed that the majority (87%) of households surveyed have access to telephone service and (98%) has access to internet services.

Forty-eight per cent (48%) reported having access to at least a laptop, tablet or desktop. Respondents indicate that cell phone is the most commonly accessible communication device for residents of Spring Village.

### 3.15 CRIME & PUBLIC SAFETY AND OTHER DEVELOPMENTAL ISSUES

Information gathered via the Community Engagement Survey revealed that fifty-six percent (56%) of the community stated that unemployment was their greatest concern. When ranked in order of priority, high unemployment was listed as the number one concern for residents of Spring Village.

Residents identified the following issues as the main challenges impacting the Spring Village community:

1. Poor roads, drainage and infrastructure (66% of Residents)
2. Unemployment (42% listed it in top 5; 32% listed it as number one)
3. Drugs and alcoholism (36%)
4. The constant threat of flooding of over 50% of the residential areas
5. Eating of livestock by stray dogs (praedial larceny was not considered to be a major issue in the community).
6. The releasing of water down river by VINLEC (Hydro-power dam) without notice (no alerting mechanism in place) has negative consequences when residents attempt to use the river to wash their clothes. Also, the hydro-power plant utilizes all of the river water upstream in the dry season, as a result, very little to no water flows downstream.

# 4 Governance Profile



## 4.1 POLITICAL DIRECTORATE



**Constituency:**

North Leeward

**Parliamentary Representative:**

Carlos James, Esq.

(November 2020 to present)

## 4.2 SOCIAL/CIVIC ORGANISATIONS

Table 13 below lists the various social and civil society organisations that exist in Spring Village

**Table 13:** Spring Village Civil Society Organisation (Source CES 2018)

Name of Group	Contact Info.	Vision	Mission	Objectives
Spring Village Disaster Development Organisation	Sonia Millington Spring Village	An Organization that is transparent with leaders who are reliable; committed; open and works well with people to make members feel appreciated and empowered for the safety and development of the Spring Village Community	To be readily available to serve the community by collaborating with other local groups and disaster response agencies to sensitize the community about disaster preparedness	<ul style="list-style-type: none"> <li>To locate the contacts for partner agencies by the end of March, 2020;</li> <li>To set up a social media page for the group and have someone monitor it;</li> <li>To host workshops and community meetings;</li> <li>To have the executive trained</li> <li>To have a training of trainers' workshop</li> </ul>
Spring Village Touch Football Club	Laura Francois Spring Village			
Spring Village Police Youth Club	Fernel Charles Spring Village			
Spring Village United Development Organisation (SUDO)	Watson Stewart Spring Village			
Spring Village Fair Trade	Jepthil Hector Spring Village			

## 4.3 METHODS OF COMMUNITY ENGAGEMENT

The CDRRF Individual Community Engagement Survey (CES) was conducted in St. Vincent and the Grenadines in collaboration with the Seismic Research Centre of the University of the West Indies and the Ministry of National Mobilisation, September 17th – 25th, 2018. The survey was conducted as part of the Volcano-Ready Communities Project as a precursor to community-based disaster risk reduction initiatives.

The purpose of the survey was to gather feedback on the community engagement needs and preferences of select groups of residents in each community. During the implementation of the CDRRF sub-projects, limited inclusion and participation of community residents in project activities resulted from the consistent use of community meetings as a main engagement strategy. It was found, that women, youths, disabled and the elderly are often excluded due to inconvenient times, days and location of community discussions. The survey therefore sought to identify the most appropriate engagement strategies to secure the involvement of the different groups of residents in these interventions.

The survey was conducted in ten (10) communities and convenience sampling was employed. A total of 50 persons were interviewed in each community. Data was collected during the hours of 8am to 4pm. Findings were presented to members of the North Leeward and North Windward communities and staff of the Ministry of National Mobilisation. The summary of the findings from the community engagement survey is highlighted below.

### 4.3.1. PARTICIPATION IN COMMUNITY GROUPS

The Community Engagement Study done in 2018 also showed that:

- Eighty-two (82%) of respondents believed they have a role to play in the development of their community.
- Twenty-five (25%) play an active role through membership in a community group.
- Religious events are the activities most commonly patronized by members of the Spring Village community.
- Perceptions of community groups were both positive and negative. Persons stated that they are a “good thing”, “a good idea”, “important for the community” and “help bring important issues to the fore”
- Others noted that groups are “biased”, “die after a while”, and “bring back nothing for the community”.

### 4.3.2. METHODS OF COMMUNITY ENGAGEMENT

Also from the Community Engagement Survey:

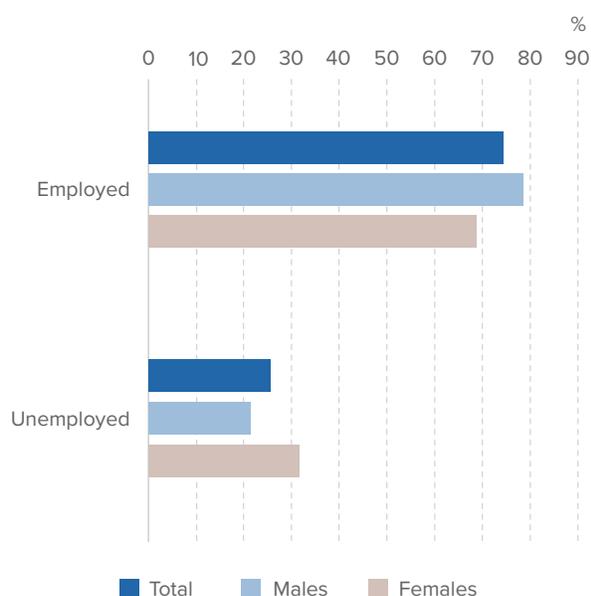
- Community members displayed a preference for localized semi-formal settings for engaging in community activities. Ninety-two percent (92%) combined noted a preference for a church or community meeting for dissemination of information on community activities.
- Respondents showed preference toward Saturdays (27%) and Sundays (22%) for receiving information on community activities.
- Evenings were preferred by respondents for receiving information on community activities (53%), although a smaller proportion may be available on mornings (20%) or afternoons (20%).

# 5 Economic Profile



According to data from the 2012 Housing and Population Census, 74.5% of the economically active population in the Barrouallie division were employed. This statistic represents persons aged 15 and over who are able and willing to work. Twenty-five point five percent of persons (25.5%) fitting this description were unemployed. The data show a higher percentage of unemployment among females (31.6%) compared to males (21.3%), consistent with movement in the general population.

**Figure 17:** Employed and Unemployed Population

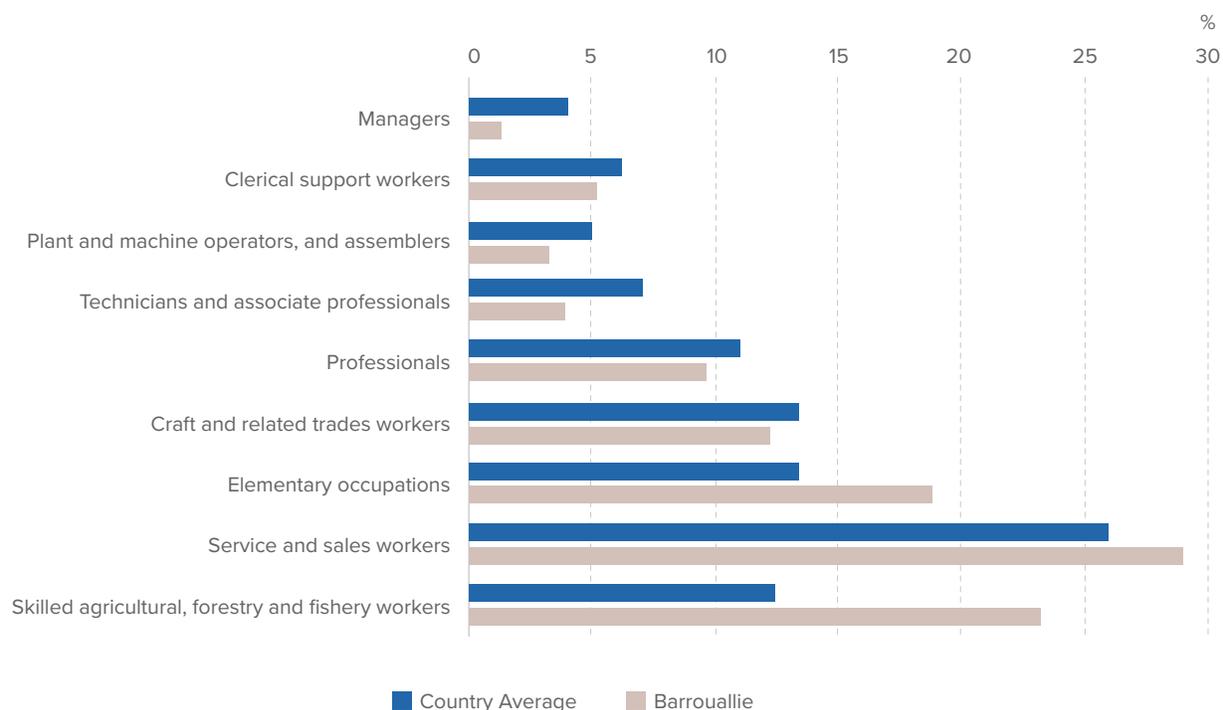


Data from the Ministry of Agriculture indicates that in 2018 there were a total of 156 farmers in Spring Village engaged in arable and pastoral farming. Most did arable farming and planted mainly ground provision and vegetables. In relation to breakdown by gender, there were 97 males and 59 females. 88 were livestock farmers and 12 youth farmers.

The KoBo Tool box survey data showed the classification of employment by percentage of twenty (20) of the forty (40) respondents who answered the question on their main source of income as follows: Police Officer, Labourer, Security = 15%; Retired, Mechanic, Cleaners Carpenters, Sailors, Construction workers, Hair dressing, Shop Owner, Bar, Nursing = 35%.

Of the sixteen (16) of the forty (40) respondents who answered this question, 27.5 % are registered farmers and 12.5 are non-registered farmers. 17.5% do a mix of crops and animals, while another 17.5% plant cash crops.

**Figure 18:** Major Occupation - Barrouallie Division and Country Average



Among the employed, the most commonly held occupation group was service and sales sector which accounted for 29.1% of the employed in the division, compared to 26% island wide. Skilled agricultural, forestry and fishery work and elementary occupations were also commonly held, accounting for 23.3% and 18.9% of the employed in the division, respectively.

There is a furniture making shop within the community in Gordon Village. It is owned by a resident and employs twenty three (23) persons, mostly males. However, only eight (8) of its employees are from Spring Village. The others are from neighbouring communities.

There are fourteen (14) types of local livelihood businesses in Spring Village. The most common of which are bars, numbering five (5), followed by three (3) tour operator services and three (3) restaurants/ food catering establishments (Table 14).

**Table 8:** Type and Number of Livelihood Businesses in Spring Village

Type of Business	Number
Bakery	1
Bar	5
Computer and Phone retail and Repair outlet	1
Cook shop	1
Day care facility	2
Dress making shops (Seamstress)	1
Furniture making shop (Carpentry)	1
Gas supplies & services	1
Restaurant/Food catering	3
Small Grocery – basic goods	1
Tailor shop	1
Tour operator (service)	3
Truck rental/vehicle supply store	1

## 5.1 POVERTY LEVELS

Despite all of its rich and diverse natural resources, the community is located within the third poorest Census Division in relation to poverty severity in St Vincent and the Grenadines with only the Georgetown & Sandy Bay and Colonaire Census Divisions being worse off (Country Poverty Assessment, Kairi 2007/2008) as shown in Figures 19 and 20.

The main economic activity in Spring Village is agriculture. Banana was the main produce until the loss of the banana market in Europe in the 1990s. Some of the community's present produce include ground provisions, vegetables and several fruit trees such as oranges and mangoes. In an effort to diversify the economy of this community, the government has invested resources in Eco tourism related activities as a means of addressing the problems of unemployment and poverty faced by the community.

**Figure 19:** SVG Poverty Level by Census District and Poverty Gap Index (Source: Country Poverty Assessment, Kairi 2007/2008)

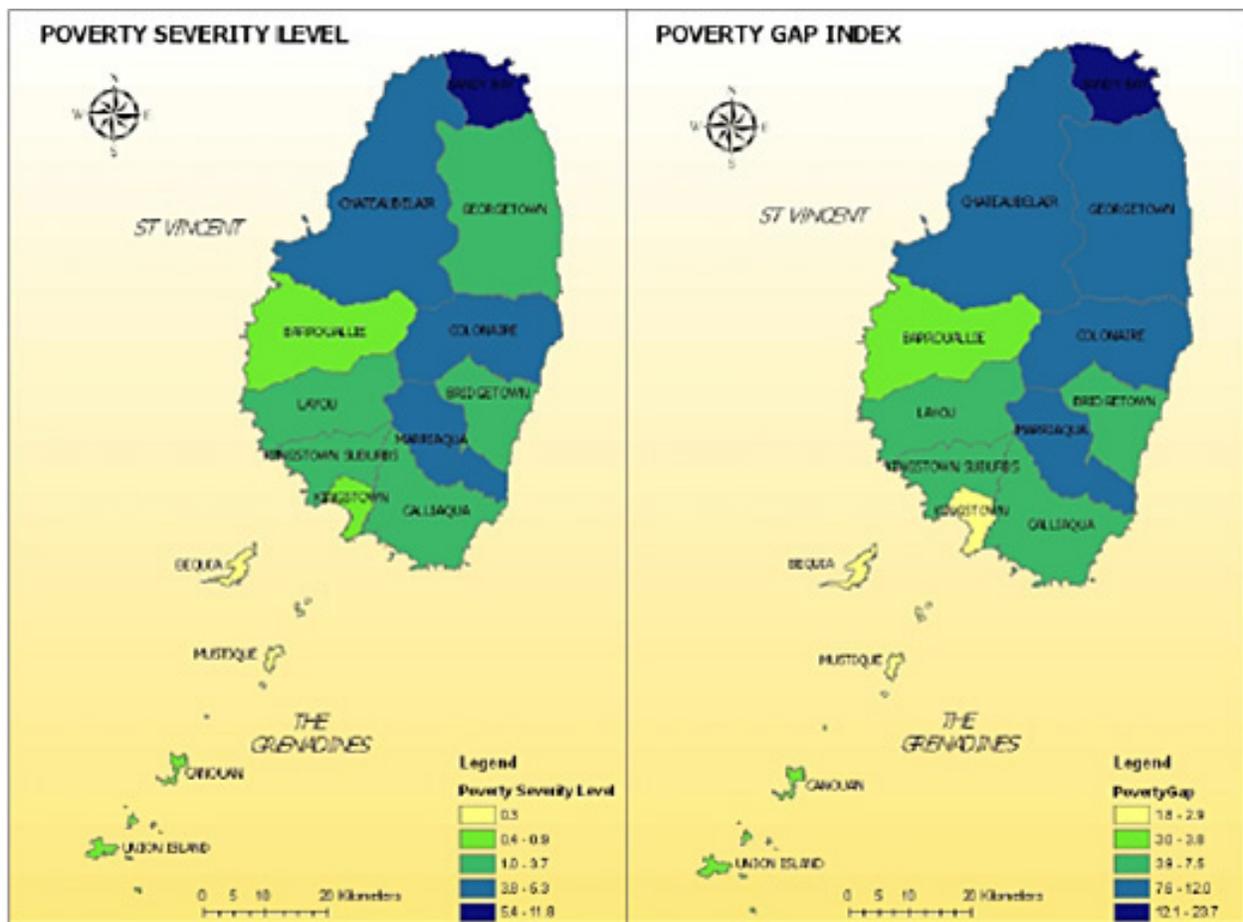
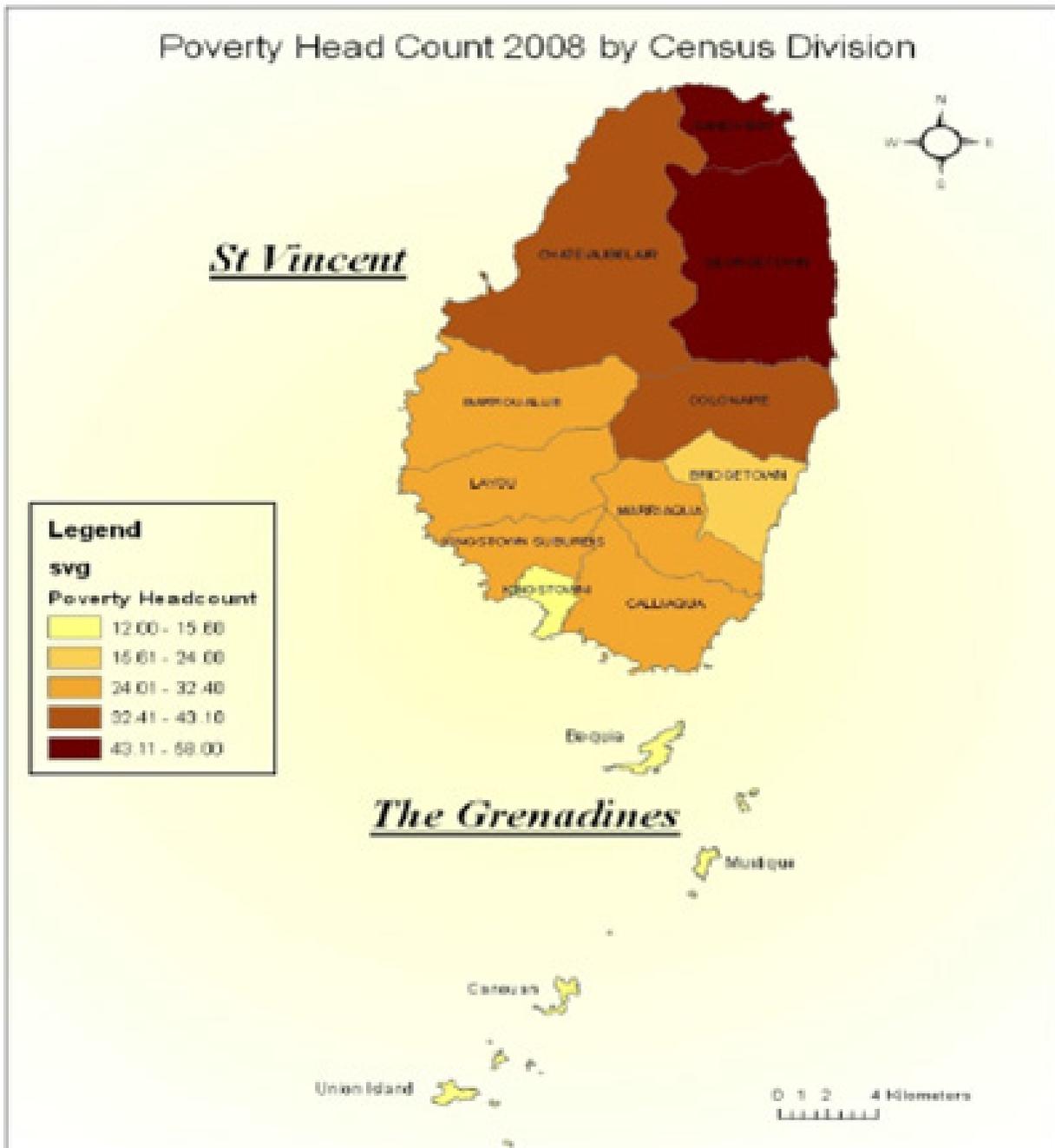


Figure 20: SVG Poverty Level (Source: Country Poverty Assessment, Kairi 2007/2008)



### 5.1.1. FINANCIAL SERVICES

There were no financial services available within Spring Village. Residents travel to Barrouallie (5 miles south) to access such services or to Kingstown (17.3 miles south).

# 6 Vulnerability and Hazard Profile



St. Vincent is exposed to high levels of risk to meteorological (high wind, extreme rainfall, hurricanes, and drought) and geophysical (earthquakes, volcanic eruptions, tsunamis) hazards, which have significant negative impacts on economic development, fiscal stability, and communities. Some of these natural hazards are being exacerbated by the adverse impacts of climate change, which put increased stress on coastal investments, national infrastructure, water availability, and livelihoods, especially of the poor and vulnerable groups. Of the disasters regularly affecting SVG, hydro-meteorological (hydromet) events occur most frequently and represent a significant source of average annual losses, which from 1996 to 2015 were estimated to be around 1.2 percent of GDP (ranked 16th globally) (Kreft et al. 2015). The trough in December 2013 resulted in extensive physical damage and economic losses estimated at approximately US\$108.4 million (15 percent of GDP). The trough hit at a time when SVG was just showing signs of recovery from the global financial crisis, and the natural disasters exerted further strain on an already challenging fiscal context.

The island of St Vincent lies in the hurricane belt, and is susceptible to both strong windstorms and heavy rains. Two-thirds of the island is forested (FAO, 2010). As noted in the 2013 Caribbean Catastrophe Risk Insurance Facility (CCRISF) report on the St Vincent and the Grenadines, the SVG islands are prone to moderate levels of a variety of hazards.

The islands lie towards the southern end of the main Atlantic hurricane belt although the complex topography can increase the risk for stronger winds, heavy rains and landslides.

The low-lying Grenadines are exposed to storm surge and wave hazards. Earthquake hazards are moderate, but there are significant volcanic hazards from both the Soufrière volcano on St Vincent and from Kick 'Em Jenny in the southern Grenadines, which is also a potential tsunami source. St Vincent and the Grenadines has limited economic diversity, with tourism important in the Grenadines where there is moderate exposure to wave and storm surge hazards.

Since bananas are the main export product from St Vincent, all farming is prone to the impact from high winds and heavy rain. Landslides commonly hamper

communications on the island. Several volcanic eruptions in the past 2 centuries have killed many people and devastated areas in the north of the island. While this report is being finalized, St. Vincent and the Grenadines is experiencing a series of explosive volcanic eruptions.



## 6.1 HURRICANES

Although St Vincent lies quite far south in the Lesser Antilles, hurricanes are still common, and the rugged topography of the island and low-lying nature of the Grenadines makes the impact of even moderate hurricanes potentially serious. Hurricanes Janet (1955), Allen (1980), Hurricane Lenny (1999), and Hurricane Tomas (2010), produced severe hurricane winds (greater than 110 mph) on St Vincent, although damage reports for these events are not available.



## 6.2 FLOODING

The islands are also vulnerable to flash flooding. The steep topography coupled with short (6 km) distances from the coast to the center mountain ridge creates a hydraulic system where stream concentration times are short (nominally 30 minutes). High rainfall, such as rain associated with a thunderstorm, quickly concentrates in stream channels, promoting rapid flooding. In this type of system, early warning of an actual flood event cannot be accomplished by monitoring stream levels because once they rise, it is too late. Any warning would need to be based on rainfall observations to trigger an alert.



### 6.3 LANDSLIDES, STORM SURGE AND DROUGHT

The Caribbean Handbook on Risk Information Management<sup>3</sup> (CHARIM) also notes that Landslides, particularly on the larger islands, are a significant hazard and the risk is increased during the seasonal rains. Coastal flooding is a major concern particularly relating to storm surge and high wave action. The Grenadines are more susceptible to drought.

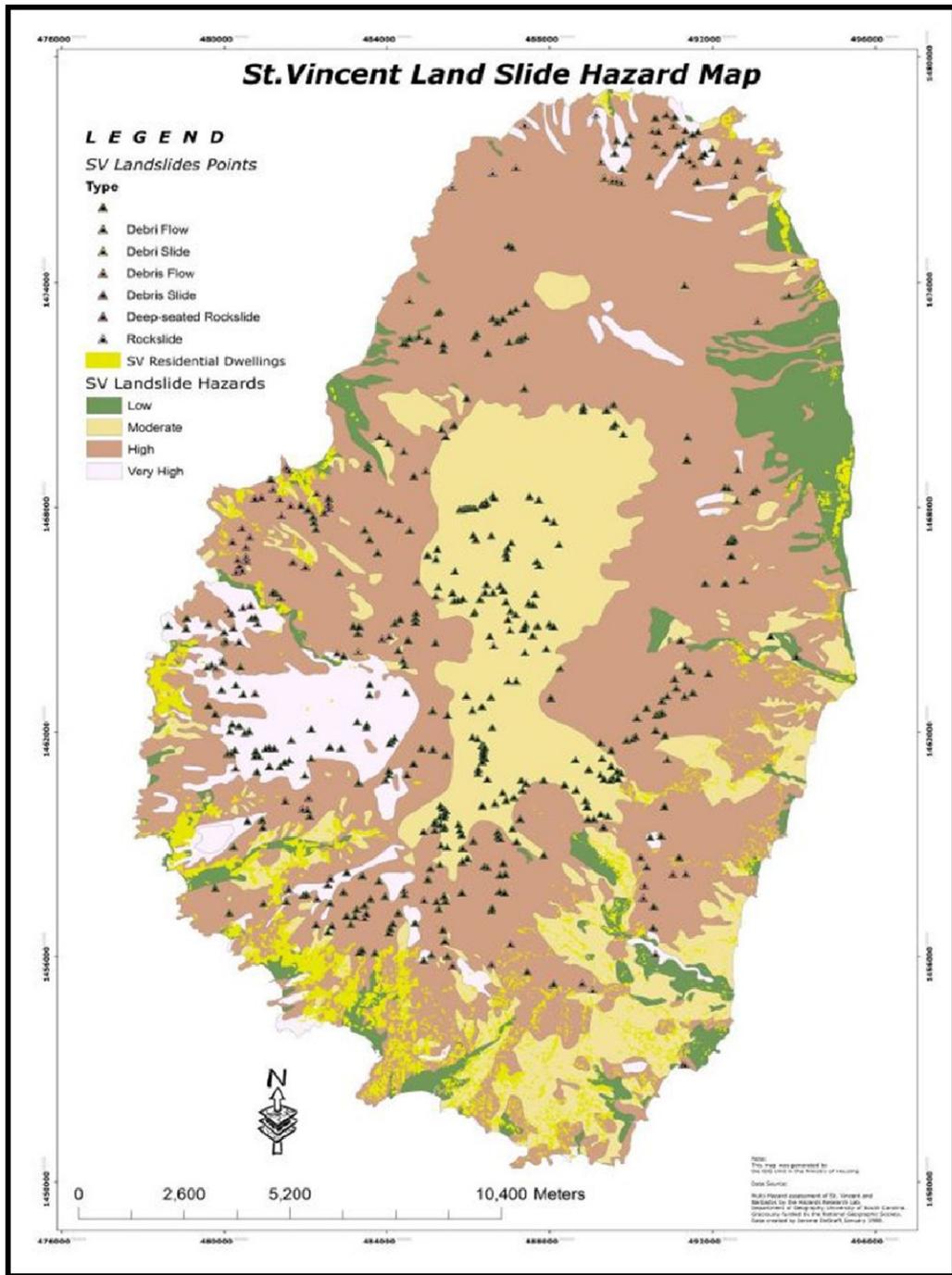
Given its geographic location, small land mass, and topography, the entire nation is highly vulnerable to natural disasters. Because of its volcanic origin, steep slopes dominate the islands' landscape and tilted volcanic layers define the geology and soils (De Graff 1988, cited in Westen, C.J. and Sijmons, Koert. 2016). It has more than 40 rivers and tributaries, which originate in the central mountains and discharge to the Caribbean Sea or the Atlantic Ocean (DLN Consultants 2006).

The combination of tropical temperatures and abundant rainfall leads to slope instabilities and the high potential for landslides. In 1988, De Graff produced an analysis of landslide susceptibility (Figure 19) and during the study identified about 475 landslides, covering about 1 percent of the country's surface. The most common type of landslides in SVG are debris avalanches, which are defined as rapid movements of an unconfined mass of soil and rock falls. Depending on the topography, another common type of landslide is debris flow, for which the movement of debris is confined to a channel. In SVG, debris flow is usually associated with river channels in the mountainous sections of the country. Debris flows can travel long distances, particularly when river flooding has occurred. They approach quickly and exhibit a considerable destructive force. Volcanic eruptions have affected the country in 1789, 1812, 1902, 1971, and 1979 and again in 2021. With the on-going eruption of La Soufriere, the combination of rainwater, debris and volcanic ash can form into lahar and can continue to pose as significant risks for months or even years to come.

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<sup>3</sup> <http://www.charim.net/stvincent/information>

Figure 22: Landslide Hazard Map – St. Vincent (Source, cited in Joslyn, 2008)





## 6.4 EARTHQUAKES

An earthquake is the sudden release of stored energy in the earth crust. Most earthquakes occur along a fracture within the earth, called a fault. The shaking caused by this sudden shift is often very small, but occasionally large earthquakes produce very strong ground shaking. It is this strong shaking and its consequences – ground failure, landslides, liquefaction – that results in damaged buildings and structures and often results in negative impacts on the economy. Earthquake magnitude and intensity are measured on two different scales, the Richter Magnitude scale for source magnitude (the amount of energy released by the event) and the Modified Mercalli Intensity<sup>4</sup> (MMI) scale for the amount of shaking felt at a specific place on the ground.

St Vincent and the Grenadines lie in a relatively quiet zone of the Lesser Antilles island arc. Earthquakes are more common to both the north and south. However, there are four instances of shaking intensity (MMI<sup>5</sup>) at category VII or VIII (potentially damaging) in the past 200 years, although actual damage reports for these events are not readily available (See Figure 20). Prior the current set of eruptions, the last major volcanic eruptions, in 1979 and 1902, produced felt earthquakes as well as more devastating explosions and pyroclastic flows in valleys around the north of the island.

<sup>4</sup> Modified Mercalli Intensity scale

<sup>5</sup> Modified Mercalli Intensity Scale developed from Giuseppe Mercalli's Mercalli intensity scale of 1902, is a seismic intensity scale used for measuring the intensity of shaking produced by an earthquake. It measures the effects of an earthquake at a given location, distinguished from the earthquake's inherent force or strength as measured by seismic magnitude scales (such as the "Mw" magnitude usually reported for an earthquake). While shaking is caused by the seismic energy released by an earthquake, earthquakes differ in how much of their energy is radiated as seismic waves. Deeper earthquakes also have less interaction with the surface, and their energy is spread out across a larger volume. Shaking intensity is localized, generally diminishing with distance from the earthquake's epicenter, but can be amplified in sedimentary basins and certain kinds of unconsolidated soils. [https://en.wikipedia.org/wiki/Modified\\_Mercalli\\_intensity\\_scale](https://en.wikipedia.org/wiki/Modified_Mercalli_intensity_scale)

**Figure 23:** Mercalli Intensity Scale Categories (Source: <https://alltechinc.blogspot.com/2031/10/understanding-intensity-scale-and-sense.html>)

- I. Instrumental**  
Not felt by many people unless in favorable conditions

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- II. Weak**  
Felt only by a few people at best, especially on the upper floors of buildings. Delicately suspended objects may swing.

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- III. Slight**  
Felt quite noticeably by people indoors, especially on the upper floors of buildings. Many do not recognise it as an earthquake. Standing motor cars may rock slightly. Vibration similar to the passing of a truck. Duration estimated.

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- IV. Moderate**  
Felt indoors by many people, outdoors by a few people during the day. At night, some awakened.

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- V. Rather Strong**  
Felt outside by most, may not be felt by some people in non-favourable conditions. Dishes and windows may break and large bells will ring. Vibrations like train passing close to house.

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- VI. Strong**  
Felt by all; many frightened and run outdoors, walk unsteadily. Windows, dishes, glassware broken; books fall off shelves; some heavy furniture moved or overturned; a few instances of fallen plaster. Damage slight.

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- VII. Very Strong**  
Difficult to stand; furniture broken; damage negligible in building of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken. Noticed by people driving motor cars.

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- VIII. Destructive**  
Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture moved.

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- IX. Violent**  
General panic; damage considerable in poorly designed structures, well designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.

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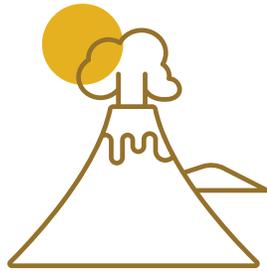
- X. Intense**  
Some well built wooden structures destroyed; most masonry and frame structures destroyed with foundation. Rails bent.

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- XI. Extreme**  
Few, if any masonry structures remain standing. Bridges destroyed. Rails bent greatly.

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- XII. Cataclysmic**  
Total destruction - everything is destroyed. Lines of sight and level distorted. Objects thrown into the air. The ground moves in waves or ripples. Large amounts of rock move position. Landscape altered, or leveled by several meters. In some cases, even the routes of rivers are changes.



## 6.5 VOLCANIC HAZARDS

According to the Seismic Research Center (SRC) of the University of the West Indies (UWI), there are 19 active volcanoes in the Eastern Caribbean with every island from Grenada to Saba directly exposed to volcanic eruption threats. The islands of Grenada, St. Vincent, St. Lucia, Martinique, Dominica, Guadeloupe, Montserrat, Nevis, St. Kitts, St. Eustatius and Saba have active volcanic centres. On the other hand, non-volcanic islands such as Anguilla, Antigua, Barbuda, Barbados, British Virgin Islands, most of the Grenadines and Trinidad & Tobago are close to volcanic islands and are also exposed to volcanic hazards such as severe ash fall and volcanically-generated tsunamis.

St. Vincent and the Grenadines is located in the southern section of a chain of volcanic islands which comprise the Lesser Antilles. It is an archipelagic State that forms part of the Windward Islands in the Southern part of the Caribbean and is surrounded by St Lucia to the North, Barbados to the East and Grenada to the South. The state covers a total land area of approximately 150.3 square miles (388 sq. km.) and a larger marine area including a shallow coastal shelf encompassing an area of approximately 690 square miles. The main island of Saint Vincent is 28 kilometers long and 15 kilometers wide. (source: SVG National Volcano Emergency Plan, 2021).

Topographically, St. Vincent is mainly defined by a backbone of volcanic mountains that stretch much of its length and rise northwards to an elevation of approximately 1,220 m above mean sea level where the La Soufriere volcano is located. The Soufriere is a strata-volcano, with an open summit crater of 1.6 km in diameter. Volcanologists have noted that volcanic activity can be quiet and effusive or violent and explosive, and the length of time that an eruptive episode persists can vary from a few minutes to weeks, months or even decades (source: SVG National Volcano Emergency Plan, 2021).

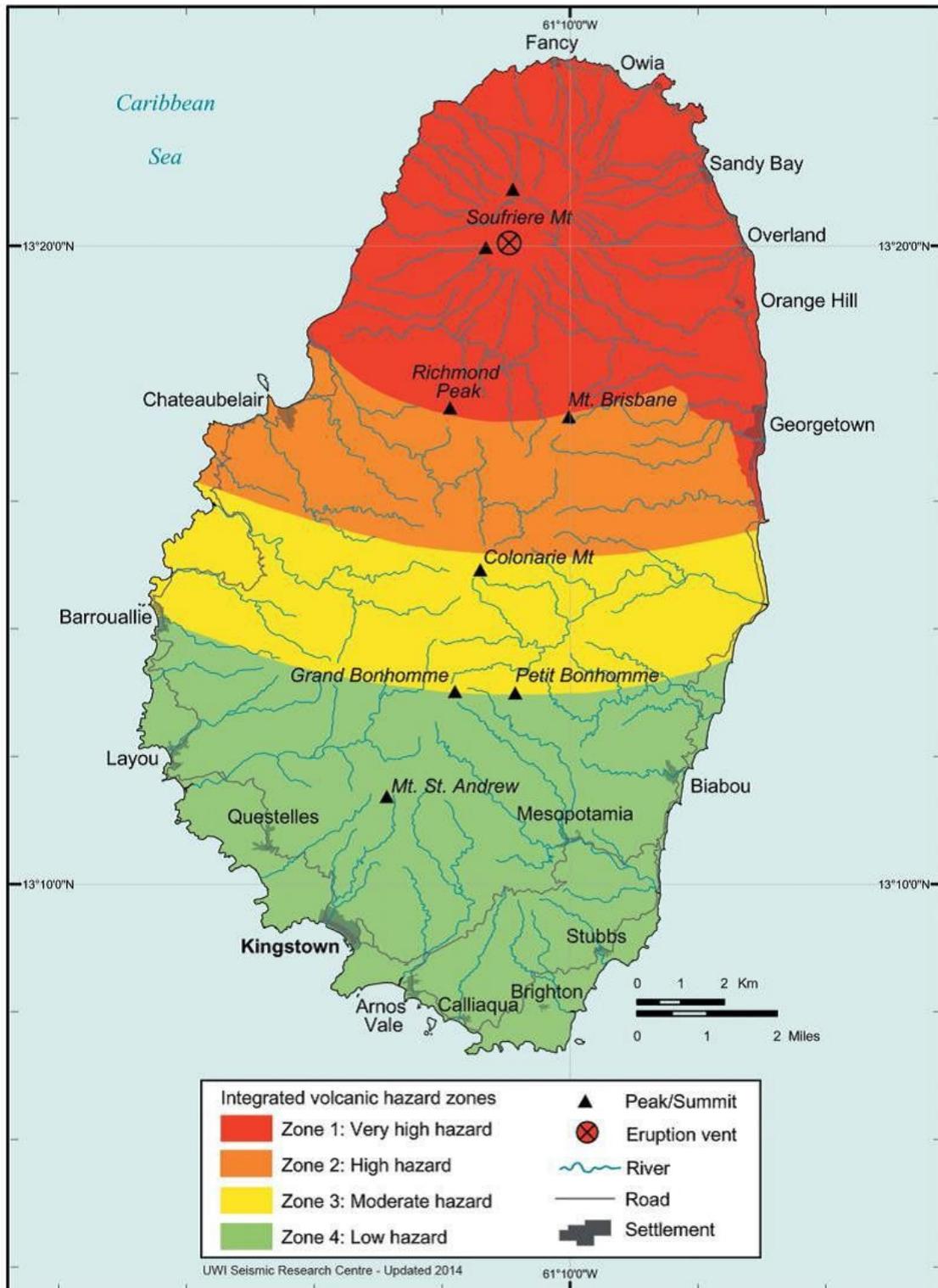
Figure 23 shows the various volcanic hazard zones for the whole island of St. Vincent and shows that Spring Village, which is in the Barroullie Division, is in the Yellow Zone.

In 1994, Robertson described volcanic vulnerability as a “measure of the susceptibility to loss expected due to a particular volcanic event. It is a measure of the possible magnitude of losses expected from a particular volcanic event (UNDRO, 1982)”. Alexander (1991, cited in Robertson 1994), presented a conceptual equation for vulnerability in which it is a function of four factors:

- risk amplification (results of bad construction practice);
- risk mitigation (due to good construction practice);
- risk perception and an indirect cultural factor.

The Soufrière volcano, whose steep sides, poorly-consolidated bedrock and incised ravines (or ‘gutters’, Nanton, 2017, cited in Pyle, et.al. 2018) present a suite of ongoing hazards during periods of both quiescence and unrest (e.g. from sediment-charged flash floods and landslides).

Figure 23: Volcanic Hazard Zones (Source: NEMO 2021)



As described by Pyle et.al., (2018), the summit of the Soufrière comprises a complex of intersecting craters of different ages, suggesting that it has experienced repeated eruptions during its history, most recently in 2021. In addition to 2021 activity, there have been at least five eruptions since 1718, which mean that St Vincent is – by this measure – the most active subaerial volcano in the Caribbean. Eruptions over the past 300 years have occurred against the backdrop of an evolving social, economic and political environment.

According to Robertson (1994), throughout its recorded history (post-1718), the Soufriere volcano has exhibited two contrasting styles of activity, a quiet, effusive versus a violent explosive style. Examination of the stratigraphy suggest that activity during the pre-historic period varied only slightly, with one major period of very cataclysmic Plinian type activity (Rowley, 1978a; Sigurdsson, 1981; Robertson, 1992 – cited in Roberston, 1994).

### 6.5.1. DIFFERENT TYPES OF VOLCANIC HAZARDS

The 2021 draft St. Vincent and the Grenadines: Volcano Emergency Plan and Standard Operating Procedures identifies the different types of primary volcanic hazards as follows:

- Pyroclastic flows and surges from dome collapses
- Pyroclastic flows and surges from the collapse of the crater walls
- Pyroclastic flows and surges from explosive column collapse
- Lateral Blasts Explosions with ash and rock fallout
- Mudflows or Lahars

**Table 15:** Effect of the 1979 volcanic eruption on some aspects of the human and natural resources of St. Vincent and the Grenadines. (Source: Robertson 1994)

Human and natural resource affected	Costs (USD)
Maintenance of evacuees housed in evacuation camps	39,507 per day
Maintenance of evacuees housed outside evacuation camps	5,269 per day
Operation of public transport involved in the evacuation exercise	3,160
Rehabilitation of schools, community centres and church buildings used as evacuation camps	79,013
Repairs to the national housing stock	2,130,069
Repairs to the national road network	4,213,994
Rehabilitation of agriculture	2,129,646
Damage to the main crop (bananas)	50-60% loss of entire crop

Table 16 presents these hazards and the types of impacts they can be expected to cause.

**Table 16:** La Soufriere Volcano Impact Matrix (Source: NEMO 2021)

Hazard	Area Affected (Radial distance from vent, km)	Immediate Risk	Ongoing Risk	Anticipated Loss	Mitigation	Recovery Period following Cessation of Activity
Earthquake*	5-8km	Low	Low	Small	Not applicable	Not applicable
Lava flows and domes*	1-3km	High	Low	High	Moderate	Several months to years
Pyroclastic flows and surges*	5-7km	High	High	Extreme	None	Several weeks to several months
Mudflows*	5-10km	High	High	High	None	Several weeks to several months
Ballistic projectiles*	1-5km	Moderate	Moderate	Moderate	Minor	1 week to several months
Airfall Tephra*	1 to >10km	Moderate	Moderate	Low to Moderate	Moderate	1 week to several months
Volcanic gases	1-3km	Moderate	Moderate	Low	Minor to Moderate	Not applicable
Phreatic explosions	<4km	Moderate	Low	Low	None	Several weeks to several months
Landslides*	5-8km	Moderate	High	Moderate		Several weeks to several months
Laterally directed blasts and structural collapse	5-8km	Low	Low	High		Several weeks to several months
Lightning*	<7km	Low	Low	Low	None	Days to weeks
Tsunami	5 to >10km	Low	Low	Low	Moderate	Up to 1 – 2 days

\*Events which are likely to be repeated over a period of time (days, weeks to months) following the initial event

The secondary volcanic hazards are:

- Ruptured water lines which can lead to flooding.
- Fires
- Contamination of water supply
- Respiratory ailments due to dust
- Visibility issues due to dust
- Ash clouds can contribute to airport closures.

Volcanic threats to livelihoods include:

- Livestock farming
- Arable farming
- Traditional farming
- Nature tourism (Waterfalls, Ecology)
- Beekeeping
- Major impact to critical facilities such as healthcare
- Major impact to factories and small businesses
- Fishing industry (Restricted access to sea, damage to jetties and inability to access fish storage locations)

Prior to the 2021 eruption, Robertson (1994) suggested that the 1979 eruption already had huge impact on human and economic life and forced major adaptation in the patterns of human life and activity on the island of St. Vincent. But he also noted that population growth and increasingly limited options means that people would continue to live in and develop areas of high risk from eruptions at the Soufriere volcano. “Future volcanic eruptions should therefore be expected to have a greater effect socially, than has been the case in the past,” Robertson suggested.

The social impact of past eruptions, such as the 1979 eruption, have varied from disruption of family life due to evacuation and relocation, to migration of entire families to foreign countries. In addition, mental and emotional stress was placed upon the evacuated population who were accustomed to more expansive personal space. The social impacts have varied from disruption of family life due to evacuation and relocation, to migration of entire families to foreign countries. In addition, mental and emotional stress was placed upon the evacuated population who were accustomed to more expansive personal space.

Fortunately, even prior to the 2021 eruption, as Robertson noted in 1994, “the Soufriere volcano features prominently in the minds of most Vincentians” The degree to which this affects their actions varies largely with their economic status, recollection of past events, proximity to the volcano and knowledge of volcanic processes. The manner in which the volcanic threat is perceived is well illustrated by the fact that during all of the historic eruptions, people living within the areas of highest risk (north of the Rabacca and Wallibou rivers), begun moving away from the volcano prior to any formal evacuation exercise ordered by the governing authorities.

In 2021, the Soufriere volcano erupted once again. The impacts, damages and losses are discussed in the next section on vulnerability and risk.

## 6.6 ENVIRONMENTAL ISSUES IN SPRING VILLAGE

The community suffers from the occasional land slippage due to the hilly terrain overlooking the coastal lands and high levels of precipitation across its sub-villages (See Figures 24 and 25). The coastal lands in Cumberland are prone to storm surges. The last major event to impact the community was a flood that took place in 2013 which left significant damage to property and infrastructure. Other notable issues include: abandoned and useless structures in the depleted coastal area; illegal dumping of garbage into rivers and streams; overuse of pesticides on farmlands; and farming on river banks.

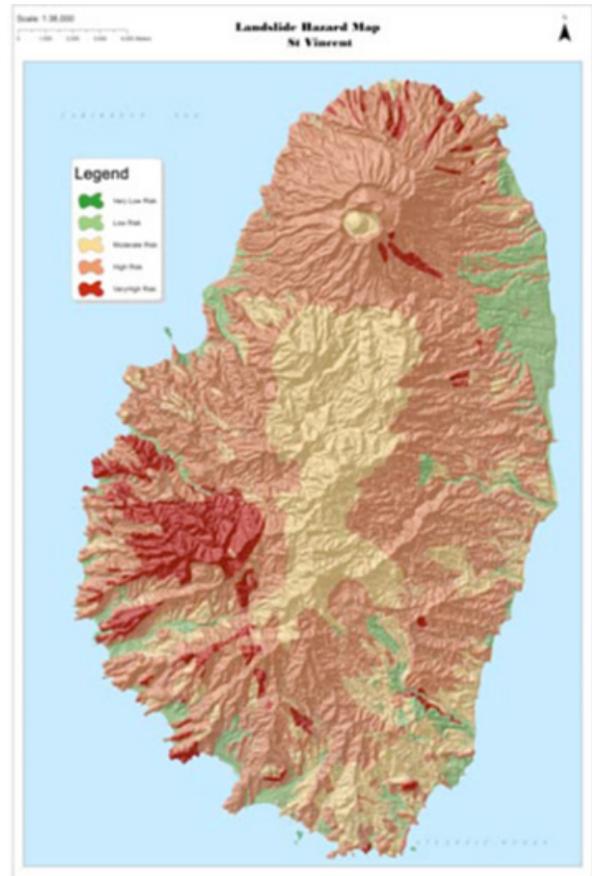
**Figure 25:** Susceptibility to Soil Erosion



Additional, Spring Village has several environmental challenges that continue to be a daily threat to the natural assets of the community. If these are not urgently addressed they will continue to negatively affect the environment within the community. Examples of such challenges are:

- a. the rivers and streams are being polluted by the negative actions of residents who illegally dump garbage into the rivers and streams
- b. the overuse of pesticides by farmers
- c. the seeping of sewerage and waste from pig pens located on the river banks and in some instances in the river bed
- d. deforesting of lands on steep slopes for legal and illegal farming resulting in soil erosion which contaminates the rivers and streams

**Figure 26:** Landslide Hazard Map



- e. the presence of the Tattoo/Armadillo (a wild animal) has contributed to the uprooting of trees and consequent erosion of steep slopes
- f. both public utilities, the Central Water and Sewerage Authority (CWSA) and the St. Vincent Electricity Services (VINLEC) abstract one hundred percent of water from the Cumberland River for six months of the year, which result in a dry river basin downstream of the Groove hydropower plant in Spring Village. This has seriously impacted the residents of the Spring Village community who depend on the resources of the river (Joslyn, 2008).

## 6.7 HAZARDS AFFECTING SPRING VILLAGE

A hazard is defined as a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Figures 28 and 29 illustrate the key hazards that can impact Spring Village.

Volcanic Eruption, Flooding, Landslide, Bush Fires were the four main natural hazards cited by residents during the LBA assessment.

Figure 29: Cumberland Watershed / Spring Village Community Hazard Map (Joslyn, 2008)

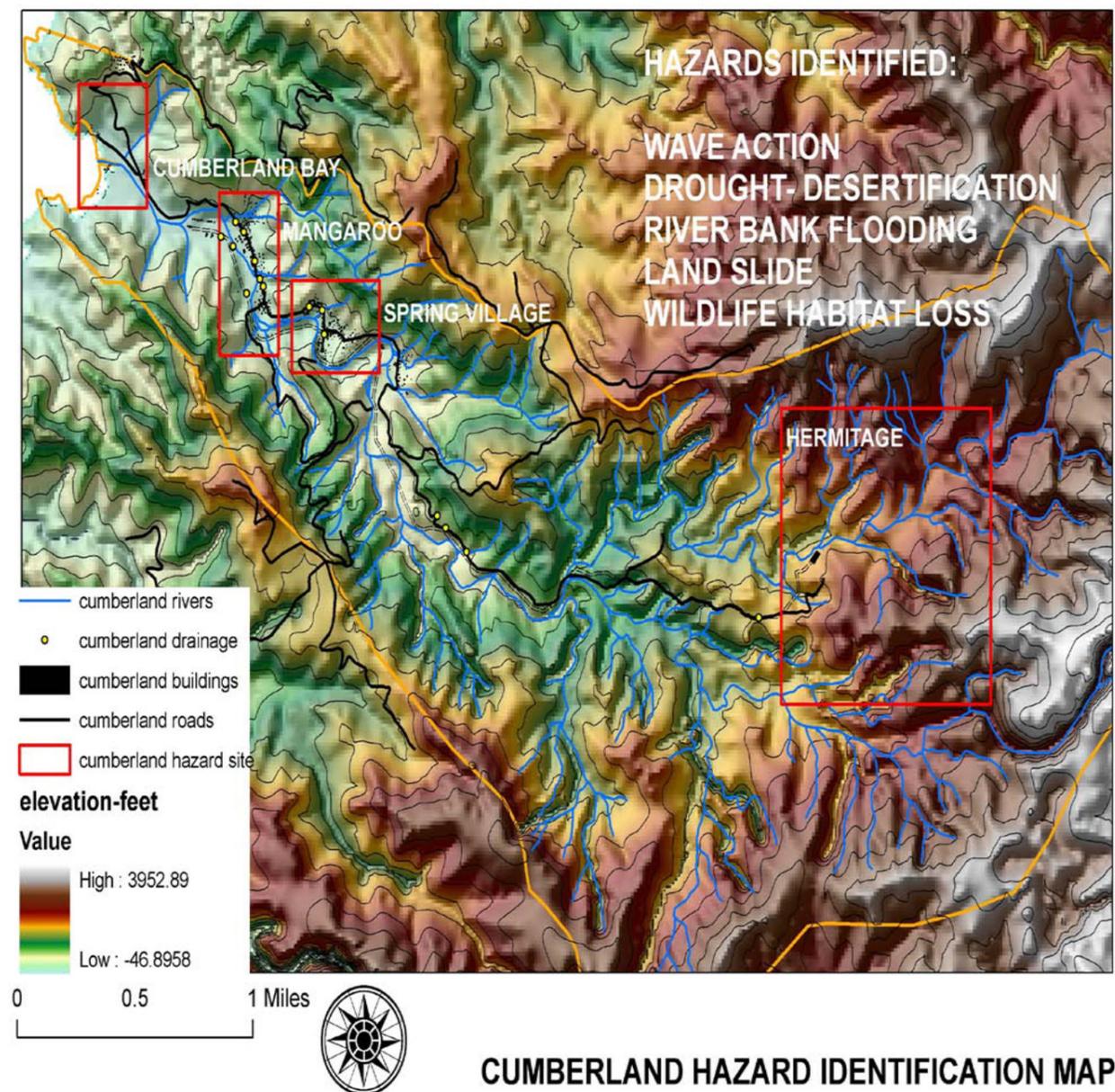
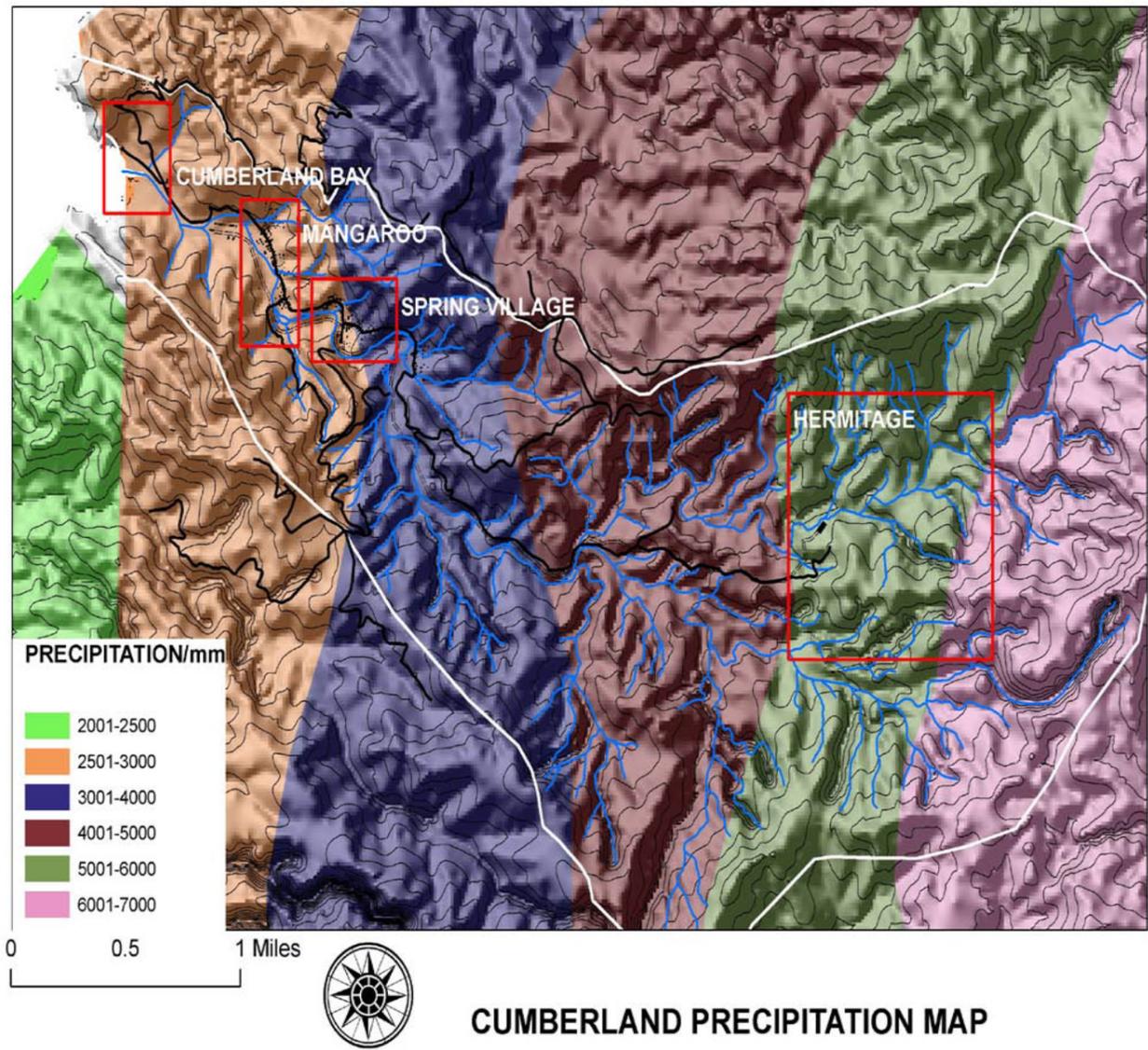


Figure 29: Cumberland Watershed / Spring Village Community Hazard Map (Joslyn, 2008)



**Table 17:** Hazard Matrix - LBA Assessment

Hazard Type	Frequency (when)	Season (month)	Geography (where)	Typical Damage Max = 5	Typical Loss Max = 5	Overall Impact on lives and livelihood
Flooding	2013	December	Entire Community	5	5	<ul style="list-style-type: none"> <li>• Severe impact on farmers (Some are still recovering).</li> <li>• Some persons had to relocate.</li> <li>• Loss of crops and livestock (not in main farming areas).</li> <li>• River and bridge damage.</li> <li>• Damage to pipelines.</li> <li>• Flooding of flood prone residential areas</li> <li>• Flooding of flood prone residential areas</li> </ul>
	1983 or 84	September		5	4	
	1966			5	4	
Landslide	2013	December	Gordon	4	0	<ul style="list-style-type: none"> <li>• Road Blockage</li> </ul>
			Charles Village			
			Cocoa			

However, when asked to prioritise the severity of impact from among these four hazards, flooding and landslide were the two (2) main natural hazards identified as seen hazard matrix Table 17. This vulnerability is due to the fact that the terrain of the Cumberland watershed is steep with slope formation of 30° in the lower valley and extended to a 90° formation in the upper watershed (Joslyn, 2008).

Flooding was identified as the predominant hazard by 30% of the participants interviewed while 5% said landslide, 2.5% said hurricane and another 2.5 % said other.

Landslides were identified as the predominant hazard particularly during the rainy season. The overall impact of the Landslide was seen to have cause the most significant impact due to the frequency and given the loss of crops, resulting in financial losses.

The overall impact of the 2013 floods on the community was severe, particularly on the farmers (with some still recovering). Persons had to relocate as there was loss of livestock and crops and also damage to the bridge, power station and pipelines. Figures 26 and 27 illustrate the main hazards and the most vulnerable

areas in the Spring Village community and the levels of precipitation across its sub-villages.

However it is important to note that the LBA assessment was done in 2019, well before the 2021 volcanic eruption. Residents may rank the hazards that affect them the most quite differently in the post 2021 eruption period, because it was so catastrophic.

#### 6.7.1. LEVEL OF PREPAREDNESS

A Community Engagement survey administered in Spring Village in 2018 as part of the Volcano Ready SVG project revealed the following:

- Ninety-six percent (96%) of persons surveyed could identify an emergency shelter in the community.
- Only 16% believed there was a community disaster plan and 12% had seen evidence of this plan.
- Twenty-five (25%) of respondents reported having family disaster plans.

KoBo Tool box analysis (a household survey conducted in October 2019) showed that 35% of households interviewed did not take any precautionary measures to prepare for any hazardous event.

## 6.8 VOLCANO READY PROJECT AND REDUCING VULNERABILITY

The Volcano-ready Communities Project in St. Vincent, which is financed by the CDRRF and is being implemented by the Seismic Research Centre (SRC), University of the West Indies, St. Augustine, Trinidad and Tobago. This project seeks to reduce vulnerability to the multi-hazard environment of the Soufriere Volcano through a combination of activities designed to enhance community early warning procedures, increase adaptive capacities, strengthen awareness, and enhance response capacities. The Project comprises four components which seek to increase the resilience of the 12 communities in St. Vincent and the Grenadines to volcanic and other natural hazard events and climate change. The communities have been grouped into two and they are (a) Windward communities comprising Fancy, Owia, Sandy Bay, Overland and Big Level, South Rivers, Park Hill, Colonaire, and (b) Leeward communities comprising Fitz Hughes, Chateaubelair, Rose Hall, and Spring Village.

The project consists of three (3) main components :

### Component 1

Increased Community Volcano and Other Natural Hazard Readiness;

### Component 2

Increased Knowledge and Awareness of Volcano and Multi-Hazards Risk Reduction and Climate Change Impacts in the Beneficiary Communities; and

### Component 3

Enhanced Adaptive Capacity. A fourth component covers project management and administration. CDRRF Volcano Ready Project

The proposed project is a solid example of effective partnership engagement and coordination. Strong partnerships with Red Cross and Community Development are particularly worth noting. Even though the initial consultation with the communities was over a year ago, all the communities visited during the Rapid Community Climate Vulnerability Assessment (RCCVA) mission were aware and in support of the proposed initiative.

It was evident that NEMO has a strong working relationship with the proposed communities and a detailed understanding of the social and environmental challenges. Relationships with a broad range of stakeholders in government, civil society, and the private sector ensure a holistic approach to the implementation of the project. This collaborative approach will also facilitate the sharing of knowledge and skills which could lead to greater impacts.

To also seek to effectively incorporate climate change in the proposed initiative, it will be important to broaden the focus from the volcanic hazards to the “volcanic environment” in general. In other words, to determine how the presence of the volcano creates other hazards that can interact with or be exacerbated by climate-related hazards. For example, due to the steep slopes, landslides and rates of flooding could increase under future changes in climate. The focus should be on building general resilience of the targeted communities rather than trying to build resilience to a specific hazard. The rationale is that increasing the resilience of particular parts of a community to specific disturbances may result in resilience lost in other ways.

### 6.8.1. FINDINGS FROM THE 2016 RAPID COMMUNITY CLIMATE VULNERABILITY ASSESSMENT (RCCVA)

During the focus group discussions (FGD) held in September 2016 across the Volcano Ready Communities, the participants identified agriculture as the most predominant livelihood activity in their communities. Problems were identified such as poor access to markets that limit income security at all times, and thereby undermine resilience in the face of hazards. Unemployment and constrained livelihood opportunities in the north of the island are therefore accentuating underlying vulnerability to disasters. Addressing the high level of uncertainty and problems related to agriculture will be key to resilience-building efforts at the community level. Other livelihoods are also under pressure as unemployment is widespread in these communities.



The situation is amplified in some areas by poor construction and land management practices which often lead to increased sedimentation and degradation of the marine environment. The proposed multi-hazard approach will ensure that a holistic approach is taken to reduce exposure to multiple stressors and shocks.

#### 6.8.1.1. Finding 1

The consensus from the focus group discussions is that disaster impacts generally affect women more or in a worse way. In Fancy, the female farmers have organized themselves into a group (Fancy Ladies) to offset negative impacts on their livelihoods. Women are particularly involved with livestock production (sheep, goats, pigs). It will be important to consider these gender dynamics during the implementation of the project.



#### 6.8.1.3. Finding 3

During the focus group discussions, the participants indicated the use of savings as the most typical coping strategy. Strong support from community members was also cited as a key coping strategy. The recovery process, or what people do after a hazardous event has impacted their household, seems to be based on a combination of factors: continuing with daily routines and activities, accessing assistance from the state, and using their savings or relying on their families and friends. The fact that the island is prone to the impact of multiple hazards means that recovering is made more difficult by the possibility that another hazard might impact soon after. For example, after the eruption in 1979, Hurricane Allan struck the island in 1980 and caused a lot of damage to crops that had been recently planted. Other problems, such as plant disease also impact farmers.



#### 6.8.1.2. Finding 2

While La Soufriere Volcano is a hazard that can have a direct impact on the entire island as well as in the neighbouring islands, the proposed communities are also exposed to floods, hurricanes, droughts, landslides and coastal erosion. These are also major concerns. The most recurrent events are hurricanes and tropical storms. Given the island's topography, the types of construction and the places where these have been built, frequently in unstable hill areas, rain and wind often cause severe damages to buildings, infrastructure and agriculture. Landslide is also a major challenge facing the communities due to the steep topography, friable soils, and localized rainfall events.



#### 6.8.1.4. Finding 4

The main livelihood challenges facing the communities include:

- Marketing of agricultural produce (farmers are primarily dependent on Traffickers<sup>5</sup>)
- Land space and tenure - access to arable land are limited in most of the proposed communities
- Pest & Plant disease: Farmers indicated that they had experienced an increase in the frequency of pests and plant disease
- Drought and heavy rains: Drought was identified as 'silent' stressor while the increased frequency of heavy rain is a major concern
- Extension service: Farmers expressed the need for improvement in extension services to their communities
- Quality of seeds and planting material:
- Praedial Larceny
- Landslides
- Social cohesion: strong but formal groups are relatively weak



#### 6.8.1.5. Finding 5

The success of the Community Early Warning Systems (CEWS) will be dependent on the strength of the community groups. While groups exist in most of the proposed communities, their capacities are limited and will need strengthening to effectively support the implementation. Of particular importance will be the building of awareness of local income-generating opportunities. In general, the communities are not sufficiently informed about national plans for coping with geologic hazards and do not have adequate resources, training and information with which to mitigate their impact. Building community adaptive capacity to volcanic eruptions can be challenging. The indicators and outcomes should be revised to focus on the volcanic environment in general and to capture and address the multi-hazard risks facing the targeted communities.

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<sup>5</sup> Persons who are legally allowed to buy and sell produce in other islands

# 7 The 2021 Volcanic Eruption



In December, 2020, the La Soufriere Volcano became active once again and on April 9th 2021 it erupted explosively.

The explosive volcanic activity prompted mass evacuation of persons from communities in the red and orange zones (Figure 20) – the northeast and northwest of the island. Numerous farmers were been displaced from their communities and relocated to southern communities.

Late in April 2021, once the eruptions had subsided enough for Damage and Loss Assessment Teams (DaLAT) to formed and assessments to be conducted of the infrastructure and crop damage, Detailed Agriculture Damage Assessment (DADA) reports were prepared. This LBA report includes the data and information that were collected from these preliminary reports.

The National Emergency Management Organization (NEMO) reported that a total of 13,303 persons<sup>6</sup> were evacuated. Of these persons, approximately 2875 were registered farmers and 278 were fisherfolk who were dislocated from the red and orange zones (Table 18). Additionally, some farmers and fishers from the Yellow Zone, especially on the leeward side, were evacuated.

**Table 18:** Farmers Disaggregated by Hazard Zones

Zones	Total numbers of registered farmers	Total number registered fishers	Total by zone
 Red	1850	125	1975
 Orange	1023	153	1176
 Yellow	2569	2	2571
 Green	4996	1468	6464
	<b>10,438</b>	<b>1,748</b>	<b>12,186</b>

<sup>6</sup> NNational Emergency Management Organization update, dated April 19, 2021

Figure 31 is a map of St Vincent showing the Hazard Zones and Agricultural Districts and a table showing the demographic distribution of registered farmers and fishers.

**Figure 31:** Map of St. Vincent Showing Agricultural Districts and Hazard Zones

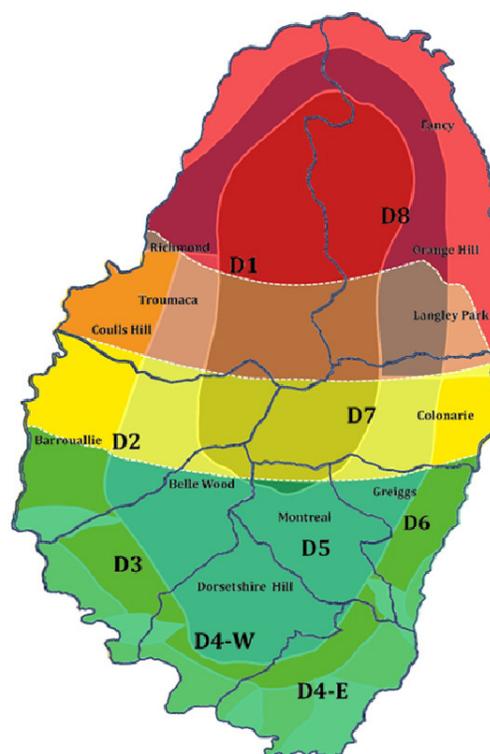


Figure 30 Composite map of St Vincent including Agro-ecological zones (CARDI), Agricultural Regions and Districts (MAFFRTIL) and Volcanic Hazard Zones (UWI SRC). Layers and overlays put together by Colville King, Diversification Officer MAFFRTIL, April 2021.

The Eruption precipitated a mass evacuation from communities in the northeast and northwest of the country with over 13,000 persons moving from the hazard zones to public and private dwelling within the safer zones in the south of the country. Numerous farmers have been displaced from their communities and relocated to southern communities in the process. Extensive acreages of crops have been lost or damaged as a direct and or indirect consequence of the eruptions or from secondary reasons related to the abandonment of the crops and free roaming animals let loose by farmers before they evacuated.

The eruptions both directly and indirectly affected agriculture, forestry, fishing and agriculture infrastructure throughout the country resulting in damages and losses ranging from as low as 7% in the Green Zone to 100% in a substantial number of commodities in the Red and Orange Zones.

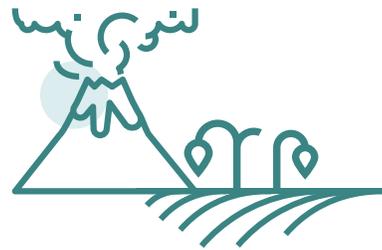
Table 19 summarizes the estimated damage and loss by sectors. However, the Assessment team have suggested that while their preliminary report estimated a loss of \$54,000,000 (USD \$20,000,000) in general agriculture infrastructure, “the full extent of the damage and loss will need to be comprehensively assessed and may result in much higher estimates.”

With respect to the livestock sector, the damage and loss was initially estimated to be low as farmers were advised to let their animals loose. However, “with the limited availability of feed and water in a highly ash contaminated environment, the prediction was that indirect losses in animals will increase ranging from 10 to 30 percent due to health and other complications.”

Overall, the preliminary DADA report indicates the estimated value of total damage and loss sustained by the crops, livestock, apiculture, fisheries and forestry sectors is \$142,628,402.00.

A further cropland damage assessment done on April 26 2021 by Ghosh et.al., and employed Normalized Difference Vegetation Index (NDVI)<sup>7</sup> analysis to assess the magnitude of ash damage to crop and vegetative cover and found that the changes in NDVI values are much higher in the surrounding areas of the volcano.

**\$142,628,402**  
total estimated damage and loss



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<sup>7</sup> Normalised Difference Vegetation Index (NDVI) “quantifies vegetation by measuring the difference between near-infrared (which vegetation strongly reflects) and red light (which vegetation absorbs) <https://gisgeography.com/ndvi-normalized-difference-vegetation-index/>

Table 19: Crop Damage and Loss Assessment

Crop type	Acreage in production	Yield/a cre (lb)	Expected Yield (Lb)	Estimated Damage (acreage)	Cost of Production/acre	Estimated total Value of damage	Farm gate price/Lb	Total Value of Losses	Estimated total Damage and Loss E C\$	Estimated total Damage and Loss US\$
Arrowroot	98	9,000	882,000	98	\$5,700.00	\$558,600.00	\$1.00	\$558,600.00	1,440,600.00	533,555.56
Asparagus	5	8,000	40,000	0.2	\$3,705.00	\$741.00	\$10.00	\$16,000.00	16,741.00	6,200.37
Beet	1.5	4,000	6,000	0.5	\$4,268.00	\$2,134.00	\$1.00	\$2,000.00	4,134.00	1,531.11
Broccoli	1.5	7,000	10,500	1	\$7,245.00	\$7,245.00	\$4.00	\$28,000.00	35,245.00	13,053.70
Cabbage	20	12,000	240,000	12	\$7,065.00	\$84,780.00	\$2.00	\$288,000.00	372,780.00	138,066.67
Carrots	60	8,000	480,000	54	\$7,685.00	\$414,990.00	\$2.50	\$1,080,000.00	1,494,990.00	553,700.00
Cassava	80	25,000	2,000,000	88	\$7,532.00	\$512,176.00	\$0.90	\$1,530,000.00	2,042,176.00	756,361.48
Cauliflower	11	9,000	99,000	6	\$6,885.00	\$41,310.00	\$6.00	\$324,000.00	365,310.00	135,300.00
Celery	3	6,000	18,000	3	\$6,073.00	\$18,219.00	\$3.25	\$58,500.00	76,719.00	28,414.44
Chive	66	8,000	528,000	59	\$8,054.00	\$475,186.00	\$1.75	\$826,000.00	1,301,186.00	481,920.74
Corn	48	12,000	576,000	7	\$4,783.00	\$33,481.00	\$1.50	\$126,000.00	159,481.00	59,067.04
Cucumber	35	18,000	630,000	35	\$6,336.00	\$221,760.00	\$1.00	\$630,000.00	\$851,760.00	315,466.67
Dashew	400	14,000	5,600,000	100	\$4,166.00	\$416,600.00	\$0.80	\$1,120,000.00	1,536,600.00	569,111.11
Eddoes	550	11,000	6,050,000	138	\$4,100.00	\$565,800.00	\$1.00	\$1,518,000.00	2,083,800.00	771,777.78
Eggplant	6	15,000	90,000	6	\$6,853.00	\$41,118.00	\$2.00	\$180,000.00	221,118.00	81,895.56
Flavour pepper	8	15,000	120,000	1	\$9,342.00	\$9,342.00	\$2.50	\$32,500.00	41,842.00	17,348.89
Ginger	120	20,000	2,400,000	11	\$8,320.00	\$91,520.00	\$3.00	\$660,000.00	751,520.00	278,340.74
Hot Pepper	5	15,000	75,000	1.5	\$8,922.00	\$13,383.00	\$3.00	\$67,500.00	80,883.00	29,956.67
Lettuce	8	3,000	24,000	8	\$7,712.00	\$61,696.00	\$3.50	\$84,000.00	145,696.00	53,961.48
Melons	8	20,000	160,000	8	\$6,416.00	\$51,328.00	\$3.00	\$480,000.00	531,328.00	196,788.15
Ochra	12	6,000	72,000	1	\$5,206.00	\$5,206.00	\$2.00	\$12,000.00	17,206.00	6,371.59
Parsley	2	4,000	8,000	2	\$6,277.00	\$12,554.00	\$6.75	\$54,000.00	66,554.00	24,649.63
Pak-choi	3	12,000	36,000	3	\$5,955.00	\$17,865.00	\$2.00	\$72,000.00	89,865.00	33,283.33
Peanut	32	3,000	96,000	22	\$5,525.00	\$121,550.00	\$8.00	\$528,000.00	649,550.00	240,574.07
Pigeons Peas	20	10,000	200,000	14	\$4,914.00	\$68,796.00	\$7.00	\$980,000.00	1,048,796.00	388,442.96
Pumpkins	13	10,000	130,000	13	\$5,039.00	\$65,507.00	\$1.00	\$130,000.00	195,507.00	72,410.00
Radish	1	8,000	4,000	0.5	\$4,268.00	\$2,134.00	\$3.50	\$14,000.00	16,134.00	5,975.56
Sweet	8	5,000	40,000	6	\$5,198.00	\$31,188.00	\$3.00	\$90,000.00	121,188.00	44,884.44
Squash	5	15,000	75,000	5	\$5,303.00	\$26,515.00	\$3.16	\$237,000.00	263,515.00	97,598.15
String Beans	8	5,000	40,000	4	\$4,478.00	\$17,912.00	\$2.20	\$44,000.00	61,912.00	22,930.37
Sweet Pepper	55	7,000	385,000	33	\$5,683.00	\$187,539.00	\$4.00	\$924,000.00	1,111,539.00	411,681.11
S Potatoes	100	8,000	800,000	80	\$2,965.00	\$237,200.00	\$1.50	\$960,000.00	1,197,200.00	443,407.41
Tannia	150	9,000	1,350,000	45	\$5,983.00	\$269,235.00	\$2.50	\$1,012,500.00	1,281,735.00	474,716.67
Tomatoes	73	15,000	1,095,000	66	\$11,417.00	\$753,522.00	\$3.00	\$2,970,000.00	3,723,522.00	1,379,082.22
Turmeric	8	34,000	272,000	4	\$10,043.00	\$40,172.00	\$1.50	\$204,000.00	244,172.00	90,434.07
Water Melons	15	20,000	300,000	15	\$6,416.00	\$96,240.00	\$2.20	\$660,000.00	756,240.00	280,088.89
Other Yam	8	12,000	96,000	7	\$7,683.00	\$53,781.00	\$4.00	\$336,000.00	391,181.00	144,881.85
P Yam	40	8,000	320,000	36	\$9,879.00	\$355,644.00	\$4.00	\$1,152,000.00	1,507,644.00	558,386.67
White Yam	110	12,000	1,320,000	99	\$7,883.00	\$780,417.00	\$4.00	\$4,752,000.00	5,532,417.00	2,049,043.33
Yellow Yam	8	8,000	64,000	7	\$8,159.00	\$57,113.00	\$4.00	\$224,000.00	281,113.00	104,115.93
Avocado	123	9,000	1,104,000	49	\$2,209.00	\$108,241.00	\$0.80	\$705,600.00	813,841.00	301,422.59
Banana	593	20,000	11,864,800	534	\$11,340.00	\$6,055,580.00	\$0.92	\$9,825,600.00	15,881,160.00	5,881,911.11
Breadfruit	137	24,500	3,352,000	55	\$1,889.00	\$103,895.00	\$2.00	\$5,390,000.00	5,493,895.00	2,034,775.93
Breadnut	14	15,000	211,800	6	\$1,889.00	\$11,334.00	\$3.00	\$54,000.00	65,334.00	204,197.78
Carambola	15	9,000	135,000	6	\$2,268.00	\$13,608.00	\$2.00	\$216,000.00	229,608.00	85,040.00
Christophene	12	2,000	24,000	6	\$2,851.00	\$17,106.00	\$1.96	\$23,520.00	40,626.00	15,046.67
Chive	4	8,000	28,000	1	\$1,900.00	\$1,900.00	\$25.00	\$400,000.00	401,900.00	148,851.85
Cocoa	540	5,000	2,700,000	405	\$2,500.00	\$1,012,500.00	\$1.50	\$6,075,000.00	7,087,500.00	2,625,000.00
Coconut	1500	15,000	22,500,000	1350	\$1,689.00	\$2,280,150.00	\$0.50	\$20,250,000.00	22,530,150.00	8,344,500.00
Golden apple	116	21,000	2,437,000	17	\$2,209.00	\$37,553.00	\$1.00	\$714,000.00	751,553.00	278,352.96
Grapefruit	10	20,000	200,000	1	\$2,028.00	\$2,028.00	\$1.00	\$40,000.00	42,028.00	15,565.93
Guava	24	24,000	576,000	5	\$2,099.00	\$10,495.00	\$1.00	\$240,000.00	250,495.00	92,775.93
Ju jube	5	24,000	121,888	3	\$2,268.00	\$6,804.00	\$3.00	\$432,000.00	438,804.00	162,520.00
Lemon	5	18,500	93,848	0.5	\$1,288.00	\$644.00	\$2.50	\$46,250.00	46,894.00	17,368.15
Limes	12	18,500	222,000	2	\$1,288.00	\$2,576.00	\$4.00	\$296,000.00	298,576.00	110,583.70
Mandarin	2	16,000	27,615	0.2	\$1,288.00	\$257.60	\$1.00	\$6,400.00	6,657.60	2,465.78
Mangoes	400	17,500	7,000,000	80	\$1,969.00	\$157,520.00	\$0.50	\$1,400,000.00	1,557,520.00	576,859.26
Nutmeg	40	800	32,000	4	\$1,900.00	\$7,600.00	\$3.50	\$22,400.00	30,000.00	11,111.11
Orange	15	27,000	405,000	1.5	\$2,367.00	\$3,550.50	\$1.00	\$81,000.00	84,550.50	31,315.00
Passion Fruit	10	8,000	80,000	10	\$2,841.00	\$28,410.00	\$2.50	\$200,000.00	228,410.00	84,596.30
Paw-paw	8	15,000	120,000	4	\$5,334.00	\$21,336.00	\$2.00	\$120,000.00	141,336.00	52,346.67
Pineapple	30	15,000	450,000	27	\$7,098.00	\$191,646.00	\$8.00	\$3,240,000.00	3,431,646.00	1,270,990.00
Plantain	700	30,000	21,000,000	595	\$8,092.00	\$4,814,740.00	\$1.00	\$17,850,000.00	22,664,740.00	8,394,348.15
Sapodilla	2	18,000	36,000	0.2	\$1,900.00	\$380.00	\$2.00	\$14,400.00	14,780.00	5,474.07
Soursop	14	20,000	280,000	2	\$1,914.00	\$3,828.00	\$1.20	\$96,000.00	99,828.00	36,973.33
Sugarapple	8	12,000	96,000	1	\$1,914.00	\$1,914.00	\$1.00	\$24,000.00	25,914.00	9,597.78
Tangerine	5	16,000	74,000	0.5	\$1,288.00	\$644.00	\$1.00	\$16,000.00	16,644.00	6,164.44
Waterapple	10	20,000	200,000	2	\$1,900.00	\$3,800.00	\$1.00	\$80,000.00	83,800.00	31,037.04
<b>TOTAL CULTIVATED</b>	<b>6,556.4</b>					<b>\$21,722,919.10</b>		<b>\$93,637,170.00</b>	<b>115,360,089.10</b>	<b>42,725,958.93</b>

Notes:  
 163 acres of arrowroot planted, 65 acres (40%) of arrowroot was harvested before the eruption and is considered as the value of starch loss.  
 15,000 coconuts/acre is estimated as 45,000 lbs.

Figure 31 shows that the entire region was affected after the eruption and clearly shows that the “changes in NDVI values are much higher in the surrounding areas of the volcano.”

**Figure 31:** Vegetation changes (NDVI) using Sentinel 2 after April 10th 2021 (left: Jan1-Apr9 and Right: Apr10-Apr26)

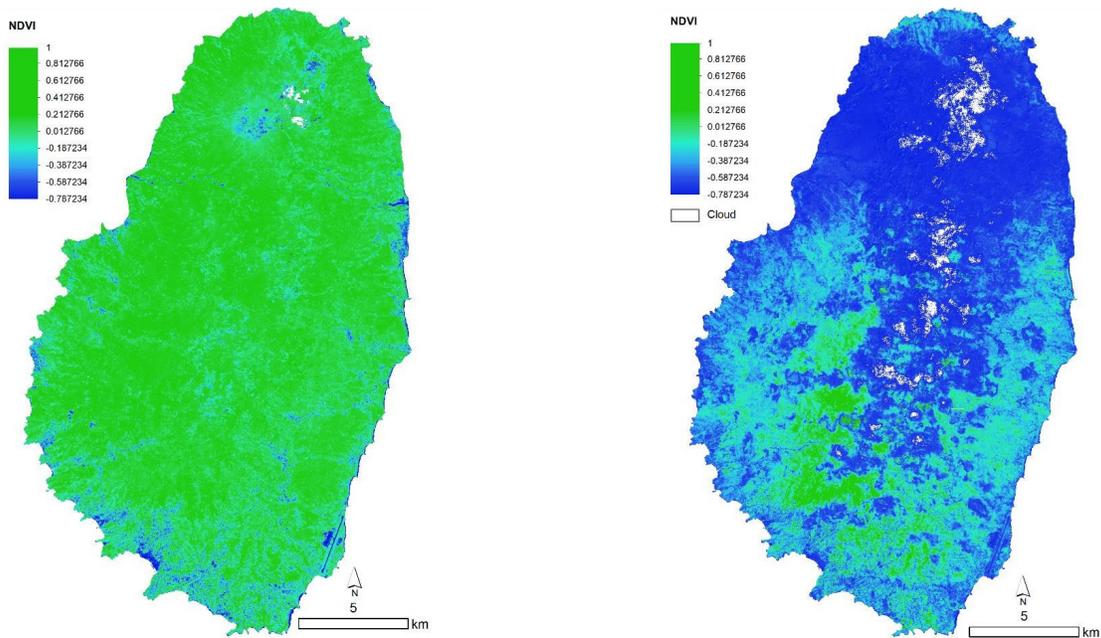
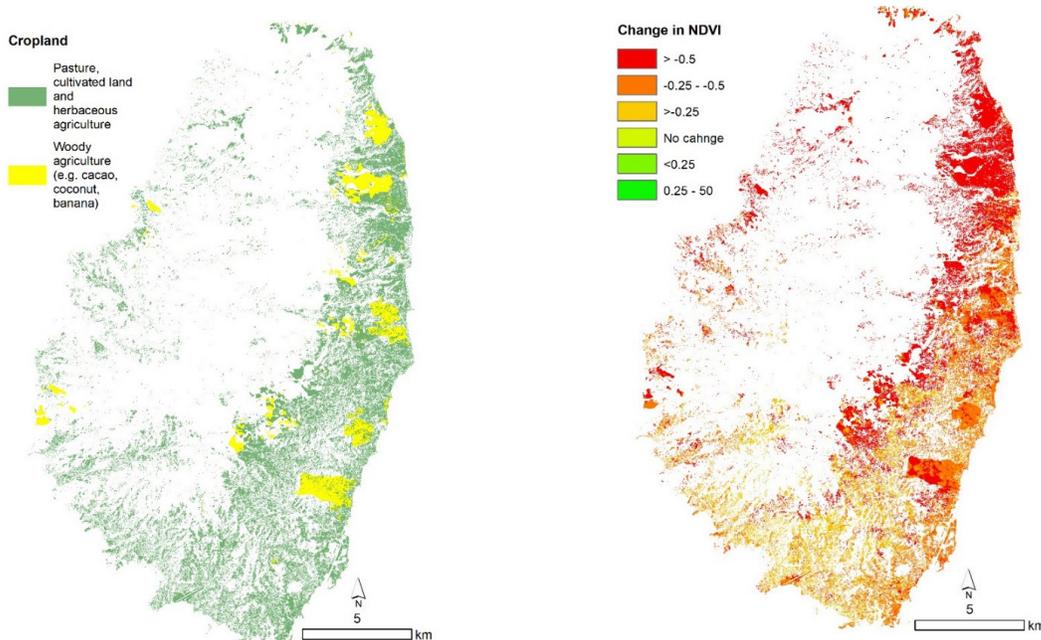


Figure 32 illustrates type of damage and changes in NDVI for specific types of land cover, including pasture, crops, and woody agriculture (tree crops).

**Figure 32:** NDVI Changes after 10th of April over the cropland area (left: Cropland, Right: NDVI change)



The NDVI analysis estimated that a total of 43% of all the cultivated lands in the island were severely impacted (roughly 3200 hectares), while 3000 hectares were partly affected and only 0.6% of lands were not affected.

Tables 20 and 21 provide further detailed estimated area of damage and the types of changes in vegetation and crop land in each of the hazard zones.

**Table 20:** Impacted cultivated land (ha) in Saint-Vincent Islands based on land cover, vegetation changes (NDVI), by hazard zones, land cover and administrative units

Hazard	Admin Units	Pasture, cultivated land and herbaceous agriculture	Woody agriculture (e.g. cacao, coconut, banana)	Impacted cultivated land (cropland)				
				Total	High	Medium	Low	No change
Red	Charlotte	1089.45	347.16	1436.61	1234.18	170.19	25.68	1.68
Red	Saint David	223.16	16.78	239.94	226.65	7.92	0.99	0.12
Orange	Charlotte	484.35	132.89	617.23	388.92	213.50	13.37	0.31
Orange	Saint David	196.55	6.28	202.83	138.05	56.54	6.52	0.06
Orange	Saint Patrick	5.21	0.00	5.21	2.77	1.87	0.33	-
Yellow	Charlotte	1017.34	127.19	1144.53	499.00	557.64	81.00	2.11
Yellow	Saint Andrew	1.19	0.00	1.19	0.30	0.27	0.45	0.01
Yellow	Saint David	7.58	0.00	7.58	2.81	4.03	0.43	0.04
Yellow	Saint Patrick	141.49	0.14	141.64	48.15	76.63	15.60	0.18
Green	Charlotte	1038.32	401.21	1439.53	448.07	795.65	184.73	6.12
Green	Saint Andrew	454.53	0.07	454.60	53.07	206.40	187.11	6.56
Green	Saint George	1680.96	4.06	1685.02	150.03	840.51	677.19	26.90
Green	Saint Patrick	83.37	56.65	140.02	48.39	73.63	15.53	0.67
<b>Total</b>		<b>6424</b>	<b>1092</b>	<b>7516</b>	<b>3240</b>	<b>3005</b>	<b>1209</b>	<b>45</b>

**Table 21:** Impact severity (%) on cultivated land based on vegetation (NDVI) changes, administrative units and hazard zones

Hazard zones	Admin Units	Negative changes (based on NDVI) in cultivated areas (cropland)			
		High <-0.5	Medium -0.5 to -0.25	Low <-0.25	No change
● Red	Charlotte	85.91	11.85	1.79	0.12
● Red	Saint David	94.46	3.30	0.41	0.05
● Orange	Charlotte	63.01	34.59	2.17	0.05
● Orange	Saint David	68.06	27.88	3.21	0.03
● Orange	Saint Patrick	53.26	35.89	6.42	-
● Yellow	Charlotte	43.60	48.72	7.08	0.18
● Yellow	Saint Andrew	25.62	22.31	38.01	0.83
● Yellow	Saint David	37.10	53.18	5.71	0.52
● Yellow	Saint Patrick	34.00	54.10	11.01	0.12
● Green	Charlotte	31.13	55.27	12.83	0.48
● Green	Saint Andrew	11.67	45.40	41.16	1.44
● Green	Saint George	8.90	49.88	40.19	1.6
● Green	Saint Patrick	34.56	52.58	11.09	0.48

**Table 22:** Total Effect of Volcanic Eruption to the Agriculture Sector

Category	Crops	Apiculture	Livestock	Forestry	Fisheries	Infrastructure	Grand Total EC\$	Grand Total US\$
Damage	21,722,919	116,500	447,662	20,832,500	423,947	54,000	43,597,528	16,147,232.59
Loss	93,637,170	110,250	522,243		4,815,211		99,084,874	36,698,101.48
<b>Total</b>	<b>115,360,089</b>	<b>226,750</b>	<b>969,905</b>	<b>20,832,500</b>	<b>5,239,158</b>	<b>54,000</b>	<b>142,682,402</b>	<b>52,851,334.07</b>

The Assessment team included officials from the Ministry Agriculture Planning Unit, Forestry, Fisheries, Extension and Advisory, Animal Health and Production Division, Banana Services Division, Inter American Institute for Cooperation Agriculture, Caribbean Agricultural Research and Development Institute (CARDI) and Food and Agriculture Organisation of the United Nations (FAO).

A mixed methodology was employed to conduct the DaLA and included “field visits, telephone and personal interviews, the use of data from the Ministry and other institutions, review of past damage assessment documents and statistics from MAFFRIL and the Ministry of Finance and Economic Planning.”

Crop loss was calculated using the acreages affected multiplied by the expected yield foregone multiplied by the market price. Loss calculations for tree crops were done using the extended period of 24 months since recovery for this commodity group will take 2 to 3 years before full recovery.

Validation of these estimates was made using further resources and information from FAO, IICA and CARDI, as well as national statistics.

Livestock damage was calculated based on field visits and reports on deaths of animals and damage estimated using market values by type of animal. Losses were calculated based on production and farm gate prices.

Fisheries damage was calculated based on the estimated market value and repair costs to vessels, equipment and facilities affected. Fisheries losses were calculated based on two sets of variables (i) estimation based on vessels damaged (ii) an estimated 30% of the total fish landings for 2020.

Damage and loss in the forestry sector was not easily quantifiable due to the nature of the forestry ecosystem and services. Notwithstanding, observation and reports were used to estimate the damage done to plantation, primary and secondary forest. An estimate was made on the total number of acres of plantation and natural forest damaged and calculated using a multiplier.

The infrastructure estimation was done using visual observations from field visits and estimates of costs for damages.

## 7.1 CROP LOSS

The DADA provides detailed estimates for each of the main crops grown (primarily arrowroot, vegetables, root crops, bananas and plantains, and tree crops). Table 22 shows these DADA estimates in detail.

## 7.2 APICULTURE

The DADA report found that country’s “thriving apiculture industry” (with 713 hives) was not severely impacted since less than 10 percent of the hives are located in the red and orange zones. The total damage was estimated at \$116,500.00 and loss amounted to \$110,250.00.

## 7.3 LIVESTOCK

However, the extensive loss of vegetation (pasture and other forage on which to graze animals) in the red and orange zones will further exacerbate preliminary estimated livestock losses which were determined to be at least \$447,662.00 in the red and orange zones with an overall estimated loss \$522,243.00. Even if farmers can get their livestock to safe zones, there are significant costs “associated with the protection, feeding and veterinary support of these livestock and their relocation to the areas.”

The estimated livestock farmers affected in the red and orange zones is 1,233. (Tables 23 and 24)

The affected animal population in the red zone for small ruminants is 4990, cattle 684 and approximately 400 pigs. More losses are expected as a result of respiratory and dietary issues and other complications.

**Table 23:** Livestock Damage and Loss

DAMAGES						LOSSES			
PRIVATE			PUBLIC			PRIVATE			PUBLIC
Commodity	No. of animals lost	Value of animals	Infrastructure damage value	No. of animals lost	Value of animals	Items	Infrastructure damage value	Farmgate loss	Production loss Apr-Dec
Poultry	2872	\$59,720.00	\$89,550.00	0	\$0.00	Pens	\$10,000.00	\$304,875.00	\$0.00
Sheep	45	\$26,000.00	\$32,000.00	9	\$3,250.00	Guttering	\$3,000.00	\$13,020.00	\$11,620.00
Goat	90	\$52,320.00	\$4,704.00	8	\$13,200.00	Fencing	\$2,950.00	\$28,040.00	\$20,600.00
Pig	59	\$45,725.00	\$22,308.00	10	\$850.00	Forage bank	\$12,585.00	\$57,520.00	\$37,708.00
Cattle	17	\$63,500.00	\$6,000.00	0	\$0.00			\$42,560.00	\$6,300.00
<b>TOTAL</b>	<b>3083</b>	<b>\$247,265.00</b>	<b>\$154,562.00</b>	<b>27</b>	<b>\$17,300.00</b>		<b>\$28,535.00</b>	<b>\$446,015.00</b>	<b>\$76,228.00</b>

**Table 24:** Livestock Infrastructure Damage and Loss

	PRIVATE	PUBLIC	TOTAL	XCD	USD
<b>DAMAGE</b>	No. of Animals	3083	27	3110	
	Value of Animals	\$247,265.00	\$17,300.00	\$264,565.00	\$447,662.00
<b>LOSS</b>	Infrastructure damage value	\$154,562.00	\$28,535.00	\$183,097.00	
	Farmgate Loss	\$446,015.00	0	\$446,015.00	\$522,243.00
	Production loss Apr- Dec	\$69,648.00	\$6,580.00	\$76,228.00	\$192,220.18
	<b>TOTAL</b>	<b>\$917,490.00</b>	<b>\$52,415.00</b>		<b>\$969,905.00</b>
					<b>\$356,989.58</b>

## 7.4 FISHERIES

The DADA reports that the fishery sector in the red, orange and yellow zones has been significantly impacted. Approximately 800 fishers have been affected among which 278 relocated.

The number of vessels damaged were reduced as the MAFFRIL provided prior advice to fishers to safeguard

their vessels. It was reported that seven (7) vessels with their engines and other equipment have been damaged.

As a result, the preliminary estimated damage and loss for fisheries is \$5,017,060.00 with \$361,850.00 representing damages and losses of \$4,655,210 (loss on fish landing, damaged vessels and aquaculture). International export of fisheries products also ceased due to the closure of the airport. The quantification of such loss is still to be determined.

**Table 25:** Summary of Fisheries Sector Damage

Number	Type/length	Boat	Engine HP	Beach Seine Net	Buoys / Fishing gears and auxiliaries	Oars	Damage	Loss	Total
1			27,000.00				27,000.00	-	27,000.00
1	Pirogue 26ft	40,000.00	38,000.00				78,000.00	147,000.00	225,000.00
1	Double Ender 28ft + Beach Seine Net	20,000.00		35,000.00		800	55,800.00	324,000.00	379,800.00
3	Double Ender 14 (support boat) ft (x3)	13,000.00	-			300	13,300.00	147,000.00	160,300.00
1	Double Ender 11ft	5,000.00	-				5,000.00	36,750.00	41,760.00
1	Bow and Stern 13ft	20,000.00	15,800.00				35,800.00	73,500.00	109,300.00
1	Deck Boat 30ft	100,000.00	38,000.00		8,950.00		146,950.00	122,500.00	269,450.00
	<b>Total</b>	<b>198,000.00</b>	<b>91,800.00</b>	<b>35,000.00</b>	<b>8,950.00</b>	<b>1,100.00</b>	<b>361,850.00</b>	<b>850,860.00</b>	<b>1,212,600.00</b>

**Table 26:** Fish Landing loss

Fish landing weight	Fish Price (\$)	Fish value
559,636	7.00	\$3,804,460

## 7.5 FORESTRY

The DADA estimated that “established plantations and the natural forest suffered in excess of 65% damage in the Red, Orange and Yellow zones. The estimated damage is \$56,247,750.”

**Table 27:** Forestry Damage

Forest area	Location	Cultivated area/ no. of trees/ stands (before disaster) Acres	Damaged/ Affected area/ no. of trees	Repair Cost (where applicable)	Replacement Cost (where applicable)	Ecosystem service value	Est. Value of Damage (USD\$)
Standing timber		569.47	No. Trees/ acre	Salvage/ Rehabilitation	Planting		
Plantation Forest			200				
Red & Orange zone		76.25	76.25/ 15,250	76,250.00	381,250.00		\$457,500.00
Yellow and Green		493.22	98,644	nil	nil		
Forest Access roads	Cumberland Perseverance Rabacca			10 miles	Tractor		
Natural Forest	Central	31,500	20,475			Wildlife, watershed	\$20,475,000.00
Upper Montane		10,500	Destroyed	Monitoring	Protection		
Montane							
Coastal							
Total		<b>43,165.94</b>					<b>\$20,832,500.00 (XCD \$56,247,750.00)</b>

## 7.6 AGRICULTURE INFRASTRUCTURE

Substantial damage was done to agricultural infrastructure in the Red and Orange zones, since most of the agricultural investments were in this area (Agricultural Biotechnology Center, arrowroot and cassava factories, fisheries complex, CARDI Field Station, Ministry of Agriculture Livestock Centre, Langley Park Palletisation Centre, and Perseverance Agricultural Station).

At the time the preliminary DADA was completed, the information on the extent of damage and loss to private sector infrastructure (shade houses, farm sheds, animals housing and equipment) were not yet fully assessed. However, it was very clear that “roadways in agricultural areas in the red and orange zones as well as a number of bridges and feeder roads” were affected. The damage to the bridges and roads was an indirect result of erosion due to heavy rains, lahars and pyroclastic flows, clogged streams and rivers due to fallen trees and vegetation.

**Table 28:** List of General Agriculture Infrastructure

Location	Name Public	Name Private	Volcanic Zone	Impact	Proposed Relocation
Owia	Owia Fisheries Complex		● Red	Ash accumulation	Not Applicable (NA)
	Arrowroot Factory		● Red	Destroyed	No relocation recommended
Orange Hill	Orange Hill Agricultural Training Institute		● Red	Ash accumulation	NA
	Apiaries ATI		● Red	Total collapse	Botanical Gardens
	Irrigation Unit		● Red	Ash accumulation	Recommend to be moved to acquired lands in South Union
	Orange Hill Biotechnology Centre		● Red	Total green house collapse	Montreal Green House Park
Rabacca Farms	Rabacca Livestock Station		● Red	Partial damage	Montreal Green House Park
CARDI Field Station	Rabacca Farms		● Red	Partial damage	Montreal Green House Park
Langley Park	Langley Park Palletization Centre		● Red	Ash accumulation	No relocation recommended Assistance in rebuilding, no relocation
Langley Park		Little Nut	● Red	Total collapse of installation	No relocation recommended
Perserverance	Perserverance Agriculture Station		● Red	Total green house collapse	No relocation recommended
Perserverance		Hadley Cocoa Drying Facility	● Red	Ash accumulation	No relocation recommended
Congo Valley		Congo Valley Mountain Top	● Orange	Ash accumulation, disruption of water	No relocation recommended
Mt. Young		Mt. Young ALCO Hatchery	● Orange	Death of chicks	No relocation recommended
Byera		Mt. William Estate	● Orange	Ash accumulation	No relocation recommended
Three Rivers	Three Rivers Agriculture Station		● Yellow	Ash collection	No relocation recommended
New Grounds	New Grounds Nursery		● Yellow	Ash collection	No relocation recommended
Montreal Garden	Montreal Green House Park		● Green	In good condition	No relocation recommended
Dumbarton Garden	Dumbarton Agriculture station		● Green	In good condition	No relocation recommended
La Croix	La Croix Palletization Centre		● Green	In good condition	No relocation recommended
Rivulet	Rivulet Cannabis Authority		● Green	In good condition	No relocation recommended
Rivulet	Research and Development		● Green	In good condition	No relocation recommended
Kingstown	Kingstown: MAFFRIL head office		● Green	In good condition	No relocation recommended
Kingstown	Plant Quarantine Port		● Green	In good condition	No relocation recommended
Kingstown	Aviary Old Montrose		● Green	In good condition	No relocation recommended
Kingstown	Fisheries Division Headquarters		● Green	In good condition	No relocation recommended
Campden Park	Plant Protection Unit head office		● Green	In good condition	No relocation recommended
Campden Park	Bureau of Standards		● Green	In good condition	No relocation recommended
Campden Park		East Caribbean Feed Mills	● Green	In good condition	No relocation recommended
Campden Park		East Caribbean Flour Mill	● Green	In good condition	No relocation recommended
Rillian	Taiwan technical Mission Pembroke		● Green	In good condition	No relocation recommended
Peters Hope	Peters Hope Germ Plasm		● Green	In good condition	No relocation recommended
Barrouaille	Barrouaille Fisheries Complex		● Green	In good condition	No relocation recommended
Walliabou	Walliabou Agriculture Station		● Yellow	In good condition	No relocation recommended
Belle Isle	Research and Development Plot at Belle Isle		● Yellow	Ash accumulation	No relocation recommended
Belmont	Belmont Livestock Station		● Orange	Partial damage	No relocation recommended
Chateaubelair	Chateaubelair Fisheries Complex		● Orange	Ash accumulation	No relocation recommended
Richmond		Richmond Vale Academy	● Red	Ash accumulation	No relocation recommended

The DADA recommendations include: “urgent attention to avoid catastrophic outcomes” such as flowing down stream and river pathways as was experienced in December 2013. The figure of \$54,000,000 was quoted in the preliminary report however, from qualitative reports provided the extent of the damage maybe more. Given the extreme flooding that also

later occurred in late April 2021, further damage to agricultural infrastructure will need to be documented. Table 27 presents and inventory of both public and private agricultural infrastructure and shows which assets are located in Barrouaille Division which includes Rose Hall and what damage was noted during the DADA.

## 7.7 VULNERABLE GROUPS

According to the United Nations<sup>8</sup> appeal, most vulnerable groups in Saint Vincent and the Grenadines will be disproportionately affected by the eruption, with a long and difficult road to recovery ahead of them. High-risk groups include poor and vulnerable households, single female-headed households with children and dependents, pregnant women and girls, farmers and fisherfolk, people living with disabilities, as well as those living with HIV/AIDS, the LGBTQ<sup>9</sup> community, youth (aged 15-29) and children, especially those under five, and the elderly. Poverty is perhaps the broadest cross-cutting issue affecting vulnerable groups.

Prior to the eruption of La Soufrière, poverty was already expected to worsen significantly due to the impact of COVID-19 on livelihoods, projected to increase from 30.2 per cent to 38.5-43.8 per cent, while severe poverty was expected to jump from 2.9 per cent pre-pandemic to 11.9 per cent, significantly diminishing the resilience of affected people to recover from this crisis.

Tourism and agriculture are the backbone of the Vincentian economy, making workers in these sectors particularly vulnerable during the current emergency, especially women and youth. Unemployment disproportionately affects women (30.1%) and youth (ages 15-29), for whom joblessness is twice the national rate. Some of the poorest and most vulnerable populations, many of whom are dependent on agriculture and fisheries, reside in high-risk communities that have suffered losses and damages to housing, crops, livestock as well as the tools and equipment they depend on for their livelihoods. Those dependent on these sectors will be displaced from their source of livelihood, beyond the immediate short-term, as the sector's recovery could take months, if not years.

The current volcanic eruption appears to be far worse than what has happened in previous years. Several communities have had to be completely evacuated from the island entirely and are now on cruise ships waiting indefinitely to return once the volcanic activity has ceased.

But the eruption has also produced excessive amounts of ash across the entire island and as far a field as Barbados and other islands. More importantly, the ash has been so heavy that it has disrupted electricity supply, completely covered crops, stressed livestock, weighed down and snapped trees, and very importantly contaminated the island's water supply.

Farmers<sup>10</sup> in St Vincent's breadbasket region are already counting thousands of dollars in losses after the decimation of their crops from the erupting La Soufriere volcano's ashfall.

Without water, livestock cannot be kept alive and crops cannot be salvaged.

## 7.8 LINKS/INTERACTION WITH COVID-19

The eruption of La Soufrière comes as Saint Vincent and the Grenadines is recovering from its largest COVID-19 surge amid the pandemic, and the region's worst Dengue outbreak in recent history. La Soufrière is likely continue to erupt in the coming weeks and maybe even months. The long-term effects of a protracted eruption on agriculture and tourism, which are the mainstays of the Vincentian economy and contribute about half of the Gross Domestic Product (GDP), will further exacerbate the already devastating socioeconomic impact of COVID-19. It will also reduce capacity for recovery and erode hard-earned development gains.

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<sup>8</sup> United Nations. April 2021. UN Global Funding Appeal. Explosive Eruption of Soufriere Volcano: St. Vincent

<sup>9</sup> Lesbian, Gay, Bi-Sexual, Trans, Queer

<sup>10</sup> Smith, Kareem. Farmers dig out from tonnes of ash, face uncertain future. Barbados Today. April 17, 2021. <https://barbadostoday.bb/2021/04/17/farmers-dig-out-from-tonnes-of-volcanic-ash-face-uncertain-future/>

# 8 Livelihood Assessment and Contingency Planning



Livelihood assessment data are collected in advance about the normal emergency appeal timetable and other elements of the Livelihood of the population in an area likely to be affected by a hazard.

Livelihoods consist of the capabilities, assets (both material and social resources), and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, and provide net benefits to other livelihoods locally and more widely, both now and in the future, while not undermining the natural resource base (The Livelihood Assessment Tool-Kit).

To plan for and evaluate the possible impact hazards may have on the livelihoods within a community, an understanding of the types of livelihoods present, the sources needed, the susceptibility of these livelihoods to hazards (natural and man-made) and the existing and required response mechanisms is needed.

Livelihoods consist of the capabilities, assets (both material and social resources), and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, and provide net benefits to other livelihoods locally and more widely, both now and in the future, while not undermining the natural resource base (The Livelihood Assessment Tool-Kit).

**Table 29:** Livelihood Categories and Asset Inventory in Spring Village

Livelihood	Skills Needed	Tools & Equipment	Natural Resources
<b>Farming</b> Dasheen, corn, potato, plantain, pineapple, tannia, ginger, eddoes, yam, peas	Knowledge of: crops, diseases that affect crops, weather patterns, pesticides, when to plant. Ability to use tools.	Cutlass, hoe, fork, weed-wacker (swiper), power saw	Land
<b>Carpentry</b>	Knowledge of: types of wood, how to use tools, read measurements.	Different types of saws, measuring tape, level, drills	Trees
<b>Teaching</b>	Education	Computers, chalk, books, whiteboard.	Human resources
<b>Fishing</b>	Knowledge of: Read weather patterns, how to swim, how to use tools.	Hooks, fishing line, fishing pot, nets, boat, fishing gun, engine	Sea/river
<b>Hunting</b>	Ability to shoot, wild life knowledge.	Bird gun, dreg/hand lance, flash light and batteries	Land

To plan for and evaluate the possible impact hazards may have on the livelihoods within a community, an understanding of the types of livelihoods present, the resources needed, the susceptibility of these livelihoods to hazards (natural and man-made) and the existing and required response mechanisms needed. Focus group participants in Spring Village identified the five (5) main types of livelihood categories in the community, namely: Farming, fishing, carpentry, teaching and hunting (Table 29).

To cope after the occurrence of a hazard, farmers seek assistance from the government for seedlings and livestock or seek employment elsewhere. In the case of service providers, households resort to cutting back on their household spending and patterns as an urgent recovery strategy. They also seek assistance from the government to rebuild and gave precedence to using their money for purchasing food.

## 8.1 SEASONAL CALENDARS

Seasonal calendars indicate what type of livelihoods are taking place at any particular time of the year. This illustrates livelihood activities in a year without a hazard and the changes or coping strategies employed when there is a hazard event over the course of a year.

Seasonal Calendar shows livelihood activities in a year without a hazard and the changes or coping strategies employed when there is a hazard event over the course of a year.

Table 33 below details the Seasonal Calendar for a normal year for farmers, Carpenters, Teachers Fishermen and Hunters in Spring Village.

**Table 30:** Spring Village - Seasonal Calendar by Livelihood – Normal Year

Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Farming:</b>												
Dasheen			X (H)	X (P)					X (H)	X (P)		
Potatoes				X (P)					X (H)			
Plantain	X	X	X	X	X	X	X	X	X	X	X	X
Peas			X (P)									X (H)
Pineapple	X	X	X	X	X	X (P)	X	X	X	X	X	X
Tannia	X (P)	X	X	X	X	X	X	X	X	X	X	X (H)
Eddoes			X (P) X (H)	X (H)	X (P)							
Yam			X (P)					X (H)	X (H)	X (H)		
Ginger			X (P)					X (H)	X (H)	X (H)		
Corn												
<b>Others:</b>												
Carpentry	X	X	X	X	X	X	X	X	X	X	X	X
Teaching	X	X	X	X	X	X			X	X	X	X
<b>Fishing</b>												
Long line	X	X	X	X	X	X	X	X	X	X	X	X
Tri-Tri	X											X
Net	X	X	X	X	X	X	X	X	X	X	X	X
<b>Hunting</b>	X									X	X	X

Key: Plant (P) Harvest (H)

Table 31 shows an abnormal year Seasonal Calendar. The planting and reaping time for farmers who plant Dasheen and Sweet Potatoes is affected as they have to reap one month later than in a normal year. The production of Tannia is also affected during an abnormal year, in that, planting will commence

in April as against January in a normal year. Participants indicated that the activities of some farmers in Spring Village are the same for years with or without a hazard, as some farmers would have already adapted to changing climate patterns.

**Table 31:** Spring Village - Seasonal Calendar by Livelihood – Normal Year

Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Farming:</b>												
Dasheen				X (P)					X (H)			
Potatoes				X (P)					X (H)			
Plantain	X	X	X	X	X	X	X	X	X	X	X	X
Peas			X (P)									X (H)
Pineapple	X	X	X	X	X	X	X	X	X	X	X	X
Tannias				X (P)					X (H)			
Eddoes				X (P)					X (H)			
Corn												
<b>Others:</b>												
Carpentry	X	X	X	X	X	X	X	X	X	X	X	X
Teaching	X	X	X	X	X	X			X	X	X	X
<b>Fishing</b>												
Long line	X	X	X	X	X	X	X	X	X	X	X	X
Tri-Tri	X											X
Net	X	X	X	X	X	X	X	X	X	X	X	X
<b>Hunting</b>	X									X	X	X

**Key:** Plant (P) Harvest (H)

**Effects:**

- Seek employment outside of the community.
- Job loss.
- Creation of employment in the construction or rebuilding process.
- Female plant short crops and males do other jobs.

# 9 Coping Strategies



Understanding how people cope with various hazards and disasters is critical to knowing how to plan and support them. People may have both positive and negative coping strategies. For contingency planning, it is important to find measures to support the positive coping strategies, while finding alternative measures of support to mitigate against the negative coping strategies.

Negative coping strategies for example might include selling all livelihood assets, selling livestock, using all of one's savings, taking children out of school, and so on.

Table 35 illustrates the coping strategies outlined by residents of Spring Village inclusive of a few farmers. The main strategies used by the residents to cope with the fallout from the hazards are to seek government assistance in the form of equipment and housing material, borrowing, remittances and doing odd jobs. While male farmers seek employment outside of Spring Village by taking up temporary employment in the construction industry, their female counterparts plant short term crops. Whilst these strategies help them to cope, they also result in negative long-term effects, such as, conflicts due to borrowing, frustration and ultimately depression.

Based on the responses from farmers, their coping strategies were in no way unilateral. It appears that some farmers have already adapted to the effects of climate change on their livelihoods and have indicated that due to the adjustments they made they have not experienced the negative consequences of climate

change as with the case of some their fellow farmers. Their strategy includes adjusting their planting and harvesting time. As a consequence, they indicated that there is no need for them to do things differently when there is a dry spell. They reported that they target most of their harvesting specifically regarding pineapples to occur at a particular time and to coincide with the tourist season so that they can earn maximum profits. They also said that when they sell their produce to traffickers they are not allowed to set their own prices, so as a result they sustain losses. The challenge going forward for Spring Village farmers is to get their fellow farmers to adapt to the changing climatic conditions so as to minimize economic losses resulting from climate related hazards.

As was noted during the focus group discussions done for the RCCVA, participants indicated the use of savings as the most typical coping strategy. Strong support from community members was also cited as a key coping strategy. The recovery process, or what people do after a hazardous event has impacted their household, seems to be based on a combination of factors: continuing with daily routines and activities, accessing assistance from the state, and using their savings or relying on their families and friends. The fact that the island is prone to the impact of multiple hazards means that recovering is made more difficult by the possibility that another hazard might impact soon after. For example, after the eruption in 1979, Hurricane Allan struck the island in 1980 and caused a lot of damage to crops that had been recently planted. Other problems, such as plant disease also impact farmers.

**Table 32:** Spring Village - Coping Strategy Inventory

Likely Climate Impact	Positive Coping Strategies and Practices	Negative Coping Strategies and Practices
Job loss	Seek employment elsewhere	Additional cost of transportation to seek job elsewhere.
Loss of crops	Assistance from government: seedlings, planting materials	Having to start over from scratch with farming
Loss of livestock	Assistance from government: provide livestock	Cost of replacing livestock
Damage to homes	Assistance from government: Materials provided	Relocation away from family
Road Blockage		Could not travel to work, More time to travel

# 10 Response and Recovery Typologies



With respect to the 2021 Volcanic Eruption, the DADA reports that have been completed identify both a number of short-term and long-term types of responses that should be implemented both at community and institutional levels. These are presented here:

### 10.1 IMMEDIATE RESPONSE NEEDS (NEXT 3 TO 6 MONTHS)

- Protection of the public and private livelihoods assets in the red and orange zones (livestock, planting materials, tools/equipment, in-vitro facilities, etc.)
- Income support to farmers, fishers and farm workers.
- Initiative to make food readily available and accessible (to reduce food and nutrition insecurity).
- Policy on loan moratorium for farmers with financial institutions to reduce foreclosure.
- Infrastructure to support relocation of farm and farm assets.
- Identification of lands to relocate farmers (a land bank approach).
- Program to engage farmers, youth and women in initiatives at the evacuation centres.
- Procurement of planting materials, genetic stock for crop and livestock
- Clearing of rivers and streams especially in the upper watersheds in red and orange zones.
- Establishment of crop and livestock support systems.

### 10.2 MEDIUM TO LONG TERM RECOVERY AND REHABILITATION NEEDS (NEXT 6 TO 12 MONTHS)

- A comprehensive plan for recovery and rebuilding of a modern, competitive agricultural sector
- Farm relocation
- Introduction of technology and innovation
- Incentive program to encourage young people into farming.
- Policy support for incentives, infrastructure, information and intelligence to build a modern agriculture sector.

### 10.3 RESPONSE TYPOLOGIES IDENTIFIED FOR SPRING VILLAGE

Some farmers in Spring Village employ their own responsive mechanisms/coping strategies (see Table 36), which have so far proven to be effective for them. The main cash crops in terms of financial gains are eddoes, sweet potatoes, ginger, corn, dasheen, yam and pineapple. Farmers indicated that the biggest threat to their livelihoods is not flooding as their farms are on the mountain slopes and landslides are not a major threat. They are most fearful of prolonged dry spells during the dry season, although they are confident that the adjustments they have made over the years with regards to farming techniques have reduced their vulnerabilities to the effect of extreme weather related impacts. Some the adjustments farmers highlighted for prolong dry spells include:

- Planting drought tolerant crops such as tannia, dasheen, eddoes
- Planting short term crops
- Intercropping – yam & tannia, yam & eddoes.
- Using the dry season for land preparation
- Leaving crops in ground longer than usual; reap earlier than usual
- Scheduling planting time so that you get highest prices at harvesting time
- Targeting harvest time to coincide with tourist season (pineapples)

This is however not the case with all the farmers, as some have not adjusted to the changing climate and continue to suffer losses during extended periods dry spells. They will therefore need external farming support.

External interventions will also be required for the effective and efficient restoration of their homes, as about 50-60% of the houses in the community are located in river beds and are in danger of flooding once there is extensive prolonged rainfall. Possible pre-disaster preparation will include the cleaning of drains and post-disaster responses will include the replacement of household furnishings, food supplies, clothing and temporary sheltering. The clearing of the main drains in the flood prone areas of the community post-flood would also be needed to alleviate excess flood waters (Table 5-6).

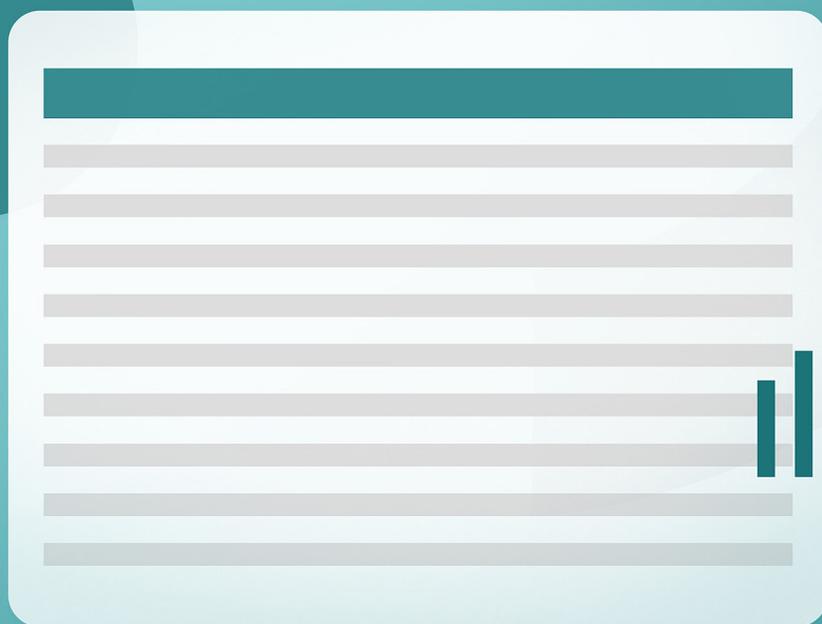
NB: In addition to earning a living from the sale of roots, tubers and livestock, farmers across SVG also earn a livelihood from the sale of fruits (Appendix III). There is an abundance of fruit trees across mainland SVG. Along with selling their produce locally, many farmers export their produce to regional markets such as Trinidad and Tobago, Barbados, Grenada and the BVI.

**Table 36:** Response Typologies for Spring Village

Type of Response Needed	Geographical Area	# of Households likely to be affected	Required quantity (US\$)	Duration	Cost (US\$)	Responsibility
<b>Replacement cost of plant material:</b>	Gordon					Min. of Agri.
Eddoes		134	11,616 plants @\$0.74x 30 ac	One-off	257,875	
Sweet Potato		103	14,520 plants @\$0.37x14 ac	One-off	75,214	
Corn		93	9,680 plants @\$0.74x7	One-off	50,142	
<b>Cost of production per acre*:</b>	Gordon					Min. of Agri.
Eddoes		134	30 acres (ac)@\$1,519		45,519	
Sweet Potato		103	14 acres (ac)@\$1,098		15,372	
Corn		93	7 acres (ac)@\$1,772		12,404	
<b>Flooding</b>	Top Village Corner Mangaroo Cocoa Ball Ground					
2. Cleaning of homes		25	\$75 per household	1 week	1,875	BRAGSA
3. Cleaning of drains and scattered debris		150	600 Ft	1 week		BRAGSA
4. Uniform assistance		25	\$55.56 per student	One-off	1,389	Min. of National Mobil.
Meals & transport subsidy		25	\$66.67 per student	9 months	5,556	
5. Support for house repairs		10	\$925.93 per structure	One-off	9,259	Min. of Housing
6. Rental Assistance		10	222.22 per month	6 months	13,333	Ministry of National Mobil.
7. Interim assistance benefit		25	184.19 Per month	9 months	41,443	Ministry of National Mobil.
8. Basic amenities & disaster relief	10	444.44	One-off	4,444	Ministry of National Mobil.	

\*Cost of production per acre includes: labour operations (clearing, digging, planting, weeding, fertilizer application, moulding and harvesting); materials (herbicide, fungicide, insecticide, fertilizer, tools, other); other costs (transportation)

# 11 Annexes



## ANNEX 1 - MINISTRY OF AGRICULTURE, INDUSTRY AND LABOUR COMPENSATION LIST FOR AGRICULTURAL CROPS AND LIVESTOCK (2019)

Agriculture Region and District	No. of crops	Name of cash crop	Acres	Average number of farmers per crop	Plants per acre	Expected Yield (XCD\$)	Growing Duration (months)	Value at stage in mid of hurricane season (XCD\$)	Value (XCD\$)	75% dependent on crop grown above ground (XCD\$)	55% dependent on crop grown underground	Justification
<b>CHATEAUBELAIR*</b>												
REGION ONE District 1	1	Ginger	2	16	21,780	20,000	9	\$2.00 per plant	87,120		47,916	Roots and tubers are more like to be affected by flash floods as a result of run-off water from heavy rains
	2	Eddoes	1	28	11,616	11,000	6	\$2.00 per plant	23,232		12,778	
Leeward	3	Dasheen	1	6	7,260	14,000	7	\$2.00 per plant	14,520		7,986	
<b>FITZ HUGHES</b>												
District 1	1	Eddoes	2	15	11,616	11,000	6	\$2.00 per plant	46,464		25,555	
	2	Ginger	1	11	21,780	20,000	10	\$0.10per sq. ft.	4,356		2,396	
	3	Sweet Potatoes	1	14	14,520	7,000	4	\$1.00 per plant	14,520		7,986	
<b>ROSE HALL</b>												
District 1	1	Carrots	7	60	264,000	8,000	3/4	\$0.10per sq. ft.	30,492		16,771	Flash floods
	2	Tomatoes	6	90	21,780	15,000	3	\$2.00 per plant	174,240	130,680		Plant like to be damaged/ destroyed by heavy rains and high winds
	3	Cabbages	3-4	90	14,520	12,000	3	\$0.30 per plant	14,810		8,146	Flash flood, heavy rains and drought
<b>SPRING VILLAGE</b>												
District 1	1	Eddoes	30	134	11,616	11,000	6	\$2.00 per plant	696,960		383,328	
	2	Sweet potatoes	14	103	14,520	8,000	4	\$1.00 per plant	406,560		223,608	
	3	Corn	7	93	9,680	25,000	3/4	\$2.00 per plant	67,760	50,820		Plants are likely to be damaged by high winds

\*Hurricane intensifies in the latter half of the season and costs were based on this trend and period estimate for growth

Agriculture Region and District	No. of crops	Name of cash crop	Acres	Average number of farmers per crop	Plants per acre	Expected Yield (XCD\$)	Growing Duration (months)	Value at stage in mid of hurricane season (XCD\$)	Value (XCD\$)	75% dependent on crop grown above ground (XCD\$)	55% dependent on crop grown underground	Justification
<b>COLONARIE</b>												
REGION THREE District 7	1	Plantain	4	12	1,210	30,000	11	\$12.00 per plant	58,080	43,560		Plants are likely to be damaged/ destroyed by high winds
	2	Sweet Potatoes	7	23	14,520	8,000	4	\$1.00 per plant	101,640		55,902	
Windward	3	Yams	4	7	4,840	12,000	9	\$5.00 per plant	96,800		53,240	
	4	Bananas	50	18	680	20,000	9	\$10.00 per plant	340,000	255,000		
<b>FANCY</b>												
District 7	1	Sweet Potatoes	5	20	14,520	8,000	4	\$1.00 per plant	72,600		39,930	
	2	Groundnuts	3	16	87,120	3,000	4	\$0.10 per sq. ft.	13,068		7,187	
	3	Eddoes	3	15	11,616	11,000	6	\$2.00 per plant	69,696		38,333	
<b>PARK HILL</b>												
District 7	1	Yams (Portuguese)	7	18	2,723	20,000	7	\$5.00 per hole	95,305		52,418	Extensive dry periods can result in produce smaller in size or loss of plantlets due to the heat. The method of calculation can apply for loss during a drought.
	2	Sweet Potatoes	5	17	14,520	8,000	4	\$1.00 per plant	72,600		39,930	
	3	Dasheen	2	7	7,260	14,000	7	\$2.00 per plant	29,040		15,972	
<b>OWIA</b>												
District 8	1	Sweet Potatoes	12	33	14,520	8,000	4	\$1.00 per plant	174,240		95,832	
	2	Tannia	9	32	4,840	9,000	9	\$2.00 per plant	87,120		47,916	
	3	Eddoes	7	25	11,616	11,000	6	\$2.00 per plant	162,624		89,443	

Agriculture Region and District	No. of crops	Name of cash crop	Acres	Average number of farmers per crop	Plants per acre	Expected Yield (XCD\$)	Growing Duration (months)	Value at stage in mid of hurricane season (XCD\$)	Value (XCD\$)	75% dependent on crop grown above ground (XCD\$)	55% dependent on crop grown underground	Justification
<b>OVERLAND AND MAGNUM</b>												
District 8	1	Sweet Potatoes	12	47	14,520	8,000	4	\$1.00 per plant	174,240		95,832	
	2	Tannia	9.5	43	4,840	9,000	9	\$2.00 per plant	91,960		50,578	
	3	Eddoes	5	29	11,616	11,000	6	\$2.00 per plant	116,160		63,888	
<b>SANDY BAY</b>												
District 8	1	Tannia	23	73	4,840	9,000	9	\$2.00 per plant	222,640		122,452	
	2	Sweet Potatoes	22	77	14,520	8,000	4	\$1.00 per plant	319,440		175,692	
	3	Eddoes	9.3	39	11,616	11,000	6	\$2.00 per plant	216,058		118,832	
<b>SOUTH RIVERS</b>												
District 7	1	Dasheen	8	24	7,260	14,000	7	\$2.00 per plant	116,160		63,888	
	2	Sweet Potatoes	14	37	14,520	8,000	4	\$1.00 per plant	203,280		111,804	
	3	Eddoes	5	18	11,616	11,000	6	\$2.00 per plant	116,160		63,888	

Please note that agriculture regions 1 and 3 tend to be severely affected by hurricanes and other natural disasters. Both regions are in the north of the country and experience a greater intensity of wind and heavy rainfall.

Livestock	Cost per animal	Infrastructure cost		
Sheep	300	\$35/sq. ft.	roof \$8/sq	8800/sq. ft. fencing
Goat	300	\$35/sq.ft.	roof \$8/sq	8800/sq. ft. fencing
Pigs	450	\$35/sq.ft.	roof \$8/sq	
Cattle Female	3000			
Cattle Male	4000			
Poultry Boiler	1.25			
Poultry Layer	4.25			
Peak layers	20			
Pre Peak	10			

A 20 ft. x 10 ft pig pen (10 years plus and dilapidated was valued at \$2,500)

## **ANNEX 2 – MINISTRY OF NATIONAL MOBILISATION - SERVICES OFFERED UNDER THE SOCIAL ASSISTANCE PROGRAMME (XCD\$)**

### **BACKGROUND**

The Ministry of National Mobilisation etc. is charged with the national portfolio of providing social protection to vulnerable households through the Public Assistance Programme guided by the Public Assistance Act. Due to societal changes during the past two (2) decades, additional types of monthly and emergency assistance were added to compliment the traditional services. The following are some of the services currently being offered under this programme:

1. Uniform Assistance (\$100&150/student once per year).
2. Rental Assistance (\$400-\$600/person per month for six months).
3. School fees & Exam Fees (\$200/student).
4. Meals & Transport Subsidy (\$180/student per month).
5. Basic Amenities & Disaster Relief (\$250&\$1200/person (one-off assistance).
6. Interim Assistance Benefit (\$500/family for nine (9) months).
7. Medical & Funeral (\$2000/person (one-off assistance).

## ANNEX 3 MINISTRY OF AGRICULTURE, INDUSTRY AND LABOUR – COMPENSATION LIST FOR AGRICULTURAL AND FORESTRY CROPS

FIELD CROPS	COSTS (XCD\$)	FIELD CROPS	COSTS (XCD\$)
Arrowroot	10 cents per sq. ft.	Grasses (cultivated)	5 cents per sq. ft.
Bananas	\$3.00 per plant up to 3 months \$6.00 per plant at medium stage \$10.00 per plant if bearing	Ground Nuts	10 cents per sq. ft.
Plantain	\$4.00 per plant up to 3 months \$7.00 per plant at medium stage \$12.00 per plant if bearing	Yams (Portuguese)	\$3.00 per hole when young \$5.00 per hole if matured
MaughFaugh Baugh	\$1.00 per plant up to 3 months \$3.00 per plant at medium stage \$6.00 per plant if bearing	Dominic	\$2.00 per hole when young \$4.00 per hole if matured
Grindy	\$3.00 per plant up to 3 months \$6.00 per plant at medium stage \$9.00 per plant if bearing	Water	\$1.00 per hole when young
Sugar Cane	\$1.00 per hole	White	\$3.00 per hole if matured
Cassava	30 cents per hole up to 3 months \$2.00 per plant when matured	Bascombe	75 cents per hole when young
Corn	15 cents per hole up to 3 months \$2.00 per plant when matured	Others	\$2.00 per hole if matured
Pigeon Peas	\$1.00 per hole in pure stand \$6.00 per isolated tree	Sweet Potatoes	25 cents per hole when young \$1.00 per hole if matured
Cotton	60 cents per hole up to 2 months \$2.00 per plant if bearing	Ochro	25 cents per hole when young \$1.00 per hole if matured
Eddoes	50 cents per hole up to 3 months \$2.00 per plant if matured	Ginger	10 cents per sq. ft.
Tannia	50 cents per hole up to 3 months \$2.00 per plant if matured	Sorrel	15 cents per hole when young 25 cents per hole if matured
		Tobacco	50 cents per hole up to 3 months
		Pineapple	\$1.75 per hole up to 3 months \$3.50 per hole up to 3 months \$7.50 per hole up to 3
		Dasheen	50 cents per hole up to 3 months \$2.00 per plant if matured

GREEN VEGETABLES	COSTS (XCD\$)	GREEN VEGETABLES	COSTS (XCD\$)
Beans	10 cents per hole non flowering 25 cents per hole if bearing	Lettuce	20 cents per hole for young plants \$1.00 per plant if bearing
Beets	10 cents per hole	Pepper (Hot or Sweet)	25 cents - 50 cents for young plants \$1.00 per plant if bearing
Cabbage	25 cents per hole when immature \$2.00 per plant when matured	Tomato	10 cents – 50 cents per young plant non flowering \$1.50 - \$2.50 per plant if bearing
Carrots	10 cents per sq. ft.	Pumpkin	10 cents -50 cents per hole when immature \$5.00 per hole if bearing
Cauliflower	25 cents per plant when immature \$1.00 - \$2.00 per plant when matured	Passionfruit	\$1.00 per non bearing vine \$5.00 per vine if bearing
Christophene	\$1.00 per hole when immature \$5.00 per hole if bearing	Black Pepper	\$1.00 per plant not bearing \$5.00 per plant if bearing
Cucumber	10 cents per plant when immature \$2.00 per plant if bearing	Pineapples	\$1.75 up to 3 months \$3.50 up to 6 months \$7.50 up to and over 12 months
Egg Plant	10 cents - 50 cents per plant when immature \$2.00 per plant if bearing		

## FOREST CROPS (XCD\$)

SPECIES	BEARING TREES	DAMAGED OVER 10 YRS	DAMAGED OVER 5-10 YRS	DAMAGED 0-5 YRS
Mahogany	\$140.00	\$80.00	\$45.00	\$35.00
Teak	\$140.00	\$80.00	\$45.00	\$35.00
Red Cedar	\$140.00	\$80.00	\$45.00	\$35.00
White Cedar	\$140.00	\$80.00	\$45.00	\$35.00
Cype	\$140.00	\$80.00	\$45.00	\$35.00
Honduras Mahogany	\$100.00	\$60.00	\$30.00	\$20.00
W.I Mahogany	\$100.00	\$60.00	\$30.00	\$20.00
Blue Maho	\$100.00	\$60.00	\$30.00	\$20.00
Galba	\$100.00	\$60.00	\$30.00	\$20.00
Pinus Caribbean	\$100.00	\$60.00	\$30.00	\$20.00
Angeline	\$100.00	\$60.00	\$30.00	\$20.00
Bamboo	\$100.00	\$60.00	\$30.00	\$20.00

## ORCHARD TREES AND PERMANENT CROPS (XCD\$)

SPECIES	BEARING TREES	DAMAGED OVER 10 YRS	DAMAGED OVER 5-10 YRS	DAMAGED 0-5 YRS
Breadfruit	\$120.00	\$60.00	\$45.00	\$45.00
Breadnut	\$90.00	\$50.00	\$30.00	\$25.00
Cocoa	\$80.00	\$60.00	\$45.00	\$35.00
Coconut	\$100.00	\$70.00	\$60.00	\$45.00
Coffee	\$45.00	\$35.00	\$30.00	\$15.00
Cashew	\$50.00	\$45.00	\$30.00	\$15.00
Custard Apple	\$15.00	\$10.00	\$8.00	\$6.00
Golden Apple	\$75.00	\$50.00	\$30.00	\$20.00
Sugar Apple	-	\$15.00	\$8.00	\$6.00
Guava	\$40.00	\$30.00	\$20.00	\$10.00
Mango (other)	\$70.00	\$45.00	\$30.00	\$15.00
Mango (grafted)	\$120.00	\$60.00	\$45.00	\$35.00
Mammie Apple	\$56.00	\$40.00	\$30.00	\$15.00
Nutmeg	\$120.00	\$90.00	\$60.00	\$35.00
Pawpaw	\$30.00	\$20.00	\$10.00	\$5.00
Plum	\$70.00	\$50.00	\$30.00	\$15.00
Plumrose	\$50.00	\$35.00	\$25.00	\$15.00
Sapodilla	\$70.00	\$50.00	\$30.00	\$15.00
Pear (Avocado)	\$90.00	\$60.00	\$45.00	\$30.00
Grapefruit	\$90.00	\$60.00	\$45.00	\$30.00
Orange	\$90.00	\$60.00	\$45.00	\$30.00
Tangerine	\$90.00	\$60.00	\$45.00	\$30.00
Ortanique	\$90.00	\$60.00	\$45.00	\$30.00
Lime	\$90.00	\$60.00	\$45.00	\$30.00
Soursop	\$50.00	\$40.00	\$30.00	\$15.00
Clove	\$70.00	\$50.00	\$40.00	\$30.00
Cinnamon	\$70.00	\$50.00	\$40.00	\$30.00
Mauby	\$50.00	\$40.00	\$30.00	\$15.00

## ANNEX 4 – COST OF PRODUCTION

Source: Ministry of Agriculture, Industry and Labour, SVG.

**CROP:** Ginger **VARIETY:** Jamaican **ACREAGE:** One (1) Acre **DATE:** 7/10/2018

ITEMS	UNITS	RATE(\$)	NO.	COST(\$)
<b>LABOUR OPERATIONS</b>				
Land clearing (Cutlass & Clean) / spraying	M/day	40.00	12	480.00
Ranging	M/day	40.00	15	600.00
Gathering / preparation of planting material	M/day	40.00	5	200.00
Chopping holes and planting	M/day	40.00	6	240.00
Weeding manually ( X 2 ) & Moulding( X 1 )	M/day	40.00	28	1120.00
Fertilising - Band application ( X 3 )	M/day	40.00	4	160.00
Harvesting (pull, cut, wash, dry, bag)	M/day	40.00	30	1200.00
Heading out of field	M/day	40.00	20	800.00
<b>Subtotal</b>				<b>\$ 4,800.00</b>
<b>MATERIALS</b>				
Planting Materials ( )	Lbs	1.50	3000	4500.00
Grammoxone & pre-emergent	Gal			205.00
Fertiliser (NPK)	Sack	65.00	12	780.00
Tools(e.g.) Spray can Fork, Hoe, Cutlass, File		665.00	1	665.00
Other(Bags)		1.00	200	200.00
<b>Subtotal</b>				<b>\$ 6,350.00</b>
<b>OTHER COSTS</b>				
Land charges (Lease)	Acre	500.00	1	500.00
Transportation		300.00		300.00
Supervision				
Interest on loans (9 - 11%)				
Depreciation on tools & equipment				
Other				
<b>Subtotal</b>				<b>\$ 800.00</b>
<b>Total cost of production</b>				<b>\$ 11,950.00</b>
<b>Total cost per unit of output(\$/Lb)</b>				<b>\$ 0.60</b>
<b>ASSUMPTIONS</b>				
a) Plant spacing	1 X 3 Within Row X Between Row (Ft)			
b) Plant density	14,520 plants per acre			
c) Marketable yields	20,000 Lbs			
d) Losses & main cause	Negligible.(Due nematode)			
e) Maturation Period	10 Months			
f) Price per unit yield - Farmgate :				

**CROP:** Eddoe **VARIETY:** Black **ACREAGE:** One (1) Acre **DATE:** 31/12/2014

ITEMS	UNITS	RATE(\$)	NO.	COST(\$)
<b>LABOUR OPERATIONS</b>				
Land clearing --Spraying/Cleaning	M/day	40.00	2	80.00
Digging Holes	M/day	40.00	15	600.00
Gathering and preparing plant material	M/day	40.00	4	160.00
Planting (Including heading and dropping)	M/day	40.00	8	320.00
Weed control (herbicide)(X2)	M/day	40.00	3	120.00
Fertiliser application ( X 2 )	M/day	40.00	4	160.00
Moulding ( x1 )	M/day	40.00	12	480.00
Harvesting (incl. Sort & heading)	M/day	40.00	12	480.00
Heading out of field	M/day	40.00	8	320.00
<b>Subtotal</b>				<b>\$ 2,720.00</b>
<b>MATERIALS</b>				
Planting materials (Slips)				
Herbicide -(Grammaxone)	Gal.	136.00	2	180.00
Fertiliser (types) N.P.K.	sack	100.00	9	900.00
Tools(e.g.) Fork, Hoe, Cutlass, File, Spray can				
Other (e.g.) Boxes, bags				
<b>Subtotal</b>				<b>\$ 1,080.00</b>
<b>OTHER COSTS</b>				
Land charges (Lease/ Rent/ Share)	Acre			
Transportation				300.00
Supervision				
<b>Subtotal</b>				<b>\$ 300.00</b>
<b>Total cost of production</b>				<b>\$ 4,100.00</b>
<b>Total cost per unit of output(\$/Lb)</b>				<b>\$ 0.37</b>
<b>ASSUMPTIONS</b>				
a) Plant spacing	2 X 3 Within Row X Between Row (ft)			
b) Plant density	7,260 plants per acre (plants/acre)			
c) Marketable yields(lbs)	11,000			
d) Losses (Rejects & Spoils)	Negligible			
e) Maturation Period	6 Months			
f) Price per unit yield - Farmgate :	\$0.75/Lb			

**CROP:** Dasheen **VARIETY:** Upland **ACREAGE:** One (1) Acre **DATE:** 31/12/2014

ITEMS	UNITS	RATE(\$)	NO.	COST(\$)
<b>LABOUR OPERATIONS</b>				
Land clearing --Spraying/Cleaning	M/day	40.00	2	80.00
Digging Holes	M/day	40.00	15	600.00
Gathering and preparing plant material	M/day	40.00	3	120.00
Planting (Including heading and dropping)	M/day	40.00	5	200.00
Weed control (herbicide)(X2)	M/day	40.00	3	120.00
Fertiliser application ( X 2 )	M/day	40.00	4	160.00
Moulding ( x1 )	M/day	40.00	12	480.00
Harvesting (incl. Sort & heading)	M/day	40.00	12	480.00
Heading out of field	M/day	40.00	8	320.00
<b>Subtotal</b>				<b>\$ 2,560.00</b>
<b>MATERIALS</b>				
Planting materials (Slips)				0.00
Herbicide -(Grammaxone /Touchdown)	Gal.	170. /136	2	306.00
Fertiliser (types) N.P.K.	sack	100.00	10	1,000.00
Tools(e.g.) Fork, Hoe, Cutlass, File, Spray can				
Other (e.g.) Boxes, bags				
<b>Subtotal</b>				<b>\$ 1,306.00</b>
<b>OTHER COSTS</b>				
Land charges (Lease/ Rent/ Share)	Acre			
Transportation				300.00
Supervision				
<b>Subtotal</b>				<b>\$ 300.00</b>
<b>Total cost of production</b>				<b>\$ 4,166.00</b>
<b>Total cost per unit of output(\$/Lb)</b>				<b>\$ 0.30</b>
<b>ASSUMPTIONS</b>				
a) Plant spacing	2.5 X 3 Within Row X Between Row (ft)			
b) Plant density	5,800 plants per acre (plants/acre)			
c) Marketable yields(lbs)	14,000			
d) Losses (Rejects & Spoils)	Negligible			
e) Maturation Period	8Months			
f) Price per unit yield - Farmgate :	\$.60/Lb			

**ANNEX 5 – IMAGES OF DESTRUCTION IN SPRING VILLAGE ALONG THE BANKS OF THE CUMBERLAND RIVER FROM THE DECEMBER 2013 FLOODS.**





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