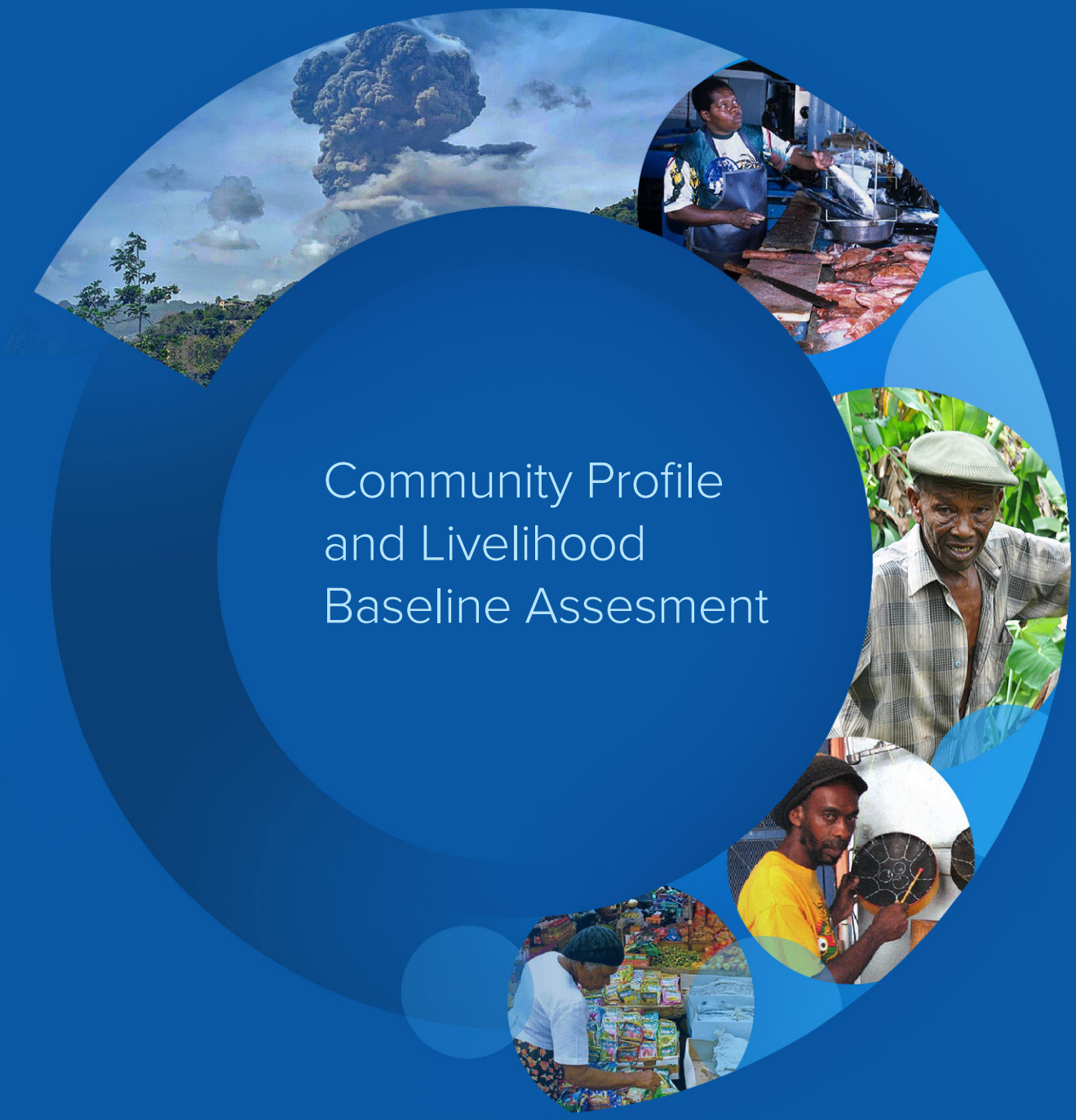


Community Profile
and Livelihood
Baseline Assesment

Chateaubelair

St. Vincent and the Grenadines

Canada

Food and Agriculture Organization of the United Nations

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 Chateaubelair 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 complied 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.

Suggested citation: CDB (2022). *Preparation of Revised Livelihood Baseline Assessment Report: Chateaubelair, St. Vincent and the Grenadines.* Community Disaster Risk Reduction Fund. Caribbean Development Bank. St. Michael, Barbados.

Prepared by: Donovan Campbell and Marc James, Department of Geography & Geology, The University of the West Indies, Kingston, Jamaica.

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 the St. Vincent and the Grenadines (VRC in SVG) project.

Chateaubelair is one of the communities that was included in this process and this report provides the Livelihood Baseline Assessment (LBA) information that resulted from the assessment process.

The report illustrates that Chateaubelair is a heavily forested region located along the West coast of St. Vincent in the parish of Saint David. Commonly referred to as “Chateau”, it is a farming and fishing town named after Joseph Chatoyer, Chief of the Black Caribs.

According to the 2012 Housing and Population Census, the town of Chateaubelair has an estimated four hundred and fifty-eight (458) households with a population of one thousand four hundred twenty-one (1,421). Data related to the wider Chateaubelair Census Division are used to indicate the social realities of the town (education, health and housing). These are discussed in detail in Chapter 3.

Based on an earlier conducted Community Engagement Survey (CES) funded by the project in September 2018, community development activities are seen as important by a majority of residents of the community but only a few persons play active leadership roles through involvement in an organisation. The vision, mission and objectives of the community groups in Chateaubelair and other results pertaining to the survey are outlined in Chapter 4. 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 Chateaubelair Census Division, as an indication of the economic profile of the community. Chapters 1 through 5 form the Community Profile for Chateaubelair.

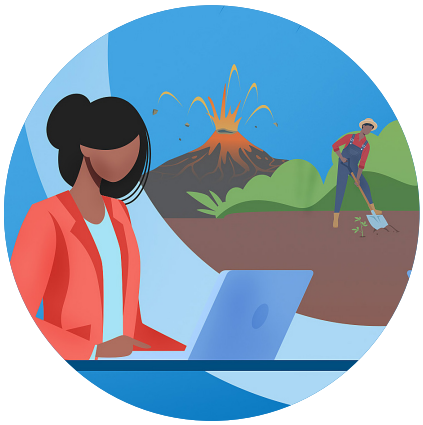
Chapter 6 is a profile of the main hazards that impact the community most directly while Chapter 7 outlines the impact of the April 2021 volcanic eruption.

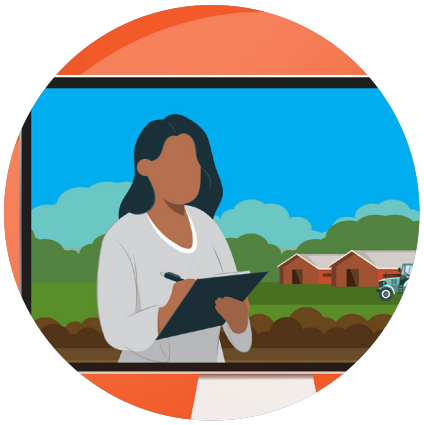
In Chapter 8, the outcome of the Livelihood Baseline Assessment is detailed and includes a profile of community livelihoods and resources. The focus is primarily on agricultural livelihoods. Chapter 9 looks at the type of coping strategies that are employed to deal with hazard impacts on agricultural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





Acronyms

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

GPS	Global Positioning System
HH	Household
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
IICA	International Institute for Cooperation on Agriculture
ILIA	Initial Livelihood Impact Assessment
ILO	International Labor Organization
IWCAM	Integrated Watersheds and Coastal Areas Management project
J-CCCP	Japan-Caribbean Climate Change Program
LAS	Livelihood Assessment Specialist
LAT	Livelihood Assessment Toolkit
LB	Livelihood Baseline Assessment
LGBTQ	Lesbian, Gay, Bi-Sexual, Trans, Queer
LPG	Liquified Petroleum Gas
M&E	Monitoring and Evaluation
MMI	Modified Mercalli Intensity
MoA	Ministry of Agriculture
MoNM	Ministry of National Mobilisation
NDVI	National Difference Vegetation Index
NEMO	National Emergency Management Organization
NGO	Non-Governmental Organization
NVEP	National Volcanic Emergency Plan
OECS	Organisation of Eastern Caribbean States
PAD	Project Appraisal Document
PM	Project Manager
PVC	Polyvinyl Chloride
RC	Red Cross
RCCVA	Rapid Community Climate Vulnerability Assessment
RDVRP	Regional Disaster Vulnerability and Reduction Project
RR	Risk Reduction
SAP	Social Assistance Programme
SD	Sustainable Development
SDC	Social Development Commission
SDGs	Sustainable Development Goals
SIDS	Small Island Developing States
SMART	Specific, Measurable, Achievable, Realistic, Time-bound
SRC	Seismic Research Centre
STREVA	Strengthening Resilience in Volcanic Areas
SVG	St. Vincent and the Grenadines
UN	United Nations
UNFPA	United Nations Population Fund
UNISR	United Nations Office for Disaster Risk Reduction
UWI	University of the West Indies
VCA	Vulnerability and Capacity Assessment
VINLEC	St. Vincent Electricity Company
VRCinSVG	Volcano Ready Communities in St. Vincent and the Grenadines
VRCP	Volcano Ready Communities Project
WAD	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[1] 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.

The Tool-kit contains three volumes. 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 to Volume 2 - which focused on the preparation of the Livelihood Baseline and Contingency Plan. Following the training, teams in the SVG adapted and used 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] *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.

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 Chateubelair, St. Vincent & and the Grenadines.

2 Methodology

The Community Profile (CP) and Livelihood Baseline Assessment (LBA) for Chateaubelair 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 exiting 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 the 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 8 a.m. and 4 p.m. October 1st, 2019 using a convenience sample of residents of the community. Twenty-six (26) persons participated in the survey in Chateaubelair, seventeen (17) females and seven (7) males. Data were collected and analysed using the KOBO Toolbox[2] application. A focus Group Discussion (FGD) was conducted on the same day at the Fitz-Hughes Government School. Six (6) residents of the community who were farmers participated in the discussion. In addition to the survey and focus group discussion, primary data from the 2018 Community Engagement Survey (CES) 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 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) that was conducted in 2016 and the detailed RCCVA that was completed in 2020.

[2] 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)

3 Description of the Community

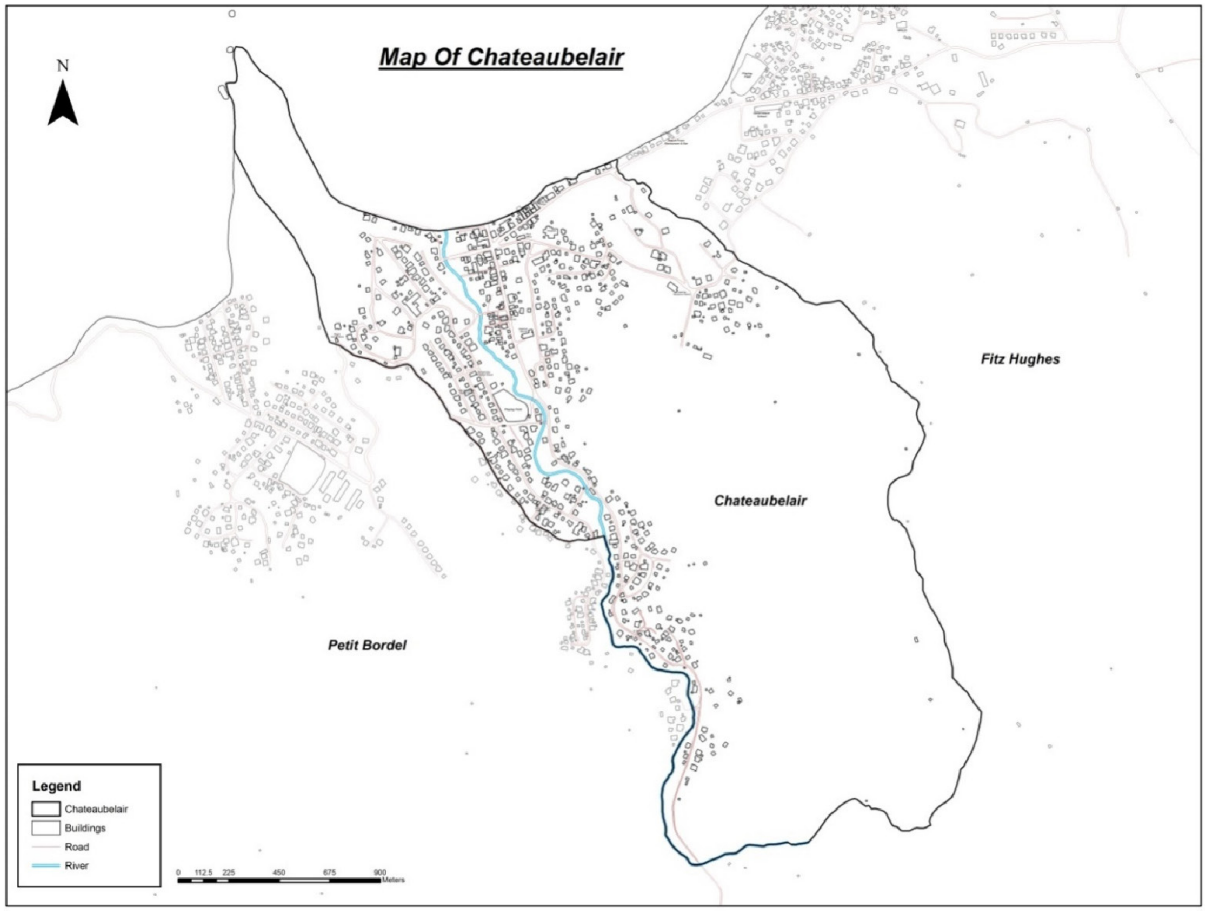
3.1 LOCATIONAL DATA

Chateaubelair is one of six (6) towns on mainland St. Vincent. It is located along the West coast of the island in the parish of Saint David. Its geographic coordinates are 13°17'18"N, 61°14'25"W. It is a mountainous and heavily forested region just southwest of the La Soufrière volcano. It is comprised of the following smaller communities including Cocoa, Sharpes, Mission Corner, Barracks, and Cherry Hill. It is bordered by the community of Fitz Hughes to the north, Petit Bordel to the south and the Caribbean Sea to the west. Other neighbouring communities include Richmond, Rose Hall, Rose Bank and Troumaca.

3.2 HISTORY/HISTORICAL DEVELOPMENT

Commonly referred to as just "Chateau", Chateaubelair is the largest town in the North Leeward region of St. Vincent, and the fourth largest town in the entire country. It is a largely rural fishing and farming community on the Leeward (west) coast of the Caribbean island of Saint Vincent. "Chateaubelair" was named after Joseph Chatoyer who was the chief of the Black Caribs in St. Vincent and the Grenadines; the area was the scene of some parts of the anti-British rebellion led by the chief. Local attractions include Trinity falls, Dark View falls, and archaeological rock carvings believed to have been left by Black Caribs. Chateaubelair was officially declared a Port of Entry to the island of St. Vincent in 2003.

Figure 1: Community Map Chateaubelair *(Source: GIS Unit, Physical Planning Division, Ministry of Transportation, Works, Lands and Physical Planning, Kingstown)*



3.3 NATURE OF COMMUNITY (CULTURE, TRADITIONS)

The community is mostly known for farming and fishing. Due to its proximity to the La Soufriere Volcano the soil in the town is fertile. The town is a close-knit community. Sports are a major part of the community's recreational activities. Cricket is the most popular sport played by residents, followed by netball and football (soccer). The main religion practiced by residents is Christianity; and the largest denomination is Spiritual Baptist. The residents are renowned for their warmth and friendliness. The majority of the population are of African descent.

3.4 NATURAL RESOURCES (RIVERS, FORESTS, FARMING LANDS)

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). The Chateaubelair Watershed, like the neighbouring Cumberland Watershed, experiences annual rainfall that is way above the national average as seen in Figure 2. This situation coupled with its rich volcanic soils makes Chateaubelair a prime agricultural community. Some of the commonly grown cash crops are Ginger, Eddoes and Dasheen.

The main river which traverses through the town is used for domestic washing, and economically for catching crayfish and river fish.

Previous volcanic eruptions, including the 1979 eruption, have made the soils fertile which results in great farming yields for farmers.

The sea is also a major resource for the residents of Chateaubelair as it also allows for fishing which is also a major economic pillar of the community.

Like much of the island, Chateaubelair is vulnerable to landslides, with more recent ones occurring in 2013 and 2016. Chateaubelair is also in close proximity to the island's dormant La Soufriere Volcano which is an ever present threat to the community.

Figure 2: Rainfall Map of the Island of St. Vincent *(Source: Joyette, 2008).*

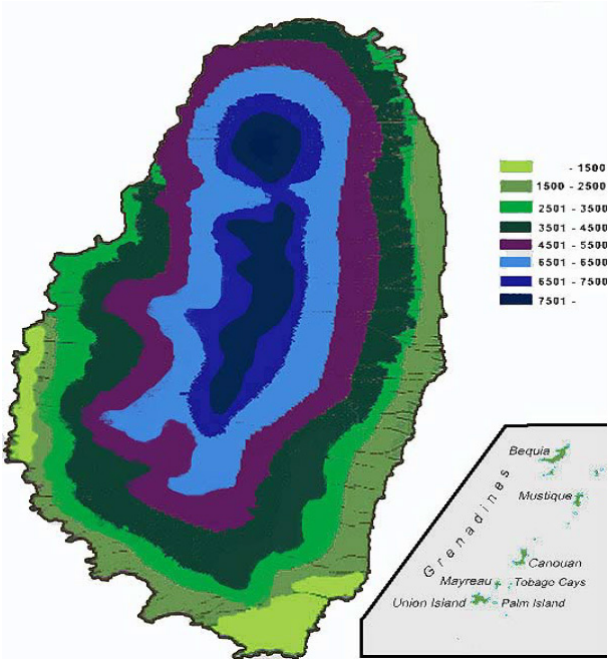
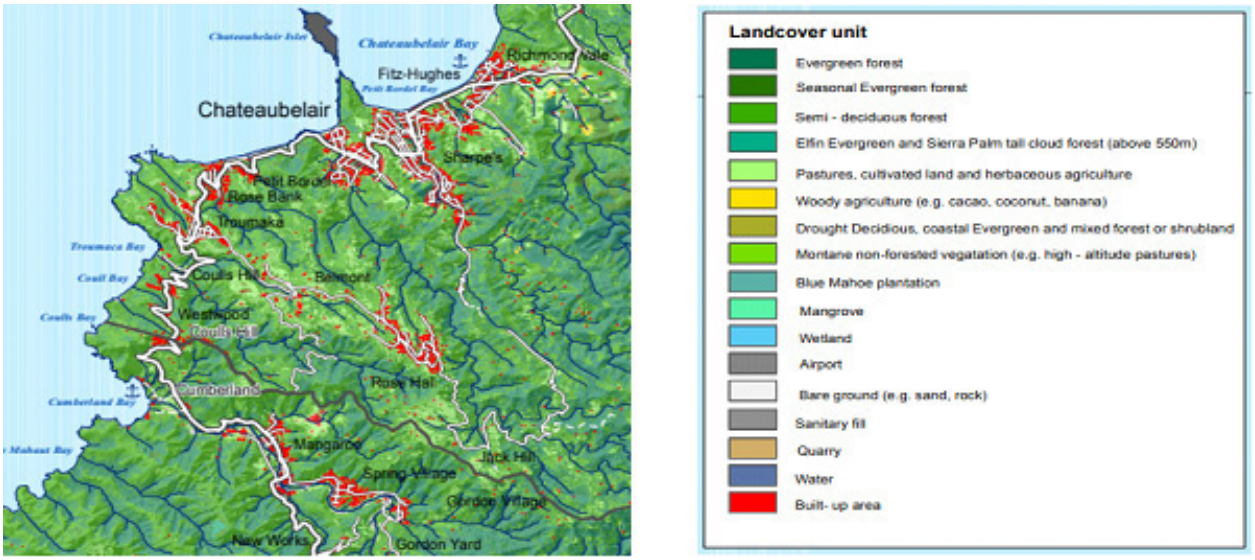


Figure 3: The Sixteen (16) Watersheds of Saint Vincent *(Source: GEF-IWCAM, No Date).*

Figure 4: Land Use and Distribution – Chateaubelair *(Source: Westen, C.J. and Sijmons, Koert. 2016)*



3.5 LAND USE

Figure 4 illustrates that lands of Chateaubelair are predominantly agricultural consisting mainly of forested areas and some built-up areas. The built-up or residential areas are mainly concentrated along the banks that flows from the mountains. There are pockets of lands comprised of pastures, cultivated lands and herbaceous agricultural lands. There are no visible woody agricultural (cocoa, coconut, banana) lands as in the case of Fitz Hughes.

3.6 POPULATION AND AGE STRUCTURE

According to the 2012 Population and Housing Census, the population of the administrative Census division of Chateaubelair is five thousand, seven hundred and fifty-six (5,756). This figure is for the entire census division and inclusive of the communities of Coulls Hill, Troumaca, Rose Hall, Rose Bank, Chateaubelair, Fitz Hughes, Petit Bordel and Richmond. The town of Chateaubelair itself has an estimated population of one thousand four hundred twenty-one (1,421) that occupies four hundred and fifty-eight (458) households. Sex disaggregated data for the community are shown below.

The population in the Chateaubelair community is comprised of an estimated seven hundred and forty-six (746) males and six hundred seventy five (675) females. The male to female ratio is 1.11 and is consistent with the male to female ratio in the wider population of 1.05. Population and sex are the only variables for which data can be estimated for the community.

746
Males

675
Females

Table 1: Estimated Population by District (*Source: 2012 Population and Housing Census)*

District	Number of Households	Males	Females	Population
Coulls Hill	76	109	102	211
Troumaca	177	297	252	549
Rose Hall	285	512	442	954
Rose Bank	186	415	339	754
Chateaubelair	458	746	675	1421
Fitz Hughes	298	568	503	1071
Petit Bordel	186	379	394	773
Richmond	3	11	12	23
Total	**1,669**	**3037**	**2719**	**5,756**

Examination of the population in the administrative division of Chateaubelair revealed that, like the wider population of St. Vincent, there was a large proportion of younger individuals. Twenty-seven point six (27.58%) percent of the population was under the age of 15 and forty-six point three percent (46.3%) under the age of 24. The elderly population, above 65 years of age, was 8.8% and the percentage of the working age population (15-64 years) was 63.6%.

An age Dependency ratio establishes the number of dependents (children and persons 65 and over) per 100 persons in the working age population (14-65). Age dependency ratio was calculated at 57 dependents per 100 persons in the working age population, marginally higher than the dependency ratio of 51 calculated for the entire population.

3.7 HOUSEHOLD SIZE AND HOUSEHOLD HEADS

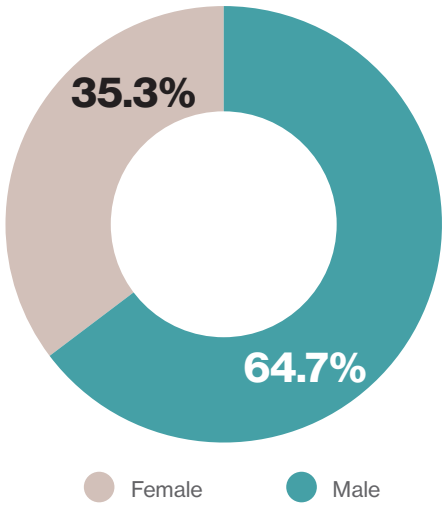
The Chateaubelair division had an average household size of 3.4 persons, which is larger than the national average of 3.0 persons per household. The number of persons in households ranged from 1 to over 14. Household size in the Chateaubelair division was among the largest in the country, second only to Sandy Bay which had an average size of 3.9 persons.

Sixty-four point seven percent (64.7%) of household heads in the division were male and 35.3% female. The ratio of male to female headed households in Chateaubelair was 1.8 - one of the highest in all divisions -surpassed only by the Southern Grenadines which had a male to female ratio of household heads of 2.1. It is noteworthy that in the Chateaubelair division there is both a higher than average proportion of male headed households and larger than average household size when compared to other divisions.

Table 2: Distribution of Households by size (Census Division) (*Source: 2012 Population and Housing Census)*

Household size	% of households, Chateaubelair (CD)	% of household nationally
1	26.5	26.3
2	15.6	19.3
3	14.0	17.6
4	15.2	14.9
5	10.6	10.0
6	7.6	5.4
7	4.7	2.9
8+	5.9	3.5
Average household size	**3.4**	**3.0**

Figure 5: Household Heads by Sex, Chateaubelair Division



According to data from the Housing and Population Census 21.1% of household heads in the division are married and living with spouse and another 22.1% living in a common law union.

Table 3: Union Status of Heads of Household in Chateaubelair Division (*Source: 2012 Population and Housing Census)*

Age category	%
Never had a spouse or common-law partner	13.0
Married and living with spouse	21.1
Common Law Union	22.1
Visiting partner	10.1
Not in a Union	32.1
Not stated	1.6

3.8 EDUCATIONAL ATTAINMENT

All of the educational data for the report was obtained from the 2018-2019 Statistical Digest and shows that while educational enrolment, attendance and attainment for the community is not disaggregated, data for the wider administrative division shows that 29.3% of the population is enrolled in full-time education, 0.43% enrolled in part-time education and 70.3% is not enrolled in an educational institution. Data show that for adults aged 24 years and over 91.5% had completed primary education and 38.9% had completed secondary education. Only 1.8% of the population had completed tertiary education compared with a country average of 5.9%.

Figure 6: Educational Attainment Population aged 24 years and over (*Source: Educational Statistical Digest 2018-2019)*

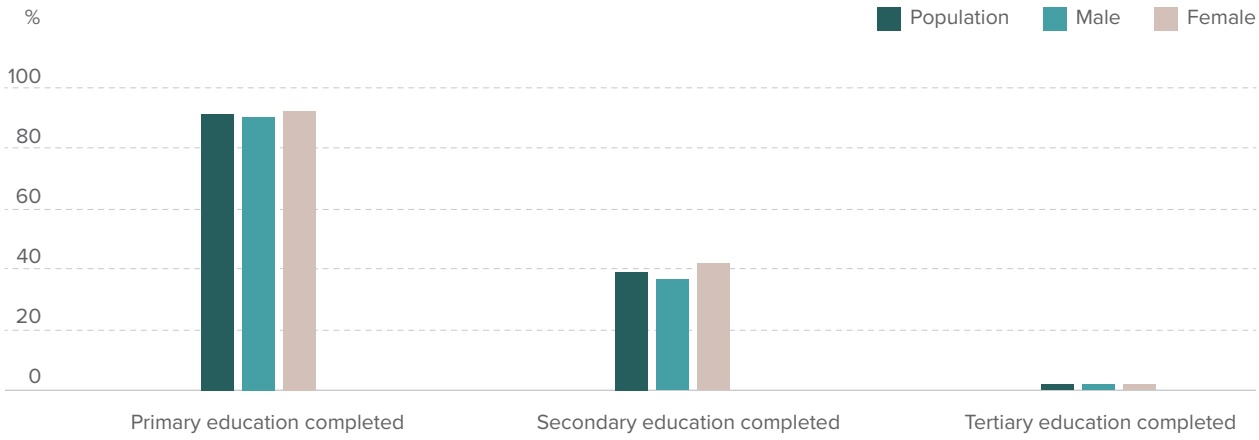
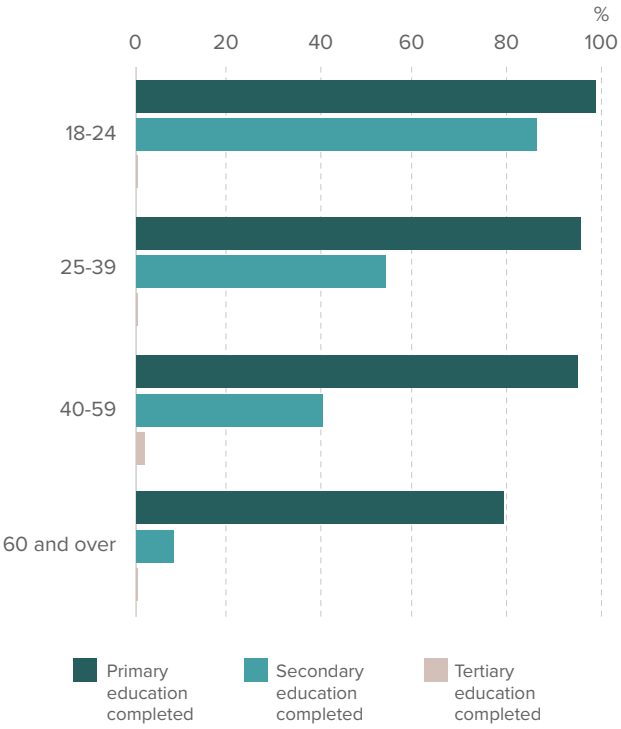


Figure 7: Completion rate across broad age categories

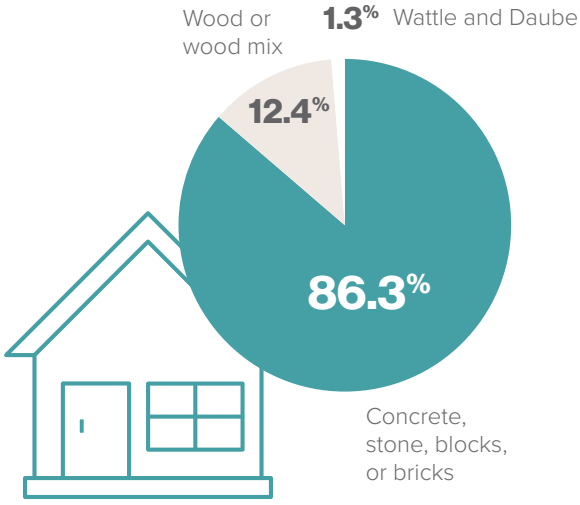


There was little difference in completion rate between the sexes except at the secondary level where more females than males had completed formal education at this level. Analysis across broad age groups however, showed higher completion rates of secondary education and marginally higher completion rates of primary education in younger age groups.

3.9 HOUSING QUALITY

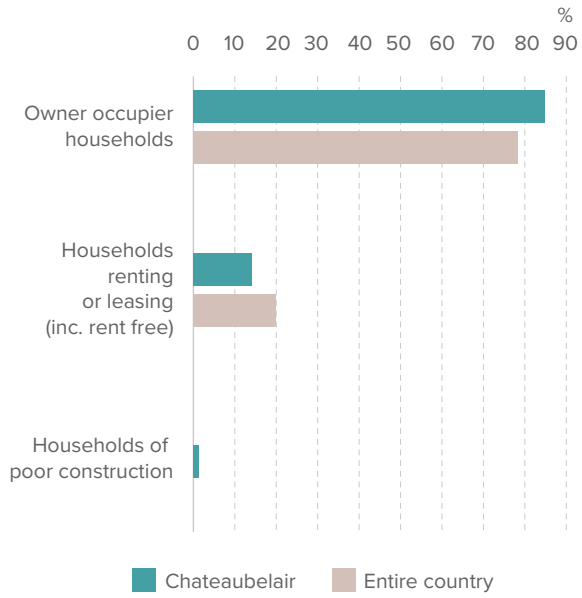
A large majority of homes in the administrative division are constructed with concrete, stone and blocks (86.3%). A small percentage of homes use a mixture of wood and stone/block materials (7.9%) or wood only (4.5%) for outer walls, and a marginal number are constructed by wattle and daube (1.3%). Compared with all other census divisions on the mainland, Chateaubelair had the highest proportion of homes constructed using concrete/blocks and the lowest proportion of homes constructed using wood.

Figure 8: Main materials of outer walls *(Source: 2012 census)*



The proportion of persons owning and occupying their homes in the administrative division is 85% compared to a national average of 79%. Additionally, the proportion of persons renting or leasing homes (including rent free occupancy) is 20% compared to 14.4% national average.

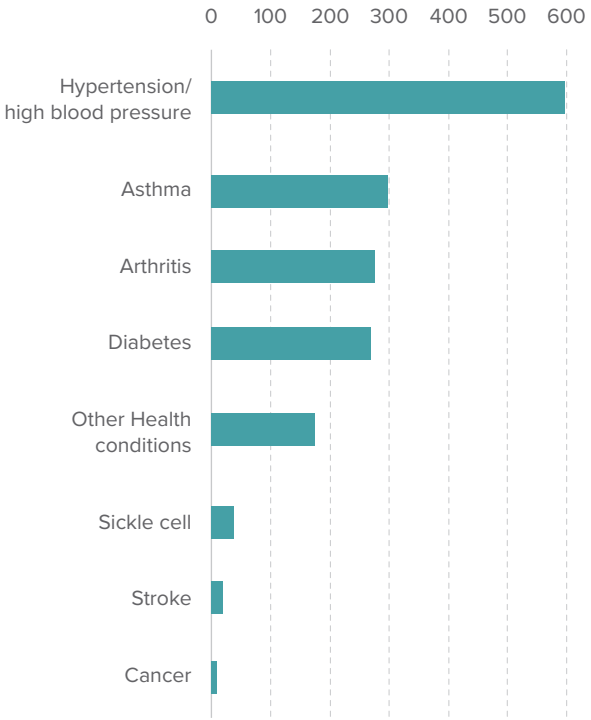
Figure 9: Housing indicators



3.10 HEALTH & SANITATION

A total of 1,334 persons reported at least one case of chronic illness in the 2012 census, representing 23.2% of the administrative population, and 347 persons, 6.0% reported two or more cases. Hypertension/High Blood Pressure was the most reported illness, with a total of 598 cases or 10.4% of the administrative population. Asthma (300 cases), arthritis (276) and diabetes (269) were also commonly reported affecting 5.2%, 4.8% and 4.7% of the population respectively.

Figure 10: Chronic Illnesses frequently reported among all age groups



4 Governance Profile

4.1 POLITICAL DIRECTORATE

Constituency: North Leeward
Parliamentary Representative: Carlos James, Esq. (from November 2020 to present)

4.2 SOCIAL/CIVIC ORGANISATIONS

There are various social groups and civic organisations for persons of all ages and genders throughout the island of St. Vincent and the Grenadines. Chateaubelair, however, does not have that many fully functioning groups.

Among the functioning ones are:

- Chateaubelair Red Cross;
- North Leeward Connection;
- and the Chateaubelair Farmers' Co-operative Society.

Non-functioning groups include the Chateaubelair Police Youth Club and Generation Next. The contact information for the function groups is described here.

4.2.1. CHATEAUBELAIR RED CROSS/ COMMUNITY DISASTER RESPONSE TEAM

President:
Mrs. Sharon Prince

Secretary:
Keshieka Prince

Vision:
A strong, committed, inclusive organization with dedicated leaders who will influence and develop the community of Chateaubelair as it aims to meet the social and financial needs of the community.

Mission:
To build an alliance with other community group to educate and develop the community of Chateaubelair through best practices and adoption of good moral practices.

Objectives:
- To create employment for 40 young persons through skills training to enhance sustainable development.
- To get 20 youths involved in sports by the ending of 2020 to help in reduction of crime.

There are various social groups and civic organisations for persons of all ages in the community of Chateaubelair. The table below lists the civic organizations in Chateaubelair at the time this report was prepared.

4.2.2. CHATEAUBELAIR FARMER'S COOPERATIVE

President:
Mr. Elton James

4.2.2. THE NORTH LEEWARD CONNECTION

President:
Mr. Adrian Codoson

4.3 CRIME, PUBLIC SAFETY AND PERCEPTION OF COMMUNITY ISSUES

No crime data were available from the central Statistical Office for the Chateaubelair administrative division during the LBA assessment. However, findings from the Community Engagement Survey (CES) conducted in October 2018 showed that forty-nine percent (49%) of respondents' ranked unemployment as the Number 1 issue affecting the community. Sixty-five percent (65%) overall listed it among their top five issues.

Drugs, crime and violence were the second most commonl issues noted. Twenty percent of persons (20%) 20% ranked it as Number 1, and 77% overall listed it among their top five.

Poor infrastructure including roads, drainage and facilities in the community was the third most common issue noted (39% of respondents) and pollution, erosion, landslides and effect of natural disaster ranked fourth as the most common issue (36% of respondents).

Teenage pregnancy was ranked fifth most common issue affecting the community (24% of respondents). Other common issues noted included poverty, lack of education and political divide.

Other issues residents highlighted were:

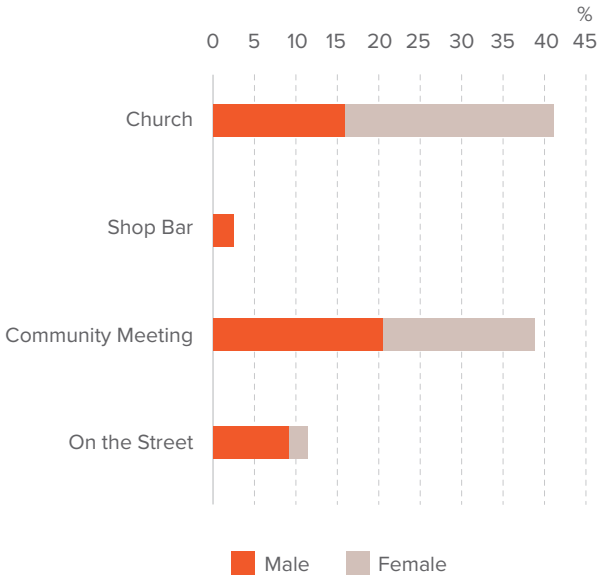
- Poverty
- Lack of education
- Political divide

Figure 11: Issues affecting Chateabelair

4.4 PREFERRED METHODS FOR COMMUNITY ENGAGEMENT

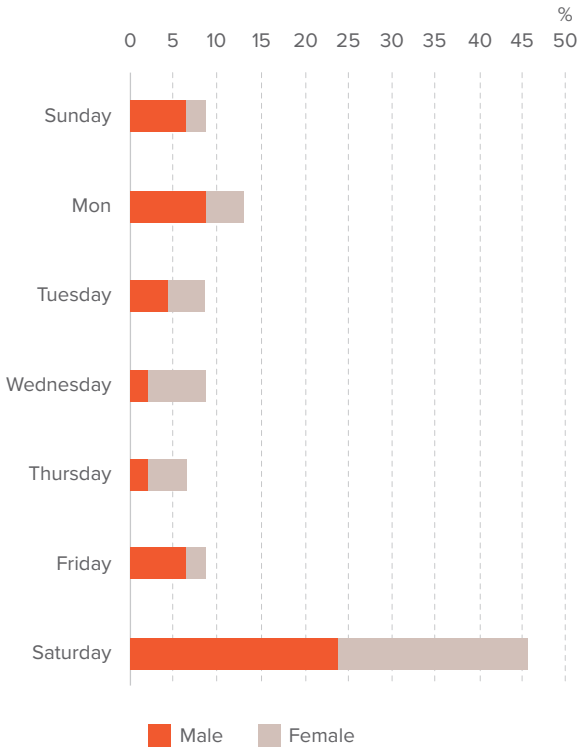
In the Community Engagement Survey (CES) conducted October 2018, the findings revealed that residents of Chateaubelair displayed an overwhelming preference for engaging in community activities in more formal or semi-formal settings. Eighty percent (80%) stated a preference for the use of a church or community meeting for dissemination of information on community activities.

Figure 12: Preferred Method of Engagement



Respondents in the community showed a clear preference toward Saturdays for engagement in community activities (56%). This preference was upheld in both men and women. Preference was also shown for engagements at evenings (66%) versus other time of day, and with a regularity of monthly (30%) or bi-monthly (30%).

Figure 13: Preferred Days of the Week for Community Engaement



5 Economic Profile

According to data from the 2012 Housing and Population Census, 73.6% of the economically active population in the Chateaubelair division were employed. This statistic represents persons aged 15 and over who were able and willing to work. Twenty-six point four percent of persons (26.4%) fitting this description were unemployed. The data show a higher percentage of unemployment among females (33.8%) compared to males (22.2%), consistent with movement in the general population.

Among the employed, the most held occupation group was skilled agricultural, forestry and fisheries workers which accounted for 35.7% of the employed in the division, compared to 12.5% island wide. Service and sales and elementary occupations were commonly held occupations accounting for 21.7% and 11.4% of the employed in the division.

Figure 14: Employed and Unemployed Population

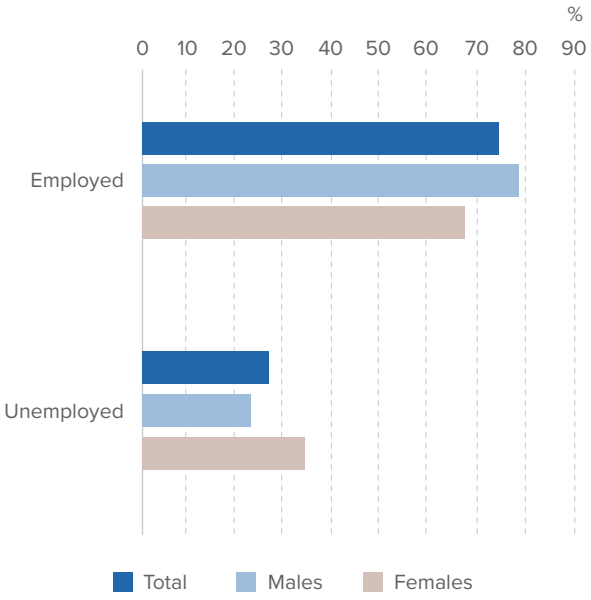
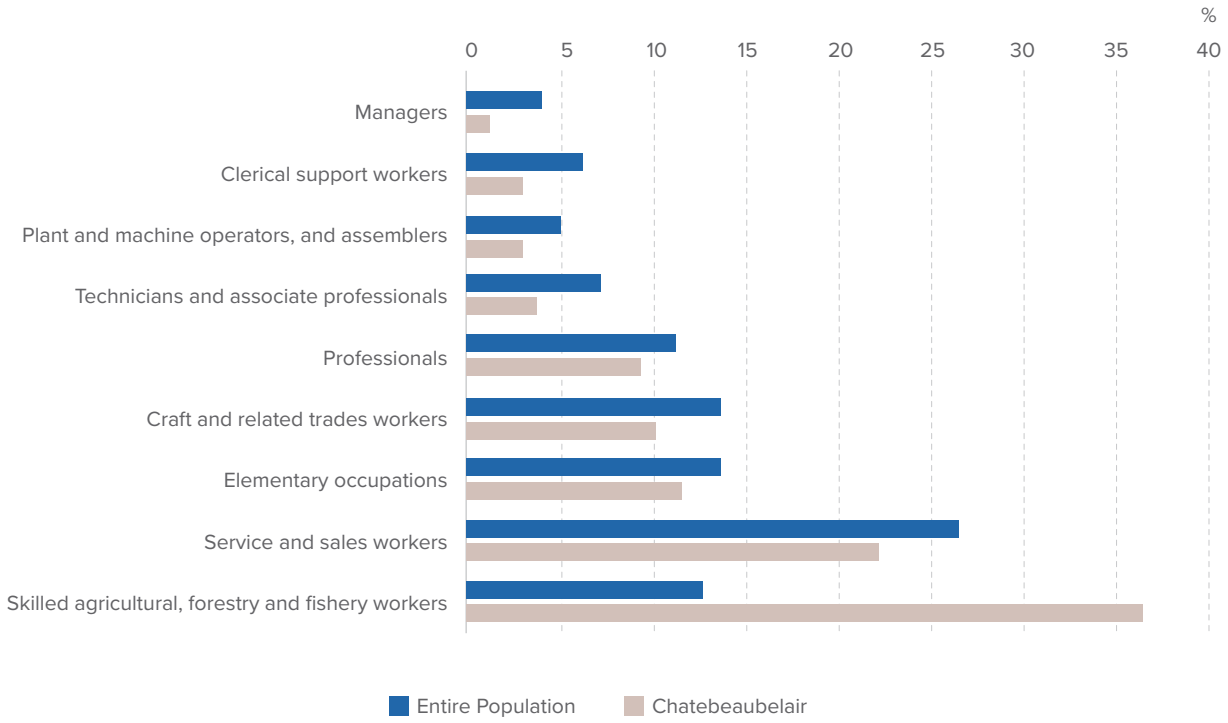


Figure 15: Major Occupation - Chateaubelair and Country Average



6 Vulnerability and Hazard Profile

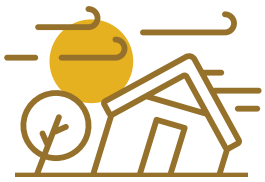
St. Vincent is exposed to high levels of risk to meteorological (high wind, extreme rainfall, hurricanes, and drought) and geophysical (earthquakes, volcanic eruptions, tsunamis) hazards, which have significant negative impacts on economic development, fiscal stability, and communities. Some of these 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). More recently, 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 was finalized, St. Vincent and the Grenadines experienced a series of explosive volcanic eruptions.



6.1 HURRICANE HAZARD PROFILE

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.

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). More recently, 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.

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

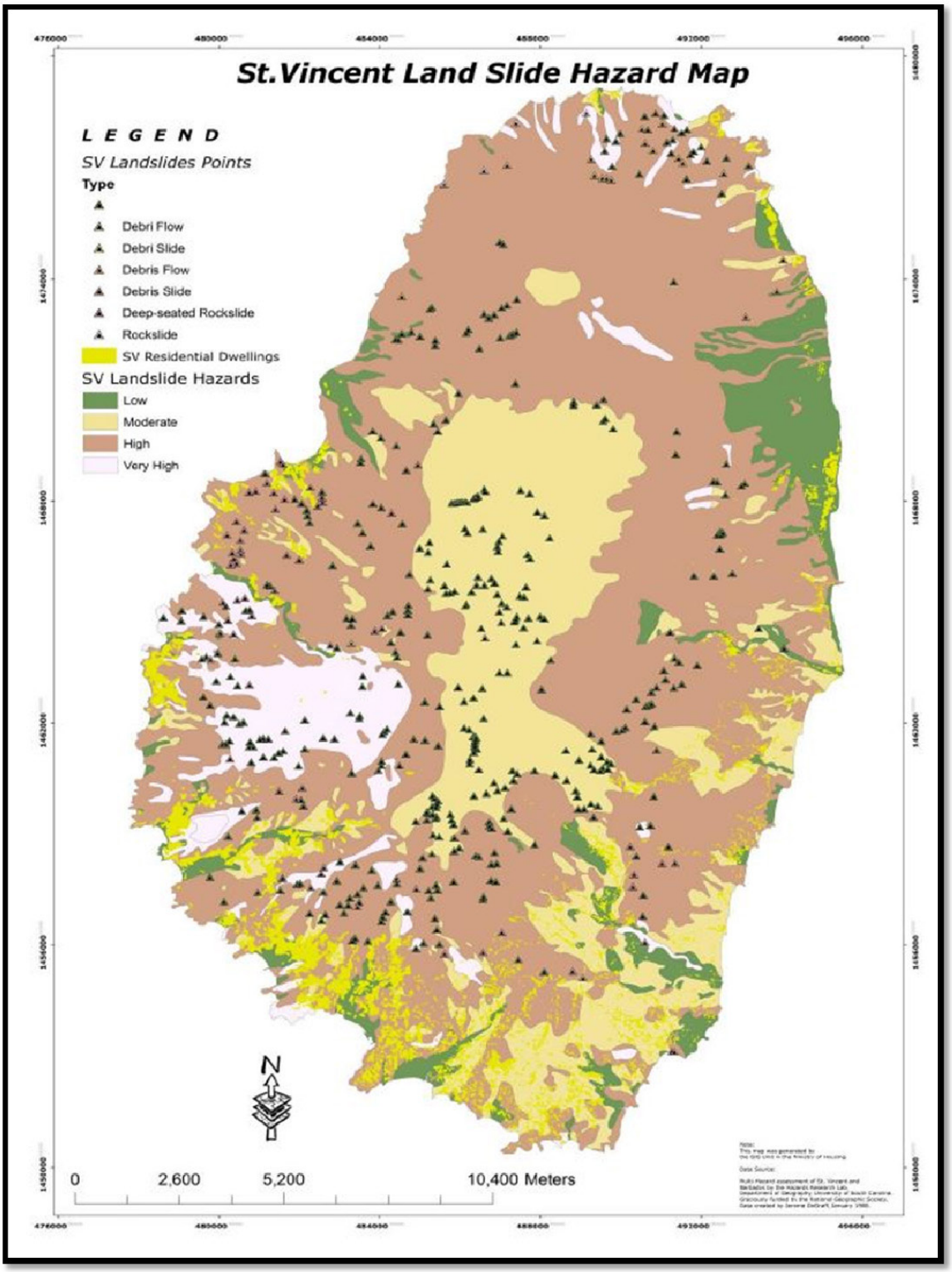
The Caribbean Handbook on Risk Information Management[3] (CHARIM) also notes that Landslides, particularly on the larger islands, are a significant hazard and the risk is increased during the seasonal rains. Coastal flooding is a major concern particularly relating to storm surge and high wave action. 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 16) 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.

[3] http://www.charim.net/stvincent/information

Figure 16: Landslide Hazard Map – St. Vincent *(Source, cited in Joslyn, 2008)*



6.4 EARTHQUAKE HAZARD PROFILE

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[4] (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[5]) 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 17). 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.

[4] Modified Mercalli Intensity scale

[5] 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

Figure 17: 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

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

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

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

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.

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

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

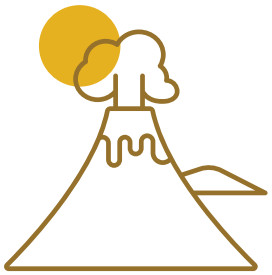
VIII. Destructive
Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse. Damage great in poorly builts structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture moved.

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.

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

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

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).

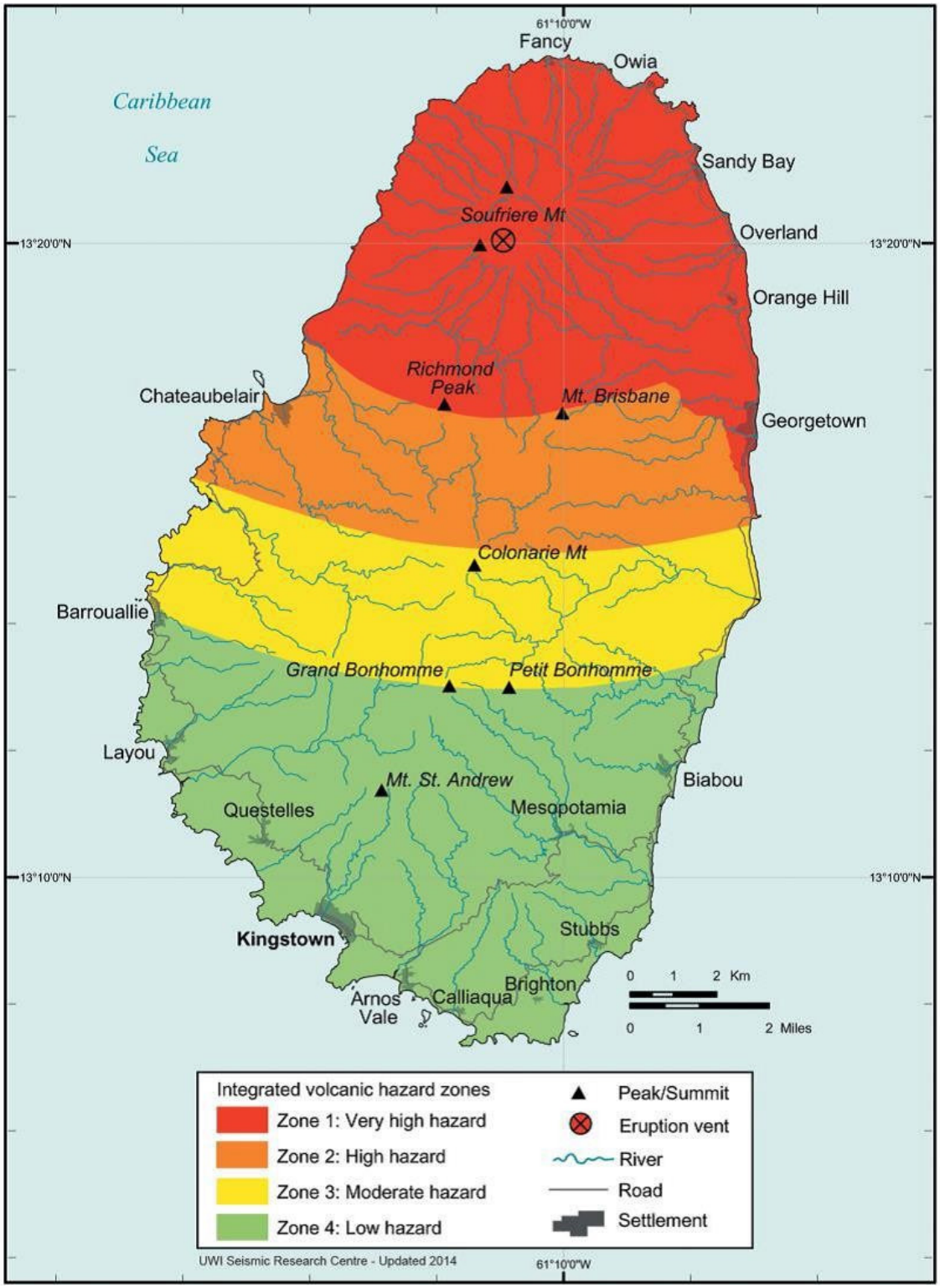
Figure 18 shows the various volcanic hazard zones for the whole island of St. Vincent and shows the Chateaubelair Division is in the Orange Zone.

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 18: 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 4: 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 evacutation camps	5,269 per day
Operation of public transport involved in the evacuation exercise	3,160
Rehabilitation of schools, community centres and churce 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 5 presents these hazards and the types of impacts they can be expected to cause.

Table 5: 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 Activitty
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.

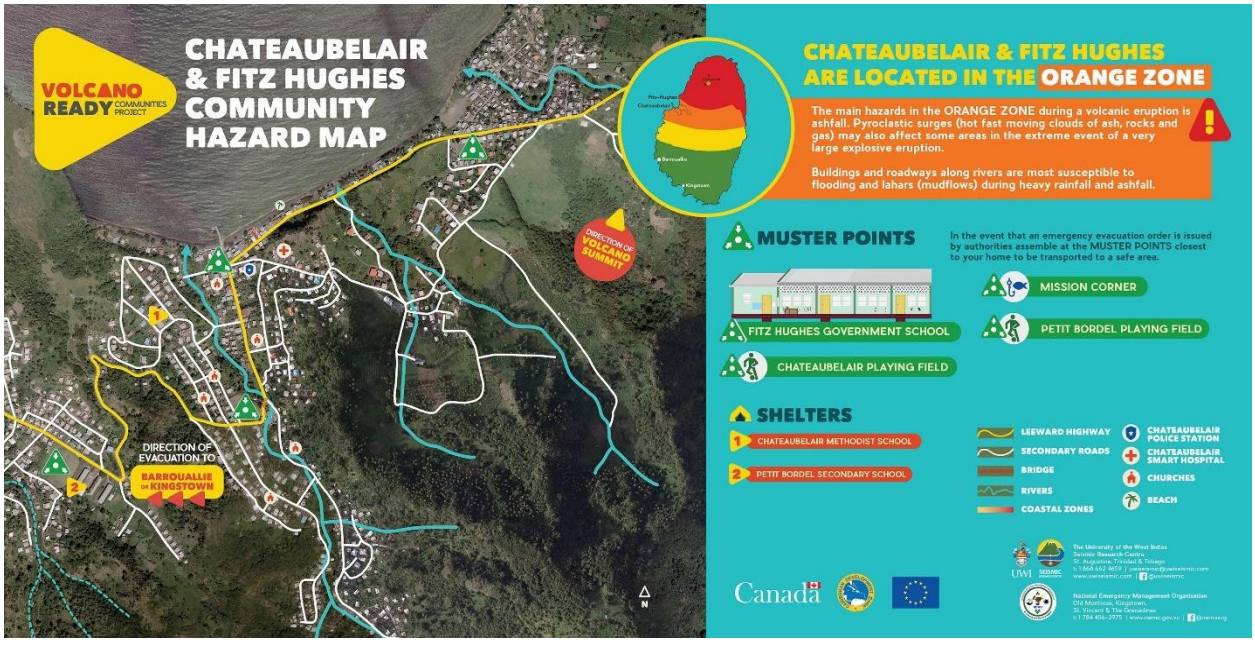
Volcanic threats to livelihoods include:

- 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, Roberston (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.

Figure 19 shows that Chateaubelair is clearly in the orange zone of the volcano.



6.6 OTHER ENVIRONMENTAL ISSUES DIRECTLY AFFECTING CHATEAUBELAIR

When the LBA exercise was conducted, which was prior to the 2021 eruption, it was explained that 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. Volcanic Eruption, Flooding, Landslide, Bush Fires were the four main natural hazards cited by residents shown in Table 6 below.

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

The key hazards that impact the community which may cause loss of life, injury, property damage, social and economic disruption or environmental degradation include:

1. flooding of low-lying areas due to the overflow of the river
2. bushfires due to extreme heat conditions
3. landslides from the occasional land slippage due to the hilly terrain overlooking the coastal lands and
4. volcanic eruptions were ranked relatively low when the LBA was conducted, but it is likely that this hazard would be ranked as a much higher priority hazard if the exercise was to be conducted again in 2021.

Table 6: Hazard Matrix – Chateaubelair *based on the 2019 LBA Assessment*

Hazard	Year	Season	Geography (area affected)	Physical damages (1-5)	Economic and Financial Losses (1-5)	Overall Impact
Volcanic Eruption	1979	April	Chateaubelair	2	1	Evacuate
Flooding	2013	Dec.	Areas close to the river.	4	3	Damage of bridges and roads, loss of crops and livestock
Landslides	2013 & 2016	Dec. & Nov.	Villages - Cocoa, Sharpes, Chateau on the main road.	3	1	Loss of crops
Bush Fire	Yearly	April	Hill of Chateaubelair	1	1	Landslide

Ranking 1-5 with 5 the worst

6.6.1. 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.

When the 2016 RCCVA was conducted, it was evident that NEMO had 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.

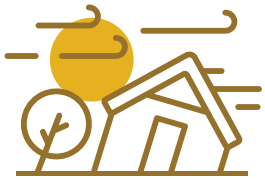
6.6.2. FINDINGS FROM THE 2016 RAPID COMMUNITY CLIMATE VULNERABILITY ASSESSMENT (RCCVA)

During the RCCVA 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 vulnerabilit 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.

6.6.2.1. 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.



6.6.2.2. 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. 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.

6.6.2.3. 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.

6.6.2.4. Finding 4

The main challenges facing the communities include:

- Marketing of agricultural produce (farmers are primarily dependent on Traffickers[6])
- 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

6.6.2.5. 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.

6.6.3. VULNERABILITY & RISK 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). More recently, 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.

[6] Traffickers" are not to be confused with illegal trafficking. This term is the popular term to define persons who are legally allowed to buy and sell produce. In other countries, they are sometimes referred to as "higglers".

The islands lie towards the southern end of the main Atlantic hurricane belt and 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 was finalized, St. Vincent and the Grenadines experienced a series of explosive volcanic eruptions.

Climate vulnerabilities are further exacerbated by the country's limited human and financial resources as well as highly exposed social and economic infrastructures—much of which are located in low-lying coastal areas. The considerable economic dependence on primary production and the service industry further contributes to such vulnerabilities as the success of both sectors is heavily influenced by climate.

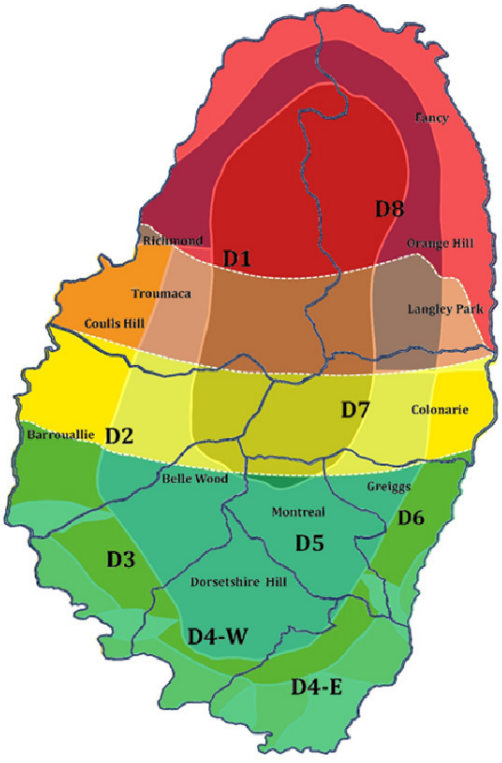
7 The 2021 Volcanic Eruption

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 have been displaced from their communities and relocated to southern communities.

As part of the Caribbean Damage Assessment and Needs Assessment (DANA) Continuum and the Regional Response Mechanism, a Detailed Damage Sectoral Analysis (DDSA) was conducted starting mid-April 2021 covering agriculture, health and water. This LBA report features data and information that were collected from the DANA Agriculture report.

Figure 20: Map of St. Vincent Showing Agricultural Districts and Hazard Zones



[7] National Emergency Management Organization update, dated April 19, 2021

The National Emergency Management Organization (NEMO) reported that a total of 13,303 persons[7] were evacuated. Of these persons, approximately 2875 were registered farmers and 278 were fisherfolk who were dislocated from the red and orange zones (Table 7). Additionally, some farmers and fishers from the Yellow Zone, especially on the leeward side, were evacuated.

Figure 20 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. Table 7 shows the distribution of farmers according to the different Hazard Zones.

Agricultural Region	Agricultural District
1	D1, D2, D3
2	D4-W, D4-E, D5, D9 (Grenadines)
3	D6, D7, D8

Figure 20 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.

Table 7: 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
	10,438	**1,748**	**12,186**

The hazard 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.

7.1 DETAILED DAMAGE SECTORAL ANALYSIS (DDSA) (AS OF MAY 2021)

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 8 summarizes the estimated damage and loss by sectors. However, the DDSA 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 DDSA 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.

Table 8: Crop Damage and Loss Assessment

Crop type	Acreage in production	Yield/acre (lbs)	Expected Yield (Lbs)	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 EC$	Estimated total Damage and Loss US$
Arrowroot	98	9,000	882,000	98	$5,700.00	$558,600.00	$1.00	$882,000.00	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
Broccolli	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	68	$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	$51,760.00	315,466.67
Dasheen	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	$1,895.56
Flavour pepper	8	15,000	120,000	1	$9,342.00	$9,342.00	$2.50	$37,500.00	46,842.00	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	$0,883.00	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
Ochro	12	6,000	72,000	1	$5,206.00	$5,206.00	$2.00	$12,000.00	17,206.00	6,372.59
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	$9,865.00	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
Sorrel	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	$7,883.00	$55,181.00	$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	$13,841.00	301,422.59
Banana	593	20,000	11,854,800	534	$11,340.00	$6,055,560.00	$0.92	$9,525,600.00	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	$540,000.00	551,334.00	204,197.78
Carambola	15	9,000	135,000	6	$2,268.00	$13,608.00	$2.00	$216,000.00	229,608.00	$5,040.00
Christophene	12	2,000	24,000	6	$2,851.00	$17,106.00	$1.96	$23,520.00	40,626.00	15,046.67
Clove	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	$,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
Jujubee	5	24,000	112,686	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
Mandarine	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	$1,367.00	$3,550.50	$1.00	$81,000.00	$4,550.50	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	$4,596.30
Pawpaw	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	1,270,980.00
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	$,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	287,000	2	$1,914.00	$3,828.00	$1.20	$96,000.00	99,828.00	36,973.33
Sugarapple	8	12,000	91,000	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
Waxapple	10	20,000	200,000	2	$1,900.00	$3,800.00	$1.00	$80,000.00	$3,800.00	31,037.04
TOTAL CULTIVATED	6,556.4					$21,722,919.10		$93,637,170.00	115,360,089.10	42,725,958.93
Note:										
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										

Table 9: 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
Total	**115,360,089**	**226,750**	**969,905**	**20,832,500**	**5,239,158**	**54,000**	**142,682,402**	**52,851,334.07**

7.1.1. ASSESSMENT METHODOLOGY

The DDSA 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 Organization of the United Nations (FAO).

A mixed methodology was employed to conduct the DDSA 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 MAFFRTIL 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.

7.1.2. CROP LOSS

The DDSA provides detailed estimates for each of the main crops grown (primarily arrowroot, vegetables, root crops, bananas and plantains, and tree crops). Table 10 shows these DDSA estimates in detail.

7.1.3. APICULTURE

The DDSA 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.

7.1.4. LIVESTOCK

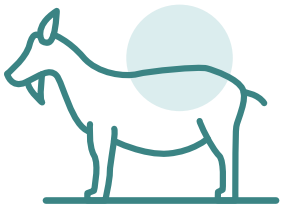
The extensive loss of vegetation (pasture and other forage on which to graze animals) in the red and orange zones will further exacerbate preliminary estimated livestock losses which were determined to be at least $447,662.00 in the red and orange zones with an overall estimated loss $522,243.00. Even 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."

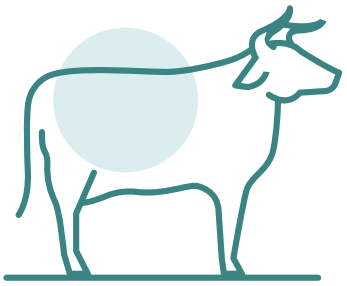
The estimated livestock farmers affected in the red and orange zones is 1,233. Tables 11 and 12 show these losses.

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.

<10%
of hives located in red and orange zones

4990
Small ruminants





684
Cattle

400
Pigs

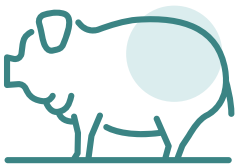


Table 10: Livestock Damage and Loss

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
Poulty	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
TOTAL	**3083**	**$247,265.00**	**$154,562.00**	**27**	**$17,300.00**		**$28,535.00**	**$446,015.00**	**$76,228.00**

Table 11: Livestock Infrastructure Damage and Loss

PRIVATE			PUBLIC	TOTAL	XCD	USD
DAMAGE	No. of Animals	3083	27	3110		
	Value of Animals	$247,265.00	$17,300.00	$264,565.00	$447,662.00	$164,769.41
LOSS	Infrastructure damage value	$154,562.00	$28,535.00	$183,097.00		
	Farmgate Loss	$446,015.00	0	$446,015.00	$522,243.00	$192,220.18
	Production loss Apr- Dec	$69,648.00	$6,580.00	$76,228.00		
	TOTAL	**$917,490.00**	**$52,415.00**		**$969,905.00**	**$356,989.58**

7.1.5. FISHERIES

The DDSA 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 12: Summary of Fisheries Sector Damage

Number	Type/length	Boat	Engine HP	Beach Seine Net	Buoys / Fishing gears and auxillaries	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
	Total	**198,000.00**	**91,800.00**	**35,000.00**	**8,950.00**	**1,100.00**	**361,850.00**	**850,860.00**	**1,212,600.00**

Table 13: Fish Landing loss

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

7.1.6. FORESTRY

The DDSA 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 14: 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 Plantation Forest		569.47	No. Trees/ acre 200	Salvage/ Rehabilitation	Planting		
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		**43,165.94**					**$20,832,500.00 (XCD $56,247,750.00)**

7.1.7. 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 DDSA 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.

The DDSA strongly recommended “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 15 presents and inventory of both public and private agricultural infrastructure and shows which assets are located in Chateaubelair Division which includes Rose Hall and what damage was noted during the DDSA.

Table 15: List of General Agriculture Infrastructure

LIST OF ASSETS PUBLIC AND PRIVATE					
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
	Apiaires 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 Stati	Rabacca Farms		RED	PARTIAL DAMAGE	MONTREAL GREEN HOUSE PARK
Langley Park	Langley Park Palletization Centre		RED	Ash Accumulation	No relocation recommended
Langley Park		Little Nut	RED	Total collapse of installation	Assistance in rebuilding, no relocation
Perseverance Fa	Perseverance Agriculture Station		RED	Total green house collapse	No relocation recommended
Perseverance		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 Garde	Montreal Green House Park		GREEN	In good condition	No relocation recommended
Dumbarton Gar	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: MAFFRTIL 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
Rillan	Taiwan technical Mission Pembrook		GREEN	In good condition	No relocation recommended
Peters Hope	Peters Hope Germ Plasm		GREEN	In good condition	No relocation recommended
Barrouaillie	Barrouaillie 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

7.2 COMPLEMENTARY SATELLITE-BASED DAMAGE ASSESSMENT OF EXPLOSIVE ERUPTION IMPACTS ON AGRICULTURE

A damage assessment using satellite data was conducted from 23 to 26 April with the support of FAO. This was conducted in parallel with the preparation of the Detailed Damage Assessment Report. The preliminary damage assessment report provided the context needed to design the geospatial analysis methodology and the results were reviewed and interpreted together with the Ministry and the rest of the DDSA team on 3 May.

The following summarize the recommendations on the use of the complementary satellite-based analysis data:

1. The satellite based assessment results can be used in recovery and rehabilitation planning through the production and dissemination of different thematic maps. Different printed maps targeting different audiences can be produced such as maps that can be shared to farmers to help them understand the impacts in their respective areas and appreciate the range of recovery and rehabilitation actions that would have to be undertaken. This can also be helpful in the context of relocation planning.

2. There are several other uses of the results including uploading the satellite analysis to an online geospatial platform to allow additional analysis together with other data as well as interactive visualization by any online user. The datasets can also be used for subsequent, more advanced geospatial analysis. The data can also inform or complement community or household level analysis as/when needed during the recovery phase.

3. The satellite analysis shows changes in the Neutral Density Vegetation Index (NDVI), which is considered as an indicator for the degree of crop health or stress. It does not directly identify or differentiate areas with severe physical damage or damage without chance of survival. Results should therefore be interpreted in this context. This type of analysis complements the Ministry analysis because it can allow the Ministry to determine or confirm areas that have been affected but not necessarily completely damaged and could still benefit from recovery or rehabilitation interventions.

The satellite assessment revealed that about 7,900 acres have been severely impacted while the field assessment report (DDAS) prepared under the leadership of the Ministry estimates 3,588 acres of damaged cropland. This difference can be explained by the fact that the severely impacted land identified/measured using the satellite data is based on the computed change in NDVI (vegetation health/stress) which does not specify/confirm chance for survival/recovery while the damaged acreage reported by the Ministry is based on a very specific or specialized definition that evaluates the degree of physical damage and chance/no chance of survival.

Figure 21: Vegetation changes (NDVI) using Sentinel 2 after April 10th 2021 (left: Jan1-Apr9 and Right: Apr10-Apr26)

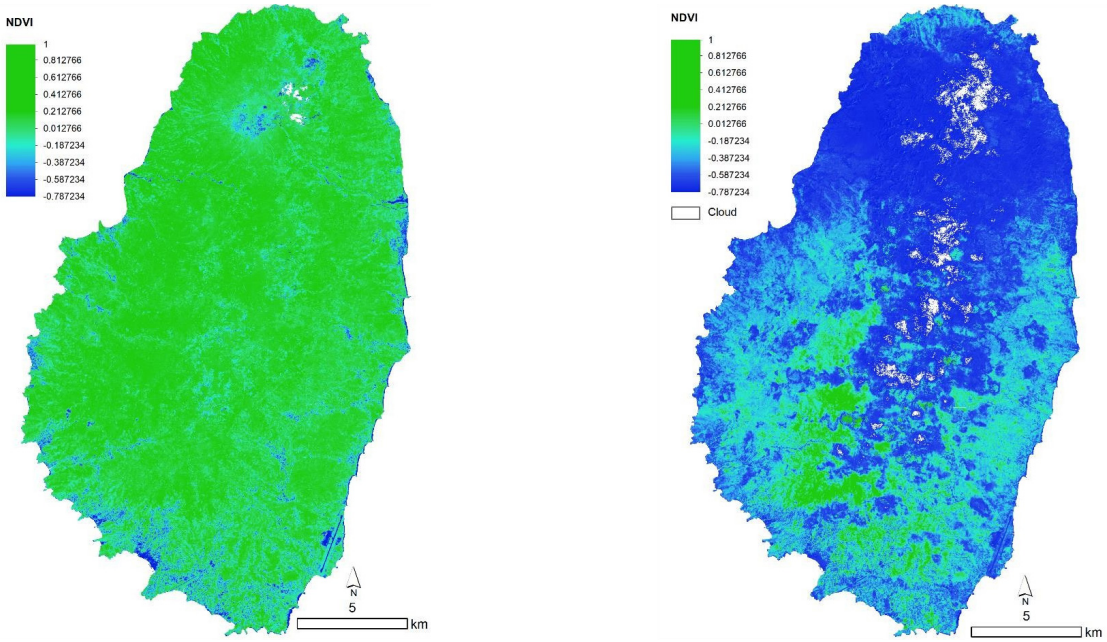
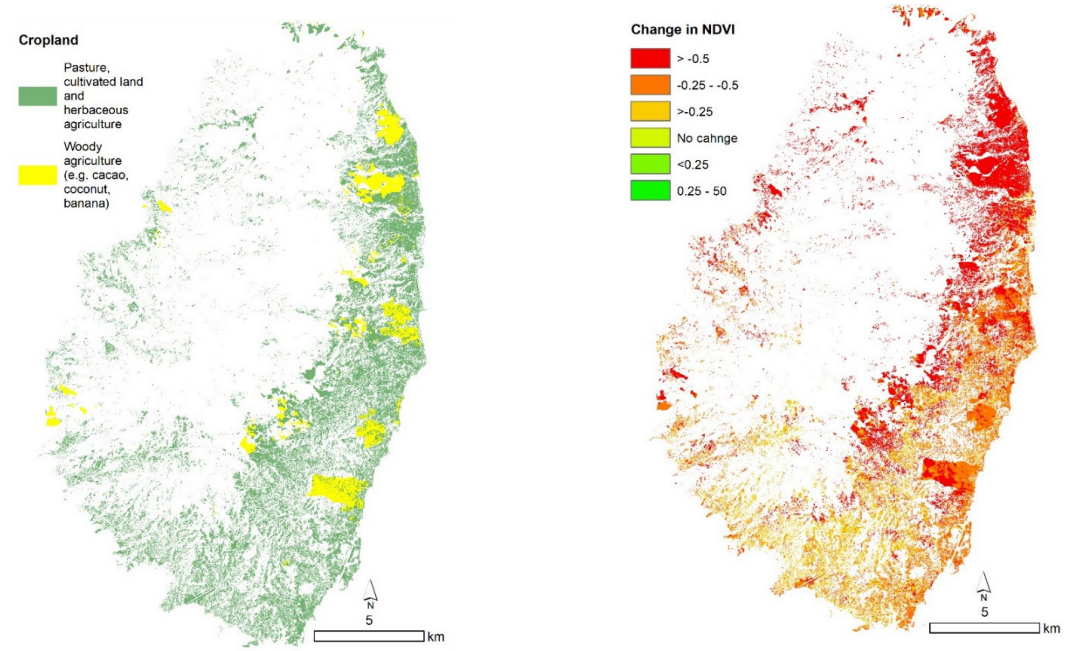


Figure 22: NDVI Changes after 10th of April over the cropland area (left: Cropland, Right: NDVI change)



Tables 9 and 10 provide further detailed estimated area of damage and the types of changes in vegetation and crop land in each of the hazard zones.

Table 16: 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
	Total	**6424**	**1092**	**7516**	**3240**	**3005**	**1209**	**45**

Table 17: 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

7.2.1. VULNERABLE GROUPS

According to the United Nations[8] 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[9] 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 cent2, significantly diminishing the resilience of affected people to recover from this crisis.

[8] United Nations. April 2021. UN Global Funding Appeal. Explosive Eruption of Soufriere Volcano: St. Vincent
[9] Lesbian, Gay, Bi-Sexual, Trans, Queer

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 rate3 . 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 to cruise ships Until the volcanic activity 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. The ashfall has been very extensive such that it has disrupted electricity supply, completely covered crops, stressed livestock, weighed down and snapped trees, and contaminated the island's water supply.

Farmers[10] 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.

7.3 COVID COMPLICATIONS

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. The long-term effects of the 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.

[10] Smith, Kareem. Farmers dig out from tonnes of ash, face uncertain future. Barbados Today. April 17, 2021.

8 Livelihood Assessment and Contingency Planning

Livelihood assessment data about the normal emergency appeal timetable and other livelihood elements are collected in advance for an area that is 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.

Focus group participants in Chateaubelair identified the five (5) main types of livelihood categories in the community. These are namely: Farming, Fishing, Hunting and Vending. The major crops cultivated by farmers are eddo, dasheen, ginger and potato. Data from the Ministry of Agriculture indicate that there are two hundred and twenty-one (221) registered farmers in Chateaubelair of which one hundred and twenty three (123) are livestock farmers.

8.1 ASSET INVENTORIES

Documentation of livelihood assets is very critical to any contingency planning. It is especially important to document the physical, natural and human resource assets that exist in case they are damaged or lost in any particular disaster. Matrix 1 outlines the key assets that are present in the Chateubelair community.

Matrix 1: Livelihoods & Asset Inventory Matrix

Livelihood Group	Skills Needed	Tools & Equipment	Natural Resources
Farming	Knowledge & Care of animals, land preparations, Use of equipment, proper use of chemicals.	Cutlass, Land for rearing animals, Containers for water, Animal pens, Rake, Spray cans, Fork, Hoe, Seeds, Seedlings, Suckers	Rivers, Lands, Human Resource, Sunlight, Rainfall, Trees
Fishing	Mending, Navigation, Operation of boats, Knowledge of different techniques, lines, fishing guns.	Diving glass, Fins, Snorkel, Nets, Boats, Fishing gun, Fish pots, Hooks, Fishing lines, Twine, Tool for mending nets, Buckets, Refrigerator, Ice, Transportation	Sea, River, Human resource
Hunting	Skills in shooting, Use of spear, Great vision	Guns, Lands, Search Light, Bulbs Batteries, Dogs, Cutlass	Forest
Vendors	Hustling, Skills, Friendly, Record keeping	Ice box, Trollies, Bags, Baskets	Human Resource

8.2 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.

Evidently farmers who depend on eddoes and dasheen for their livelihood are most affected. Farmers who plant Eddoes and Dasheen suffer significant losses (crop and financial) as a result of flooding. In the case of the service providers, households seemingly cut back on their consumption and usage of utilities as urgent recovery strategies. Rebuilding and money for food take precedence in such instances.

Matrix 3 shows what changes are made to the cropping activities during a year when a landslide has occurred.

Matrix 2: Seasonal Calendar Matrix - Normal Year
Types of Livelihoods (Farming, Fishing, Hunting and Vending)

Description of Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Clearing of Lands (Slash & Burn)						Eddoes & Dasheen						
Preparation of land							Eddoes & Dasheen					
Planting of Crops	Potatoes			Peas			Eddoes & Dasheen					
Harvesting				Potatoes				Peas				Eddoes & Dasheen
Fishing	✓			✓		✓	✓	✓	Chichi			✓
Hunting	✓											✓
Vending	✓			✓		✓	✓	✓	✓			✓

Matrix 3: Seasonal Calendar Template - Year of Landslide
Type of Livelihood:(Farming, Fishing, Hunting and Vending)

Description of Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Clearing of Lands (Slash & Burn)						Eddoes & Potatoes						
Preparation of land							Eddoes & Dasheen					
Planting of Crops	Potatoes			Peas			Eddoes & Dasheen					
Harvesting				Potatoes				Peas				Eddoes & Dasheen (Loss of crop)
Fishing	✓			✓		✓	✓	✓	Chichi			✓
Hunting	✓											✓
Vending	✓			✓		✓	✓	✓	✓			✓

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.

The LBA investigation found that according to residents, the main strategies used to cope with impacts of the hazards are recovering existing crops and replanting them; and clearing the existing road or creating alternative entrance to the farm land. Whilst these strategies help them to cope after an event, they also threaten negative longer-term effects such as farmers not being able to sell their produce at the market resulting in financial losses. Additionally, a longer time will be required to get to their farms as a result of utilising an alternative entrance.

Table 18: Coping Strategy Inventory – Landslide Effects on Farming

Likely Climate Impact	Positive Coping Strategies & Practices	Negative Coping Strategies & Practices
Road to farms diverted	Clear road/ find different routes to land	Longer time to get to farms.
Loss of Crops	Able to recover and replant	Both Market Sales are missed for the Easter season for (Potatoes) and Summer season for (Peas)

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.

10 Response and Recovery Typologies

While individuals employ their own response mechanisms/coping strategies, external interventions are usually required for the effective and efficient restoration of livelihoods.

The DDSA 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 AND RECOVERY 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 RESPONSE, 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 FOR ADDITIONAL TYPES OF HAZARDS

Generally speaking, the Chateaubelair community has been resilient and recovers quickly after each hazard event. Outside of the 2021 volcanic eruption, landslides are the most significant event to have affected the area and the residents believed that delaying planting of eddoes and dasheen is a sufficient coping strategy due their multi-crop approach. However, depending on the severity of the impact, farmers may need support in replacing crops such as Ginger, Dasheen and Eddoes.

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. 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 19: Chateaubelair Response Typology

Type of Response Needed	Geographical Area	# of Households likely to be affected	Required quantity (US$)	Duration	Cost (US$)	Response
Replacement cost of plant material:						
Ginger	Areas close to the river	16	21,780 plants @$0.74x2 ac	One-off	32,234	Min. of Agri.
Eddoes		28	11,616 plants @$0.74x 1ac	One-off	8,596	
Dasheen		6	7,260 plants @$0.74x1 ac	One-off	5,372	
Cost of production per acre*:						
Ginger	Areas close to the river	16	2 acres (ac)@$4,426		8,852	Min. of Agri.
Eddoes		28	1 acre (ac)@$1,519		1,519	
Dasheen		6	1 acre (ac)@$1,543		1,543	
Loss of Livestock		10				
Damage to Housing:						
Support for house repairs/construction	Areas close to the river	25	$925.93 per structure	One-off	23,148	Min. of Housing
Rental Assistance	Areas close to the river	10	222.22 per month	6 months	13,333	Min. of National Mobil.
Interim assistance benefit	Chateaubelair	50	184.19 per month	9 months	82,886	Min. of National Mobil.
Cleaning of drains and scattered debris	Areas close to the river			1 week		BRAGSA
Uniform assistance	Chateaubelair	75	$55.56 per student	One-off	4,167	Min. of National Mobil.
Meals & transport subsidy	Chateaubelair	75	$66.67 per student	9 months	45,002	Min. 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, land lease).

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$)	75% dependent on crop grown above grown (XCD$)	55% dependent on crop grown underground	Justification
CHATEAUBELAIR*												
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	
FITZ HUGHES												
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	
ROSE HALL												
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
SPRING VILLAGE												
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$)	75% dependent on crop grown above grown (XCD$)	55% dependent on crop grown underground	Justification
COLONARIE												
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		
FANCY												
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	
PARK HILL												
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	
OWIA												
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$)	75% dependent on crop grown above grown (XCD$)	55% dependent on crop grown underground	Justification
OVERLAND AND MAGNUM												
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	
SANDY BAY												
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	
SOUTH RIVERS												
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 f.t 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.
		Yams (Portuguese)	$3.00 per hole when young $5.00 per hole if matured
Plantain	$4.00 per plant up to 3 months $7.00 per plant at medium stage $12.00 per plant if bearing	Dominic	$2.00 per hole when young $4.00 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	Water	$1.00 per hole when young
		White	$3.00 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	Bascombe	75 cents per hole when young
		Others	$2.00 per hole if matured
Sugar Cane	$1.00 per hole	Sweet Potatoes	25 cents per hole when young $1.00 per hole if matured
Cassava	30 cents per hole up to 3 months $2.00 per plant when matured	Ochro	25 cents per hole when young $1.00 per hole if matured
Corn	15 cents per hole up to 3 months $2.00 per plant when matured	Ginger	10 cents per sq. ft.
Pigeon Peas	$1.00 per hole in pure stand $6.00 per isolated tree	Sorrel	15 cents per hole when young 25 cents per hole if matured
Cotton	60 cents per hole up to 2 months $2.00 per plant if bearing	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
Eddoes	50 cents per hole up to 3 months $2.00 per plant if matured		
Tannia	50 cents per hole up to 3 months $2.00 per plant if matured	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.		
Cauliflower	25 cents per plant when immature $1.00 - $2.00 per plant when matured	Pumpkin	10 cents -50 cents per hole when immature $5.00 per hole if bearing
Christophene	$1.00 per hole when immature $5.00 per hole if bearing	Passionfruit	$1.00 per non bearing vine $5.00 per vine if bearing
Cucumber	10 cents per plant when immature $2.00 per plant if bearing	Black Pepper	$1.00 per plant not bearing $5.00 per plant if bearing
Egg Plant	10 cents - 50 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

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($)	NO,	COST($)
LABOUR OPERATIONS				
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
Subtotal				**$ 4,800.00**
MATERIALS				
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
Subtotal				**$ 6,350.00**
OTHER COSTS				
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				
Subtotal				**$ 800.00**
Total cost of production				**$ 11,950.00**
Total cost per unit of output($/Lb)				**$ 0.60**
ASSUMPTIONS				
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($)	NO,	COST($)
LABOUR OPERATIONS				
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
Subtotal				**$ 2,720.00**
MATERIALS				
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				
Subtotal				**$ 1,080.00**
OTHER COSTS				
Land charges (Lease/ Rent/ Share)	Acre			
Transportation				300.00
Supervision				
Subtotal				**$ 300.00**
Total cost of production				**$ 4,100.00**
Total cost per unit of output($/Lb)				**$ 0.37**
ASSUMPTIONS				
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($)	NO,	COST($)
LABOUR OPERATIONS				
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
Subtotal				**$ 2,560.00**
MATERIALS				
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				
Subtotal				**$ 1,306.00**
OTHER COSTS				
Land charges (Lease/ Rent/ Share)	Acre			
Transportation				300.00
Supervision				
Subtotal				**$ 300.00**
Total cost of production				**$ 4,166.00**
Total cost per unit of output($/Lb)				**$ 0.30**
ASSUMPTIONS				
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 – REFERENCES

Boruff, Bryan & Cutter, Susan. (2007). The Environmental Vulnerability of Caribbean Island Nations. Geographical Review. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1931-0846.2007.tb00278.x

Campbell, Donovan. 2016. Preliminary Rapid Community Climate Vulnerability Assessment (RCCVA) for the "Volcano Ready Communities in St. Vincent and the Grenadines (VRCinSVG)" Project. Community Disaster Risk Reduction Fund (CDRRF), Caribbean Development Bank (CDB). Barbados.

Caribbean Handbook on Risk Information Management (CHARIM). http://www.charim.net/stvincent/information

Community Engagement Survey (CES). September 17th – 25th, 2018. Community Disaster Risk Reduction Fund (CDRRF), Caribbean Development Bank (CDB).

Dalton, Michael, et.al. April 2021. Detailed Agriculture Damage Assessment Report. Prepared by the Damage and Loss Assessment Team (DaLAT). National Emergency Management Organisation (NEMO), Kingstown.

DeGraff, J.V., 1988. Landslide hazard on St. Vincent, West Indies Final Report. Washington, D.C., Organization of American States. 2, Cited in Westen, C.J. and Sijmons, Koert. 2016. Saint Vincent and the Grenadines: Topographic map, Caribbean Handbook on Disaster Information Management project (CHARMIN). https://www.researchgate.net/publication/311311875_Saint_Vincent_and_the_Grenadines_Topographic_map/citation/download

DNL Consultants. 2005. Inception Report for the Island Wide Flood Risk Assessment Study Project No. SVGDMP-CON-ICB-F-B12/03.

Economic Commission for Latin America and the Caribbean (ECLAC). 2011. St. Vincent and the Grenadines: Macro Socio-Economic Assessment of the Damage and Losses Caused by Hurricane Tomas. https://info.undp.org/docs/pdc/Documents/BRB/76749_LC-CAR-L%20294%20-%20SVG%20DaLA%20REPORT.pdf

Food and Agriculture Organization of the United Nations (FAO) and the International Labour Organization (ILO). 2009. Livelihood Baseline Assessment Toolkit. FAO, Rome.

Geographical Information Systems (GIS) Division. Ministry of Housing, Informal Human Settlement, Land and Surveys and Physical Planning. http://www.housing.gov.vc/housing/index.php?option=com_content&view=article&id=37:geographical-information-systems-division&catid=31&Itemid=50

Geographical Information Systems (GIS) Division. Ministry of Housing, Informal Human Settlement, Land and Surveys and Physical Planning. http://www.housing.gov.vc/housing/index.php?option=com_content&view=article&id=37:geographical-information-systems-division&catid=31&Itemid=50

Ghosh, Amit, et.al. April 26, 2021. Cropland damage assessment after the volcanic eruption of La Soufrière in Saint-Vincent Island. FAO, contact: Matieu.henry@fao.org and Roberto.Sandoval@fao.org

GIS Unit. Physical Planning Division, Ministry of Transport, Works, Lands, and Physical Planning, Kingstown. St. Vincent and the Grenadines.

Global Environmental Facility (GEF) – Integrated Watershed and Coastal Area Management Project (IWCAM) - Land and Water National Awareness Raising Proposal. No Date.

Government of SVG. 2011. Strategic Programme for Climate Resilience SAINT VINCENT AND THE GRENADINES PHASE TWO PROPOSAL Narrative. Kingstown.

Government of St. Vincent and the Grenadines. 2014. Regional Disaster Vulnerability Reduction Project (RDVRP). Social Assessment Report. Central Planning Division. Ministry of Finance, Planning and Economic Development. Kingstown. https://www.gov.vc/images/pdf_documents/rdvrp_social_assessment_april_2014.pdf

John, Lyndon. 2006. From growing ganja to planting trees: Stimulating legal livelihoods and watershed management in Saint Vincent through payments from public utilities A report on the Integrated Forest Management and Development Programme (IFMDP) and Forest User Groups of St. Vincent and the Grenadines. https://www.researchgate.net/publication/321010618_From_growing_ganja_to_planting_trees_Stimulating_legal_livelihoods_and_watershed_management_in_Saint_Vincent_through_payments_from_public_utilities_A_report_on_the_Integrated_Forest_Management_and_Dev

Joslyn, Ottis. 2008. Pilot Vulnerability and Capacity Assessment Study Final Report St. Vincent and the Grenadines. St. Vincent and the Grenadines National Trust And The Environmental Services Unit Ministry of Health and the Environment. Kingstown.

Joyette, Antonio. 2006. SVGMETS Annual Report to CMC46 Directors of Meteorology, Antigua and Barbuda.

Joyette, Antonio. (2007). An Assessment of the climate of St. Vincent and the Grenadines: Reviewing Trends in identified variables, Identifying Risks and Providing Guidance. https://www.researchgate.net/publication/271837547_An_Assessment_of_the_climate_of_St_Vincent_and_the_Grenadines_Reviewing_Trends_in_identified_variables_Identifying_Risks_and_Providing_Guidance

Joyette, Antonio. (2015). The Management of Drought In St. Vincent and the Grenadines. https://www.academia.edu/31196414/The_Management_of_Drought_In_St_Vincent_and_the_Grenadines

Kairi Consulting. St. Vincent and the Grenadines. Country Poverty Assessment (CPA) 2007/2008. Living Conditions in a Caribbean Small Island Developing State (SIDS). Final Report. Kingstown. http://stats.gov.vc/stats/wp-content/uploads/2019/03/Country-Poverty-Assessment-Report-Volume-1-2007-to-2008.pdf

Kreft, Sonke, David Eckstein, Lukas Dorsch & Livia Fischer. November 2015. Briefing Paper: Global Climate Risk Index 2016. Who Suffers the Most from Extreme Weather Events. Weather-related Loss Events in 2014 and 1995 to 2014. Germanwatch. https://germanwatch.org/sites/germanwatch.org/files/publication/13503.pdf

Lyndon, J. and D. Firth (2005) 'Water, watersheds, forests and poverty reduction: a Caribbean perspective'. Paper originally presented at the Seventeenth Commonwealth Forestry Conference, Kuala Lumpur, 28th February – 5th March, 2005. The Caribbean Natural Resources Institute (CANARI), Laventille, Trinidad and Tobago and International Institute for Environment and Development, London, UK. https://pubs.iied.org/sites/default/files/pdfs/migrate/G00403.pdf

McIntosh, Sarah and Nicole Leotaud. 2007. Fair deals for watershed services in the Caribbean. Natural Resource Issues No. 8. International Institute for Environment and Development. London, UK. https://canari.org/wp-content/uploads/2015/04/Fair-deals-for-watershed-services-in-the-Caribbean.pdf

Murray, Reynold. Updated 2016. Environmental Management Framework for Regional Disaster Vulnerability Reduction Project (RDVRP). Ministry of Finance, Planning and Economic Development. Kingstown. https://www.gov.vc/images/pdf_documents/emf_feb_2016_redisclosure4_final3.pdf

National Emergency Management Office (NEMO). 2005. St. Vincent and the Grenadines National Disaster Plan. Kingstown. http://nemo.gov.vc/nemo/images/PoliciesActsAndBills/NationalDisasterPlan.pdf

Primary/Secondary School Listing. 2018. Ministry of Education. Government of St. Vincent and the Grenadines. Kingstown. https://www.svgcdu.org/primary-and-secondary

Protz, Maria. 2020. Detailed Rapid Community Climate Vulnerability Assessment (RCCVA) for the "Volcano Ready Communities in St. Vincent and the Grenadines (VRCinSVG)" Project. Community Disaster Risk Reduction Fund (CDRRF), Caribbean Development Bank (CDB). Barbados.

Pyle, D.M., Jenni Barclay, Maria Teresa Armijos. 2018. The 1902–3 eruptions of the Soufrière, St Vincent: Impacts, relief and response. Journal of Volcanology and Geothermal Research 356 (2018) 183–199. https://www.sciencedirect.com/science/article/pii/S0377027317306613

Robertson, Richard E.A. November 1994. An Assessment of the Risk from Future Eruptions of the Soufriere Volcano of St. Vincent. Natural Hazards 11: 163-191, 1995. Seismic Research Unit, University of the West Indies, St. Augustine, Trinidad. https://www.researchgate.net/publication/226148597_An_assessment_of_the_risk_from_future_eruptions_of_the_Soufriere_volcano_of_St_Vincent_West_Indies/link/5761e34d08ae5c6f86da81d4/download
Robertson, Richard. (2012). Land Degradation Assessment of St. Vincent, W.I.. 10.13140/RG.2.2.33175.27044. https://www.researchgate.net/publication/318693005_Land_Degradation_Assessment_of_St_Vincent_WI

Robertson, Richard. Proposal Document (ProDoc). Volcano Ready Communities in St. Vincent and the Grenadines. Seismic Research Centre, University of the West Indies, St. Augustine, Trinidad and Tobago.

Robertson, R.E.A. (2003). The Volcanic Geology of the Pre Soufrière rocks of St Vincent, West Indies. PhD, Department of Geography and Geology, University of the West Indies, Mona.Sam's Taxi Tours. https://samtaxitours.com/

St. Vincent and the Grenadines. April 2021. Encyclopaedia Britannica. https://www.britannica.com/place/Saint-Vincent-and-the-Grenadines/Government-and-society

St. Vincent and the Grenadines Educational Statistical Digest: 2018-2019. Prepared by the Planning and Research Units within the Ministry of Education, National Reconciliation and Information with assistance from the Examinations and Assessment Unit, Reprographic Unit, Human Resources Department the Education Media Unit and educational institutions.Kingstown. http://education.gov.vc/education/images/Stories/pdf/Education-Statistical-Digest-of-SVG-2018-19.pdf

Statistical Office. 2015. National Health and Nutrition Survey. Non-Communicable Disease Risk Factor Surveillance Report for St. Vincent and the Grenadines. Economic Planning and Sustainable Development Division Ministry of Finance, Economic Planning, Sustainable Development & Information Technology, Kingstown. http://stats.gov.vc/stats/wp-content/uploads/2018/10/2015-National-Health-and-Nutrition-Survey.pdf

Statistical Office. 2015. Overview of the Labour Market of St. Vincent and the Grenadines: A Gender Perspective. Economic Planning and Sustainable Development Division Ministry of Finance, Economic Planning, Sustainable Development & Information Technology, Kingstown. http://stats.gov.vc/stats/wp-content/uploads/2018/09/Overview-of-the-labour-Market-of-SVG.pdf

Statistical Office. Central Planning Division. Ministry of Finance, Planning and Economic Development. 2012. Population and Housing Census Report: 2012. Kingstown, St. Vincent and the Grenadine. http://stats.gov.vc/stats/wp-content/uploads/2018/11/Population-and-Housing-Census-Report-2012.pdf

Sword-Daniels, Victoria. STREVA Project – Strengthening Resilience in Volcanic Areas. University College, London. http://nemo.gov.vc/nemo/images/pdf/article_pdf/AshimpactsDRR.pdf

United Nations. April 2021. UN Global Funding Appeal. Explosive Eruption of Soufriere Volcano: St. Vincent and the Grenadines. United Nations – Barbados and the Eastern Caribbean. Bridgetown, Barbados.

Westen, C.J. and Sijmons, Koert. 2016. Saint Vincent and the Grenadines: Topographic map, Caribbean Handbook on Disaster Information Management project (CHARMIN). https://www.researchgate.net/publication/311311875_Saint_Vincent_and_the_Grenadines_Topographic_map/citation/download