

# **Impact of climate change on youth in small island communities: The case of St. Vincent and the Grenadines**

**Andrew Simmons**

School of Engineering and Sustainable Development  
De Montfort University

This thesis is submitted to De Montfort University in partial fulfilment of the requirements for the award of Doctor of Philosophy

July 2018

## **Acknowledgements**

On my journey toward completing this doctoral study, I received support from numerous persons. I would like to thank my supervisors, particularly Dr Subhes Bhattacharyya, without whom this study would not have materialised, and Dr Andrew Reeves, for their diligence in assisting with its completion. They are among the many people who have supported me at the Institute of Energy and Sustainable Development - an enjoyable and inspiring environment in which to work.

It has also been made possible by many people outside of De Montfort University, from the relatively small donations of time by participants in the research, specifically the youth of the JEMS Progressive Community Organisation in St. Vincent and the Grenadines who assisted with the conceptualizing the themes of the research and also participated as Peer Research Volunteers in the collection of data from youth involved in the Focus Group Discussions. I want to thank Bentley Brown, former Director of the OECS Mission in St Lucia for assisting with covering some of the costs in field in St. Vincent and the Grenadines. I also want to thank fellow students Molla and Justin for their continuous support and encouragement.

Lastly, but most importantly, I would like to thank my wife Anoria, daughters Andrena and Andree-Ann and son-in-law Gokhan for their practical help, encouragement and patience.

# TABLE OF CONTENTS

|  |               |
|--|---------------|
| <b>Chapter 1 - Introduction</b>  | <b>1</b>      |
| 1.1 Background   | 1             |
| 1.1.1 Impact of Climate Change on SIDS   | 2             |
| 1.1.2 The impact of Climate Change on Livelihoods                                    | 3             |
| 1.2 Building resilience and the adaptive capacity of youth in SIDS                   | 5             |
| 1.3 Pathway to alternative skills and knowledge development                          | 6             |
| 1.4 Top-down and bottom-up approaches to climate change adaptation                   | 7             |
| 1.4.1 Top-down approach  | 7             |
| 1.4.2 Bottom-up approaches   | 8             |
| 1.5 The case for the research  | 8             |
| 1.6 Research aim and objectives  | 8             |
| 1.6.1 Objectives   | 8             |
| 1.6.2 Research Questions   | 9             |
| 1.7 The contribution of the research to new knowledge                                | 9             |
| 1.8 Thesis structure   | 10            |
| <br><b>Chapter 2 – Literature Review</b>   | <br><b>15</b> |
| 2.1 Youth in SIDS  | 15            |
| 2.1.1 Causes of Youth vulnerability  | 18            |
| 2.1.2 Climate change scenarios and effects on youth                                  | 21            |
| 2.2 Climate change and possible manifestations                                       | 22            |
| 2.2.1 Coastal flooding and sea level rise  | 23            |
| 2.2.2 Natural resources and the environment  | 25            |
| 2.2.3 Hurricane and Storms   | 25            |
| 2.2.4 Impact of Climate Change   | 26            |
| 2.2.4.1 Impact of Climate Change on SIDS and challenges with obtaining viable data   | 27            |
| 2.2.4.2 Impact of Climate Change on livelihoods in SIDS                              | 28            |
| 2.2.4.2.1 Tourism  | 28            |
| 2.2.4.2.2 Agriculture  | 30            |
| 2.2.4.2.3 Fisheries  | 32            |
| 2.3 Climate Change Adaptation Theory   | 33            |
| 2.3.1 Climate change adaptation terminologies  | 35            |
| 2.3.2 Types of Climate Change adaptation approach: Top-down and bottom-up approaches | 37            |
| 2.3.2.1 Top-down approaches to Climate Change Adaptation                             | 37            |
| 2.3.2.2 Bottom-up approaches to Climate Change Adaptation                            | 38            |
| 2.3.3 Hybrid approach: Combining Top-down and Bottom-up approaches                   | 41            |
| 2.3.4 Human Capital Theory and Climate Change Adaptation for Youth in SIDS           | 42            |
| 2.3.4.1 Human Capital as a vehicle for Climate Change Adaptation                     | 43            |
| 2.3.5 Education and skills training for Climate Change Adaptation                    | 45            |
| 2.4 The case for the new Climate Change Adaptation Framework for youth in SIDS       | 49            |
| 2.4.1 The Sustainable Livelihoods Framework (DFID, 2000 in Angelsen, 2011).          | 58            |
| 2.4.2 ILO Framework  | 61            |
| 2.4.3 ODI framework  | 63            |
| 2.4.4 A conceptual framework for developing adaptation indicators                    | 66            |
| 2.4.5 Summary of Case for Framework  | 67            |
| 2.5 Chapter Summary  | 68            |

|   |            |
|---|------------|
| <b>Chapter 3 - Methodology</b>  | <b>70</b>  |
| 3.1 Section 1 - Conceptual Framework: Framework of analysis on the Adaptation of Youth to new Climate Conditions    | 71         |
| 3.1.1 Steps for the Operationalisation of the framework   | 73         |
| 3.1.1.1 Step 1: Climate Risk Vulnerability Context: Relevance of understanding the context                          | 73         |
| 3.1.1.2 Step 2: Socio-Economic and Physical Effects on SIDS   | 75         |
| 3.1.1.3 Step 3: Human Capital Adaptation  | 77         |
| 3.1.1.4 Step 4: Adjustment to Youth Development Policy Strategy   | 79         |
| 3.1.2 Linking Youth Development Outcomes to the broader conceptual framework  | 83         |
| 3.1.3 Summary of Section 1, Chapter 3   | 84         |
| Methods and approaches  | 85         |
| 3.2 Section 2 - Data Collection Methodology   | 87         |
| 3.2.1 Ethical Issues  | 89         |
| 3.2.2 Collecting data in the field - visits to St Vincent and the Grenadines  | 91         |
| 3.2.3 Data Analysis Procedures  | 94         |
| 3.2.4 Stages of Sampling Design   | 96         |
| 3.2.4.1 The sampling of Young people  | 96         |
| 3.2.4.2 The sampling of Policymakers and Senior Officials   | 97         |
| 3.2.4.3 Concerns with random sampling   | 97         |
| 3.2.5 Pre-testing of Research Instruments   | 98         |
| 3.2.6 Textual Analysis  | 99         |
| 3.2.7 Research instruments  | 99         |
| 3.2.7.1 Interview   | 99         |
| 3.2.7.2 Participatory Action Research Path and Mapping  | 100        |
| 3.2.7.2.1 Strengths and weaknesses of using the participatory methodology   | 101        |
| 3.2.7.3 Participatory Climate Risk and Vulnerability Mapping exercises  | 102        |
| 3.2.7.4 Case Study  | 103        |
| 3.2.7.5 Observation   | 104        |
| 3.2.7.6 Conducting the Study in the field   | 105        |
| 3.2.7.7 Reliability, Replicability and Validity   | 107        |
| 3.2.7.8 Limitations of the study  | 108        |
| 3.2.7.8.1 Time and Financial Limitations  | 109        |
| 3.2.7.8.2 Language  | 110        |
| 3.2.7.8.3 Cultural sensitivities  | 112        |
| 3.2.8 Summary of Section 2, Chapter 3   | 112        |
| 3.3 Overall summary of Chapter 3  | 113        |
| <b>Chapter 4 - Case Studies</b>   | <b>114</b> |
| 4.1 Section 1: the Geographic and Socio-Economic perspective of St. Vincent and the Grenadines                      | 114        |
| 4.1.1 Climate and natural resources   | 116        |
| 4.1.2 Population  | 118        |
| 4.1.3 Economic  | 120        |
| 4.1.3.1 Vulnerabilities in the Agriculture Sector   | 122        |
| 4.1.3.2 Vulnerabilities in the Fisheries Sector   | 123        |
| 4.1.3.3 Vulnerability to the Tourism Sector   | 125        |
| 4.1.3.4 Vulnerability of Coastal Zone   | 126        |
| 4.1.3.5 Vulnerability in the Water Resource sector  | 127        |
| 4.2 Section 2: The Historical heritage of dealing with calamities over time: Case of St. Vincent and the Grenadines | 127        |
| 4.2.1. Section 2 Summary  | 133        |
| 4.3 Section 3: Participatory Climate Risk and Vulnerability Mapping exercises                                       | 134        |

|  |            |
|--|------------|
| 4.3.1 Methodology  | 134        |
| 4.3.2 The strength of knowledge mapping  | 134        |
| 4.3.3 Analysis of GIS Maps on the impact of CC and Calamities evolved from mapping   | 139        |
| 4.3.4 Georgetown District, North Windward, St Vincent and the Grenadines   | 140        |
| 4.3.5 Flooding in the Marriagua (Mespo) District, located in the interior of the island  | 145        |
| 4.3.7 Climate change and other calamities impact on the island of Bequia   | 148        |
| 4.3.8 Climate change and other calamities impact on the South East of mainland St. Vincent   | 151        |
| 4.3.9 Reflection on the participatory mapping exercise   | 153        |
| 4.3.10 Critical lessons to be learned  | 156        |
| 4.3.11 Section 3 Summary   | 158        |
| 4.4 Summary of the Chapter   | 159        |
| <b>Chapter 5 - Analysis – Top-down approach</b>  | <b>161</b> |
| 5.1 Section 1: Process for the utilising thematic analysis tool to analyse data from FGD and Interview   | 161        |
| Step 1: Familiarisation with the data  | 164        |
| Step 2: Generating the initial codes   | 164        |
| Step 3: Searching for themes   | 164        |
| Step 4: Reviewing themes   | 167        |
| Step 5: Defining and naming the themes   | 167        |
| Step 6: Producing the report   | 173        |
| 5.1.1 Summary of the thematic analytical process   | 175        |
| 5.2 Section 2: Analysis of the Top-down approach of data from Interviews with Policymakers and Senior Officials and Bottom-up approach from FGD with Youth | 175        |
| 5.2.1 Climate Change   | 176        |
| 5.2.2 Human interference   | 178        |
| 5.2.3 Rise in temperature  | 181        |
| 5.2.4 Sea Level Rise   | 183        |
| 5.2.5 Storms and hurricanes  | 185        |
| 5.2.6 Changes in weather patterns  | 187        |
| 5.2.7 Invasive species and diseases  | 189        |
| 5.2.8 Community  | 192        |
| 5.2.8.1 Unsustainable Livelihoods  | 192        |
| 5.2.8.2 Low Community capacity   | 195        |
| 5.2.9 Youth Preparedness   | 199        |
| 5.2.9.1 Irrelevant Education   | 199        |
| 5.2.9.2 Lack of understanding of climate change concepts   | 203        |
| 5.2.10 Change Enablers   | 205        |
| 5.2.10.1 Change enabler - Youth empowerment  | 205        |
| 5.2.10.1.1 Capacity development  | 205        |
| 5.2.10.2 Technological innovation and creativity   | 208        |
| 5.2.10.3 Opportunity for Decision-making   | 210        |
| 5.2.11 Change enabler - Adaptation   | 212        |
| 5.2.11.1 Integration of Climate Change Education   | 212        |
| 5.2.11.2 New Climate change adaptation policy  | 216        |
| 5.2.11.3 Innovations in Sustainable livelihoods  | 218        |
| 5.3 Summary of Chapter   | 222        |
| <b>Chapter 6 – Case Studies on Top-down and Bottom-up Approaches</b>   | <b>223</b> |
| 6.1 Section 1: Case Study on the Top-down approach to establishing the Tobago Cays Marine Park (TCMP) Livelihoods Initiative                               | 223        |
| 6.1.1 The objective of the Case Study  | 224        |
| 6.1.2 Location and biological resources of the TCMP  | 224        |
| 6.1.2.1 Livelihoods activities in the Southern Grenadines  | 225        |
| 6.1.2.1.1 Tourism and recreation   | 225        |

|   |            |
|---|------------|
| 6.1.2.3 Diving and Snorkelling  | 226        |
| 6.1.2.4 Beach tourism   | 227        |
| 6.1.2.5 Fishing   | 227        |
| 6.1.2.6 The building of capacity on the ground  | 227        |
| 6.1.2.6.1 Fisherfolk Cooperatives   | 227        |
| 6.1.2.6.2 Yachting network  | 228        |
| 6.1.2.6.3 Diving operators group  | 228        |
| 6.1.2.6.4 Cruise Liners and operators network   | 228        |
| 6.1.2.6.5 Water Taxi Operators Association  | 229        |
| 6.1.2.7 Vendors Association   | 229        |
| 6.1.2.8 Reflection  | 230        |
| 6.1.2.9 Summary of the Case Study   | 235        |
| 6.1.3 Section 2: The case study on JEMS Bottom–Up approach to capacity building for youth to adapt to climate change. | 236        |
| 6.1.3.1 Introduction  | 236        |
| 6.1.3.2 The aim of the case study project   | 237        |
| 6.1.3.3 Capacity building training for youth leaders on CCA   | 237        |
| 6.1.3.3.1 The Capacity building workshops on CCA – Community level  | 237        |
| 6.1.3.3.2 The national capacity building training workshops   | 238        |
| 6.1.3.3.3 Strategies used for delivering the capacity building training   | 239        |
| 6.1.3.3.4 The effectiveness of the capacity building training   | 240        |
| 6.1.3.3.5 Issues arising from the training and strategies implemented to resolve them                                 | 240        |
| 6.1.3.4 The suitability of the workshop programme as a youth empowerment initiative                                   | 241        |
| 6.1.3.5 Community engagement in Climate Change Adaptation   | 243        |
| 6.1.3.5.1 The effectiveness of the community engagement   | 244        |
| 6.1.3.6 Outcomes of the project   | 245        |
| 6.1.3.7 Lesson learned  | 246        |
| 6.1.3.8 Reflection and summary of the case study  | 246        |
| 6.1.3.8.1 Strengths   | 247        |
| 6.1.3.8.2 Weaknesses  | 247        |
| 6.1.3.8.3 Threats   | 248        |
| 6.1.3.8.4 Opportunities   | 248        |
| 6.2 Summary of the Case Studies   | 249        |
| <b>Chapter 7 - Discusssion</b>  | <b>253</b> |
| 7.1. Question 1: How vulnerable are the youth to the impacts of climate change?                                       | 253        |
| 7.1.1 Socio-economic impact of Climate Change   | 255        |
| 7.1.2 Poverty reduction and well being  | 257        |
| 7.2 Question 2: How vulnerable are the youth to the impacts of climate change?  | 258        |
| 7.2.1 Education and training  | 259        |
| 7.2.2 Governance and decision-making process  | 261        |
| 7.3 Question 3: How can adaptation measures be delivered?   | 261        |
| 7.3.1 The Operationalisation of the Conceptual Framework on the Adaptation of Youth to new Climate Conditions         | 261        |
| 7.3.2 Short-term versus Long-term measures/approaches   | 264        |
| 7.3.2.1 Bottom-up and top-down approaches   | 265        |
| 7.3.2.2 Challenges of implementing the bottom-up approach   | 268        |
| 7.3.2.3 Top-down approach   | 268        |
| 7.4 Policy change enablers and action to enhance youth development and adaptation                                     | 271        |
| 7.4.1 Youth Empowerment   | 272        |
| 7.4.2 Sustainable Livelihoods   | 273        |
| 7.4.3 Technological innovation  | 274        |
| 7.4.4 Building community resilience   | 275        |
| 7.4.5 Adaptation Platform   | 276        |
| 7.4.5.1 Climate Change Education  | 276        |

|   |            |
|---|------------|
| 7.4.5.2 Climate Change Policy   | 277        |
| 7.4.5.3 The building of cooperation and partnership                                 | 277        |
| <b>Chapter 8 – The Conclusion of the Research</b>                                   | <b>278</b> |
| 8.1 The contribution of the research to new knowledge                               | 280        |
| 8.1.1 First research of its kind in SIDS  | 280        |
| 8.1.2 Building the capacity of youth  | 280        |
| 8.1.3 Theoretical contribution to knowledge   | 282        |
| 8.1.4 Methodological contribution   | 282        |
| 8.1.4.1 Participatory mapping and other methods                                     | 283        |
| 8.1.4.2 The contribution of the new framework to knowledge                          | 283        |
| 8.2. Limitations of the new Conceptual framework                                    | 284        |
| 8.3 Further research  | 285        |
| 8.4 Recommendations   | 287        |
| 8.4.1 Climate Change Education  | 289        |
| 8.4.2 Enhancing governance and decision making                                      | 291        |
| 8.5. The Conceptual Framework and the Adaptation of Youth to new Climate Conditions | 292        |
| <b>9. Bibliography</b>  | <b>294</b> |
| <b>10. Appendices</b>   | <b>317</b> |

## LIST OF FIGURES

|  |     |
|--|-----|
| <b>Figure 1:</b> Possible Top-Down Bottom-Up Integration (Desai and Hulme, 2004)   | 40  |
| <b>Figure 2:</b> Dynamics of Climate Change impact on human capital  | 44  |
| <b>Figure 3:</b> The Sustainable Livelihoods Framework (SLF)   | 58  |
| <b>Figure 4:</b> ODI Framework (Pereznieta <i>et al.</i> , 2011)   | 61  |
| <b>Figure 5:</b> Conceptual framework for adaptation indicators (Harley & Minnen, 2010)  | 63  |
| <b>Figure 6:</b> Methodological Framework  | 69  |
| <b>Figure 7:</b> Conceptual Framework  | 70  |
| <b>Figure 8:</b> Climate change stressors/pressures and possible effects (Step 1 of the framework)   | 71  |
| <b>Figure 9:</b> Socio-Economic and Physical effects of climate change on youth in SIDS  | 73  |
| <b>Figure 10:</b> Human Capital adaptation process   | 75  |
| <b>Figure 11:</b> Adjustment to youth development policies, processes and strategies   | 78  |
| <b>Figure 12:</b> Building adaptive capacity from a top-down and bottom-up approach - process base indicators (Harley and Minnen, 2010)  | 80  |
| <b>Figure 13:</b> Youth Development Outcomes to the broader conceptual framework   | 81  |
| <b>Figure 14:</b> Map of St. Vincent and the Grenadines  | 119 |
| <b>Figure 15:</b> Participants in Vermont identifying areas that are vulnerable to climate risk hazards and other calamities   | 135 |
| <b>Figure 16:</b> Climate risk hazards map produced by participants of the Vermont Community   | 136 |
| <b>Figure 17:</b> Figure showing map interpretation process  | 137 |
| <b>Figure 18:</b> GIS maps on risk map on Climate risk and vulnerability on Georgetown, North Windward area of mainland St. Vincent and the Grenadines   | 138 |
| <b>Figure 19:</b> GIS map of the volcanic risk hazard and vulnerabilities in the Georgetown area, North Windward, mainland St. Vincent and the Grenadines  | 140 |
| <b>Figure 20:</b> GIS map of the Flooding, Sea Level Rise and Tsunami vulnerabilities in the Georgetown area, North Windward, mainland St. Vincent and the Grenadines                                | 141 |
| <b>Figure 21:</b> Photo of the lower North Windward coast of Goss/Byrea showing the area where the entire community was evacuated and had to be relocated due to the impact of sea level rise on the | 142 |

coast (Photo from CARIBSAVE, 2012)

|   |     |
|---|-----|
| <b>Figure 22:</b> GIS map on flooding in the Marriacqua Valley, the mainland of St. Vincent and the Grenadines  | 142 |
| <b>Figure 23:</b> Photos of the destruction caused to roads and deposit of logs on beaches  | 143 |
| <b>Figure 24:</b> GIS map on Sea Level Rise and Tsunami in the Vermont valley area, mainland St. Vincent and the Grenadines   | 143 |
| <b>Figure 25:</b> GIS map on Climate risk and vulnerability on the island of Bequia, Grenadines of St. Vincent and the Grenadines   | 145 |
| <b>Figure 26:</b> GIS map on Landslide risk hazard on Stubbs District located on South East of mainland St. Vincent and the Grenadines  | 147 |
| <b>Figure 27:</b> View of Brighton Beach – sand mining of the sand dunes has left the entire area exposed to high tide/tidal waves, tsunami, storms and hurricanes and other impacts of climate change (Mol & Boomert, 2011)    | 149 |
| <b>Figure 28:</b> Photo showing past and predicted future coastline at Brighton Beach: blue area = erosion 1972-2008; green line = coastline in 20 years; red line = coastline in 50 years (Taylor 2010 in Mol & Boomert, 2011) | 149 |
| <b>Figure 29:</b> The process of data analysis  | 159 |
| <b>Figure 30:</b> NVIVO Cloud Interview visualisation of Word Frequency in interview texts with Policymakers and Senior Officials   | 162 |
| <b>Figure 31:</b> NVIVO Cloud Focus Group Discussions, with youth, visualisation of Word Frequency  | 162 |
| <b>Figure 32:</b> Themes evolving from the thematic analysis of data from Interviews and Focus Group Discussions  | 163 |
| <b>Figure 33:</b> Showing codes, sub-themes and themes for research on the impact of climate change on youth in SIDS  | 171 |
| <b>Figure 34:</b> Indicates the climate change stressors impacting on young people in small island communities  | 175 |
| <b>Figure 35:</b> The Location of the Tobago Cays in the southern waters of St. Vincent and the Grenadines (Espeut, 2006 in Doyle 2011)   | 221 |
| <b>Figure 36:</b> Yachts anchored in the Tobago Cays Lagoon   | 222 |
| <b>Figure 37:</b> Photo of Water Taxi   | 225 |
| <b>Figure 38:</b> Revised Conceptual Framework on the Adaptation of Youth to new Climate Conditions   | 259 |
| <b>Figure 39:</b> Strategic change for building sustainable communities   | 266 |

## LIST OF TABLES

|  |     |
|--|-----|
| <b>Table 1:</b> Thesis Organisation  | 10  |
| <b>Table 2:</b> Listing the sources of vulnerability of the Youth (Hazell, 2010 Perezniето <i>et al.</i> , 2011)                   | 19  |
| <b>Table 3:</b> Showing the impact of Climate Change Drivers, areas of Risks and Potential Adaptation in SIDS (IPCC, 2014)         | 33  |
| <b>Table 4:</b> Gaps in the literature on the impact of Climate Change on Youth in Small Island Communities                        | 48  |
| <b>Table 5:</b> Gap Analysis in the literature on the impact of Climate Change on Youth in SIDS                                    | 51  |
| <b>Table 6:</b> The relationship between Research Objectives and Questions   | 68  |
| <b>Table 7:</b> Chronology of the impact of Climate Change and other calamities in St. Vincent and the Grenadines                  | 126 |
| <b>Table 8:</b> The Coding Process of Qualitative Study on the impact of Climate Change on Youth in SIDS                           | 167 |
| <b>Table 9:</b> Community Types and Economic Linkages  | 196 |
| <b>Table 10:</b> SWOT Analysis of the Tobago Cays Marine Park (TCMP)   | 228 |
| <b>Table 11:</b> Issues arising from the Training and Strategies Implemented to resolve them                                       | 238 |
| <b>Table 12:</b> Presents an Analysis of Outcomes of the Top-Down Conventional Training and Bottom-Up Capacity Building Initiative | 239 |
| <b>Table 13:</b> Summary of Outcomes in Case Studies   | 247 |
| <b>Table 14:</b> Showing research questions, findings and recommendations  | 283 |



## LIST OF APPENDICES

|  |     |
|--|-----|
| <b>Appendix I:</b> Analysis of the TCMP by utilising the Cultural web (Top down approach)  | 312 |
| <b>Appendix II:</b> Questions used during the Focus Group discussion with Youth  | 316 |
| <b>Appendix III:</b> Questions used during interviews with Policymakers and Senior Officials   | 321 |
| <b>Appendix IV:</b> Colleges, TVET Centre and Groups participating in the Focus Group Discussion (FGD)   | 323 |
| <b>Appendix V:</b> Code for Policymakers and Senior Officials participating in the Interview   | 325 |
| <b>Appendix VI:</b> Strengths Weaknesses Opportunities and Threats on JEMS capacity building for youth to adapt to Climate Change                                      | 327 |
| <b>Appendix VII:</b> Gap Analysis: Climate change vulnerability codes and youth development merged: Analysis of Climate Change NVivo codes and youth development theme | 329 |
| <b>Appendix VIII:</b> Reflection on positionality, which highlights the choices made by the researcher at different stages of the research process.                    | 342 |

## ABBREVIATIONS

|                    |   |
|--------------------|---|
| <b>CARICOM</b>     | Caribbean Community   |
| <b>CBA</b>         | Community Based Adaptation  |
| <b>CBO</b>         | Community Based Organisations   |
| <b>CCA</b>         | Climate Change Adaptation   |
| <b>CCCCC (5Cs)</b> | Caribbean Community Centre for Climate Change                         |
| <b>CITES</b>       | Convention on the Trade in Endangered Species of Wild Fauna and Flora |
| <b>CYEN</b>        | Caribbean Youth Environment Network                                   |
| <b>DfID</b>        | Department for International Development                              |
| <b>EC</b>          | European Commission   |
| <b>EDS</b>         | Education for Sustainable Development                                 |
| <b>FGD</b>         | Focus Group Discussions   |
| <b>GCF</b>         | Green Climate Fund  |
| <b>GEF</b>         | Global Environment Facility   |
| <b>GEP</b>         | Goldman Environmental Prize   |
| <b>GDP</b>         | Gross Domestic Product  |
| <b>GIS</b>         | Graphic Information System  |
| <b>HC</b>          | Human Capital   |

|                |   |
|----------------|---|
| <b>ILO</b>     | International Labour Organisation   |
| <b>IPCC</b>    | Inter-Governmental Panel on Climate Change                                |
| <b>JEF</b>     | Jewish Community Federation   |
| <b>JEMS</b>    | Junction, Enhams, McCarthy and Surrounding villages                       |
| <b>M&amp;E</b> | Monitoring and Evaluation   |
| <b>NEMO</b>    | National Emergency Management Organisation                                |
| <b>NGO</b>     | Non-Governmental Organisation   |
| <b>OAS</b>     | Organisation of American States   |
| <b>OEDC</b>    | Organisation for Economic Development Cooperation                         |
| <b>OECS</b>    | Organisation of Eastern Caribbean States                                  |
| <b>OPAAL</b>   | Protected Areas Management and Associated Alternative and New Livelihoods |
| <b>PAR</b>     | Participatory Action Approach   |
| <b>PLA</b>     | Participatory Learning Approach   |
| <b>SIDS</b>    | Small Island Developing States  |
| <b>SVG</b>     | St. Vincent and the Grenadines  |
| <b>SLF</b>     | Sustainable Livelihoods Framework   |
| <b>SLR</b>     | Sea Level Rise  |
| <b>STEM</b>    | Science Technology Engineering and Mathematics                            |
| <b>TCMP</b>    | Tobago Cays Marine Park   |
| <b>TVET</b>    | Technical and Vocational Education and Training                           |
| <b>UN</b>      | United Nations  |
| <b>UNEP</b>    | United Nations Environment Programme                                      |
| <b>UNICEF</b>  | United Nations Children’s Fund  |
| <b>UNECLAC</b> | United Nations Economic Commission for Latin America and the Caribbean    |
| <b>UNESCO</b>  | United Nations Educational, Scientific and Cultural Organisation          |
| <b>UNDP</b>    | United Nations Development Programme                                      |
| <b>UNFCC</b>   | United Nations Framework Convention on Climate Change                     |
| <b>UNWTO</b>   | United Nations World Tourism Organisation                                 |
| <b>USAID</b>   | United States Agency for International Development                        |

## DEFINITION OF TERMS

**Adaptive Capacity** - the ability of a system to adjust to climate change, including climate variability and/or extremes to moderate potential damages or cope with consequences and to take advantage of the opportunities climate change may bring and/or cope with the consequences (IPCC, 2007).

**Bottom-up approach to CCA** - focuses mainly on the concept of vulnerability. The approach assumes that if one can address actual vulnerability today, one inevitably reduces future (expected) vulnerability (Burton *et al.* 2002). Bottom-up approach develops a process and procedures for implementation of the approach by identifying the network of actors and stakeholders who are involved in the delivery of services at the local area level by focusing on their goals, strategies, activities and contacts (Hanf, Hjem and Porter, 1978, Stochowiak *et al.*, 2016).

**Climate Change** - a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over a comparable time period (UNFCCC, 2012 in IPCC p.5).

**Climate Change Adaptation** - refers to human actions to build resilience and reduce vulnerability to the existing impact of climate change, which is closely aligned with the concept of disaster risk reduction (UNESCO, 2015)

**Climate Change Education for Sustainable Development (CCESD)** - focuses on “preparing people for all walk of life to plan for, cope with and find solutions for issues that threaten the sustainability of our planet,” (UNESCO, 2014:16).

**Empowerment** - creating and supporting the enabling conditions under which young people can act on their own behalf, and on their own terms, rather than at the direction of others (Commonwealth Secretariat, 2007)

**Exposure** - the presence of people, livelihoods, species or ecosystems, environmental functions, services, infrastructure or economies, social or cultural assets in place and settings that could be adversely affected (IPCC, 2001, IPCC, 2014).

**Green Growth** - “Growth that is efficient in its use of natural resources, clean in that it minimizes pollution and environmental impacts, and resilient in that it accounts for natural hazards and the role of environmental management and natural capital in preventing physical disasters...this growth needs to be inclusive,” (World Bank:2).

**Hybrid approach to adaptation** - combines the micro-level variables of bottom-up and the macro-level variables of the top-down approaches in the development and implementation of climate adaptation projects in order to benefit from the advantages and strengths of both approaches by enabling the various levels of stakeholders to interact and influence project outcomes (Matland 1995; OECD, 2013). Combining both approaches highlight their strengths and minimises their weaknesses.

**Human capital** - the skills, knowledge and ability to labour and good health that together enable people to pursue different livelihoods strategies and achieve their livelihoods objectives (Angelsen *et al.*, 2011).

**Human Capital Models** - presume that an investment in education is made with the expectancy of positive returns to the individual or state on their investment.

**Human Capital Theory** - the theoretical framework responsible for the adaptation of education and development policies (Olaniyan & Okemakinde, 2008).

**Life learning approach** - emphasises the need for policymakers, education and training institutions to link training and skills provided with market needs as an initial strategy to prepare youth to make full use of opportunities that would be created by climate change in the future (UNDP, 2015).

**Livelihood** - comprises the capabilities, assets, and activities required for a means of living (Chambers & Conway, 1988).

**Resilience** - the ability of human or ecological systems to cope with and adapt to changes in the environment. (Marshall *et al.*, 2009 pg.5).

**Sample** - the subgroup of a target population actually studied, i.e. the group from which data are collected (Angelsen *et al.*, 2011).

**Sensitivity** - the degree to which a system is affected by or is responsive to climate inducements (Lomos, 2001), i.e. it is also referred to as the degree to which a structure or organism is affected, either unfavourably or beneficially, by climate-related impacts (Lomos, 2001).

**Shocks** - destructive events that occur unexpectedly and last for a very short period of time such as tsunamis, earthquakes, storms, volcanic eruptions, landslides, avalanches and wildfires. (Calgaro *et al.*, 2014).

**Small Island Developing States (SIDS)** – recognised as a distinct, diverse group of developing countries encountering specific social, economic and environmental vulnerabilities at the United Nations Conference on Environment and Development (UNCED in Rio in 1992), also known as the Earth Summit, held in Rio de Janeiro, Brazil (3-14 June 1992).. <http://unohrrls.org/about-sids/>

**Stressors** - events that happen at a slow speed with their impacts being felt for longer periods of time (Calgaro, 2011; Calgaro *et al.*, 2014).

**Sustainable development** - “development that meets the needs of the present without compromising the ability of future generations to meet their needs,” (United Nations, 1987 in UNESCO, 2014:20).

**Sustainable Livelihoods** - A livelihood is sustainable when it can cope with and recover from the stresses and shocks, and maintain or enhance its capabilities and assets both now and in the future without undermining the natural resource base (Chambers & Conway, 1992).

**SWOT analysis** – an analytical tool that identifies the internal strengths and weaknesses, as well as its external opportunities and threats of an organisation or project.

**Target population** - the group being studied, i.e. the group about which one wishes to draw data conclusion (Angelsen *et al.*, 2011).

**Top-down approach to adaptation** - described as a planned coordination of intention and action to achieve CCA outcomes imposed by the central authority such as the government (Matland 1995; OECD, 2013). Top-down CCA is more applicable to government agencies.

**Vulnerability** – defined as the degree to which geophysical, biological and socio-economic systems are susceptible to, and unable to cope with, adverse impacts of climate change (IPCC, 2007; Nurse *et al.*, 2014) i.e. it is the degree to which a system is susceptible to injury, damage or harm (Olmos, 2001).

**Youth empowerment** - Youth are empowered when they acknowledged that they have or can create choices in life are aware of the implications of those choices, make informed decisions freely, take action based on that decision and accept responsibility for the consequences of those actions (Commonwealth Secretariat, 2007)

**Youth** is defined by UN as a cohort of persons from 15 to 24 years of age whereas in the Commonwealth, youth is defined as the category of persons aged 15 to 29 years (Simmons, 2006). Qualitatively, youth is defined as a phase when a person moves from a time of dependency (childhood) to independence (adulthood) (World Bank, 2007).

## **ABSTRACT**

Building the resilience of youth to adapt to the impact of climate change is a significant development challenge faced by policymakers in Small Island Developing States (SIDS). Climate Change is already impacting negatively on youth and their communities, their enterprises and their overall wellbeing, especially in locations exposed to seasonally intense climatic events. Little progress has been made in the last two decades on how to systemically reduce vulnerability in the broader context of human and environmental systems. Minimal understanding is known on the youth perspective of climate change. This knowledge gap denies policymakers and practitioners effective climate change education and adaptation strategy implementations in preparation for youth resilience against the impacts of future climate changes.

The research explores the knowledge deficit between that which is known and that which is necessary for young people to enhance local resilience to climate change. Primary data was collected through interviews with sixteen policymakers, focus group discussions with eleven youth-related organisations, participatory mapping and case studies. Theories around youth development, education and training for climate adaptation in SIDS were reviewed and implemented in the development of a framework assessing the vulnerability of youths living in small island communities. The research explores the strategic effectiveness of actions within the context of top-down vs bottom-up approaches. The framework provides policymakers with a toolkit to enhance youth resilience capacity in SIDS to create sustainable livelihoods in SID communities.

The study confirms notions that youth have been neglected in climate change schemes, having inadequate knowledge and skills to adapt to climate changes affecting them. Findings support the added value of the bottom-up approach compared to the use of the top-down method within the framework to improve youth practicality and awareness. Added value can be gained when using a hybrid top-down and bottom-up approach (refer to the definition of terms on pg. xi-xiii). Findings also highlight key change enablers such as technological innovation, financial and technical resource support, key officials' engagement, conducive policy/organisational environment and regional collaborations for youth empowerment in adapting to climate change in SIDS. The outcomes of the research discussed with key stakeholders in St. Vincent and the Grenadines found the framework

applicable for Climate Change Adaptation (CCA) on the island. Therefore, based on the similarities of SIDS, this may encourage the application of the framework in other SIDS contexts and environments.

Overall, the findings fill a gap in the literature on youth and CCA in SIDS. The framework would encourage further research potential in impact assessment and adaptation areas.

# Chapter 1

## Introduction

### 1.1 Background

Climate Change is emerging as a significant global issue; this phenomenon will be around for years to come, regardless of the levels of progress achieved internationally to reduce greenhouse gas emissions. It has the potential to produce substantial impact across temporal and spatial scales (Nurse *et al.*, 2014; IPCC, 2014; Clemencon, 2016) with significant adverse consequences on local economies and livelihoods, particularly in small island developing states – SIDS (Mills, 2005; Land *et al.*, 2013). The increase in the future severity of climate change, suggested by the Intergovernmental Panel on Climate Change (IPCC) (UNFCCC, 2011; Bueno *et al.*, 2008), is likely to make SIDs more vulnerable. Considering that youth<sup>1</sup> constitute more than 50% of the population of the Commonwealth Caribbean; they are described as the most vulnerable population sector to climate change and other calamities in SIDS (Pereznieto *et al.*, 2011). As the youth are vital in ensuring a sustainable future, to ignore such a large segment of the population does not constitute economic, social or political sense (Charles, 2006).

The warming of the climate system due to the observed increases in the anthropogenic greenhouse gases concentration as a consequence of human actions and the build-up of greenhouse gases is transforming the global environment (Beniston, 2010). Although Small Island Developing States (SIDS) are responsible for producing less than one percent of global greenhouse gas emissions (Nurse, 2014; IPCC, 2007, 2014; Hernandez-Delgado, 2015), changing climate is likely to affect them significantly.

---

<sup>1</sup> Youth are defined by the United Nations (2005) as the segment of the population aged between 15-24 years of age, however, the majority of countries in the Caribbean follow the Commonwealth definition of youth as that category of the population 15-29 years of age (Carter, 2008).



Sea level rise (SLR) is projected to occur throughout the 21<sup>st</sup> Century and beyond and represents a severe and chronic issue to the sustainable development of coastal zones in the Caribbean SIDS (Simpson *et al.*, 2010; IPCC, 2014). Other problems associated with Climate Change include increase in vulnerability relating to increase in more furious storms (Byrne & Innis, 2002; Nurse *et al.*, 2014), changes in precipitation resulting in making these islands much dryer and destruction of flora and fauna - the biodiversity of most nations (Lane *et al.*, 2013; United Nations, 2014). Most small islands already suffer from limited water catchment areas and contamination of groundwater lens, therefore, further changes in precipitation possess the potential to increase the scarcity in the water supply (Royle, 2001; IPCC, 2014). Ocean acidification and sea temperature rise is already triggering coral bleaching in islands. This problem is also causing significant difficulties for marine flora and fauna as well as the erosion of coastlines and the coral-line building up process on the fringes of islands (Tompkins, 2007; Walker & Billingham, 2011; Hernandez-Delgado, 2015).

#### **1.1.1 Impact of Climate Change on SIDS**

SIDS, due to their location, are extremely prone to climate change impacts. For example, these islands are low-lying population centres with most of their central infrastructure located less than 5 metres above sea level making them severely vulnerable to SLR, hurricanes and other forms of climate change impact (Simpson *et al.*, 2010; Chatenoux & Wolf, 2013). SLR of 1m can displace over 2 million people across the Caribbean region as well as severely affect the tourism infrastructure and other forms of livelihoods. SIDS possess structural complications regarding smallness, high vulnerability, limited economic performance as well as limited financial and human resources and capacity (Sem, 2007; Nurse *et al.*, 2010; Lazrus, 2012). Consequently, climate change will affect the population, specifically the youth and destroy its ecosystem, infrastructure and livelihoods. This would impede the ability of youth in SIDS to achieve their development goals by mid-century and will become a security risk that would steadily intensify under greater warming scenarios (Simpson *et al.*, 2010).

Climate change is already threatening health systems, local economies and livelihoods (Gomez, 2013; Hernandez-Delgado, 2015). SLR and storm surges continue to destroy coastal communities and ecosystems resulting in reducing the attractiveness of these

islands by destroying beaches, infrastructures, tourism and communication facilities (Chatenoux & Wolf, 2013). It is estimated that 301km of new or improved coastal defence is needed to structurally protect the Caribbean cities from SLR in the 21<sup>st</sup> century. The cost of constructing such infrastructure is estimated between US\$1.2 and US\$4.4 billion, and annual maintenance is estimated at US\$111 to US\$128 million (Simpson *et al.*, 2010). Similarly, increases in the frequency and intensity of hurricanes (Nurse *et al.*, 2014; IPCC, 2014) have become a reality. In September 2017, the Caribbean region was struck by two category five hurricanes - Hurricane Irma and Hurricane Maria. These hurricanes were responsible for unpacking winds of up to 165-185 miles per hour. Hurricane Irma was classified as the most powerful and costly hurricane to strike the region, costing approximately US\$13 billion in damages (Economist, 2017; Fieser, 2017).

It is predicted in the future that the Caribbean will experience strengthening in the intensity of extreme weather events, a rise in sea surface temperatures and SLR, which are anticipated to have adverse effects on marine and freshwater biological systems, including coral reefs (IPCC, 2008). Coral reefs are susceptible to temperature changes, enduring slight increases in temperature by becoming pale or lead to coral bleaching (Hoegh-Guldberg *et al.*, 2007 in Schleussner *et al.*, 2016). Therefore, the temperature rise of 1-2 degrees C over a three-week period during the summer can lead to severe coral bleaching. Sustaining of livelihoods in the tourism and fisheries sectors is directly linked to the maintenance of healthy coral reefs. This begs the case for the development of measures to enhance the institutional capacity of SIDS to adapt to and mitigate the impact of climate change in the 21<sup>st</sup> century and beyond.

### **1.1.2 The impact of Climate Change on Livelihoods**

A large proportion of youth in Small Island Developing States depend on agriculture, tourism and fisheries as their main livelihoods (Simpson, 2010; Charenoux & Wolf, 2013; Nurse, 2014). For example, the tourism industry accounts for over 2 million jobs in the region, of which a sizable proportion are youths. Islands such as Bonaire, Antigua and Barbuda, the Bahamas and Barbados are very dependent on tourism as their primary economic activity. However, the industry is very vulnerable to the impact of climate change, which can severely affect the natural resources base of these islands. These

natural resources are the main factors for attracting tourist to these shores (Scott, Jones, & Konopek, 2007; Simpson *et al.*, 2008).

Similarly, loss of coral reef habitat is having detrimental implications for coastal fisheries (Pratchette *et al.*, 2009) where reef based subsistence and tourism activities are essential to the economic development and wellbeing of small island states (Hernandez-Delgado, 2015, Nurse *et al.*, 2014). This situation is compounded by evidence that fish stocks are declining as a result of degradation of coral reefs (Jones *et al.*, 2004). Changes in migration patterns and depth of fish stocks are two of the main factors affecting the distribution and availability of fish in small island states. It is expected that climate change may cause a migration shift in the future aggregation to other areas (Sem, 2007).

Moreover, decreases in precipitation, increases in drought and invasive species have severe implications for sustainable agriculture production and food security in SIDS (IPCC, 2014, Nurse, 2014). Although actual figures on the impact of recent storms on youth are unavailable, based on the high ratio of youth to the rest of the population, one can deduce that a sizable proportion of young people either were displaced or have lost their possessions and properties by these storms.

The impact of climate change represents a fundamental challenge for regional food security and sustainable livelihoods (Poschen, 2015; UNDP, 2015) and possesses the capacity to trigger new poverty traps for several countries in the region. There is a need for further research into strategies to enhance the knowledge and skills of youths to create new models to enhance their adaptive capacity to develop sustainable livelihoods in a changing climatic environment. This need for urgent action is reflected in copious reports and communiqués produced by numerous governments, regional and global organisations (Nurse, 2014; Government of St Vincent and the Grenadines, 2015; UN, 2017). However, these actions are severely hampered by the limited availability and access to resources and inadequate recognition on the part of the government for the use of participatory approaches to adaptation in the region. There is also evidence of a lack of political will on the part of leaders in the region to implement appropriate policies and programmes to adapt and mitigate climate change challenges (Economist, 2017).

## ***1.2 Building resilience and the adaptive capacity of youth in SIDS***

The youth of today will face the impact of climate change as it unfolds. Therefore, the research would provide the opportunity to investigate whether building the resilience of youth would require further development and investment in training and capacity building to prepare them to meet these future changes. In the next 20 to 30 years these young people will be economically active; therefore it is imperative to investigate whether their future livelihoods and wellbeing would be impacted by the incidence of climate change and proposed adaptation strategies to reduce such impact. The research will also examine whether the achievement of sustainability in the region will depend on the level of investment governments are injecting in youth development opportunities, be it in areas of education, training and employment, and the level of preparedness of youth to adapt to the impact of climate change.

For adaptation to be effective in reducing vulnerability, a thorough understanding of the vulnerability of youth and small island communities to the impact of climate change including the contextual factors that are causing the vulnerability in the SIDS is essential (Adger, 2003; Adger *et al.*, 2005, Sem, 2007), and the appropriate actions to be taken must involve youth in addressing the vulnerability. A key part of the research will focus on the unique challenges faced by youth which are derived from their limited access to resources, education (knowledge), training (skills), employment (livelihoods) and broader economic opportunities (Blum, 2007), and devise adaptive measures within the areas to build the resilience of youth to adapt to climate change.

There is a mismatch existing between current education and training and the job market in the Caribbean (Carter, 2008). The mismatch in education is highlighted in a study by the World Bank on 'Quality Education counts for skills and growth' which states that despite spending nearly 11 years in education, school leavers within the Caribbean often struggle to find formal employment (World Bank, 2013). The education and training provided do not equip young people to meet future needs. The negative impacts of climate change on livelihoods (ILO, 2010; Hernandez-Delgado, 2015; Poschen, 2015;

UNDP, 2015) have emphasised the need for policymakers and education and training institutions to link training and skills with the market needs as an initial strategy to prepare youth to make full use of opportunities that would be created by climate change in the future (UNDP, 2015). Climate change education can be viewed as a viable alternative to build resilience among youth to adapt to climate change. Climate Change Education for Sustainable Development (CCESD) was created by the United Nations Education and Scientific Organisation. It prepares people to plan for, cope with and find solutions for issues that threaten their sustainability (UNESCO, 2014).

The CCESD empowers people to make informed decisions for economic viability and a just society for present and future generation while respecting cultural diversity. While youth recognised the importance of emphasising CCESD as an important development model, they view it as education for future sustainable living, i.e. as a mechanism, which would enable them to develop appropriate skills and knowledge to build resilience to reduce the impact of climate change on their communities and to create sustainable livelihoods. Climate change is a new phenomenon in Caribbean SIDS and although there is literature on general adaptation skills, what is urgently needed is the development of a new framework to research the creation of skills and knowledge concerning the specific livelihood context of youth in the Caribbean. This research will fill this skills and knowledge gap that currently exists in the region.

### ***1.3 Pathway to alternative skills and knowledge development***

Research shows that Climate Change will bring about severe changes to existing enterprise and the economic sectors across the globe, i.e. many jobs and livelihoods that are currently available today would not be in existence in the future (ILO, 2013; Paschen, 2015; UNDP, 2015). However, those jobs that are established in the future would change tremendously and would require new knowledge and skills to carry them out efficiently (Paschen, 2015; UNDP, 2015). Carter (2008) highlights a mismatch between the skills and knowledge that is being provided by education and training in the Eastern Caribbean and those that are required by the workplace in the islands (Chapter 2). Therefore, the fundamental question to be asked is how will the pathway to alternative

skills and knowledge development be achieved to ensure youth are prepared for the changing market and livelihood needs that will be brought about by climate change? While governments have adopted a top-down approach to deal with climate change adaptation, there is evidence that bottom-up approaches are also being used at the local level. The top-down approaches are mainly government led, planned, national in focus and much slower in implementation. The bottom-up approach, on the other hand, harnesses local and traditional knowledge, linked with youth development and community-based adaptation activism. There is urgency for the region to move towards the development of appropriate knowledge and skills to enable youth to adapt to climate change through the development of sustainable livelihoods to meet the changing environment.

#### ***1.4 Top-down and bottom-up approaches to climate change adaptation***

There is evidence of both top-down and bottom-up approaches to development and implementation of climate change adaptation actions in St Vincent and the Grenadines including Green Infrastructure (Gill *et al.*, 2007), Flood Risk management (Garrelts & Long, 2011) and Spatial planning (Hurlimann & March, 2012). Policymakers and Senior Officials of the Government of St Vincent and the Grenadines are engaged in a series of top-down activities and practices such as Risk Management (Hunt & Watkiss, 2011) and development of resilience and vulnerability based plans (Parks *et al.*, 2012).

##### ***1.4.1 Top-down approach***

The government of St Vincent and the Grenadines utilised top-down approaches to implement climate change adaptation programmes. Top-down adaptation is defined as the end point of a sequence of analyses beginning with projections of future emission trends, moving on to the development of climate scenarios, and thence to biophysical impact studies and the identification of adaptive options to address the climate change challenge (Kelly & Adger, 2000). The top-down approaches are mainly government led, planned, national in focus and much slower in implementation. Top-down environmental activities started in 1791, which resulted in the creation of the first

environmental law in St Vincent and the Grenadines, i.e. law to create the Kings Hill Forest Reserve enacted in 1791 (Grove, 2000).

#### ***1.4.2 Bottom-up approaches***

St Vincent and the Grenadines (and most SIDS) have a rich history of utilising bottom-up approaches to address climate change adaptation and community development challenges. The island possesses a rich body of practices, which harness local and traditional knowledge, linked with youth development and community-based adaptation activism. The research will highlight climate change and environmental projects implemented at community and national levels by youth and community organisations.

### ***1.5 The case for the research***

Although young people in small island developing states are facing significant challenges in relation to the impact of climate change, the issue has not received adequate attention from mainstream researchers and practitioners. This has left youth and their communities less protected or underprepared to deal with the consequences and implications of climate change. In addition, the knowledge and skills required by youth for building resilience to adapt to the impact of climate change have remained less explored.

### ***1.6 Research aim and objectives***

The aim of the thesis is to explore the knowledge deficit between that which is known and that which is necessary for young people to enhance local resilience to climate change.

#### ***1.6.1 Objectives***

- Assess the vulnerability of youth in Small Island States such as St Vincent and the Grenadines to the impact of climate change.

- Characterise the relevant skills and knowledge required by youth in education and training to develop sustainable livelihoods and build the resilience to adapt to the impact of climate change in SIDS for the next decades.
- Review evidence of stakeholders' views on the effective top-down and bottom-up approaches, education and governance strategies to enhance climate change adaptation in communities in SIDS.
- Explore mechanisms for improving the delivery of climate change adaptation actions/measures needed to build the resilience of youth and their communities to adapt to climate change in the future.
- Development of a conceptual framework for managing the coordination of research on the impact of climate change on youth.

### ***1.6.2 Research Questions***

The questions are as follows:

- How vulnerable are the youth to the impacts of climate change?
- How can these impacts be mitigated and the resilience of the youth be built?
- How can adaptation measures be delivered?

## ***1.7 The contribution of the research to new knowledge***

The education and training provided by Caribbean Island States such as St. Vincent and the Grenadines do not prepare youth to meet the current and future development needs of the region, neither do they prepare them to deal with the impact of climate change. The key to fill this gap in knowledge and skills on climate change is to ensure strong interaction between the world of work and the world of education and training. It is important for youth to acquire adequate skills and knowledge that would equip them to build their resilience to adapt to the impact of climate change. Therefore, this research would make a substantial contribution to the field of climate change adaptation and youth development, particularly where climate change is recognised as a leading development challenge.



The case presented underlies the need for the provision of adequate knowledge and skills to prepare youth to address their vulnerability, resilience and adaptation to climate change from a top down and bottom up perspective/approach. The research offers a set of strategies for enhancing the knowledge and skills of youth, the mechanism for the delivery of such strategy and a conceptual framework for studying and managing the impacts of climate change on youth in small island communities.

Consequently, developing this framework will also make a substantial contribution to strengthen the capacity and capability in SIDS to deal with climate change impact on small island communities.

The study is situated within the framework of sustainable capital theory focusing specifically on human capital theory (ILO, 2010; UNDP, 2015). It is framed within the context of enhancing human capital of youth through skills, knowledge and livelihoods needs as a mechanism for building their resilience to adapt to climate change in the future. Therefore, studies in the future should focus on quantifying the probability, speed, scale or distribution of future climate risks. Overall, the researcher hopes to make a significant contribution to the body of knowledge in the field of Climate Change Education and Sustainable Livelihoods Development, particularly in the areas of Youth Adaptation to the Impact of Climate Change.

## **1.8 Thesis structure**

The organisation of this thesis is presented in Table 1. The table provides a summary of the key issues to be addressed in each chapter.

**Table 1: Thesis Organisation**

| Chapter          | Title                 | Key Topics   |
|------------------|-----------------------|--|
| <b>Chapter 1</b> | Introduction          | This chapter introduces the thesis based on a brief literature review on climate change. It highlights the problem associated with the impact of climate change on SIDS and livelihoods. The aim, objectives and research questions of the thesis are highlighted.   |
| <b>Chapter 2</b> | The Literature Review | Chapter two provides a review of the literature. It positions the thesis on what is already known about the impact of climate change on small island developing states (SIDS). Further, the chapter provides a review of Climate Change Adaptation (CCA) theory and Top-down approaches to CCA and practices. It highlights Bottom-up approaches to CCA focusing specifically on a review of Community-Based Adaptation approaches and practices. Importantly, the chapter introduces the terminologies such as shocks and stressors, exposure, sensitivity and adaptive capacity used in climate change studies. It explores the theory of human capital in relation to the |

|                         |   |  |
|-------------------------|---|--|
|                         |   | <p>application of human capital theory to address the skills, knowledge and livelihoods needs of youth to build the capacity and resilience in SIDS to adapt to the impact of climate change</p>   |
| <p><b>Chapter 3</b></p> | <p>Conceptual framework and methodologies for researching the impact of youth in SIDS to build resilience to adapt to the impact of climate change in the future.</p> | <p>The chapter presents a conceptual framework for analysing the adaptation of youth to new climate change conditions. The framework is explored through a set of diagrams, which combine to form the overall conceptual framework. It presents a set of step-like processes through which the conceptual framework is operationalised. By doing so, <b><i>the chapter responds to objective 1 of the thesis</i></b>. The literature provides insufficient information about frameworks that specifically address adaptation of youth to climate change in SIDS. Finally, the conceptual framework provides insights into developing a suitable theoretical model that is suited for investigating the impact of climate change on youth in SIDS and the development of the adaptive capacity of youth through a human capital outlook. The chapter also describes the research methodology and illustrates how the theoretical framework developed and presented in the above was</p> |

|                  |  |   |
|------------------|--|---|
|                  |  | used to collect data in the field. It also presents an analysis of the qualitative research methods (mainly interviews with policymakers and focused group discussions with youth) used in the collection of data, their effectiveness and challenges and explains how the collected data were analysed.  |
| <b>Chapter 4</b> | The case of St Vincent and the Grenadines and its struggles over the centuries to build resilience   | The chapter highlights the socio-economic and development perspective of St Vincent and the Grenadines. It presents an analysis of the main economic drivers of the island including agriculture, tourism and fisheries, as well as a chronological account of 400 years of history on the building of its resilience to adapt to the impact of climate change. Through a series of GIS maps evolving from a set of participatory mapping exercises, it presents an analysis of the impact of climate change on districts/communities across SVG. <b><i>This chapter responds partly to objective 2</i></b> |
| <b>Chapter 5</b> | Analysis of Top-down interviews with Policymakers and bottom-up FGDs with youth on the impact of climate change on SIDS and strategies for building the resilience of youth to adapt to Climate Change | This chapter provides an analysis on the perceptions of Policymakers and Senior Officials (interviews) and youth (Focus Group Discussions) on the impact of climate change on small island communities, youth skills, knowledge and livelihoods needs for the future and the adaptation to climate change. <b><i>This chapter responds partly to objectives 3, 4 and 5</i></b>  |

|                      |  |   |
|----------------------|--|---|
| <b>Chapter<br/>6</b> | Case Studies: Analysis of Top-down TCMP and Bottom-up JEMS Capacity-building project | This chapter provides a top-down and bottom-up assessment of the Tobago Cays Marine Park (TCMP) and JEMS capacity building projects. The analysis utilised the SWOT (strength, weakness, opportunities and threats) analysis as an analytical tool to assess both case studies. <b><i>This chapter responds partly to objectives 1, 2 and 3</i></b>   |
| <b>Chapter<br/>7</b> | Discussion of research issues  | This chapter discusses the outcomes of the research, specifically issues relating to the impact of climate change and the elements for building the adaptive capacity of youth in small island communities and the effectiveness and challenges of using top-down (Policymakers, Senior Officials and governmental institutions) and bottom-up (youth and community organisations) approaches and actions to be implemented to ensure that youth acquired the appropriate knowledge, skills and livelihoods needs to enable them to build the resilience to adapt to climate change. <b><i>This chapter answers objectives 1, 2, 3, 4 and 5</i></b> |
| <b>Chapter<br/>8</b> | Conclusion and Recommendations   | Based on findings of the research, this chapter presents a summary of outcomes and proposed actions/recommendations of adaptation strategies for enhancing the capacity and resilience of youth in small island communities to adapt to climate change in the future.   |

# Chapter 2

## Literature Review

Through the review of the literature, the researcher will establish a broad understanding of the concepts of youth development and climate change including the identification of key issues about youth development research. The review will then discuss how climate change may impact on youth in small island communities and explore the skills and knowledge required to build the resilience of young people to adapt to the impact of climate change on small island communities from a top-down and a bottom-up perspective. The review of literature will further explore the relevance and implication of human capital theory as it relates to the engagement of youth in CCA and how it may provide them with the skills and knowledge to enhance their capacity to adapt to climate change. Finally, as the aim of the research is to investigate the impact of climate change risks and vulnerability on youth in small island communities such as St. Vincent and the Grenadines, the chapter will conclude by assessing the applicability of a conceptual frameworks and identifying the key strengths and weaknesses of the frameworks and the relevance for managing research on the impact of climate change on youth.

### 2.1 Youth in SIDS

Globally, Small Island Developing States (SIDS) contribute less than 1% of the greenhouse gases which caused climate change yet they experienced the brunt of the impact of climate change (Simpson *et al.*, 2010). Young people constitute approximately 45-50% of the population of Caribbean SIDS (Carter, 2008) and are classified as the most vulnerable sector of the population to the impact of climate change. Climate change is impacting youth and their communities, their enterprises and their overall well-being, specifically in locations exposed to storms, floods, droughts and fires (ILO, 2013). The lack of opportunities for youth is considered to be a dismal calamity for Caribbean SIDS. This problem is compounded by an increase in migration, especially among the most

educated youth, resulting from youth being unable to visualise a future within their islands after not finding employment. They leave their islands leading to brain drain, which saps the island's sustainable future on top of the severe impact SIDS are already experiencing due to climate change (UNEP, 2013). Youth in SIDS are also suffering from reduced prospects in formal education and training within their respective communities. Therefore, the migration of youth would emerge as a major problem in Caribbean SIDS in the future.

Understanding young people's lives requires looking both at how youth are constructed, i.e. imagined and characterised as a meaningful social, economic and political group; and also how youth is usually experienced by young people (White, 2012; Carter, 2008). Policy discourse on youth development tends to view youth in a future-oriented way - viewing youth (the person) as human capital, and youth (the condition) as characteristically a period of transition (White, 2012). Thus, the definition of youth is an issue for many associations and countries. The United Nations has its age definition of youth (UN, 2005) and so does the Commonwealth and the Commonwealth Youth Programme (Commonwealth Secretariat, 2005&7). The UN defines youth as a cohort of persons from 15 to 24 years of age whereas, in the Commonwealth, youth is defined as the category of persons aged 15 to 29 years (Simmons, 2006).

In the Commonwealth, age definition categories also range from country to country. In some countries the age definition is culturally determined, while in others there are other considerations to do with the behaviour, level of responsibility, legal obligations, attitude, status and level of vulnerable to social and economic conditions, these define youth in that particular Commonwealth country (Takewira & Simmons, 2004; Simmons, 2006, Commonwealth Secretariat, 2007). For example, in South Africa, a young person can legally consent to sexual intercourse at the age of 16, obtain a driver's license at 17, vote at 18, but can own land only at 21 years of age (Simmons, 2006; Carter, 2008). Youth are often denied access to credit, through microcredit schemes, because of the requirement for clients to be at the legal age of 18 or 21 (depending on the country) to sign the contract document.

Most countries in the Caribbean use the age definition of the Commonwealth to categorise youth. Dennis *et al.*, (2004) in Carter (2008) argue that the reason for the

protracted period of youth in the Caribbean is the extremely high rate of youth unemployment that thwarts the earlier attainment of adulthood. The Caribbean possesses its legal categories when it comes to defining youth. For example, the age of consent ranges from 14 to 16 years of age, the age of transition from juvenile to adult in the criminal court's system ranges from 16 to 18 years of age, and the age of majority, which is universal, is 18 years across the Caribbean region (Carter, 2008).

Qualitatively, youth is defined as a phase when a person moves from a time of dependency (childhood) to independence (adulthood). According to the World Development Report 2007: Development and the next generation' (World Bank, 2007) this transition involves several common shifts, which present unique challenges:

- (a) Moving from school to seek work and independent sources of income.
- (b) Moving from parental home to new living arrangements
- (c) Forming close relationships outside the family, often resulting in marriage and children (Simmons, 2006; World Bank, 2007).

The age definition of youth (15-24 years) is appropriate for developed countries where the transition from childhood to adulthood is predictable and smooth, i.e. a child would complete his/her primary and secondary education then move on to university or join an apprenticeship programme and would on completion start working by the age of 25 years (ILO, 2010); however, it is not appropriate for small island developing states (SIDS). For the research, the World Bank Life Cycle transition approach to youth development would be used in defining young people. This view is supported by the youth participants in the focus group discussions and the participatory mapping process. These youth view the youth development stage as very critical along the national development continuum. They believe that if the necessary investment is provided by the government to harness their potential the countries of the Caribbean would benefit in the long run. However, the reality in most SIDS is that the government is not supportive of such a view. Due to increases in poverty and degradation of the natural resources base of small-island states/communities brought on by climate change, the World Bank Life Cycle transition model definition is more appropriate for defining youth in small island states.



In reality, a large percentage of children/youth participating in the research process is not able to complete their education because they are being forced to find labour outside of the family setting to help their families due to a) failed crops and enterprises resulting from drought, and b) invasive species and/or other impacts brought about by climate change (ILO, 2010). Some youth may start new families rather than returning to schools, Technical and Vocational Education Training (TVET) and Adult Continuing Education Centres to complete their education. The transition process can be conceptualised as a process where a young person thrives towards achieving economic independence, autonomy and adapts to adult responsibility. These changes may continue past the age of 24 years depending on social, cultural, political and economic factors, specifically on the level of vulnerability of the youth.

### **2.1.1 Causes of Youth vulnerability**

The body of literature on the impact of climate change on youth in SIDS is very limited (Pereznieto *et al.*, 2011). However, to explore the impact of climate change on youth the researcher looked at research on the youth and crisis by Pereznieto and colleagues (2011) for the Overseas Development Institute (ODI). Climate change is viewed in the report as a serious modern-day crisis facing youth and their communities. The literature review surveyed the way in which economic crisis impact on youth as well as the coping mechanism they have adapted to various crisis contexts. In the absence of viable literature on the subject, the researcher will refer to the work developed by Pereznieto and colleagues (2011) to guide the research process.

Caribbean SIDS were impacted severely by the economic crisis, which struck the USA and Western European countries in 2007/8 (Pereznieto *et al.*, 2011, IMF 2016 & 2017). This global economic crisis impacted harshly on the main economic sectors of St. Vincent and the Grenadines and other Caribbean SIDS namely the agriculture and tourism sectors as well as remittance from abroad (IMF, 2016, Government of St. Vincent and the Grenadines, 2016). During this period the islands recorded their most severe effects of climate change. They were constantly impacted by some of the most severe storms (two category five storms struck the Caribbean in 2017), increases in sea surface temperatures which damage the coral reef, SLR and storm surges between 2010 to 2017. The global economic crisis resulted in a decline in demand for exports, reduction in remittances to SIDS and other developing regions, reduced opportunities

for migrant workers and decline in foreign aid to SIDS from the developed northern countries. The International Monetary Fund (IMF, 2010 in Pereznieto *et al.*, 2011) report on the recovery of countries and regions to the crisis painted a web of uncertainties and projected concerns regarding the strategies countries were implemented during the recovery process. It also highlighted how the crisis had affected the various sectors of the population, specifically youth. The issues regarding the uncertainty that youth experienced during the financial crisis is similar to the uncertainties youth and SIDS are experiencing under the climate change scenario (Pereznieto *et al.* 2011).

Youth in St. Vincent and the Grenadines are faced with high unemployment as a result of the impact of the financial crisis and climate change in agriculture, fisheries and tourism. Youth unemployment is estimated at 46% (IMF, 2017). According to Pereznieto and colleagues (2011), these youth are reeling from the severe impact of the global economic crisis and climate change.

There are substantial evidences from past crises over the decades, including a) effects of recession and price rise and b) policy changes such as public spending cuts on youth education, health and employment, increase in youth crime and overall loss of youth social well-being (Pereznieto *et al.*, 2011), to inform public discourse on the likely effects of the present crisis on young people and their communities. The major problem over the years is that not enough has been done to document and monitor these crises to extract the viable lessons to be learned from these experiences.

Despite these challenges, there are lessons that can be learned from the financial crisis which would have relevance to the research on the impact of climate change on youth in SIDS, specifically relating to the impact of extreme weather events which wreaked havoc on the lives of youth in SIDS including damages to infrastructure, their lives and their livelihoods. Pereznieto and colleagues (2011) claimed that the impact of climate change on young people is similar to the economic vulnerabilities they experienced during the financial crisis.

Drawing from the work of Hazell (2010 in Pereznieto *et al.*, 2011) there are significant overlaps between the impact of economic crisis and climate change on youth in areas of employment, education, health, social well-being and citizenship.

**Table 2:** Listing the sources of vulnerability of the youth (Hazell, 2010 in Perezniето *et al.*, 2011)

| Areas affected    | Description of effects   |
|-------------------|--|
| Employment        | <p>Young people, especially those facing structural disadvantages, suffer disproportionately in the labour market in times of crisis and those impacts are likely to be exacerbated by climate change.</p> <p>E.g. Youth from low-income families cultivating marginal areas are most likely to be forced to seek employment in the informal sectors, in which young people are already over-represented and therefore become vulnerable to low paid low-quality jobs, more so if they have migrated in search of employment.</p>                  |
| Education         | <p>Extreme weather events have been shown to reduce participation, especially females, in education since the burden of schooling costs becomes higher and the need for adolescents and young people to contribute economically to households becomes greater.</p>   |
| Health            | <p>Climate change crisis can increase malnutrition among adolescents through food shortages resulting from lower agriculture yield or loss in livelihoods opportunities – with potential long-term health consequences, such as complications with pregnancy, leading to increased levels of reported stress and increase exposure to vector-borne disease.</p>  |
| Social well-being | <p>a) One of the principal adaptations to climate change is migration; therefore, unskilled migrants are often the first to lose jobs in a time of crisis.</p> <p>b) They are vulnerable to impaired social capital and psychosocial development due to the breakdown of the family and social support, increasing their vulnerability to future shocks.</p> <p>c) They are also more likely to seek alternative support networks, such as gangs or military groups.</p>   |
| Citizenship       | <p>a) Given that today's young people would be most affected by climate change and migration and adaptation policies, they should be closely involved in policy development, especially as young people have been identified as being well suited to awareness raising and promoting sustainable practices.</p> <p>b) Despite this, young people are generally not seen as important political constituents.</p> <p>c) Youth, in some context, have also more proactively sought to generate spaces for participation in national development.</p> |

Youth are already more likely to be poor (UN, 2003 & 2005). Therefore economic hardship triggered by a crisis such as a climate change is more likely to impact on the socio-economic difficulties they are already facing due to the challenges of youth development such as access to education, employment opportunities and health services (ILO, 2010 & 2013). The situation in SIDS is worse because youth have no political voice to speak on their behalf. If youth represents the future of the society in Caribbean SIDS (Ryan, 2006, Carter 2008), there is a demographic dividend to be gained by SIDS by investing in adaptation measures to enhance the resilience of youth to adapt to climate change. There are also benefits to be gained by investing in youth adaptation programmes to enable youth to make a substantial contribution to the sustainable development of SIDS (Commonwealth, 2005, World Bank 2005 & 2007; Simmons 2006, Carter, 2008). Consequently, failing to invest in youth development will be deemed an opportunity lost and can be construed as detrimental to the current and future development prospects of the Caribbean SIDS. Issues about youth, vulnerability and adaptation would be further explored later in this chapter.

### ***2.1.2 Climate change scenarios and effects on youth***

Climate Change has the potential to produce significant impacts across very large temporal and spatial scales (Marshall and Johnson, 2007; Hernandez-Delgado, 2015; Nurse *et al.*, 2014) with significant adverse consequences on local economies and livelihoods, particularly on the youth sector in small island developing communities/states (Mills, 2005).

The IPCC (2014) declares warming of the climate systems is unequivocal and that most of the observed increase is very likely due to the increase in anthropogenic greenhouse gas concentration; and that the growing accumulation of greenhouse gases in the atmosphere resulting from human activities is exceeding the historical levels that keep the earth liveable (UNEP, 2013). The IPCC developed a series of climate change scenarios which show the change in global mean surface temperature, atmospheric CO<sub>2</sub> concentration and global average SLR under three climate change pathways (Arnell *et al.*, 2015). Under the business as usual (BAU) scenario continuously rising emissions could drive observation and concentrations of greenhouse gas in the atmosphere from present-day levels of 390.5 ppm CO<sub>2</sub> to 685ppm with predicted warming of 1°C – above 3°C (IPCC, 2014). This will have a severe impact on youth in small island communities.

Its range in future temperature projection would impact severely on youth livelihoods, health and overall wellbeing (Pereznieto *et al.*, 2011).

## ***2.2 Climate change and possible manifestations***

The global mean temperature is projected to rise over the 21<sup>st</sup> century if greenhouse-gas emissions continue unabated (IPCC, 2013). The Special Report on Emissions Scenarios (SRES) A1B medium-emission scenario suggested a 1.8°C to 2.3°C medium annual increase in surface temperature in the Caribbean Sea and the Indian and Pacific Oceans SIDS regions by 2100 when compared to 1980-1999 baseline. A1 scenarios explore the impacts of CC regarding a more integrated world, A1B evaluating all energy sources. The research shows that this will result in an annual decrease in precipitation of around 12% in the Caribbean region. Comparatively, the projection for the RCP4.5 scenario suggested about 1.2 °C to 2.3°C increase in surface temperature by 2100 compared to the 1980-1999 baseline. It shows a decrease in precipitation of about 5 to 6% in the Caribbean and Mediterranean regions. Both scenarios show that there will be future potential problems for agriculture production and water harvesting in the Caribbean region (IPCC, 2014; Nurse *et al.*, 2014). This will have serious consequence for employment and the overall livelihoods of young people in that a large percentage of them depend on agriculture and tourism for their livelihoods, and there is compelling evidence on the negative impact of climate change on tourism and other sectors.

It is important to note that possible increases in temperature at about 2°C temperature by 2100 would have far-reaching consequences for ecosystem such as coral reefs and other marine and terrestrial ecosystems. Researchers conclude that coral reef is important to the economy and overall livelihoods of SIDS, specifically fishing and tourism (Bueno *et al.*, 2008; IPCC, 2014; Hernandez-Delgado, 2015; Nurse *et al.* 2014) and that a large percentage of youth are employed in these sectors. Donner (2009 in Nurse *et al.*, 2014) predicted that in the future the current accumulation of Greenhouse Gases (GG) in the atmosphere could cause more than half of the world coral reefs to experience frequent thermal stress by the year 2080. Such a rise in temperatures in the Caribbean will be devastating to the tourism industry and health system. Therefore, as

temperatures are projected to increase in the future (IPCC, 2014), tourists may choose not to travel to tropical destinations (Benjamin, 2009).

St. Vincent has already experienced a sharp shortfall in tourists from the United Kingdom in 2016-2017 (IMF, 2017). The government is currently researching to find out the reasons for the shortfall in the visitor arrivals from the UK. Although there is no data on the impact of such reduction in tourism on the livelihoods of youth, one cannot but think that there is a relation between the reduction of tourism and the rise in youth unemployment in St. Vincent and the Grenadines (IMF, 2017).

There is evidence that increased temperature will allow for the increase in vector diseases and acute respiratory infections (Nurse *et al.*, 2014; Hernandez-Delgado, 2015). Poschen (2015) supported the view that there will be an increase in malaria, dengue fever and other diseases as a result of an increase in climate change. Besides putting more strain on the already over-stretched health system in the Caribbean region, increases in diseases will exacerbate the economic strains in the region due to a reduction in tourism revenue. Tourist would not come to the Caribbean region if there were an increase in vector diseases. This will also put further strains on the human capital, in that large numbers of youth would not be able to participate in productive economic activities due to sickness and those who are available to work would not find any employment in the sector because of the reduction in tourist (Benjamin, 2009; Hernandez-Delgado, 2015).

A further rise in temperature will negatively affect the marine industry, thus affecting livelihoods such as tourism and fisheries. As discussed earlier, the temperature rise of 1-2°C can lead to coral bleaching (Benjamin, 2009; Nurse *et al.*, 2014; Hanandez-Delgado, 2015). Studies show that the Caribbean coral reefs have a higher value than reefs in other regions (Benjamin, 2009). Therefore, loss of these reefs would have detrimental effects on tourism and fisheries in the Caribbean region (UNEP, 2008; Benjamin, 2009), thus increasing the already high youth unemployment problem.

### **2.2.1 Coastal flooding and sea level rise**

There is evidence that difference in climate impacts between 1.5°C and 2°C is most pronounced for vulnerable regions and groups, specifically for youth with limited adaptive capacity (Olsson *et al.*, 2014 in Schleussner *et al.*, 2016). The impact of SLR

would not be uniform in CARICOM Nations although some countries are projected to experience severe impact from 1m SLR. Such differences in the vulnerability of these islands can be explained in the geophysical composition of the islands and their different coastal makeup, specifically those countries with large coastal plains with low lying coastal areas close to sea level such as Guyana, Suriname and Belize. These countries are highly vulnerable to SLR. The grouping of islands which contains low lying coastal islands and cays which largely comprise of coral reefs including the Bahamas, the Grenadines and Barbuda are lying below 10m are highly vulnerable to SLR and are more likely to experience flooding, erosion and threats to mangrove and seagrass beds. Saltwater intrusion into the thin lenses would contaminate the groundwater on these islands (Simpson *et al.*, 2010). This is a major challenge for these islands and their population, which is predominantly youth.

The volcanic islands in the Caribbean such as St Lucia, St. Vincent and St Kitts are less susceptible to the impact of SLR. However, these islands are still being affected in limited ways due to beach erosion, coastal flooding and landslides. The majority of the population and the productive sectors of the economy are located in coastal areas. Thus increases in sea level rise and storm surges would severely impact these sectors. The mangrove and seagrass beds on islands such as Antigua, Barbados, Jamaica and Haiti are also threatened. The coastlines of these islands are more varied and include steps, volcanic coastlines and coastal plains. Flooding of coastlines and coastal plains is the main effect of SLR and storm surges. SLR at 1m would affect less than 1% of CARICOM. However, the most valuable and vulnerable lands are located on this narrow 1% of the coastal strip of land. Therefore, the economic loss to the islands may be substantial (Simpson, 2010; Nurse *et al.*, 2014). Rahmstorf (2007) in CARIBSERVE (2012) stated that future SLR might be as high as twice the maximum level proposed by IPCC, indicating a rise of up to 1.4m by 2100. This will have devastating consequences for development in St. Vincent and the Grenadines because 80% of the population and 90% of productive economic activities are located between 5m high to 5 miles inland. Simpson (2010) claimed that the cost to protect the coastal cities in the Caribbean due to sea level rise in the future would be very substantial.

### **2.2.2 Natural resources and the environment**

Under all climate pathways, it is estimated that plant and animal habitat would become unsuitable for more than 75% of species due to climate change throughout the 21st century. Over 50% of plant species are projected to lose more than 50% of their climatically suitable habitat at 3°C and over the pathway. Other species would suffer from climate change including a higher proportion of amphibians, a low proportion of birds and mammals and reptiles (Arnell *et al.*, 2011). The impact of climate change on the natural resources base of SIDS will, therefore, be devastating (Simpson, 2010; Nurse *et al.*, 2014).

In many regions, changing precipitation or melting snow and ice are altering hydrological systems, affecting water resources regarding quality and quantity. The shrinking of the glacier worldwide due to climate change is affecting runoff and water resources downstream (Poschen, 2015). Climate change has also caused many terrestrial, freshwater and marine species to shift their geographic range, seasonal activities, migration patterns and species interactions in response to ongoing impact of this phenomenon (IPCC, 2014) and is having serious impact on people living in semi-arid lands, in low lying coastal areas, in water-limited or flood-prone areas or on small islands state (IPCC, 2001; Olomos, 2001). Although there is the absence of data on the impact on youth in SIDS, the researcher can conclude that any change in the natural resources base of SIDS would negatively affect the youth.

### **2.2.3 Hurricane and Storms**

Climate change related risks from extreme climatic events such as storms and hurricanes are already moderate (high confidence) and high with 1°C additional warming (medium confidence) (IPCC, 2014). Consequently, the risk associated with such extreme climatic events would increase further at a higher temperature. People living in small island states, specifically youths, are particularly vulnerable to the impact of climate change. Storms are projected to increase in frequency and intensity in SIDS in the future (Gomez, 2013; Nurse, 2014; Economist, 2017; Fieser, 2017). The drawing of feasible conclusions on the climatic extremes is a constant worry for researchers due to the lack of a viable body of data. This prevents researchers from determining which storms were caused by natural viability from those that were part of a long-term climatic trend. Another challenge facing researchers is the suitability and applicability of climatic models.



Climate models are still very alien in predicting tropical storms, and this limits the ability of researchers and policymakers to predict future changes in the frequency and intensity of storms. These climatic models are primitive regarding the complexities of the atmospheric processes that are involved in the creation of storm systems. Therefore these models are weak in predicting future climatic events. The current models are also unable to stimulate strong cyclone storm systems that are representative of what the region is currently experiencing (CARIBSERVE, 2012).

Although the Caribbean region is experiencing stronger hurricanes and storms, several studies have predicted that the frequency of the storms will reduce due to a decrease in vertical wind shares in the region (Knutson *et al.*, 2008 in CARIBSERVE, 2012). Overall, storms continue to be a costly undertaking for islands in the Caribbean. The cost attributed to storms is projected to increase from 1.9% of GDP in 2025 to 2.1% GDP annually in 2100 on the low impact scenario, whilst on the high impact scenario it is projected to move from 3.1% GDP in 2025 to 10% GDP in 2100 (Bueno *et al.*, 2008). Storms are destroying housing and adversely affecting the overall wellbeing of youth and the communities annually in the region. A large percentage of youth live in poor housing stocks because they are either unemployed or do not have the financial resources to construct strong houses to withstand the level of storms that are blowing across the Caribbean.

#### **2.2.4 Impact of Climate Change**

In recent decades, changes in the climate have caused impacts on natural and human systems in all continents and across the globe (IPCC, 2014). Climate change is emerging as a significant global issue; this phenomenon will be around for years to come, regardless of the levels of progress achieved internationally to reduce greenhouse gas emissions. It has the potential to produce substantial impact across the globe, (IPCC, 2014; Nurse *et al.*, 2014) with significant adverse consequences on local economies and livelihoods, particularly in small island developing communities (Mills, 2005; Bueno *et al.*, 2008; IPCC, 2014). The increase in the future severity of climate change is also supported by the Intergovernmental Panel on Climate Change (IPCC), (UNFCCC, 2011).

#### 2.2.4.1 Impact of Climate Change on SIDS and challenges with obtaining viable data

Island nations of the Caribbean, and “the 40 million people who live there, are in the front lines of vulnerability to climate change...hotter temperatures, sea-level rise and increased hurricane intensity which threaten lives, property and livelihoods throughout the Caribbean,” (Bueno *et al.*, 2008 pg. 1). SIDS include low-lying coastal areas, characteristically facing similar challenges to Sustainable Development including susceptibility to natural disasters, remoteness, external shock and vulnerability (Crossly & Sprague., 2014).

The islands are facing risks from both climate-related hazards that have occurred over centuries, as well as from new risks brought about by climate change (Nurse *et al.*, 2014).

Climate change will continue to have major impacts on SIDS in the Caribbean as changes occur in sea level (Simpson *et al.*, 2010). Increases in the frequency and intensity of tropical storms and cyclones, the rise in sea surface temperatures, invasive species and diseases are already threatening the health systems, local economies and livelihoods (Hernandez-Delgado, 2015; Gomez, 2013).

Over the years there have been extensive studies on the risks associated with climate-related hazards and adaptation to hazards such as tropical cyclones, drought, diseases and their impact on human health, tourism, fisheries and other areas (Nurse *et al.*, 2014, IPCC, 2014), but little has been done to study the impact of climate change on youth and other marginalised sectors of the society. Small island states also face unique challenges relating to the availability of literature on climate change. For most islands, there is little-published literature documenting the portability, frequency, severity or consequences of climate change risks such sea level rise, ocean acidification, salinisation of freshwater resources or associate adaptation measures in small island communities.

There are only a few studies available in SIDS that offer projections of future climate risks such as frequency and intensity of tropical storms, precipitation, ocean acidification and temperature rise and inadequate projection of regional sea level rise. These islands are also faced with lack of long-term baseline monitoring of changes in climate risks or to ground truth models (Voccia, 2012) such as risks to saline intrusion, the risk of invasive species, risk of biological loss and risk of large ocean waves. Therefore, there is

a need to implement research to provide a body of knowledge on climate change impacts and adaptation measures to build resilience to adapt to climate change. The absence of “quantified published assessment of climate risks for many islands means that future adaptation decisions have to rely on analogue of responses to past and present weather extremes and climate variability or assumed impact of climate change based on the type and shape of the island,” rather than on scientific data (Nurse *et al.*, 2014 pg. 1638).

#### *2.2.4.2 Impact of Climate Change on livelihoods in SIDS*

Small Islands Developing States depend on agriculture, tourism and fisheries as their main livelihoods (Simpson, 2010; Charenoux & Wolf, 2013; Nurse, 2014). This makes SIDS more vulnerable to the impacts of climate change through the disruption of existing agricultural production and tourism. Climate change is influencing the economy of small-island states across all geographic regions, specifically when most of their population and infrastructure are located on the coastal zone (Simpson *et al.*, 2010; CARIBSAVE, 2012; Nurse *et al.*, 2014).

##### *2.2.4.2.1 Tourism*

The Caribbean is one of the world’s most tourism-dependent regions, attracting over 22 million tourists annually (Chatenoux & Wolf, 2013). The tourism industry is the main economic activity in the Caribbean region (Bueno *et al.*, 2008) and accounts for 15% of the region’s national income (Gross domestic product, GDP), (more than two-thirds of the GDP in most of the small islands). A large percentage of youth are employed in the industry mainly in low-income jobs such as gardeners, barmen, maids, tour guides etc. Youth also employed in the adjacent entertainment industry also supporting the tourism industry. In 2004 tourism accounts for \$28 billion in revenues and 2.4 million jobs in the region, 12% of the total labour-force (Bueno *et al.*, 2008). According to Chatenoux and Wolf (2013), the region generated \$47 billion of revenue in 2012. Islands such as Bonaire, Antigua and Barbuda, the Bahamas and Barbados are very dependent on tourism as their main economic activity. In St. Vincent and the Grenadines, tourism and agriculture accounted for 35% of GDP respectively (Government of St. Vincent and the Grenadines, 2012<sup>b</sup>) and employed over 40% of the workforce (IMF, 2017).

Over the years the island has had an active tourism season. In 2012, 77,415 tourists arrived by air and 122,425 arrived by sea. Of the sea arrivals, 77,179 visitors arrived by Cruise ship (Government of St. Vincent and the Grenadines, 2012). This figure is below the average arrival of countries that are members of the Eastern Caribbean Currency Union. It is expected that the new international airport will help to enhance connectivity and improve the competition with its neighbours in the Eastern Caribbean (IMF, 2017).

Chatenoux and Wolf (2013) in a report entitled 'Ecosystem-based approaches for CCA in Caribbean SIDS' highlighted the necessity for the effective management of the "economically and ecologically valuable and large ecosystem" of the islands of Jamaica and St. Vincent and the Grenadines. They said that "under changing climate conditions, the services provided by those ecosystems will strongly contribute to the island states' socioeconomic and ecological well-being" (Chatenoux & Wolf, 2013 pg. 4).

The tourism industry is very vulnerable to the impact of climate change, which can severely affect the natural resources base of these islands (Economist, 2017; Fieser, 2017) as the industry is entirely dependent on the "existence of attractive beaches and other natural areas and comfortable weather conditions," (Bueno *et al.*, 2008 pg. 9). Over 80% of the tourists to the Caribbean are from the United States of America, Canada and Europe. Therefore most of them may choose to vacation closer to home if the northern winter becomes milder in the future. The tourism infrastructure in most Caribbean islands is located in coastal areas. Consequently, SLR and storms are impacting negatively on beaches and tourism infrastructure (hotels and mariners) which are located on these coastal areas.

The destruction of coral reefs will have serious economic consequences on small island economies regarding its negative impact on fisheries and tourism. These natural resources are the main factors attracting tourists to these shores (Scott, Jones, & Konopek, 2007; Bueno *et al.*, 2008). A survey of visitors to two Caribbean island tourism-destinations found 80% of respondents would not revisit the island for the same price if the environmental attractions (coral reefs and beaches respectively) were negatively impacted by climate change. Therefore, any destruction of this sector will have serious economic and social consequences for youth unemployment and the overall development of the region.

It is projected that even under the low impact scenario (the world taking actions in the near future and greatly reduce emissions by mid-century with additional decreases through the end of the century) the annual cost of climate change impact on the tourism industry of the Caribbean region is projected at nearly \$6 billion by 2050 and \$10 billion by 2100. Under a high impact scenario (business as usual where greenhouse gases continue to skyrocket through the 21<sup>st</sup> century) (Bueno *et al.*, 2008), it is projected that the tourism industry would lose \$4 billion per year by 2050 and \$8 billion per annum by 2100. The entire region will lose \$55 billion per annum by 2100, approximately 26.3% of its GDP to climate change impact. Therefore, there is a need for urgent action to diversify the economy to reduce the impact of SLR on the economy.

In an effort to boost the tourism sector in St. Vincent and the Grenadines, the government is utilising a number of strategies a) engaging with airlines from tourist sourced countries to improve the connectivity, b) prioritising the reopening of the largest hotel under new management and c) upgrading the tourism infrastructure including ports and mariners, public transportation and investing in human capital (IMF, 2017). It is hoped that the investments in human capital will enhance the skills and knowledge of young people to sustain the tourism industry.

In conclusion, the researcher has encountered major challenges collecting viable (and more recent) research data on the impact of climate change on tourism and other economic sectors in the Caribbean. This will affect the level of discussion and rigour the researcher can provide on the issue.

#### 2.2.4.2.2 Agriculture

Agriculture is an important economic activity in the Caribbean region; and in St. Vincent and the Grenadines, it accounted for 35% of the GDP and employed approximately 35% of the workforce (Government of St. Vincent and the Grenadines, 2012<sup>b</sup>). In St. Vincent and the Grenadines, crops are grown by farmers and their households mainly on small holdings estimated at 1 to 20 acres. The government is currently working with farmers and other development partners to enhance the transition of agriculture from subsistence farming to agribusiness, by improving linkages with the tourism industry. Currently farmers, specifically youth, are facing challenges such as limited access to markets due to the poor condition of feeder roads, inadequate water supply and

irrigation, technological gaps, difficulties for young persons to access properties to farm and underdeveloped risk sharing mechanism such as insurance and other support to assist with climatic related crop failure (IMF, 2017). It is anticipated that improvement in the physical infrastructure of the island would enable young farmers to reach new markets in the OECS and across the region through the OECS Agri-Export Strategy Initiative.

There is a range of climatic related factors affecting the agriculture sectors in St. Vincent and the Grenadines. Anthropogenic climate variability and change presents additional stressors for the agriculture sector in the Caribbean. Climate change is likely to negatively affect most key components of the agriculture sector (CCCCC, 2014). High temperatures will also have severe consequences for the agriculture sector in the Caribbean by prolonging the extended drought period. However, despite greater precipitation projected during storms and other peak periods, more frequent and longer periods of droughts are expected in some parts of the Caribbean region (Bueno *et al.*, 2008). In light of the development challenges facing the Caribbean region, Schellnhuber and colleagues (2016) argued that the impact of climate change represents a fundamental challenge for regional food security and sustainable livelihoods; and possesses the capacity to trigger new poverty traps for several countries in the region.

The challenges facing agriculture are worsened by decreases in precipitation and increases in drought, and invasive species, which researchers claimed would have serious implications for sustainable agriculture production and food security in SIDS (CARIBSAVE, 2012; IPCC, 2014; Nurse, 2014). A better understanding of the vulnerability of the agriculture sector to climate change would guide policymakers and planners to develop CCA strategies to increase the resilience of the agriculture sector to the new changing climate conditions.

Economic projections for agriculture production is based on a complex interplay of a set of factors, including physical response to soil, climate and chemical processes such as nutrient and water availability. These are also influenced by human and development practices (Schleussner *et al.*, 2016). Although some studies suggest a difference in productivity for some crops due to higher carbon concentrations, there still exists large uncertainties regarding temperature sensitivity, nutrient and water limitations, the

difference in regional responses and interactions between the various factors (Schleussner *et al.*, 2016).

Further unpredictability in the weather will have a serious impact on the agriculture sector. For example, there were higher prices for maize and soya beans (Poschen, 2015) following drought in the United States in 2010, which illustrated the nature and the scale of the climate change problem (Poschen, 2015). Although there is evidence that there would be an increase in diseases affecting health and crops, there is a serious gap in knowledge on the types of diseases that would occur and the severity of their impact under the various pathways. Therefore, there is a need for more research on the impact of the various climate stressors and the various climatic pathways on tropical cash crops such as coconut, sugar cane, bananas and ground provisions.

#### 2.2.4.2.3 Fisheries

Although there is no current data on the number of persons involved in the fisheries sector, it is estimated that over 40% of the fisherfolk are youth. Many youths are also employed in fisheries-related businesses such as boat building, servicing engines for fishing boats and marketing of fishes locally and abroad. Therefore, any reduction in the fish stock will further impact severely on the livelihoods of the youth population. Although there are limitations in the body of knowledge on the contribution of the industry to the economy and the impact of climate change on the fisheries sector in small island developing states, research show that loss of coral reef habitat is having detrimental implications for the coastal fisheries sector (Pratchette *et al.*, 2009) where reef based subsistence and tourism activities are important to the economic development and wellbeing of small island states (Hernandez-Delgado, 2015).

This situation is compounded by evidence that fish stocks are declining as a result of degradation of coral reefs. Changes in migration patterns and depth of fish stocks are two of the main factors affecting the distribution and availability of fishes in small island states. It is expected that climate change may cause a migration shift in the future aggregation to other areas (Sem, 2007).

## 2.3 Climate Change Adaptation Theory

In all continents, evidence of climate change impact is more pronounced and most wide-ranging in natural systems than in human systems (IPCC, 2014). Over the centuries, humans have been adapting to the changing environment, whether through short-term shocks or long-term atmospheric changes (Adger 2003; Adger *et al.*, 2005; Bennet *et al.*, 2015). The literature indicated some climate adaptation actions which took place in SIDS over the years. These include ad-hoc actions on a local scale where concrete blocks are placed on galvanised corrugated zinc sheet roofing to prevent the roofs of the houses from being blown away during storms in Jamaica and other islands in the Caribbean. In Vanuatu, where frequent flooding and erosion were making the inhabitants of the Lateu settlement uninhabitable, SPREP, a regional environmental organisation, accessed funding from the Canadian government and relocated 100 villagers to higher ground 600m from the coast and 15 m above sea level (Sem, 2007).

Climate change adaptation can be made by selecting adaptive or maladaptive pathways using an unstable environment dominated with an uncertain future (Wise *et al.*, 2014). There are different definitions of adaptation. In its broadest sense, adaptation means modification or fitting to suit; however, in the context of Climate Change, it is defined as the task of modifying ecological and social systems to accommodate climate change and reduce SLR so that these systems can persist over time (Barnett, 2001<sup>a</sup>). Scobie (2016) used the IPCC (2014) definition, which explains adaptation as the process of adjustment to actual or expected climate and its effects. The IPCC expanded the definition by stating that it “seeks to moderate or avoid harm or exploit beneficial opportunities and adjustments to expected climate and its effects” (IPCC, 2014 pg. 5).

The issues of adaptation can be deduced for policy purposes to include a) modifying systems to allow for long-term incremental changes and b) modifying systems to enable them to absorb and react to short-term changes without passing critical threshold limits and so flipping into alternative states of equilibrium ((Barnett, 2001<sup>b</sup>). UNESCO (2015) puts a human context on its definition of adaptation. It describes CCA as referring to human actions to build resilience and reduce vulnerability to the existing impact of climate change, which is closely aligned with the concept of disaster risk reduction.



**Table 3:** Showing the impact of climate change drivers, areas of risks and potential adaptation in SIDS (IPCC, 2014)

| Areas of Risks   | Potential adaptation   | Climatic drivers  | Timeframe                                      |
|--|--|---|--|
| Loss of livelihoods, coastal settlements,  | Significant potential exists for adaptation in islands.  | Drying trend  | Present  |
| infrastructure, ecosystem services, and economic stability   | Additional external resources and technologies will enhance response.<br><br>Maintenance and enhancement of ecosystem functions and services and water and food security<br><br>Efficacy of traditional community coping strategies is expected to be substantially reduced in the future. | Damaging cyclone<br><br>Ocean acidification<br><br>Sea level<br><br>Extreme precipitation | Near-term<br>(2030-2040)                       |
|  |  |   | 2°C<br><br>Long-term<br>(2080-2100)<br><br>4°C |
| The interaction of rising global mean sea level in the 21 <sup>st</sup> century with high water-level events will threaten | A high ratio of coastal area to land mass will adopt a significant financial and resource challenge for islands.   | Damaging cyclone<br><br>Sea level   | Present  |
|  |  |   | Near-term<br>(2030-2040)                       |

|                         |  |  |   |
|-------------------------|--|--|---|
| low-lying coastal areas | Adaptation options include maintenance and restoration of coastal landforms and ecosystems, improved management of soils and freshwater resources, and appropriate building codes and settlement patterns. |  | 2°C<br><br>Long-term<br><br>(2080-2100<br><br>4°C |
|-------------------------|--|--|---|

Adaptation is an important measure of policy response in the environmental governance of Small Island Developing States as climate change is projected to cause more intense extreme events and less encouraging conditions for the main productive economic sectors such as agriculture and tourism (Scobie, 2016).

### 2.3.1 Climate change adaptation terminologies

The tendency of organisms to adapt is influenced by certain system characteristic that is called determinants of adaptation in the literature. Some key terms are associated with the discussion on CCA. These include vulnerability, shock and stressors, exposure, sensitivity, adaptive capacity and resilience. These terms capture the broad concepts of adaptation. They influence the occurrence as well as nature of adaptation. However, there are some degrees of overlap in the concepts that are captured in these terms (See Box 1).

#### Box 1: Summary of adaptation terminology

##### **Vulnerability**

The IPCC defines vulnerability as the degree to which geophysical, biological and socioeconomic systems are susceptible to and unable to cope with, adverse impacts of climate change (IPCC, 2007; Nurse *et al.*, 2014), i.e. it is the degree to which a system is susceptible to injury, damage or harm (Olmos, 2001).

##### **Shocks and Stressors**

Destructive events that occur unexpectedly and last for a very short period such as tsunamis, earthquakes, storms, volcanic eruptions, landslides, avalanches and wildfires are referred to as shocks (Calgaro *et al.*, 2014). Equally, those that happen at a slow

speed with their impacts being felt for longer periods are called stressors (Calgaro, 2011; Calgaro *et al.*, 2014). It is important to note that shocks and stressors can be triggered by both anthropogenic factors and natural causes (Birkmann, 2007; Calgaro, 2011).

### **Exposure**

Exposure is defined as “the presence of people, livelihoods, species or ecosystems, environmental functions, services, infrastructure or economies, social or cultural assets in place and settings that could be adversely affected” (IPCC, 2014 pg. 5).

### **Sensitivity**

Sensitivity is defined as the degree to which a system is affected by or is responsive to climate inducements, i.e. it is referred to as the degree to which a structure or organism is affected, either unfavourably or beneficially, by related climate impacts.

### **Adaptive Capacity**

It is viewed as the ability of a system to adjust to climate change, including climate variability and extremes to moderate potential damages or cope with consequences and to take advantage of the opportunities climate change may bring and cope with the consequences (IPCC, 2007).

### **Resilience**

Resilience is the capacity of social, economic and environmental systems to cope with a hazardous event or trend, disturbance, responding or reorganising in ways that maintain their essential function, identity and structure while also maintaining the capacity for adaptation, learning and transformation (IPCC, 2014).

### **Types of adaptation**

Adaptation is an important measure of policy response in the environmental governance of SIDS as climate change is projected to cause more intense extreme events and less encouraging conditions for the main productive sectors such as

agriculture and tourism (Scobie, 2016).

### **Planned adaption**

Planned adaptation is regarded as a complement to autonomous adaptation (Smit & Pilifosova, 2003; Füssel, 2007). It can involve policy interventions, research and education, as well as changing governance, transforming structures and processes.

### **Autonomous adaptations**

Autonomous adaptations can involve reactive responses and can occur without government intervention (Smit & Pilifosova, 2003; Smit & Wandel, 2006). It is essential to note that adaptation can occur in unmanaged natural systems. Such adaptation can be autonomous and reactive, i.e. through a process where species, ecosystems and communities respond to changed conditions without public intervention.

## ***2.3.2 Types of Climate Change adaptation approach: Top-down and bottom-up approaches***

Top-down and bottom-up approaches to CCA were borrowed mainly from Business Management studies by climate change practitioners and academics. Both strategies have been widely accepted and dominated by empirical studies on the process of operations strategy (OECD, 2013).

### ***2.3.2.1 Top-down approaches to Climate Change Adaptation***

From a business operational perspective, a top-down process can be described as planned coordination of intention and action to achieve specific outcomes imposed by the central authority such as government (Matland, 1995; OECD, 2013). Top-down CCA is more applicable to government agencies.

In St. Vincent and the Grenadines, top-down approach was used by the colonial government to resolve environmental challenges as early as 1791. This approach gave rise to the creation of the first environmental law in St. Vincent, and the Grenadines (across the globe), i.e. a law to create the Kings Hill Forest Reserve enacted in 1791 (Grove, 2000) and St. Vincent and the Grenadines Botanical Gardens, the oldest botanical garden in the Western Hemisphere (1765). The Kings Hill Forest Reserve Act had relevance to the development of CCA strategy to build the resilience of local people

(farming communities on the south-east of mainland St. Vincent) to adapt to the impact of the longest drought in the history of Americas during the colonial era. Initially, top-down adaptation was defined as the end point of a sequence of analyses beginning with projections of future emission trends, moving on to the development of climate scenarios, and hence to biophysical impact studies and the identification of adaptive options to address the climate change challenge ( Kelly & Adger, 2000).

Despite all the advancement in technology, there is a high level of uncertainty surrounding climate science. Therefore, due to the inability of policymakers in SIDS to work with the high levels of uncertainty involved in top-down adaptation approaches, much of the research in this field stop at the impact assessment stage. It is important to note that top-down approaches to Climate Change adaptation are also mainly used by developed nations because they are less prone to the impacts of and are more resilient to climate change.

Top-down approach has its share of critics. Some critics claimed that the top-down approach takes statutory language as the starting point and do not consider the significance of previous actions taken to address the issues. Adger and colleagues (2005) along with Barnett and O'Neill, (2010) argued that the command and control approach has come under scrutiny for its contribution to potential maladaptation exacerbating vulnerabilities and causing negative externalities. The approach is also criticized for considering implementation as an administrative process and usually ignores or eliminates the political aspects of the process. It is also criticized for only taking into consideration the views and decisions of the central decision makers while neglecting the views of local actors and other stakeholders (Barrett & Fudge, 1981; Hjem & Hull, 1982; OECD, 2013).

#### *2.3.2.2 Bottom-up approaches to Climate Change Adaptation*

Most SIDS have a rich history of utilising bottom-up approaches to address CCA and community development challenges. The islands possess a rich body of practices, specifically led by youth, which harnesses local knowledge, traditional youth development and community-based adaptation activism. Bottom-up approaches to CCA are more applicable to projects developed by youth and local communities.

Over the past decade, interest was resurgent by international development agencies and practitioners to provide direct support to youth and community-led bottom-up development initiatives to build the capacity of communities to implement community-based Climate Change adaptation actions (Jaja, Dawon & Gaude, 2016; McNamara & Buggy, 2016). Bottom-up approaches to CCA are focused mainly on the concept of vulnerability. The approach assumes that if one can address actual vulnerability today, one inevitably reduces future (expected) vulnerability (Burton *et al.* 2002). Bottom-Up approaches consider vulnerability as representative of social and ecological structures that are generated by multiple factors and processes (O'Brien *et al.*, 2007). The factors can be classified as wealth, health and educational status, social equity, food reliability and others (Brooks *et al.*, 2005).

Bottom-up approaches are more applicable to developing nations including SIDS because much of the structural vulnerability addressed through bottom-up approaches is less of a consideration in developed nations, i.e. the infrastructures needed to adapt to climate change are already in place in developed countries. For adaptation to be successful, it must fundamentally be linked with key development areas such as food security, robust education and health systems, and an improvement in infrastructure provision. Therefore, achieving these development goals will help in reducing vulnerability to climate change (Sterns, 2007).

On the issue of relevance to policy development, academics who support the bottom-up approach claimed that the approach emphasises target groups and service deliverers as the main target of development, arguing that policy is being made at the local level and not by centralised government machinery (Matland, 1995). Bottom-up approach develops a process and procedures for implementation of the approach by identifying the network of actors and stakeholders who are involved in the delivery of services at the local area level and asking them about their goals, strategies, activities and contacts (Hanf, Hjem & Porter, 1978, Stochowiak *et al.*, 2016). It then uses the contacts to develop networking techniques to identify the local, regional and national actors involved in the planning, financing, and execution of the relevant governmental and non-government programmes.

Some of the strengths of using bottom-up approaches include focusing on the centrally located actors who develop and implement government programmes and policies. The approach is more flexible than the top-down approach in that it does not present prescriptive advice but describe the factors causing difficulties in reaching stated goals (Matland, 1995), i.e. ensuring that strategies are flexible to enable them to adapt to local difficulties and contextual aspects of the respective programme (OECD, 2013). Despite these strengths and benefits the bottom-up approach is faced with its share of criticisms, including a) policy control should be implemented by officials whose powers come from their accountability to the sovereign voters through their elected officials, i.e. in a democratic context. The policy should be enacted only by those who have been endowed to exercise power by the voting public and b) it overemphasises the level of local autonomy (Matland, 1995; OECD, 2013).

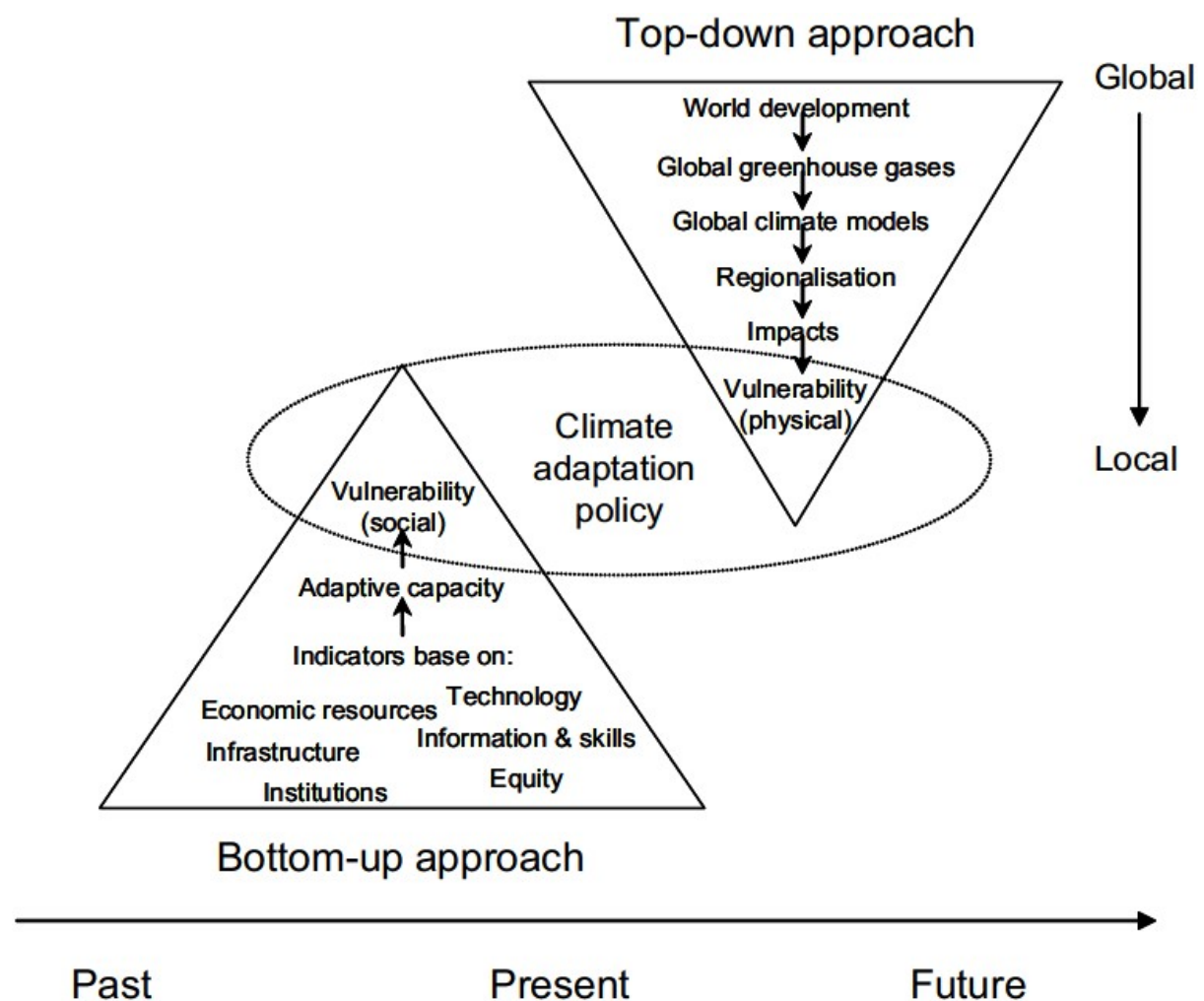


Figure 1: Possible Top-Down Bottom-Up Integration (Desai and Hulme, 2004).

### **2.3.3 Hybrid approach: Combining Top-down and Bottom-up approaches**

There is increasing interest in the literature of combining the micro-level variables of bottom-up and the macro-level variables of the top-down approaches in the development and implementation of climate adaptation projects in order to benefit from the advantages and strengths of both approaches by enabling the various levels of stakeholders to interact and influence project outcomes (Matland 1995; OECD, 2013). Suggett (2011) builds on the work of Matland (1995) which draws on strategies of both approaches to respond to policies that are characterised by high conflict and high ambiguity.

Combining both approaches would highlight their strengths and minimise their weaknesses. Policy implementation is most likely to be successful when all stakeholders at various levels can interact with each other. This provides adequate opportunities for both central policymakers and local stakeholders such as youth and community leaders on the ground to work with each other. This situation is extremely important for the successful implementation of policy and strategic programmes (OECD, 2013).

The hybrid approach is more applicable to the implementation of climate change policies and programmes (OECD, 2013, Stochowiak *et al.*, 2016). These policies are characterised by high levels of ambiguity and conflict and are designed to emphasise value or significant political shift. Such policies tend to have a referential goal and ambiguous plan of action; stakeholders' interest is often tied to policy ambiguity in their group's favour. Therefore, in bottom-up approaches, the strength of the coalition at the community level often contributes to the achievement of outcomes. While the successful outcomes of policy implementation are determined to a large extent on successful outcomes at the community level, the centralised government implementation still plays an important role in policy implementation. Hence centrally located officials can exercise their influence by providing resources and incentives, focusing attention on an issue, establishing strong leadership around a vision for the policy and engaging with networks of local groups and communities (Stochowiak *et al.*, 2016). Stochowiak and colleagues (2016) argue that the lack of tangible implementation common in high ambiguity/high conflict policy environment can suggest to policymakers



and local officials the need to reduce either the level of the conflict or the ambiguity to move the policy to a more successful implementation.

In conclusion, the literature is critical of the applicability of the data and the climatic models that are used in SIDS to collect climate change information. The literature states that the challenge of using such data sets is often associated with the resolution of the data in that the small size of SIDS means that the resolution of the data is too large to meet their needs (Kelman & West, 2009). The main concern regarding data for SIDS is that such data may be of less quality because data collection and storage is often limited. Another concern in data quality in SIDS is that the difference across the islands of SIDS may be vast, however, rather than focusing on the entire island the data may be on the capital city or the main island. Such top-down information is not downscaled to a useful accuracy or precision for the highly localised context of SIDS. The data may also have serious implications on the type of adaptation strategies the specific country would want to implement.

#### ***2.3.4 Human Capital Theory and Climate Change Adaptation for Youth in SIDS***

Education is an economic good because it is not easily obtainable and thus needs to be apportioned and allotted for (Olaniyan & Okemakinde, 2008). This research focuses on education (knowledge), skills and livelihoods that are the reference points for the analysis of the vulnerability and building resilience through enhancing human capital of youth to adapt to the impact of climate change. A thorough assessment of the literature indicates that the interplay of human capital and climate change is twofold, i.e. the impacts of climate change are perceived to be negative to the human system. Therefore a stronger human capital base would be necessary to enable youth to develop the capacity to adapt to the changing climatic situation. It is also imperative to provide resources to enable youth to build resilience to adapt to the impact of climate change.

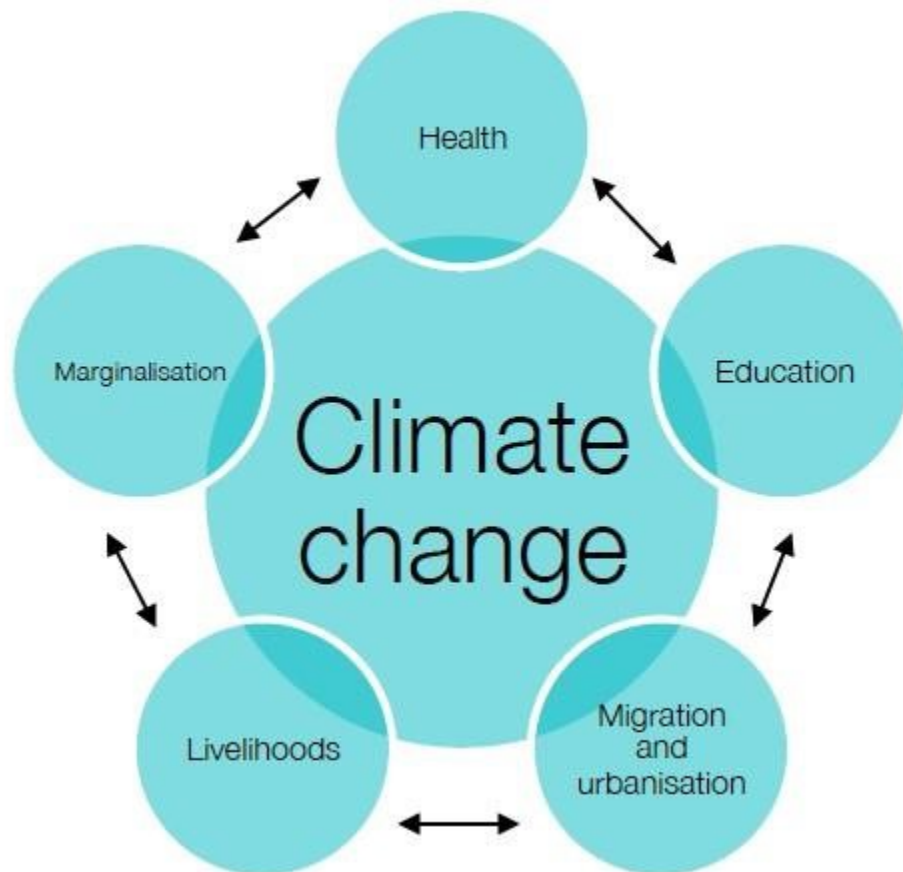
Human Capital theory is defined as the theoretical framework responsible for the adaptation of education and development policies (Olaniyan & Okemakinde, 2008). Human Capital theory is rooted in the work of Smith (1776 in Mulomgo, 2012) and Marshall (1890 in Mulomgo, 2012). Smith concluded that a man who spends much time and cost to acquire his education might be compared to an expensive machine, and his work should compensate the cost he ensured for his education.

It is important to note that the Human Capital models assume that all the education acquired by the worker is to enable them to perform the duties expected in the job or working life. Overall, the theory underscores how education increases the output and competence of workers by enhancing the levels of cognitive stock of economically productive human capabilities. Human Capital views education and training as a product of unique abilities and investment in Human Development (Olaniyan & Okemakinde, 2008).

The emphasis on education as a Human Capital phenomenon is generating immense interest from stakeholders including parents and the community as a whole. They believe that in an area of the scarce skilled workforce, the better the quality of education provided to their children, the better the opportunity for their children to receive a well-paid job when they complete their schooling. Parents who are generally poor look at their children's education as the best way of escaping the poverty trap (Olaniyan & Okemakinde, 2008).

One of the objectives of education is to contribute to economic growth and sustainability. Therefore for education to be effective and responsive, it must be high in quality and meets the knowledge and skills needs to be demanded by the economy and society as a whole (ILO, 2010 & 13, Poschen, 2015). Due to the limited resources base of some SIDS, the expansion of the education system in these countries can hinder growth and development in other social, economic and political development sectors (Olaniyan & Okemakinde, 2008). These resources allocation pressures can create problems for the governments of SIDS who would have to assess their spending and investment patterns about the resources that are available to support the education and training of their youth.

#### *2.3.4.1 Human Capital as a vehicle for Climate Change Adaptation*



**Figure 2:** Dynamics of Climate Change impact on human capital (*Qaisrani 2015: Connecting the dots: linking climate change resilience to human capital*)

Figure 2 shows how climate change is impacting negatively on human capital, specifically on education and health thereby causing further marginalisation and poverty for the poor. Climate Change can destroy livelihoods, thus increasing unemployment and poverty among persons who have already been experiencing social and economic development challenges. It can also result in increased migration and urbanisation of the economically poor, specifically youth who are already stressed by the impacts of storms, drought, SLR, high temperatures and other climate pressures.

Research shows that education is the key to improving resilience to climate change as well as the attainment of global development goals (UN, 2015; UNEP, 2013; UNESCO, 2015). Pressures from global warming will make it more challenging for developing countries, especially SIDS to achieve existing development targets for health and education (Brown & Westaway, 2011). However, better quality education would help people to develop a clear understanding on how to cope with and respond to changes in climatic conditions. Article 6 of the United Nations Framework Convention on Climate

Change (UNFCCC) calls on governments to develop and implement programmes on education, training and awareness (United Nations, 2015).

On the other hand, research has shown that as natural disasters increase, the accumulation of Human Capital, as measured by secondary school enrolment would fall. Through education and training, people can be provided with climate specific know-how and information (knowledge and skills) for improving agriculture, fisheries and tourism performance. The strategy can be further enhanced by a) improving occupational safety and health, b) the responsible use and management of pesticides and other hazardous chemicals, c) investments in extension services, d) provision of support for rural infrastructure and e) development of a non-farm rural economy (ILO, 2013; IPCC, 2014; Poschen, 2015; UN, 2015).

Human Capital can also be severely affected by poor health outcomes as a consequence of the occurrence of invasive tropical diseases such as malaria, dengue fever and others (Hernandez-Delgado, 2015). These diseases limit the country's ability to develop as well as stunt the capacity to deal with climate shocks. Therefore, it is imperative that solutions to address the Human Capital challenge must be built on the local development system and develop in cooperation with the local people such as the youth, women and children (ILO, 2013). The organisation of youth, farmers, workers and other key stakeholders is an important element to give local communities and other stakeholders a voice in the policymaking process for the overall development and the greening of economies of SIDS and the overall sustainable development of small island states. Within this emerging context, emphasis must be placed on the inclusion of women, youth and other marginalised sectors of the population into the local and national development process (ILO, 2013). The development of groups such as cooperatives, community-based organisations etc. would be an important strategy to enable youth to acquire the relevant skills and training to participate effectively in CCA initiatives at all levels (ILO, 2013).

#### ***2.3.5 Education and skills training for Climate Change Adaptation***

Climate change will bring about serious changes to existing enterprise and the economic sectors across the globe, in that some jobs and livelihoods that are currently available in SIDS would not be in existence in the future (ILO, 2013; Paschen, 2015). Those jobs that

would still be in existence in the future would change tremendously and would require new knowledge and skills to carry them out efficiently. Therefore building the adaptive capacity of youth to the impact of climate change would be essential to protect enterprises, workplaces and communities from the negative impacts of climate change (ILO, 2013; Nurse *et al.*, 2014; Paschen, 2015; UNDP, 2015). The adaptation options that would be feasible for youth would range from training, capacity building, institutional building and social assistance to infrastructure or reforestation (Paschen, 2015).

Carter (2008) identified a mismatch between the skills and knowledge that are provided by education and training in SIDS and those that are required by the market/workplace. The mismatch in education is also highlighted in a study by the World Bank on 'Quality Education counts for skills and growth' which states that despite spending nearly 11 years in education, school leavers within the Caribbean often struggle to find formal employment (World Bank, 2013). The UNDP (2015) states that the challenge in the skills mismatch in the knowledge economy is due to the slow pace of technological innovation taking place in developing countries, compounded by the rapid growth in demand for new and higher skills which are not forthcoming in most developing countries. The reports also highlighted the role that technological innovation plays in taking up work that was previously done by humans and argued that countries can no longer look to manufacturing to absorb their army of unemployed youth since computers and robots now do these work. Overall, the situation can be worsened by the impact of climate change on SIDS, specifically on youth and their respective communities. Therefore, the case for education and training provided by Caribbean island states do not equip young people to meet the current development needs of the region, nor prepare them to meet future needs. The key to fill this gap is to ensure strong interaction between the world of work and the world of education and training. It is important for youth to acquire adequate skills and knowledge that would equip them to participate in initiatives relating to the greening of the economy and enhancing their resilience against climate change.

An essential element of the overall education policy is ensuring that all youth can access education and training in SIDS to transit to new types of jobs or work with new materials, processes, and technologies in their existing jobs (Poschen, 2015). It is important to note that effective education and training cannot be achieved through the

implementation of one-of-a-kind or one-off training activity. Therefore, a continuous process of education and training is essential to achieve the above (United Nations, 2015). It is no longer effective to train youth workers to meet the current needs, but to develop skills and knowledge that support entrepreneurship, resilience, innovation in enterprise development and their transition to sustainable practices (ILO, 2013; Poshen, 2015). Government and training providers must ensure access to training programmes that support lifelong skills development and focus on future market needs (ILO, 2010; Poshen, 2015).

Most SIDS lack the country-specific industrial structure and are not at the appropriate stage of development to support the transition of skills and occupational development. As highlighted earlier in the Review of Literature there is an existing mismatch in the education system in most Caribbean island states between current education and training provided and the skills required in the job market in the Caribbean (Carter, 2008, UNEP, 2013, World Bank, 2013). This is a period when digital technologies and advanced communication technologies penetrate all areas of life, however many youths in SIDS do not have training and access to these new technologies. This is also emerging as a period when flexibility, adaptability and unconventional work are becoming the dominant development practice of the day (UNDP, 2015).

A shift in education and training is required to transit youth by providing them with viable skills and knowledge for the future. Training and skills development is understood in broad terms to cover the following, a) basic education (providing the basis for youth development, laying the groundwork for employment), b) preliminary training offering core work skills, general knowledge and industry networking enabling the shift from education to work, c) Lifelong learning contributing to the upkeep of individual skill supply (ILO, 2010). UNESCO's Climate Change Education for Sustainable Development (CCESD) encompasses the above view of education and is viewed by the government as a viable development alternative to build the resilience of youth to adapt to the impact of climate change in SIDS. The CCESD prepares people for all 'walks of life' to plan for, cope with and find solutions for issues that threaten their sustainability (UNESCO, 2014, pg16). The CCESD empowers people to make informed decisions about "environmental integrity, economic viability and a just society for present and future generation while

respecting cultural diversity,” (UNESCO, 2014 pg. 20). The CCESD approach is viewed as an enabler for sustainable development:

- (a) Education systems address sustainable issues;
- (b) Sustainable development agendas and education converge;

The CCESD initiative is implemented in some countries worldwide. While CCESD has acclaimed credible levels of success through raising the understanding of governments and key stakeholders through research, demonstration projects in countries, capacity-building efforts, partnerships and networks, leading to the application of lessons learned and changes to policy and practice, there are still challenges to be addressed in the future. These challenges concern the need for further alignment of education and the sustainable development sectors regarding policy and practice, i.e. the linkages to policy and practices are still very weak in some countries, especially in SIDS. Therefore, more work needs to be done on the institutionalisation of CCESD across the education system, policies and planning.

Although there is a commitment from member governments to implement CCESD, the actual changes in curriculum and education practices at all levels have been very slow to respond in most areas of the education system. There is also a need to improve the monitoring and evaluation of CCESD approaches as a way of extracting the lesson learned and good practices from the approach. Currently, there has been limited use of monitoring and evaluation tools to assess the quality of CCESD programme (UNESCO, 2014). While the policymakers of the Government of St. Vincent and the Grenadines support the development, mainstreaming and institutionalisation of CCESD in policies and programmes across the education curriculum, youth who participated in the research process were mainly concerned with the absence of climate change education in the curriculum. Youth stated that climate change education would enable them to develop sustainable livelihoods and build their resilience to deal with the impact of natural disasters, health issues and enhance their overall well-being.

A large percentage of youth from SIDS in the Caribbean are unable to acquire appropriate skills (employment and life skills) to enable them to find viable employment to contribute to the development of their society (Carter, 2008; ILO, 2010; UNEP, 2013). These islands are experiencing serious economic challenges resulting from the global

financial squeeze, compounded by the severe impact of climate change. They are also unable to generate enough resources to enable them to contribute to enhancing sustainable development.

Research by Carter (2008) states that there is a mismatch between education and the job market, i.e. the skills and knowledge offered by the education system is not what is required by the market. This factor would have serious implications for the future development of youth as human capital and the region as a whole. There is a need for the development of appropriate policy, practice and actions to ensure young people acquire appropriate skills and knowledge to enable them to develop/acquire sustainable livelihoods and build their resilience to adapt to climate change.

It is critical that measures are put in place to ensure the development and implementation of pathways to alternative skills and knowledge development to prepare youth to access education and training that are relevant to the changing market (ILO, 2010; UNESCO, 2014).

## ***2.4 The case for the new Climate Change Adaptation Framework for youth in SIDS***

Researchers recognise climate Change as one of the possible sources of negative impact on SIDS (Benjamin, 2009; Nurse *et al.* 2014; IPCC, 2014). The impact of climate change on youth in SIDS has received little or no attention by researchers, therefore only a very few researchers have attempted to research the impact of climate change on youth in small island communities (Ogarro & Speek-Warney, 2009; Pereznieta *et al.*, 2011). Of these limited studies only one was focused on children (youth) in SIDS - a gap analysis on children and climate change in the Small Island Developing States of the Eastern Caribbean, commissioned by UNICEF (Ogarro & Speek-Warney, 2009).

Due to the limitation of research interest on youth and climate change in SIDS, youth remains an underprepared sector of the population to the impact of climate change as highlighted by Ogarro & Speek-Warney (2009). Therefore, the issue of climate change impact and youth development is emerging as a necessary development discourse for researchers and policymakers alike.



**Table 4: Gaps in the literature on the impact of climate change on youth in small island communities**

| Gaps in the Literature  | Consequences of the gap in the Literature   |
|---|---|
| Youth development and the knowledge and skills required for youth to build resilience | The lack of research in this area makes it difficult for policymakers to draw conclusions and make recommendations to develop strategies to enhance the development of island communities to adapt to climate change in the future. Although Climate change has been recognised amongst the greatest challenge facing young people in small island developing states, such recognition has received little attention in sustainable policies, planning and programmes in SIDS.  |
| The impact of climate change on youth and children in the Caribbean                   | The lack of data on the impact of climate change on youth and children in the Caribbean was highlighted by Ogarro and Speek-Warney (2009), stating that there is “lack of relevant and scientifically-linked information from SIDS and regional data source”. Due to the lack of data available they argue that the gap analysis prepared by the Business Development Office of the University of the West Indies was “not able to identify the environmental health hazards associated to climate change” in the Eastern Caribbean region (Ogarro & Speek-Warney, 2009 pg.1). Gap Analysis could benefit from better tracking system through improved data collection systems. |
| The vulnerability of youth in the Caribbean   | The lack of data on the vulnerability of youth in the Caribbean island states is closely associated with the minimal understanding by policymakers and development practitioners of the overall impact of climate change on the human systems. This limited understanding on the part of policymakers has resulted in the development and implementation of limited CCA policies and programmes to benefit youth in the Caribbean SIDS (Sem, 2007).   |

|   |   |
|---|---|
| <p>The inadequacy of prevailing youth development policies and strategies in the modern era of Caribbean development (Charles, 2006 in Carter, 2008).</p> | <p>The response to youth development challenges in the Caribbean remains very welfare in nature and is characterised by inadequately resourced youth development agencies with low ministerial profile, Youth development initiative informed by myth and stereotyping rather than empirical data, National youth policies formulated but not implemented, quick fixed youth enterprise programmes inadequately articulated with a broader development strategy, symbolic rather than actual participation of youth in governance, absence of penal and juvenile justice reform, absence of comprehensive sustainable sporting and healthy lifestyles programme, adaptation of youth support development strategies and concept with little relevance to cultural heritage. All of the above is a consequence of the lack of research and empirical data (Charles 2006 in Carter, 2008).</p>  |
| <p>Youth development, employment and education in the Caribbean</p>   | <p>There is currently a mismatch between the demand from the labour market and the skills provided by the education system in the Caribbean (UNECLAC, 2005, Carter, 2008, UNDP, 2015). This is compounded by the lack of labour and workforce data.</p>   |
| <p>Development of a new conceptual framework</p>  | <p>Although there are numerous conceptual frameworks developed to assist with adaptation to climate change in numerous geographical settings including small island states (Calgaro 2011, Jepp <i>et al.</i>, 2010), none of these frameworks has been applied to the adaptation of youth in small island developing states (SIDS). Gaps in the body of knowledge deny policymakers and practitioners in SIDS a practical set of tools and strategies on climate change education and adaptation strategies to prepare young people to build their resilience to adapt to the impact of climate change in the future. The following conceptual frameworks were reviewed to guide the development of the new conceptual framework. The Sustainable Livelihoods Framework (DFID, 1999 in Angelsen, 2011), b) Strategic Framework to bridge training and the world of work – ILO Framework (ILO, 2010), c) Conceptual framework: Transmission Pathways: Macro-level economic shocks and micro-impact on youth – ODI Framework (Perezniето <i>et al.</i>, 2011) and d) Conceptual framework for developing adaptation indicators (Harley &amp; Minnen, 2010).</p> |

Development planners consider climate change, policy officials and practitioners as a serious threat to the sustainable development of SIDS, and youth development is viewed as a key area of focus for the future development of SIDS. Gaps in the body of knowledge deny policymakers and practitioners in SIDS a practical set of tools and strategies on climate change education and adaptation strategies to prepare young people to build their resilience to adapt to the impact of climate change in the future. Therefore, youth development and the impact of climate change would evolve as an important area of research in SIDS.

It is also important that consideration is given to developing a universal and sustainable approach to ensure CCA of youth in small island communities is consistent with sustainable development principles and practice by developing a specific framework to facilitate this to take place. This new framework should be designed to guide the sustainable development process within the context of youth development and build their resilience to adapt to the impact of climate change.

Although there are numerous conceptual frameworks developed to assist with the adaptation to climate change in numerous geographical setting including small island states (Jepp *et al.*, 2010; Calgaro 2011), none of these frameworks has been applied to the adaptation of youth in small island developing states (SIDS). The researcher reviewed the following frameworks below (Table 5) by assessing their applicability within the context of building the adaptive capacity of youth in SIDS to adapt to the impact of climate change (DFID, 2000 in Angelsen *et al.*, 2011; Pereznieto *et al.*, 2011).

**Table 5: Gap Analysis in the literature on the impact of climate change on youth in SIDS**

| Author  | Year | Method/Data source                                       | Scope/focus<br>(main features of key relevance)   | Weaknesses and Limitations  |
|---------|------|--|---|---|
| Charles | 2006 | Archival data<br><br>Review of Literature<br><br>Surveys | Paper on the conceptualisation of youth in the Caribbean and approaches to youth development. The paper highlights the inadequacies of prevailing youth development policies and strategies in a contemporary era of Caribbean development. It states that the response of Caribbean governments to youth development challenges remains very much welfarist in nature and un-developmental in orientation. | Although climate change is identified as one of the main development challenges facing the Caribbean region, his analysis did not consider or explore the impact of climate change on youth in the Caribbean region, neither does it presents strategies to enhance the capacity of youth to adapt to climate change.   |
| Sem     | 2007 | Archival data<br><br>Review of Literature<br><br>Surveys | Research on the impact of climate change on SIDS; the vulnerability of SIDS to climate change and development of adaptation strategies to reduce these vulnerabilities.   | The paper lacks adequate data on the vulnerability of youth in the Caribbean SIDS. Such minimal understanding by policymakers and development practitioners on the overall impact of climate change on human systems is closely associated with the absence of adequate policies and programmes in CCA. The limited understanding on the part of policymakers has limited the development and implementation of CCA policies and programmes that benefit youth and their communities in the Caribbean SIDS. |

|                       |      |   |   |   |
|-----------------------|------|---|---|---|
| Carter                | 2008 | <p>Archival data</p> <p>Review of Literature</p> <p>Surveys</p> | <p>The paper entitled 'Caribbean Youth: An integrated literature Review' presents a comprehensive review of the literature on Caribbean youth. It reviews the literature on youth as a construct in development, globalisation and regional integration, education, health and well-being, crime and gang violence. It highlights the miss-match between skills and knowledge that is provided by the education system and those that are needed in the job market in the future.</p> | <p>The review of the literature on Caribbean Youth lacks an analysis of research on the impact of climate change on youth in the Caribbean SIDS.</p> <p>Although efforts were made to recommend strategies to resolve the development challenges facing youth in the Caribbean region in the areas of education, health, employment and crime, no strategies were recommended to build the capacity and resilience of youth to adapt to climate change.</p> |
| Ogarro & Speek-Warney | 2009 | <p>Archival data</p> <p>Review of Literature</p>                | <p>The paper presents a gap analysis on the impact of climate change on children (youth) in the Eastern Caribbean conducted by the Business Development Office of the University of the West Indies, sponsored by UNICEF.</p>   | <p>Due to lack of data, the researchers argued that they are not able to identify the environmental health hazards associated with climate change that is impacting on children (youth) in the Eastern Caribbean. The researchers claimed that the gap analysis could benefit from better tracking system through improved data collection system.</p>  |
| United Nations        | 2015 | <p>Archival data</p> <p>Review of Literature</p> <p>Surveys</p> | <p>The report entitled 'Human Development Report: Work for Human Development' prepared by the United Nations Development Programme highlights the current challenges in employment and underemployment across the globe. It also highlights the miss-match between the demand for knowledge and skills provided by the education system and those skills and knowledge required by the market.</p>  | <p>Although the report recognised the impact of climate change on human being now and in the future and put forward a set of strategies to enhance the capacity of the workforce including youth to develop sustainable livelihoods, the report is global in scope and does not focus on the specific development challenges facing youth in SIDS and strategies to address these development issues.</p>   |

|  |                                       |   |  |   |
|--|---------------------------------------|---|--|---|
| DFID Sustainable Livelihoods Framework | 2000 in Angelsen <i>et al.</i> , 2011 | <p>Archival data</p> <p>Household Surveys</p> <p>Interviews</p> <p>Questionnaires</p> <p>Participatory method</p> | <p>The fundamental message conveyed through the Sustainable Livelihoods Framework is that society is influenced by a variety of forces including shocks, trends and seasonality, and factors, which transform structures and processes. It is also important to note that these processes and factors are constantly changing. The SLF consists of five interacting components namely the vulnerability context, livelihoods assets, transforming structures and processes, livelihoods strategies and livelihoods outcomes. The assessment of livelihoods necessitates a continuous assessment of the five assets/capitals available within the community, the livelihoods outcomes that the community is hoping to accomplish, and the livelihoods strategies which the community is adapting with the hope of achieving the designated outcomes at a later stage in the development process</p> | <p>The framework is generic in its structure and is not specifically focused on youth adaptation to climate change in small island communities in particular. While the SLF deals with five assets/capitals, the research will explore one of the five assets (human capital). This is because it has relevance when dealing with issues about climate change impact, i.e. shocks and vulnerabilities. The first component of the framework focused on addressing the vulnerability, which is caused by forces such as shocks, which include health shocks, economic shocks, crops and live stocks failure shocks and others.</p> <p>Although SLF did not specifically focus on climate change, youth development and adaptation, it has relevance for addressing the vulnerabilities caused by climate change and reducing the severity of its impact on youth in SIDS. It also has similarities to an area of the research, which focused on capital, i.e. human capital.</p> |
|  |                                       |   |  |   |

|                |      |                      |   |   |
|----------------|------|----------------------|---|---|
| DFID Framework | 2011 | Archival data        | The framework highlights the different transition pathways through which Macro level shocks are travelling via intermediary factors. These pathways are impacting the lives of youth, thus making them vulnerable to the impact of crises and calamities. The framework draws a parallel between the impact of economic crisis on one hand and climate change and other calamities on the other hand. | One of the criticisms that can be levelled at this framework is that it has not provided clear information on how to undertake vulnerability assessment to assess the impact of climate change on the youth sector. Although the framework highlights the potential negative impact of climate change on youth in areas of employment, education, health, social well-being and citizenship, it does not provide clear information on how youth will adapt to the impact of climate change. |
|                |      | Review of Literature |   |   |
|                |      | Peer to Peer         |   |   |
|                |      | Participatory method | The framework focuses on the extreme weather events which damage infrastructure, lives and livelihoods. Some of the vulnerabilities of the impact of climate change on the lives of young people are similar to those caused by the economic crisis of the past decade.   |   |

|               |      |                      |  |   |
|---------------|------|----------------------|--|---|
| ILO Framework | 2010 |                      | <p>The framework is based on the premise that countries that successfully link skills development to gains in productivity, employment and development have targeted their training and development policy towards three sustainable objectives.</p> <p>The framework constitutes a life cycle viewpoint about training and education of youth</p> | <p>The framework does not focus on youth in SIDS to enhance their skills and education to adapt to climate change and develop sustainable livelihoods. Another identified weakness is that although vulnerability assessment is an important step prior to developing Climate Change adaptation strategies (Jopp <i>et al.</i>, 2010; Simpson <i>et al.</i> 2010; Calgaro <i>et al.</i> 2013; IPCC, 2014), the framework does not provide a clear methodology nor process on how to undertake assessment of vulnerability and the mechanisms for monitoring and evaluation of the performance of the framework in relationship to achieve set adaptation goals.</p> |
|               |      | Archival data        |  |   |
|               |      | Review of Literature |  |   |
|               |      | Surveys              |  |   |
|               |      | Case studies         |  |   |

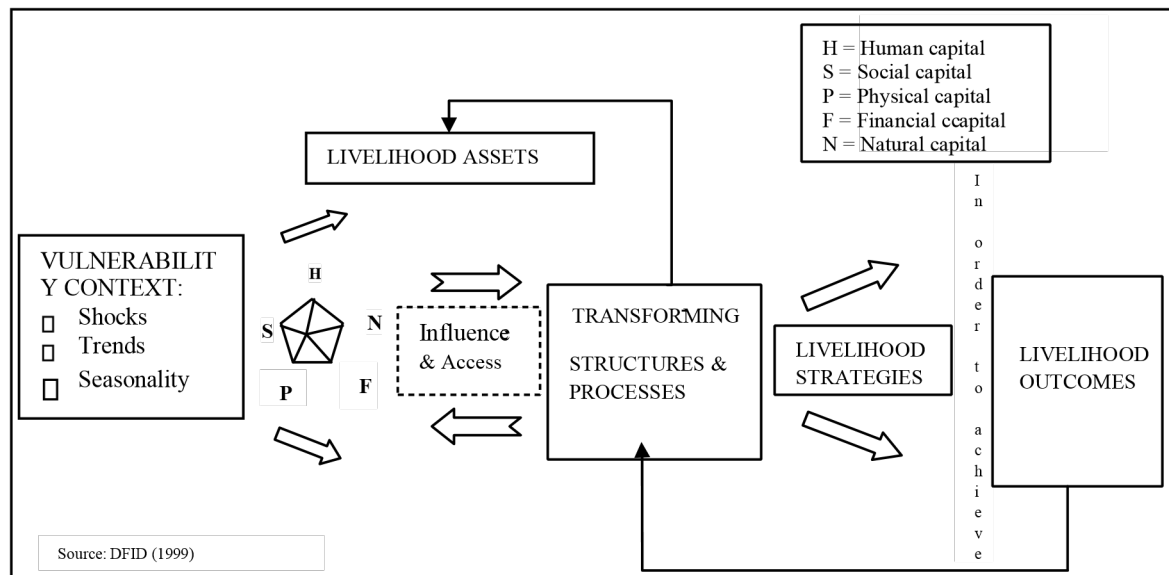


|      |  |  |   |
|------|--|--|---|
| 2010 | <p>Archival data</p> <p>Review of Literature</p> <p>Participatory method</p> | <p>The purpose of this framework is to monitor the implementation and effectiveness of adaptation policies, measures and actions. The framework can also be used for the following purposes a) to justify, target &amp; monitor funding for adaptation, b) mainstreaming of adaptation within and between sectors, c) communicate adaptation to policy and decision-makers and other stakeholders, d) compare adaptation achievements across sectors, regions and countries and e) inform international climate change negotiations. The framework approached the development of adaptation policy from two perspectives a) Top-down approach which is concerned with global climate change projections, the national impact analysis to assess the physical vulnerability on the ground; b) Bottom-up approach which starts with building local sectorial adaptive capacity utilising participatory evaluation adaptive options to assess social vulnerability.</p> | <p>Although the framework has relevance for working in CCA in SIDS such as the development of monitoring and evaluation indicators, it was not specifically designed to deal with the impact of climate change on youth in small island communities, neither does it put forward a set of strategies to enhance the adaptive capacity of youth in SIDS to adapt to the impact of climate change and build sustainable livelihoods for the future.</p> |
|------|--|--|---|

#### **2.4.1 The Sustainable Livelihoods Framework (DFID, 2000 in Angelsen, 2011).**

The Sustainable Livelihoods Framework (SLF) in Figure 1 was developed by DFID in 1999 to provide a tool for understanding community livelihoods, vulnerabilities and outcomes of community livelihoods strategies on a specific or various sectors of society (DfID, 1999; DfID, 2000 in Angelsen *et al.*, 2011). Angelsen and colleagues (2011) described the SLF as a framework for gathering contextual information. The fundamental message conveyed through the livelihoods framework is moulded by a

variety of forces including shocks, trends and seasonality and factors such as transforming structures and processes. It is also important to note that these processes and factors are constantly changing. The SLF consists of five interacting components namely the vulnerability context, livelihoods assets, transforming structures and processes, livelihoods strategies and livelihoods outcomes.



**Figure 3: The Sustainable Livelihoods Framework (SLF)**

The arrows in the SLF (DFID, 2000 in Angelsen, 2011) are used to identify types of responsibilities and functions in the livelihoods process. The assessment of livelihoods necessitates continuous assessment of the assets available within the community, the livelihoods outcomes that the community is hoping to accomplish, and the livelihoods strategies, which the community is adapting with the hope of achieving the designated outcomes at a later stage in the development process.

Although the framework is generic in its structure and is not specifically focused on youth adaptation to climate change in small island communities, it has relevance when dealing with issues about climate change impact - shocks and vulnerabilities. The first component of the framework focused on addressing the vulnerability, which is caused by forces such as shocks which include health shocks, economic shocks, crops and live stocks failure shocks and others (Angelsen *et al.*, 2011). These shocks can also be caused by climate change and other calamities in SIDS (Sem, 2007; Nurse *et al.*, 2014;

Hernandez-Delgado, 2015). Trends can be caused and influenced by population growth, resources use, economic trends, governance and technological trends and by seasonality. Understanding the vulnerability context would provide the following benefits including an understanding of adaptive capability, coping strategies and the role of the environmental and natural resource base of the community in securing livelihoods and producing safety nets for the population.

The next level of the SLF livelihoods assets is based on a belief that human beings require a set of assets or capitals. These capitals include human, social, physical, financial and natural capitals to achieve their livelihoods outcomes. Another important element of the SLF is the formation of structures, which include levels of government, private sectors and processes, which focus on laws, policies, culture and institutions. These structural factors are significant in enabling the community or society to access livelihoods assets. The final component of the SLF is the mechanism, which enables the community to adapt to achieve the livelihoods outcomes. The achievement of livelihoods outcomes will depend on the effectiveness of the community to combine a) transforming structures and processes and b) the livelihoods assets into innovative strategies to enable the community to adapt to the vulnerability.

Although the SLF did not specifically focus on climate change, youth development and adaptation, it has relevance for addressing the vulnerabilities caused by climate change and reducing the severity of its impact on youth in SIDS. It also has similarities to an area of the research which focused on capital (The research on youth adaptation and climate change in SIDS has a focus on human capital).

SLF utilises a range of strategies such as household surveys to collect data from participants on financial, physical and human capital at the household level. However, these data collection tools may have their limitations so it would be desirable for the researcher to use other strategies to collect in-depth information on social capital and natural and other forms of capital. The limitations associated with household surveys include difficulties of respondents recounting or recalling income, consumption patterns, expenditures or time use patterns for a year. Some respondents are experiencing difficulties recounting information for a week, therefore to do that for a year, respondents were encountering difficulties (Angelsen *et al.*, 2011).

Regarding questionnaires, the application is limited for persons who are illiterate. Generally, the response rate for questionnaires is normally low, and opportunities for clarifying issues are lacking. On the issue of interviews, these are time consuming and expensive depending on potential respondents being scattered across wide geographical areas. Overall, the quality of the data collected is dependent on the quality of the interaction with the respondents. There is also a tendency for the researcher/interviewer to introduce his/her bias during the interview process (Kumar, 2005). Other livelihoods related data survey may have their limitations; therefore, the researcher had to consider collecting other types of data to supplement, complement or triangulate using the core household research instrument, specifically a) additional data or information discussion that add contextual details, b) new background information, c) survey focused on specific topics that require different sampling strategies and d) the use of questionnaires (Angelsen *et al.*, 2011).

Climate change possesses the potential to negatively influence the resources in SIDS, which the youth depends on to ensure sustainable livelihoods (ILO, 2010; UNDP, 2013; IPCC, 2014; Nurse *et al.* 2014). Consequently, it is important to note that the severity of the impact will influence the adaptive strategies chosen to deal with the impact of the climatic pressures on the community (Angelsen *et al.*, 2011). Although the SLF is not specifically designed to address the main issues in the research, the researcher will 'borrow' ideas from the SLF framework to develop a new conceptual framework to deal with the adaptation of youth in small island communities to deal with the impact of climate change.

#### **2.4.2 ILO Framework**

ILO developed the framework for skills development in 2010. The framework is based on the premise that countries that successfully link skills development to gains in productivity, employment and development have targeted their training and development policy towards three objectives. These include a) matching support to current demands for skills, b) helping workers and enterprises to adjust to changes and c) building and sustaining competences for the future labour market. The ILO promotes the framework as a holistic approach to skills development with an emphasis on:

- (a) The creation of continuous and unified pathways approach to learning to start with the transition from preschool to primary education that adequately prepared youth for secondary and higher education and vocational training;
- (b) The development of core skills including literacy, communication skills, teamwork, problem-solving and the development of overall learning capacity of youth/workers;
- (c) The development of high-level skills including professional, technical and Human Resources skills;
- (d) The development of livelihood skills which focus on developing core skills to enable workers to apply their existing competencies, knowledge and experience to the new work/job environment; and
- (e) Promoting employability which comprised of the provision of core skills, access to education, availability of training opportunities and provision of continuous learning opportunities.

The framework constitutes a life cycle viewpoint about training and education of youth focusing on:

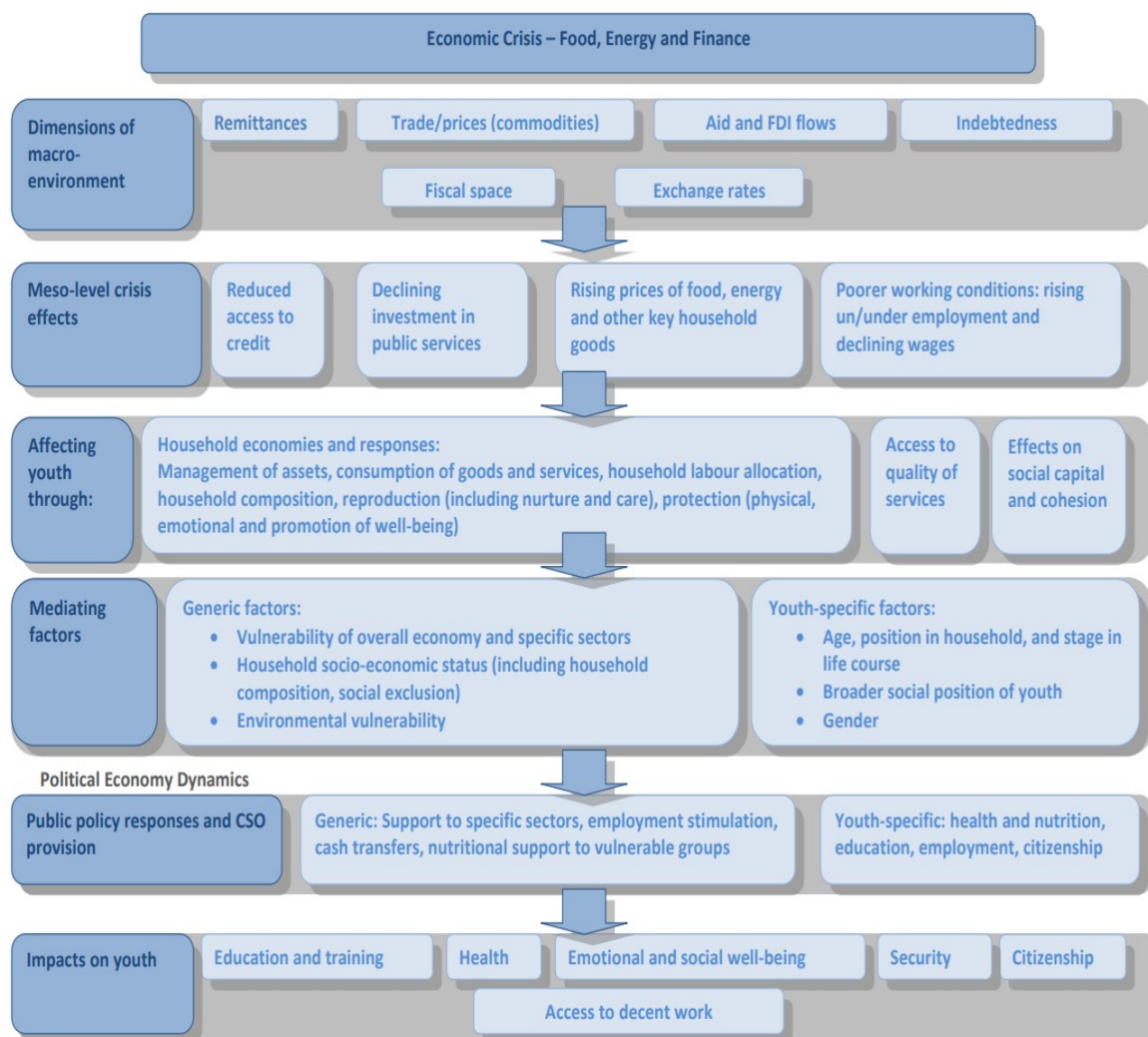
- (a) Building foundation skills throughout the school system from early childhood to tertiary education,
- (b) The improvement of foundation skills for youth by the provision of workplace skills experiences for an effective transition from school to work; and
- (c) The upkeep and continuous upgrading of skills of mature and older workers to enable them to gain new skills and competencies learned over the work period. The last step in the model focuses on convergence across policies concerned with looking at skills and employment through one lens, i.e. the full value of one policy set is realised when it supports the objectives of another policy.

One of the key potentials of the framework is that although it does not specifically focus on youth in SIDS to enhance their skills and education to adapt to climate change and develop sustainable livelihoods, it highlights the negative impact of climate change on youth in the workplace in the future and view climate change as a driver of technology and innovation for governments in search of new measures and policies to adapt to climate change. Another key strength of the framework is that it recognises the difficulties concerned with fostering of institutional arrangements and cooperation among government departments responsible for policy implementation and among employers, workers and training institutions.

Although the framework focuses on the development of youth and the promotion of a viable workforce with appropriated skills and training for present and future, it does not specifically present a model for dealing with the peculiarities of youth development, education and skills training in SIDS to enable them to build resilience to adapt to climate change and create sustainable livelihoods. The model was created for the developed countries (members of G20). Another identified weakness is that although vulnerability assessment is an important step prior to developing Climate Change adaptation strategies (Jopp *et al.*, 2010; Simpson *et al.* 2010; Calgaro *et al.* 2013; IPCC, 2014), the framework does not provide a clear methodology nor process of how to undertake assessment of vulnerability and the mechanisms for monitoring and evaluation of the performance of the framework in relationship to its set goal. In concluding, the difference in the model has stimulated the interest of the researcher to develop a more effective model, which is context specific to SIDS. There are some useful elements in the framework, which the researcher would utilise to aid the development of the new framework.

#### **2.4.3 ODI framework**

This framework was produced from a study entitled youth vulnerability and adaptation: exploring the impact of Macro level shocks on youth: Climate change implemented in Ghana, Mozambique and Vietnam by ODI (Pereznieto *et al.*, 2011).



**Figure 4: ODI Framework (Pereznieto *et al.*, 2011)**

The framework highlights the different transition pathways through which Macro level shocks can travel via intermediary factors. These pathways are impacting the lives of youth, thus making them vulnerable to the impact of crises and calamities. This is where the agencies that are responsible for youth development and the mechanism that is put in place to enable youth to cope with the stresses wielded by these vulnerabilities are vital to the overall development of young people. It is important to note that positive coping strategies would assist youth to overcome the numerous development challenges they are encountering, while negative coping strategies would enable youth to experience further vulnerabilities and risks.

The conceptual framework under review focused on the effectiveness of the policies and strategies implemented by the government – their impact on youth well-being and how

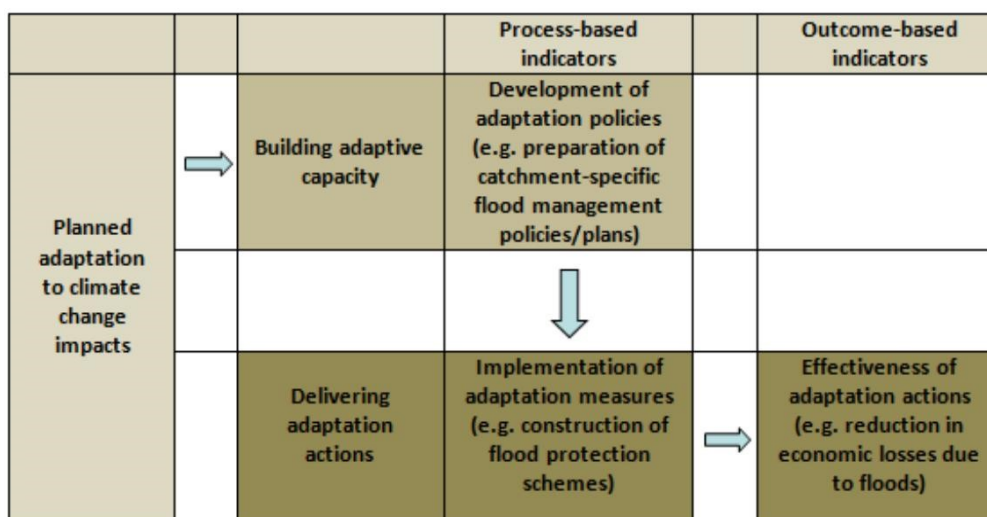
macro-level shock influences them. This factor is similar to the research the researcher is currently executing. The framework uses the vulnerability created by the economic crisis to reflect on the emergent needs for data on how climate change and other calamities are impacting on the vulnerable population groups, such as youth. It broadens the scope of the discourse beyond the meagre shocks relating to the economic crisis to look at the broader impact of climate change on youth, particularly how it relates to economic and livelihoods changes and adaptation strategies.

An important part of the framework is its focus on extreme weather events, which damage infrastructure, lives and livelihoods. Some of the vulnerabilities of the impact of climate change on the lives of young people are similar to those caused by the economic crisis. One of the criticisms that can be levelled at this framework is that it has not provided precise information on how to undertake vulnerability assessment to assess the impact of climate change on the youth sector. Although the framework highlights the potential negative impact of climate change on youth in areas of employment, education, health, social well-being and citizenship, it does not provide clear information on how youth will adapt to the impact of climate change.

The research utilised a multi-faceted, peer-to-peer methodological approach with a strong emphasis on building the capacity and mentoring of youth researchers. This approach was to encourage open participation of the interviewer in the research process (Pereznieto *et al.*, 2011). Climate change adaptation is a specific context phenomenon and therefore the framework presented cannot be applied directly to developing the adaptive capacity of youth in small island communities to adapt to the impact of climate change. The research was implemented in developing countries such as Ghana, Mozambique and Viet Nam, but none of these is classified as small island developing states. However, there are specific elements from the framework, which can be modified and adapted to deal with issues relating to vulnerability and building the resilience of youth to adapt to the impact of climate change in SIDS. These elements will be used in the development of the new framework.



#### 2.4.4 A conceptual framework for developing adaptation indicators



**Figure 5:** Conceptual framework for adaptation indicators (Harley & Minnen, 2010)

The conceptual framework in Figure 5 was developed by Harley and Minnen (2010). The purpose of the framework is to monitor the implementation and effectiveness of adaptation policies, measures and actions. The framework can also be used for the following purposes a) to justify, target & monitor funding for adaptation, b) mainstreaming of adaptation within and between sectors, c) communicate adaptation to policy and decision-makers and other stakeholders, d) compare adaptation achievements across sectors, regions and countries and e) inform international climate change negotiations.

The framework deals with two categories of indicators. These are a) process and outcome-based indicators which seek to monitor key stages that lead to choices about endpoints or outcomes and should inform and justify decisions; and b) the outcome-based indicators which seek to monitor explicit endpoints or outcomes and should focus on the long-term effects of decisions. The other step in the framework is building the adaptive capacity of the institutions or community, which is concerned with process-based indicators.

The framework approached the development of adaptation policy from two perspectives a) Top-down approach which is concerned with global climate change projections and the national impact analysis to assess the physical vulnerability on the

ground; b) the bottom approach which starts with building local sectorial adaptive capacity, to utilising participatory evaluation adaptive options up to assessing social vulnerability on the state. The Framework puts forward a cyclical process for delivering adaptation action (Adaptive Management Indicators) which includes the design of adaptive action, followed by the implementation, monitoring, evaluation, justification, and conclusion in the assessment of problems. The framework applies to the overall development of regional strategies including a) improving the knowledge of climate change impacts, b) identifying possible sector and area-specific adaptation options (contextual), c) increase the adaptive capacity of sectors and d) coordinate & encourage participation in the delivery of adaptation actions areas. The framework presents examples of outcome-based indicators for sectors (agriculture, biodiversity, health and water) along the following a) building adaptive capacity, b) delivering adaptive action outcomes-based indicators and c) delivering adaptive action process-based indicators. A similar set of adaptation indicators are developed for working in the area of Biodiversity Policy.

The framework presents a clear set of indicators to measure the performance of the adaptive actions to be implemented on the ground. Although the framework has relevance for working in CCA in SIDS, it was not specifically designed to deal with the impact of climate change on youth in small island communities. The researcher would identify those components of the framework that apply to the research including the top down and bottom up approaches and incorporate them into the design of the new approach.

#### ***2.4.5 Summary of Case for Framework***

In summary, the frameworks reviewed contain key elements and limitations for the adaptation of youth to build resilience to adapt to the impact of climate change on small island developing states. This section of research links to Chapter 1, objective 5. These frameworks provide useful approaches to addressing climate change vulnerabilities, the designing and implementation of climate change adaptive capacity strategies and initiatives. As CCA is a context-specific issue, the adaptation of youth in small island communities to climate change requires a specific framework to deal with its adaptation

challenges due to the complexities involved in understanding youth development and its application to CCA processes and approaches in SIDS.

The key strengths of the above frameworks would be used by the researcher to develop a new conceptual framework that would apply to deal effectively with an adaptation of youth to climate change in SIDS. The new framework would provide a process for guiding the vulnerability assessment and developing the adaptive processes to build the resilience of youth in SIDS to adapt to the impact of climate change (Chapter 3).

## ***2.5 Chapter Summary***

The purpose of the Review of Literature Chapter was to review in detail the literature surrounding the impact of climate change on youth in small island developing communities by exploring the skills and knowledge required by young people to build resilience to adapt to the impact of climate change in relation to the overall aim and objective 2 of the study (ref Chapter 1 overall aim and objective 2). The review was conducted within the relevance and application of the top down and bottom up approaches to CCA in small island communities (ref to Chapter 1, Objectives 3).

The findings from the review of literature show that there is an acceptable body of knowledge on the vulnerability and adaptation of SIDS to the impact of climate change. However, the literature on the impact of climate change on youth is very limited (ref to Chapter 1 Objective 1). The researcher found only one paper on the impact of climate change on children in SIDS in the Eastern Caribbean, namely, a gap analysis commissioned by UNICEF (Ogarro & Speek-Warney, 2009). Therefore, there is no relevant literature available on youth on vulnerability and exposure to climate stressors and strategies for adaptation in SIDS so that present and future generation of youth can become less vulnerable to the impact of Climate Change. The focus on youth is missing, and this leaves room for future work in the area of youth development and the impact of climate change on SIDS (Chapter 1, Objectives 2 & 4). The frameworks available are not specifically designed to respond to this issue. Hence a gap exists in this area of research (Chapter 1, Objective 5). Finally, strategies and policies have not considered the

youth perspective to CCA effectively, and this needs to be considered urgently (Chapter 1, Objective 4).

Due to the peculiarities and complexities of utilising one approach over the other the researcher was guided by the review of literature toward utilising a hybrid approach, using the strengths of the Top-down and the Bottom-up approaches to address CCA (re Chapter 1, Objective 3). The review applied academic rigours by exploring appropriate human capital strategies to enhance the capacity and resilience of young people to adapt to the impact of climate change on small island communities in the future (ref to Chapter 1, Objective 2).

The chapter concluded by presenting an analysis of existing frameworks about their applicability to the study.

# Chapter 3

## Methodology

This chapter discusses the conceptual framework concerning the methodology of the study and the methods employed by the researcher to collect the data in the field. The chapter is divided into two parts. The first part of the chapter examines the conceptual framework of the study, while the second part of the chapter discusses the research instruments used to collect data, how the samples were selected and the ethical issues considered when conducting a study of this nature.

In this research, the researcher chooses to have objectives followed by research questions. The successes of proper research depend on how each question is formulated and linked to the objectives of the research. Firstly, when research questions are well defined, the researcher will collect more specific data responding to the research aim and objectives. Secondly, sound research questions limit the scope and parameter of the research project. Lastly, a well-defined research question is an essential component in the structure of a research proposal. This helps the researcher to define the relevant literature to be reviewed, develop appropriate hypothesis and theories as well as defining the data needs of the research project (Angelsen *et al.*, 2011). These reasons in conjunction reduces duplication and wasted resources. The research objectives and questions are listed in Table 6.

**Table 6: The relationship between Research Objectives and Questions**

| Research Objectives  | Research Questions   |
|--|--|
| 1. Assess the vulnerability of youth in the Small Island States such as St. Vincent and the Grenadines to the impact of climate change.  | 1. How vulnerable are the youth to the impact of climate change? |
| 2. Characterise the relevant skills and knowledge required by youth in education and training to develop sustainable livelihoods and build the resilience to adapt to the impact of climate change in SIDS for the next decades. | 2. How can resilience of youth be built?                         |
| 3. Review evidence of stakeholders' views on the effective top-down and bottom-up approaches, education and governance strategies to enhance climate change adaptation in communities in SIDS                                    | 3. How can adaptation measures be delivered?                     |
| 4. Explore mechanisms for improving the delivery of climate change adaptation actions/measures needed to build the resilience of youth and their communities to adapt to climate change in the future.                           |  |
| 5. Development of a conceptual framework for managing the coordination of research on the impact of climate change on youth  |  |

### ***3.1 Section 1 - Conceptual Framework: Framework of analysis on the Adaptation of Youth to new Climate Conditions***

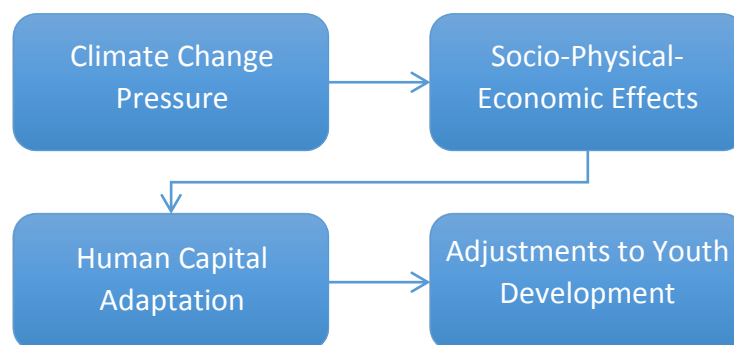
Adaptation to climate change is an integral part of the overall approach to achieving sustainable development in small island developing states (IPCC, 2014). However, as shown in Chapter 2, the literature on CCA to sustainable theories regarding youth in small island communities is insufficient, and to some extent non-existent.

The literature on CCA offers no agreed conceptual framework, which appropriately addresses the impact of climate change on youth in small island communities, i.e. it provides no appropriate framework for explaining the complexities between CCA and

sustainable development for youth and their communities in SIDS. Therefore, in essence, the literature offers no tangible and sustainable model on which adaptation can take place among youth in SIDS. Due to the complexity of successful models addressing CCA, Policymakers, researchers and youth development practitioners need a specific framework to guide adaptation to climate change in SIDS. Therefore, the purpose of this section of Chapter 3 is to:

- (a) Build on the theoretical understanding of the process emanating from the review of the literature on CCA models/approaches;
- (b) Use the information from the gaps in the literature review to develop and propose a new conceptual framework on CCA appropriate for building the capacity and resilience of youth in SIDS to adapt to climate change.

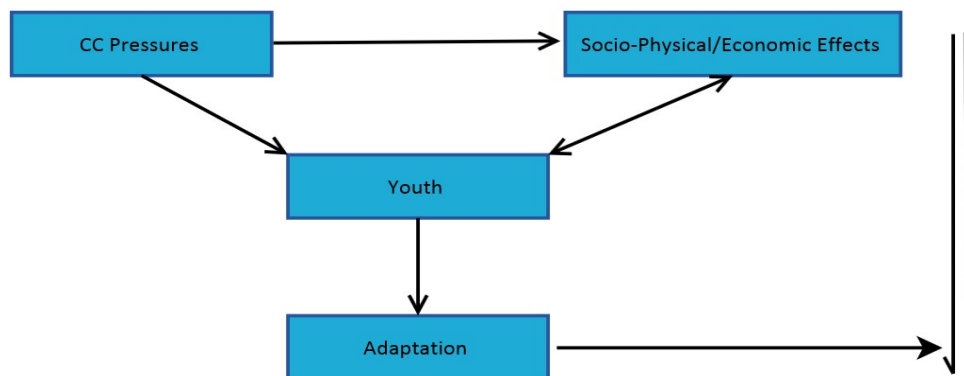
The framework on the Adaptation of youth to new climate change conditions in small island communities is divided into four steps (Figure 6). These include identification of climate change pressures, assessment of the socio-physical impact of climate change on SIDS, analysis of skills and knowledge of youth to enhance Human Capital adaptation and adjust youth development policy and strategy to enhance the capacity and resilience of youth to adapt to climate change in small island communities. Figures 6-13 present the Framework on the Adaptation of Youth to new climate conditions.



**Figure 6: Methodological Framework**

Figure 6 presents an overview of conceptual framework logic. Each component of the conceptual framework is linked and is further explored in figures/diagrams below, which

are finally combined to form the overall conceptual framework. The framework provides a mechanism for guiding adaptation to climate change in SIDS as cited in Figure 7.

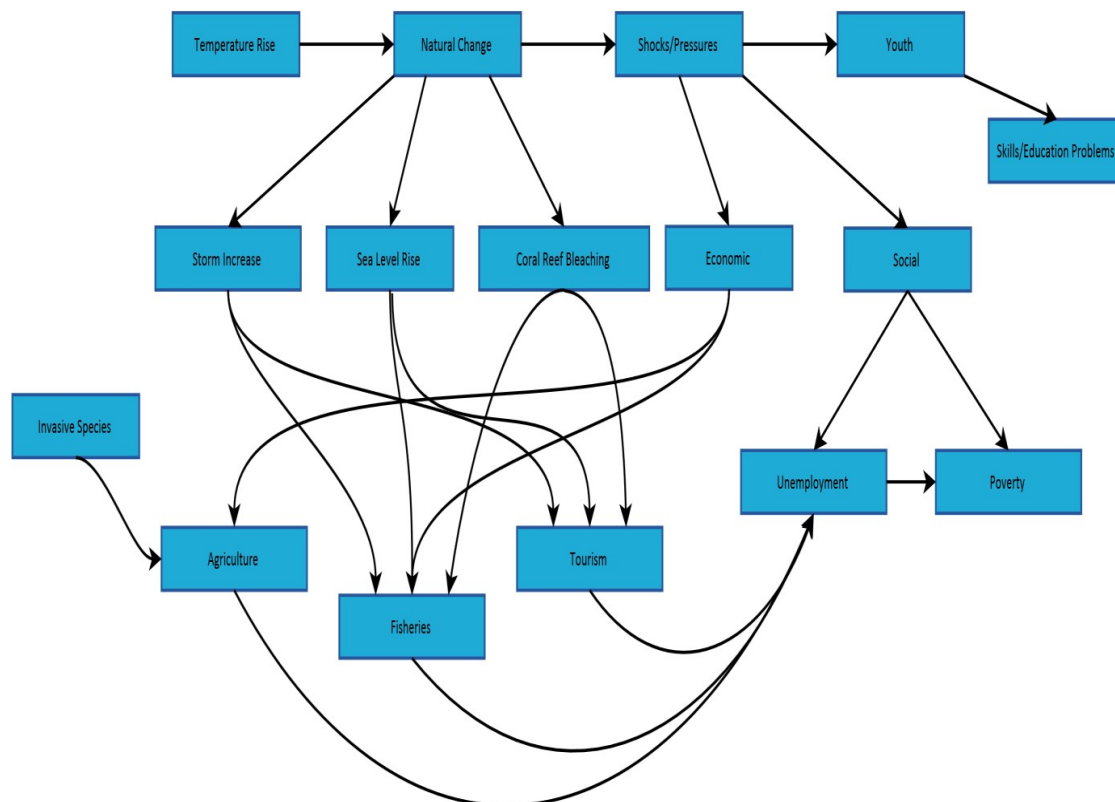


**Figure 7: Conceptual Framework**

### 3.1.1 Steps for the Operationalisation of the framework

The operationalisation of the conceptual framework would be through a step-by-step process as indicated below:

#### 3.1.1.1 Step 1: Climate Risk Vulnerability Context: Relevance of understanding the context



**Figure 8: Climate change stressors/pressures and possible effects (Step 1 of the framework)**



Figure 8 shows the climate change pressures/stressors present in St. Vincent and the Grenadines and the links of these pressures on the socio-economic and natural resources base of small island development communities. For the purpose of the study, the framework on the adaptation of youth to new climate conditions in SIDS is framed in terms of vulnerability and resilience (Henstra & Vogel, 2014) i.e. through a framework for learning in order to put theory into a practical perspective (Park *et al.*, 2012; Wise *et al.*, 2014). The diagram captures the climate change pressures/stressors that are present in St. Vincent and the Grenadines. The various impacts highlighted are seen as being the significant causes of vulnerability to the overall human and ecosystem systems of SIDS. According to literature, vulnerability is a contextual issue and depends on the adaptive capacity of the system in consideration (IPCC, 2014, Nurse, 2014). Therefore, the likelihood of identifying vulnerability will depend on the context of the situation being researched in SIDS. Therefore, it is essential to develop an understanding of the context of the area being researched in SIDS, as consideration of the first stage is focused on developing the adaptive strategies for youth to combat climate change in SIDS.

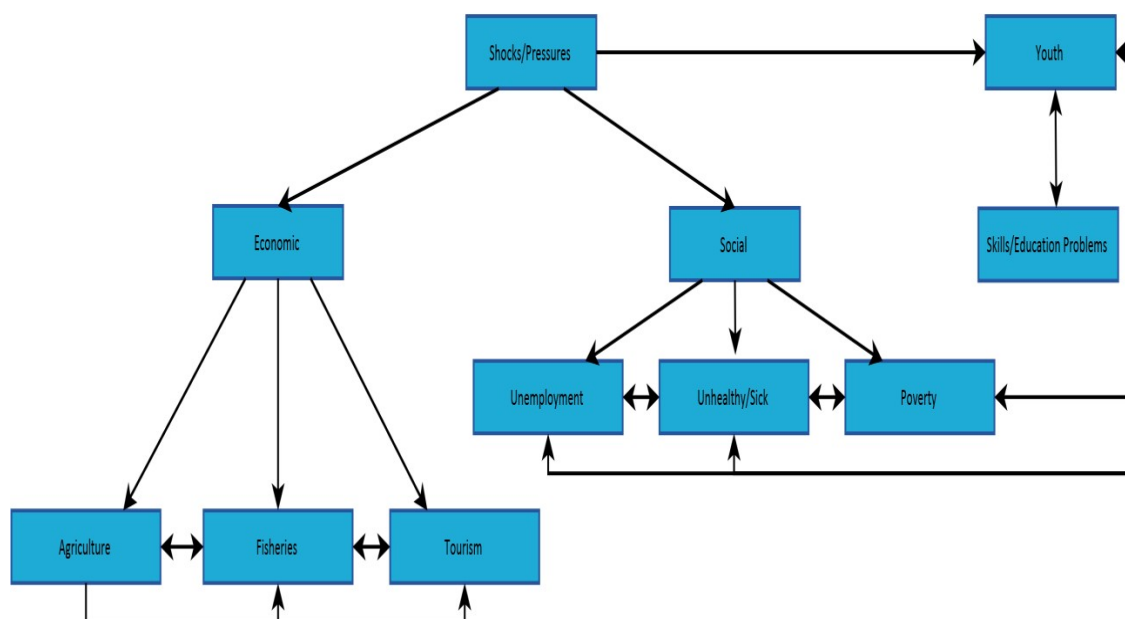
The diagram shows how these climate stressors can cause vulnerability among youth regarding affecting their overall wellbeing and livelihoods in tourism, agriculture and fisheries sectors and how such vulnerability can lead to an increase in poverty among youth. The literature shows that these climate pressures/stressors possess the capacity to cause devastating effects on SIDS. This framing perspective is supported by Nurse and colleagues (2011) who state that the vulnerability of small island states is primarily a function of four interrelated factors namely:

- (a) The degree of exposure;
- (b) Their limited capacity to adapt to projected impacts;
- (c) The fact that adaptation to climate change is not a high priority in small island developing states (SIDS), given more pressing problems that small islands have to face;
- (d) The uncertainty associated with global climate change projections and their local validity;

The impact of climate change on youth appears as an initial stage in the vulnerability assessment. Similarly, for the development of the conceptual framework of youth in changing climatic conditions, Stage 1 should be understood as the climate risk vulnerability context. The identification of climate stressors/pressures impacting on SIDS should be considered in this stage of the framework. Therefore, the identification of the climate pressures/stressors impacting in SIDS is in line with the climate change literature (Angelsen, *et al.*, 2011; Pereznieto *et al.* 2011; Nurse *et al.* 2014).

The researcher utilised multi-research methods to collect data for this stage of the conceptual framework. Participatory Climate Risk Vulnerability Mapping exercises provided opportunities for the participants to validate the climate pressures identified through the review of literature via stakeholders' engagement. Through stakeholder participation, the researcher provided the anecdotal evidence of the effects of climate change on youth in small island communities in the past. The researcher also collected data via interviews with Policymakers and Senior Officials, and Focus Group Discussions (FGDs) with youth. NVivo 11 qualitative computer software was used to assist the researcher with the analysis of the data collected from the interviews with Policymakers and Senior Officials and focus group discussions with youth. This aspect of the analysis responds to research question 1.

### 3.1.1.2 Step 2: Socio-Economic and Physical Effects on SIDS



**Figure 9:** Socio-Economic and Physical effects of climate change on youth in SIDS

As indicated in Figure 9, Step 2 of the conceptual framework shows the socio-economic and physical impact of climate change on youth in Caribbean SIDS. The purpose of this step is to explore the impact of the climate pressures on the socio-economic and physical effects of youth in small island development communities. The vulnerability on the youth sector to climatic pressures such as hotter temperatures, sea-level rise and increased hurricane intensity resulted in the loss of lives, property and livelihoods throughout the Caribbean (Bueno *et al.*, 2008). The identification of climate change impact/shocks/risk/stressors and pressures are in line with the models reviewed in the literature above. These are also in line with CCA strategies and frameworks.

The researcher adapted Calgaro's (2011) concept of shock and stressors and DfID's study (1999, in Angelsen *et al.* 2011) which theorised that livelihoods are impacted by trends as well as by shocks and seasonality over which people, especially youth often have limited control. These shocks include human health shocks, economic shocks, natural shocks and crop/livestock health shocks. In terms of seasonality, these may include prices for basic products, health relating to the impact of invasive species and diseases, and of natural resources and diversity, which may be destroyed due to the impact of drought, storms and hurricanes on biodiversity, or the impact of SLR and higher sea surface temperatures on coral reefs. It also borrowed from the Conceptual Framework 'Transition Pathways: Macro-level Economies Shocks and Micro-Impact on Youth', (Pereznieto *et al.*, 2011) which broadened the scope of discourse from meagre shocks relating to economic crisis to look at broader impact of climate change on youth, thus focusing on extreme weather events damaging infrastructure, lives and livelihoods. From the conceptual framework for developing adaptation indicators (Harley & Minnen, 2010), it draws from the top down global climate change projects and the development of national impact analysis to assessing the physical vulnerability on the ground.

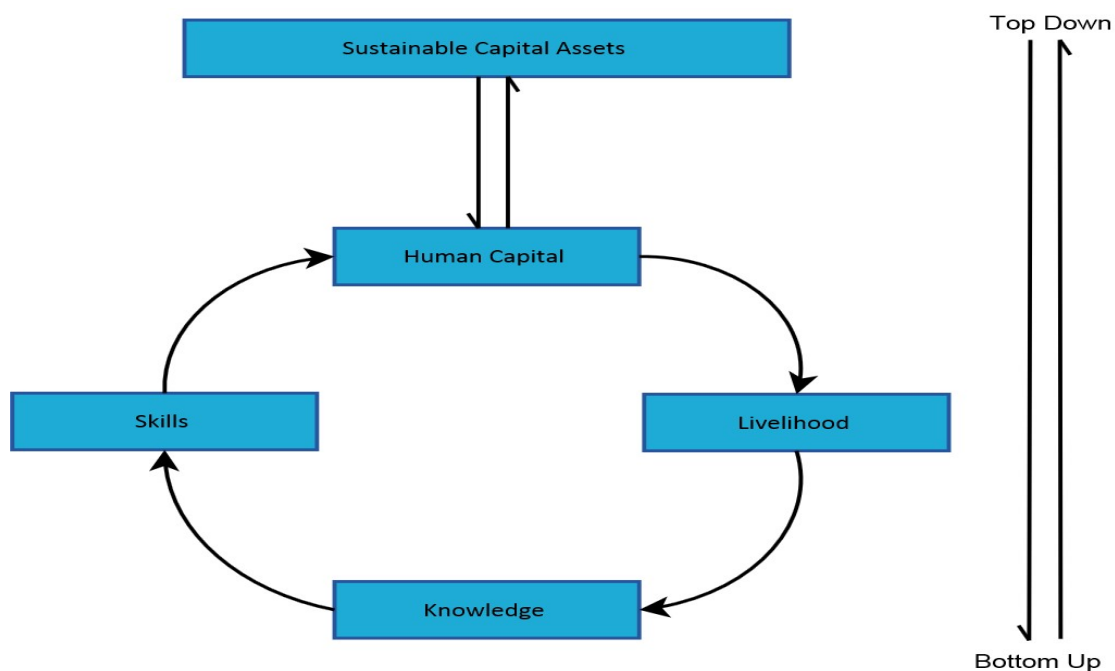
Vulnerability is the function of a system or organisation's exposure, sensitivity and adaptive capacity to the impact of climate change (IPCC, 2007 & 2014). These concepts are considered as significant vulnerability determinants in SIDS. According to the literature exposure, sensitivity and adaptive capacity are not categorised as impact. However, they are viewed as factors or processes that can increase or reduce the impact of climate change pressures (IPCC, 2014). One of the main tasks of the research is to

identify the factors and processes that may influence youth in SIDS exposure to vulnerabilities.

The effects of climate pressures on the socio-economic situation of youth and communities in Small Island Developing States (SIDS) are analysed via a mixed approach. This included literature review, interviews with policymakers and senior officials, Focus Group Discussions with youth and Participatory Climate Risk Vulnerability Mapping exercises with sample groups from six districts across St. Vincent and the Grenadines (Quinn, Pattern & Cochran, 2002; Angelsen *et al.*, 2011).

During the data collection process, the researcher employed Participatory Mapping exercises, reviewed secondary data sources to collect valuable information relating to shocks and trends on the impact of climate change and calamities on youth, the interviews with Policymakers and Senior Officials, and the FGDs with youth. The NVivo 11 computer qualitative software assisted the researcher with the analysis of the data collected from the interviews and FGDs.

### 3.1.1.3 Step 3: Human Capital Adaptation



**Figure 10:** Human Capital adaptation process

Improving the adaptive capacity of a state or community is important for reducing vulnerability as a necessity. This is indicated in Figure 10 on the human capital adaptation process and involves the implementation of adaptive strategies such as providing information for improving awareness, provision of knowledge and skills and improving the provision of social services (Smith & Pilifosova, 2002 & 2003). Figure 10 shows linkages between human capitals as they relate to youth development and CCA in Small Island Developing States. It identifies the links in the skills and knowledge required by youth to enable them to build resilience to adapt to climate change. The purpose of this stage of the framework is to put a spotlight on the relevance of human capital development by enabling youth to build resilience to adapt to climate change. Therefore improving the adaptive capacity is important in reducing the vulnerability of youth to the impact of climate change.

Human capital is one of the five capitals or assets of the Sustainable Livelihoods Framework and is shaped by a multitude of forces and factors that are dynamic in themselves and continuously changing (DFID, 2000 in Angelsen, 2011; Mulongo, 2012). The researcher adopted the human capital from the Sustainable livelihoods framework developed by DFID (2000 in Angelsen, 2011) and the use of similar data collection tools to collect data and the recognition of the value of formal and informal training and skills of youth. The framework also highlights the impact of calamities such as climate change on people and their communities about vulnerability context as well as focusing on the policies, institutions and processes that mediate across different forms of access to human capital.

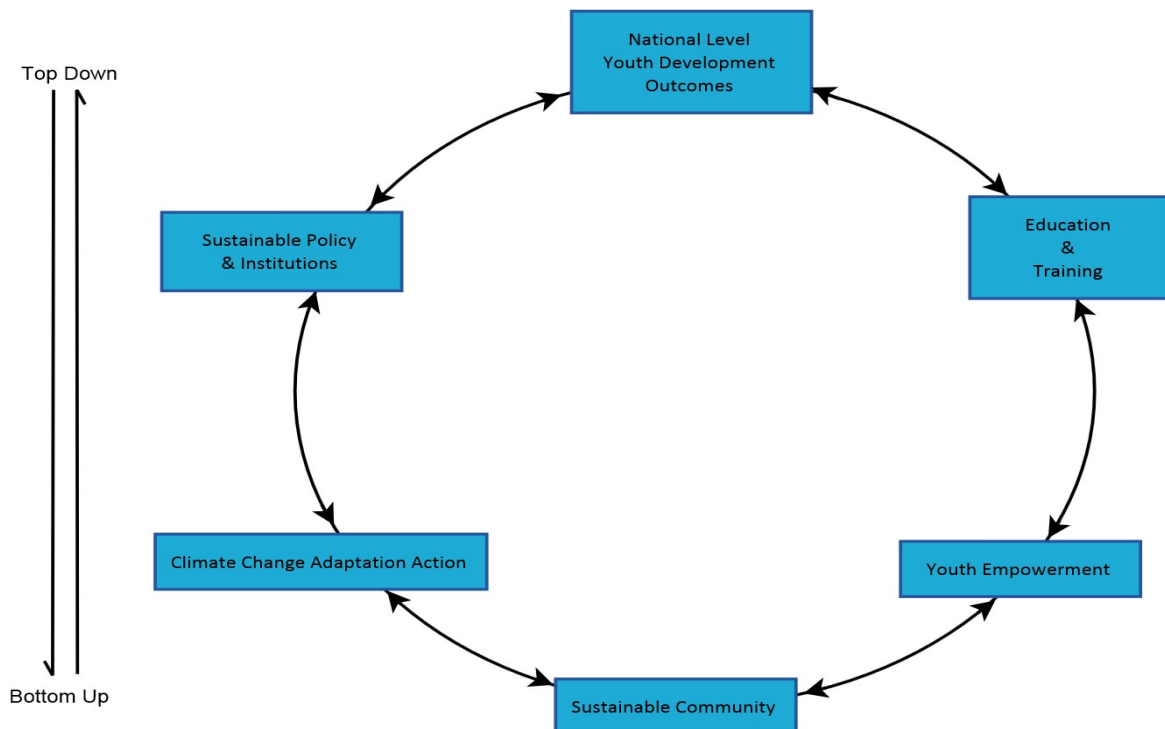
From the Conceptual Framework for Developing Adaptation Indicators by Harley and Minnen (2010), the researcher adopted the approach to developing regional and national strategies to improve knowledge of climate change impact and identifying possible sectors in which this should be done. The new framework also incorporated ideas from the Strategic Framework to Bridge Training and the World of Work development by the ILO (2010). This was done by accepting the notion, which states that countries that successfully linked skills development to gains in productivity, employment and development have targeted their training and development policies toward three objectives. These are a) matching support to current demands for skills, b) helping workers and enterprises to adapt to change and c) building and sustaining

competences for the future labour market. It also embraced the lifecycle approach to the training of youth that focuses on:

- (a) Building foundation skills throughout the school system from the early years to tertiary education levels;
- (b) Resources to improve foundation skills for youth by enhancing access to workplace skills experience which supports their transformation from school to work;
- (c) Supporting the continuous injection of resources to develop programmes which up-grade the skills of mature and older workers to enable them to develop new skills and knowledge.

Contextual information for the research was obtained from multiple sources including primary and secondary sources (Angelsen *et al.*, 2011) as well as interviews with Policymakers and Senior Officials and the FGDs with young people. The NVivo 11 qualitative computer software was used to assist the researcher with the analysis of the data collected from the field (Bazeley & Jackson, 2013) (Chapter 5). This aspect of the analysis responds to research question 2 of the thesis.

#### 3.1.1.4 Step 4: Adjustment to Youth Development Policy Strategy



### Figure 11: Adjustment to youth development policies, processes and strategies

This step in the development of the conceptual framework is to create mechanisms to adjust to or make changes (change enablers) to processes, policies and/or strategies to empower and build the resilience of youth to adapt to the impact of climate change and build sustainable livelihoods. The change enablers are divided into two areas: a) change enablers leading to youth empowerment and b) change enablers leading to adaptation. The first part of Step 4 shows the levels of adjustments and linkages to the policy and strategic process to empower youth to take action to build resilience to adapt to the impact of climate change in SIDS in the future. The second part of Step 4 indicates the change enablers and actions that are required for adaptation to take place amongst youth.

Figure 11 shows the levels of adjustments and linkages to the policy and strategic processes to enable youth to build resilience to adapt to the impact of climate change on SIDS in the future.

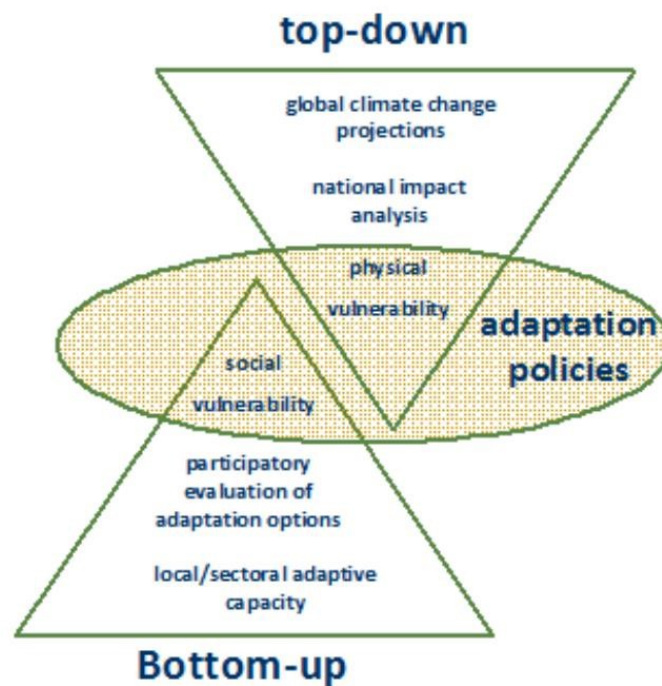
The researcher adopted this concept from DFID Sustainable Livelihoods Framework (DFID 2000 in Andelsen *et al.*, 2011) which indicates the mechanism, which allows the communities as is, to achieve their livelihoods outcomes. Du Toit and colleagues (2007), and Gough and colleagues (2007) claim that livelihoods studies often fail to recognise the structural barriers and opportunities that influence the options available to the poor. Figure 11 shows the structural and institutional processes, level of adjustment to policies and strategic processes to enable youth to build resilience to adapt to the impact of climate change in SIDS. Research by Scooners (1998) and Leach and colleagues (1999) show that institutions, whether formal or informal, are impacting on resources. Researchers define institutions as referring to rules, laws and constraints, and informal rules of constraints such as norms of behaviour, cultural practices and self-imposed codes of conduct (Angelsen *et al.*, 2011). Agrawal and Gibson (1999) and Angelsen, (2011) posit that investigation of rules governing access to various resources is, therefore, an essential step in collecting contextual information. This step is part of recognising that communities are not similar entities with shared interests or equal access to resources.

From the Strategic Framework to Bridge Training and the World of Work (ILO, 2010), the researcher adopted the model which focuses on the convergence across policies such that it looks at skills and employment through one lens. It recognises that the full value of one policy set is realised when it supports the objectives of another policy. An important part of the model is the recognition of the difficulties concerned with fostering the institutional arrangement and cooperation among government agencies responsible for policy implementation among employers, workers and training institutions. The framework also borrowed from the Conceptual Framework for Developing Adaptation Indicators (Harley & Minnen, 2010) which focuses on the use for a) mainstreaming of CCA within and between sectors, b) communicating adaptation policies and decisions to policymakers and other stakeholders, and c) comparing adaptation achievements across sectors.

The new conceptual framework also borrowed the cyclical process for delivering adaptation action, identifying possible sectors and facilitates, coordinate and encourage participants participating in the delivery of adaptation actions areas as well as presenting examples of outcomes-based indicators from the above framework. Monitoring and evaluation would not be a stand-alone step like other frameworks but would be embedded throughout all stages of the new conceptual framework. Such a feedback loop would provide opportunities for the continuous enhancement of the system by providing information on the system exposure and sensitivity in the future to climate change events.

As indicated by Harley and Minnen (2010), the researcher would approach the development of adaptive policy and action from top-down and bottom-up approaches (Figure 12). The bottom-up approach focuses on the building of local sectorial adaptive capacity, utilising participatory evaluation adaptive options to assess vulnerability on youth, whilst the top down would approach adaptation from global climate change projections down to national impact analysis and to assessing physical vulnerability on the ground.

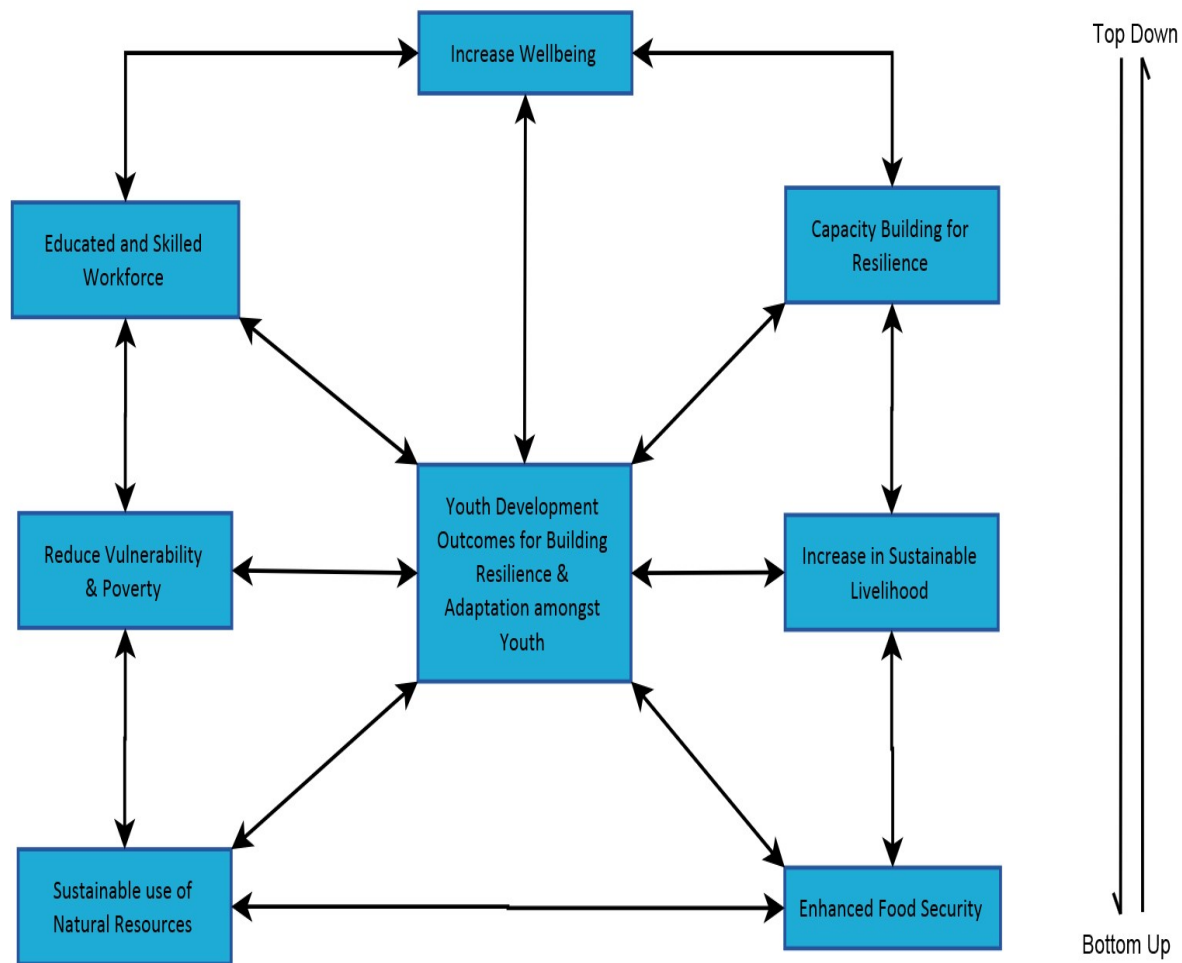




**Figure 12:** Building adaptive capacity from a top-down and bottom-up approach  
 - Process-based indicators (Harley & Minnen, 2010)

The researcher would use a multi-approach to data collection consisting of a review of literature, reports and other appropriate documents. The researcher will prepare a top-down case study on the Tobago Cays Marine Park initiative by the Government of St. Vincent and the Grenadines, and a bottom-up case study on the JEMS National Climate Change Campaign initiative implemented by youth. Data deriving from a top-down interview with Policymakers and Senior Officials and bottom-up FGD with youth would be assessed. The NVivo 11 qualitative computer software will be used to assist the researcher with the analysis of the data collected from the field. This aspect of the analysis responds to research question 3 of the thesis. Figure 13 below shows the broad range of outcomes and actions for building the resilience of young people to adapt to climate change in SIDS.

### 3.1.2 Linking Youth Development Outcomes to the broader conceptual framework



**Figure 13:** Youth Development Outcomes to the broader conceptual framework

The framework of analysis on the adaptation of youth to new climate conditions is framed in the study as reducing exposure/sensitivity, strengthen adaptive capacity and improve outcomes (Bennett *et al.*, 2015) for youth to adapt to climate change (Commonwealth, 2007). Generally, the relative responses to climate change in small island states vary between institutions, policies and stakeholders including the role of local government authorities, civil society and other development partners to provide support to build the adaptive capacity within the community (Glass *et al.*, 2010; Adger, 2003). These factors have a direct and robust relationship in influencing the outcomes of the research on the impact of climate change on youth in SIDS. This section is in response to research question 3.

### ***3.1.3 Summary of Section 1, Chapter 3***

There is no CCA conceptual framework available in the literature aimed at building the resilience of youth in SIDS to adapt to the impact of climate change. The researcher reviewed the available literature to identify structures and process of current climate change related frameworks and extract the viable aspects of these frameworks to develop a new conceptual framework which applies to young people's adaptation to changing climate condition in SIDS.

The first stage of the development of the conceptual framework is the review of the literature to identify the climate change pressures that are impacting on SIDS. This provides the researcher with a theoretical base for understanding climate change and the complexities surrounding this emerging climate phenomenon. The researcher also collected data from a top-down interview with policymakers and senior officials of government and bottom-up focus group discussions with youth to assess their perspective on the climate change pressures. Here the researcher utilised participatory climate risk and vulnerability mapping exercises to validate the climate change pressures present in SIDS.

The second stage of the development of the conceptual framework process involved the researcher reviewing the literature to investigate the impact of climate change pressures on the social-economic situation of youth and the natural resources base of SIDS. The researcher collected data from top-down interviews with policymakers and senior officials of government and bottom-up FGD with youth to assess their perspective on how climate change is impacting on youth in SIDS and to link climate change pressures to the overall vulnerability of youth. The researcher also collected data from participatory mapping exercises to verify whether there are similarities and linkages between the climate change stressors/pressures impacting on SIDS from the participatory exercises and the data collected from the review of the literature, interview with policymakers and FGD with youth on the climate change stressors in SIDS.

The third stage of the development of the conceptual framework was to review the literature about the impact of climate change on youth focusing on the knowledge and skills needs that will be required for youth to adapt to climate change and to enhance

sustainable livelihoods in the future. This aspect was also analysed through data collected from top-down interviews with policymakers and senior officials and bottom-up FGD with youth, which enabled the researcher to assess the success or failure of Human capital activities of youth in small island states within the education sector.

The final stage in the development of the conceptual framework was to create mechanisms to adjust to or make changes (change enablers) to processes, policies and or strategies to empower and build the resilience of youth to take action to adapt to the impact of climate change and build sustainable livelihoods. This is divided into two areas a) change enablers leading to youth empowerment and b) change enablers leading to adaptation. This step was analysed through data collected via review of the literature, a top-down case study on the Tobago Cays Marine Park and a bottom-up case study on the JEMS National Climate Change Campaign initiative implemented by youth, and an assessment of data derived by top-down interviews with policymakers and senior officials and bottom-up FGD with youth. Monitoring and evaluation are viewed as an essential aspect of the conceptual framework to provide feedback to implementers in order to assess or test the overall performance of the conceptual framework.

Overall, the primary goal of the research is to achieve sustainable development of the youth sector in SIDS, through CCA, therefore this is linked to the enhancement of stakeholders' understanding on whether CCA conceptual framework is supportive and efficient for building the resilience of young people to adapt to climate change in SIDS. Gaps were identified in existing sustainable development and CCA frameworks which were not applicable to youth adaptation to the impact of climate change. Therefore, the following chapter presents the methodology for testing the Framework on the Adaptation of Youth to the New Climate conditions. This framework is viewed as a viable model for the implementation of the Adaptation of Youth to new climate conditions in small island communities.

### *Methods and approaches*

Positivist and Qualitative approaches comprise the foundation of the Social Sciences. The discussion on paradigms is an essential element to consider when presenting a research methodology (Jennings, 2011; Pearce *et al.* 2011). It is critical to establish the reality from which the execution of the research question and discussion of result can be based (Hennick *et al.*, 2011). The advocates of the opposing views of the argument have

also developed their values, terminologies, methods and techniques to understand social phenomena.

A paradigm is defined as a perspective or a way of looking at reality. It is a frame of reference that researchers use to organise their observation and reasoning, therefore, in extension, the paradigm can also be defined as philosophical assumptions. Paradigm provides the basis for designing and executing the research process (Cresswell, 2007; Jennings, 2010). The research process should determine the mode of the inquiry, hence the relevance of the paradigm in the research process. Paradigm is also viewed as a theoretical framework model for shaping the research process (Neuman, 2011) and also can be considered to be a sieve or net that contain the epistemological, anthological and methodological principle of the research (Hennick *et al.*, 2011). The positivist paradigm is rooted in physical science (Kumar, 2005). The interpretative approach (known as the constructivism) assumes that reality is the product of the social process whereas the objectivism contends that there is an independent reality (Hennick *et al.*, 2011).

The research methodology is a strategy concerned with the identification of a particular practice to attain knowledge (Krauss, 2005). Tuli (2011) stated that 'the method' is a strategy which translates epistemological and entomological principles into implementable guidelines. From the perspective of the positivist point of view, qualitative research methods aim towards gearing representative samples that provide a clear answer to the research question of 'What is happening?' (Tracy, 2013). In their quest to get answers to the questions, researchers using this approach are more likely to triangulate, utilising multiple types and sources of data, devising methods of data collection, various and varying theoretical frames and numerous researchers (Denzin, 1978 in Tracy, 2013) in order to determine what reality is trending.

From the perspective of the constructivism point of view, the reality is not something "out there" which researchers can clearly explain, describe or translate in to research report. They believe that truth and knowledge are constructed and reproduced through communication, interaction and practice; therefore, knowledge about reality is always mediated through the researcher. The interpretative paradigm analyses social action from the actors' viewpoint. He/she attempts to see the world from the participants' perspective. This paradigm views the choice of methodology as a moral and values decision, which is shaped by ethical and political ramifications. Human interaction is

viewed as a text that can be read, interpreted, deconstructed and analysed and not as a tangible reality to be discovered and measured (Tracy, 2013). The section below presents the two dominant methodological approaches that involve the positivist and the objectivist/constructivist choices of research design/strategy.

### **3.2 Section 2 - Data Collection Methodology**

The methodology is one of the essential components of any research and can vary according to the researcher's chosen paradigm and design. The researcher must decide what is to be investigated. The content of the research questions and the way they are to be asked will predetermine the rest of the procedure. As the researcher reviewed previous and recent studies on similar or related themes, this review will play an important role in the formulation of the research questions. Ethical issues have to be considered, regarding the research questions and the sample population targeted for the research. Also, researchers would also need to attend to issues relating to feasibility, reflexivity and validity of the research process (Robson, 2002; Angelsen *et al.*, 2011).

The researcher found it beneficial to use multi-research methodologies for conducting this study. These consist of interviews, focus group discussions, case studies and participatory mapping exercises. The use of alternative research methods such as community-based research is gaining ground. While it is a more frustrating and time-consuming process to use, community-based research supporters believe that it is the only way research can benefit the community allowing members to become empowered. Community-based research has many preconceptions of what constitutes academic research.

The multi-search methodologies approach provides two significant advantages to enhance the quality of output of the research 1) it provides the researcher with the confidence necessary to pursue the research and; 2) it enables triangulation to take place, i.e. the use of different data collection systems within a study in order to ascertain the data given is the right information you want to find out (Saunders *et al.*, 2000, Robson, 2002). The researcher triangulated sources of information by examining

evidence from sources and using that to build a coherent justification for the themes (to be discussed later in the chapter) (Creswell, 2009). The methods employed by the researcher were desk audit and review of documents, interviews, focus group discussion, case study, and ethnological and participatory methodologies (participatory mapping). Each of these approaches possessed its peculiar strengths and weaknesses (Smith, 1995 in Saunders *et al.*, 2000; Robson, 2002; Angelson *et al.*, 2011) and was applied to the specific area of the research which best fits its use. The specific methods used to collect the research data involved:

- Conducting 16 top-down interviews with policymakers and senior officials of the civil service, other pertinent private sector and civil society agencies involved in policy formulation;
- Development and implementation of climate change education and training and adaptation programmes to garner top-down perceptions on how youth are prepared to adapt to climate change. All the interviews were conducted over an average of 90 minutes per interview. These were then transcribed.
- Reviewing of records from formal documents collected from government and development agencies regarding incidence, issues and impact of climate change on youth and small island communities.
- Conducting bottom-up climate risk hazards and vulnerability mapping consultative workshops and exercises to collect information on the impact of climate change on small island communities to create GIS climate risks vulnerability maps (IUCN & WRI, 2014). These mapping exercises provided validation from participants on the impact of climate change on the past.
- Conducting 9 Focus Group Discussions (FGD) among groups of young people from rural and urban areas including youth involvement in formal education (colleges and TVET programmes) and out of school youth to garner their perception on the impact of climate change on their communities, and explore what has been done to build their resilience to adapt to climate change in their communities (bottom-up approach).

- Preparation of case study on a live National Climate Change Campaign project implemented by young people through the JEMS Progressive Community Organisation (bottom-up approach). This provided an opportunity to extract the lessons learned from the project to make changes and adjustments to policies, strategies and programmes for climate change adaptation in the future.

The methods identified for collecting data are relevant to the aims and objectives of the study as well as the research questions and the target population (Angelsen *et al.*, 2011). Adequate consideration primarily determined the research methods used in the study regarding obtaining the relevant types of data. The study is situated within the framework of sustainable capital theory explicitly focusing on human capital.

There are some important considerations which influenced the researcher's choice of using the qualitative method over the quantitative method in the study. While all small island communities consist of differences of interest (2005), there are some issues, which provide the potential to obtain a representative view of matters of concern to such communities without recourse to large survey method, particularly in matters regarding small island communities and the impact of climate change on youth. Here the researcher would be able to extract quality data from fewer cases and with an emphasis on the description of variables (Kumar, 2005). The perception, experience and feelings of respondents are valid sources of data for understanding their views on the important aspects of the impact of climate change issues in question, and the uncertainties and complexities involved in addressing these issues.

In line with the deliberations expressed above and in keeping with the research objectives and research questions, the research methodology used is in keeping with the ethnographic research process.

### **3.2.1 Ethical Issues**

The researcher was cognisant of the importance of adopting ethical issues to guide the research process (Spradley, 1980 in Creswell, 2009). The researcher has the responsibility to respect the rights, needs, values and desires of the participants. It is being acknowledged that participants' observation invades the life of informants in the



study (Spradley, 1980 in Creswell, 2009), thus revealing sensitive information on participants. Measures were instituted by the researcher to ensure adherence to these principles:

- (1) The research objectives are to be explained verbally and in writing so that they were clearly understood including a description of how data will be stored and used;
- (2) Written permission to proceed with the study will be received from the participants;
- (3) Participants were informed of all data collection devices and activities used to collect data in the field;
- (4) Verbatim transcriptions, written interpretation and reports will be shared with all participants in the research;
- (5) The informants' rights, interests and wishes will be considered first when choices are made regarding reporting the findings;
- (6) The final decision regarding informants' anonymity will rest with the informants (Creswell, 2009).

The researcher provided an opportunity for participants to decide whether they want to participate in any aspect of the research. This step was taken to ensure that he did not intrude on the privacy of participants (Angelson *et al.*, 2011). Another ethical principle adopted was ensuring that information on the outcomes of the research was shared with the participating organisation. In fact, the researcher returned to the field (St Vincent and the Grenadines) to discuss the content of the transcripts with participants to seek clarification and verify the content of the transcripts (Feb-March, 2017). This was done as a way of avoiding and minimising biases (Robson, 2002; Angelson *et al.*, 2011).

Objectivity of data regarding the recording and collection processes is another key ethical principle the researcher adhered to by ensuring that data collected during the research process were not misrepresented (Angelson *et al.*, 2011).

### **3.2.2 Collecting data in the field - visits to St Vincent and the Grenadines**

As well as being defined by the United Nations as a small island developing state, St Vincent and the Grenadines was chosen to implement the research due to the cost of implementation and the researcher's familiarity with the island itself. The researcher is a citizen of St Vincent and the Grenadines and owns a house on the island, so this reduced the cost of housing and accommodation significantly for the period of the research. Secondly, the researcher is very familiar with the process and personalities involved in government and governance as the researcher was a senior civil servant in the government's civil service for over 20 years. This was instrumental in the ease of accessing data from governmental ministries and other stakeholders (Angelson *et al.*, 2011).

In May to July 2015 the researcher made a preliminary visit to St Vincent and the Grenadines to meet with key informants and senior policymakers of the Public Service, Private Sector and NGOs in order to assess the feasibility of the study. During that initial visit a desk audit was conducted to a) determine the climate change issues impacting on communities in St Vincent and the Grenadines, b) assess what is being done on the part of government to address these climate change challenges with specific emphasis on the level and quality of financial and human resources injected, c) discuss the policies formulated to address the climate change challenge, d) investigate whether there is a designated climate change education programme implemented by the Ministry of Education in the curriculum and e) explore the measures put in place to build the resilience of youth to adapt to climate change in the future.

An assessment was also conducted on the level and participation of the public and the broader community in the design, development and implementation of strategies and programmes to build the resilience of young people and their communities to reduce the impact of climate change. The researcher was instrumental in mobilising financial resources from the Goldman Environmental Prize (GEP) and the Jewish Community Federation (JCF) to assist JEMS Progressive Community Organisation to implement a National Campaign on Climate Change utilising a series of participatory strategies to raise awareness of over 45,000 people, and to provide funding to eight community groups to devise actions to assist these communities (rural and urban) to build resilience to adapt to climate change (Goldman Environmental Prize, 2015). The researcher

worked as a volunteer with JEMS to implement the participatory climate risk hazard and vulnerability mapping exercises at the community level (see section on the participatory mapping process in Chapter 5). During this preliminary visit, some of the participatory climate risk-mapping exercises were completed.

A follow-up visit was made to St Vincent and the Grenadines on 29<sup>th</sup> February to 7<sup>th</sup> June 2016 to conduct the field research for the project. During the field visit the researcher conducted interviews with sixteen policymakers including three Ministers and one former Minister of Government of St Vincent and the Grenadines (now Executive Director of Ministry of Tourism), five senior Directors of the Government's public service, two Chief Executive Officers of two private sector agencies and six senior officers of the Public Service involved in the formulation and implementation of the governmental policies and programmes.

Eleven FGDs were conducted with ninety-five, young people. These Focus Groups ranged from 8-12 young people per group including students from three colleges, four Technical Vocational Centres and two Focus Groups comprising young people who were out of school, and were not members of any organised group/organisation. The quality of participation in all these activities was very high.

Another follow up visit was made to St Vincent and the Grenadines on 25<sup>th</sup> February to 29<sup>th</sup> March 2017 to meet with policymakers and a sample of youth who participated in the Focus Group Discussions during the field visit in 2017 to verify the data collected. The researcher went through the transcripts with the participants and made changes to the content of the transcripts as directed by the participants. In some instances, the researcher collected additional data on the progress since the field research period on the implementation of policies and the integration of Climate Change Education in the Education Curriculum.

### **The researcher as a practitioner/activist**

The researcher is an internationally award-winning environmental activist/practitioner specialising in combatting the effects of climate change and sustainable development issues at the community level. The researcher was directly involved in the development and implementation of two of the case studies featured in the research. During the research process, a series of assessment was conducted on his roles a) as a researcher

and b) as a community sustainable development practitioner. The roles of a researcher and practitioner may have specific advantages and disadvantage when looking at the overall development of the research project. There are advantages for the researcher to take on the role of the practitioner in the implementation of research. The researcher would have an insider opportunity, i.e. a pre-existing knowledge and experience based on the situation of the people and stakeholders who are involved in the research project. This will provide a head start to the researcher in dealing with problems that would occur during the research process. There is also the likelihood that the time to be expended to carry out the research could be reduced. The researcher's insight and role in carrying out the research would help in the design, implementation and analysis of the research (Robson, 2002). Specifically, in the context of social work practice, there is a synergy between the researcher and practice, to the extent that both will benefit from the research process (Mears and Lanes, 1990 in Robson, 2002). There is potential synergy between the researcher and the practice such that the integration is of benefit to both.

On the other hand, there are disadvantages when the researcher is a practitioner/activist. Being so close to the centre of the research process can increase the biases of the researcher during the research process on the part of the researcher/practitioner/activist. Such biases can negatively influence the outcome of the research. Being directly involved in the development and implementation of components of the research (the Case studies) may not allow the investigation to apply the rigour and professional analysis required in the analysis of the research data.

The 'insider' researcher/practitioner may have a preconception about issues to be research and or solutions to address the research problem rather than relying on the analysis of the data to determine the research findings/outcomes (Robson, 2002). Another issue that is prominent in researching developing countries is that the findings produced by a local researcher/practitioner may be less valued in his own country than that provided by an outside researcher/practitioners.

During the implementation of the research process, the researcher ensures that extensive work was done on understanding the development context in the field as well as adhering to a differentiated, rigorous and systematic approach to conducting

research. All efforts were made to adhere strictly to the ethics and principles of conducting real-world research (Cresswell, 2007; Angelsen *et al.* 2011; Stacy, 2013). The researcher utilised triangulation and a range of strategies to enhance the research process.

The researcher possesses over 40 years of experience as an environmental activist at local, national, regional and international levels. Being a citizen of a Small Island Developing State (SIDS), namely St Vincent and the Grenadines, the researcher experienced the first-hand impact of climate change and other calamities on small island communities. He very passionate and motivated to use his environmental activism to influence policy, governance and practice changes at local and global levels. He was instrumental in participating in activities to build the resilience of small island states communities to adapt to the impact of climate change. As an environmental activist, he is driven to respond to developmental issues with his raw emotions. Therefore, being a researcher and practitioner has created internal tensions and has resulted in him changing the ways he responded to development issues.

During the PhD journey, the researcher acquired skills and knowledge which informed and shaped the way he responds to climate change and other development calamities. Therefore, rather than depending on his raw emotions he exercises much restraint and tack as well as employing empirical evidence to inform his decisions (check Appendix viii for the further analysis on reflective positionality of Researcher/Activist).

### **3.2.3 Data Analysis Procedures**

Data collection and analysis must be a simultaneous process in qualitative research. Qualitative data analysis is concerned with classification, particularly the properties which categorise items (Quinn & Cochran, 2002). Jacobs (1989 in Creswell, 2009) states that throughout the data analysis process, ethnographers index data using as many categories as possible.

The NVivo (version 11) software was used by the researcher to analyse data. NVivo is a sophisticated computer software program that helps to manage and retrieve complex data (Marshall, 2011). The computer software program assisted the researcher in facilitating the filing and display of data (Marshall, 2011). A major limitation of the NVivo software is that the program does not decide the outcomes of the data for the

researcher (Marshall, 2011). Therefore, analysing the data is a task of the researcher and not the task of the NVivo software programme. The following steps as indicated by Creswell (2009) were taken by the researcher to analyse the data collected from the field:

- Organising and preparation of data for analysis - This concerns transcribing the interviews and focus group discussions, typing up the field notes and sorting and organising the data into different types based on the sources of the data;
- Reading through all the data - This was done to obtain a general sense of the information collected, to make sense of the information collected and to reflect on the meaning;
- Begin local analysis with the coding process - Coding is the process of assigning numbers to text. The document containing all such codes as well as variable names and description is known as a codebook or a code framework (Angelson *et al.*, 2011). It is also viewed as the process of organising information/materials into chunks or segments of text before bringing meaning to the information (Rossman & Rallis, 1998 in Creswell 2009). This process consisted of a) taking text data or photos collected during the data collection process, b) segmenting sentences or paragraphs or photos/maps into categories, and c) labelling these categories with terms; preferable terms based in the actual language of the participants;
- Generation of a description from the coding process - The researcher used the coding process to generate a description of the setting, or people as well as categories or themes for analysis. The researcher also used these codes to generate themes or categories;
- Representation of description and themes – The researcher used a narrative passage to convey the findings of the analysis. This was done through the detailed discussion of several themes including sub-themes, specific illustrations, multiple perspectives from individuals and focus groups, and quotations and discussion with interconnected themes;

- Interpreting the meaning of the data; the critical view is to extract the lessons learned from the research (Lincoln & Guba, 1985 in Creswell, 2009). The lessons would be the meanings derived from a comparison of the findings with the information gathered from the literature and theories.

### **3.2.4 Stages of Sampling Design**

A good sampling strategy is to ensure that appropriate data is collected at each level relevant to the nature of the analysis to be implemented by the researcher (Angelson *et al.*, 2011). This will ensure that data from the different levels can be brought to bear in understanding the social, political and physical environment in which stakeholders operate. In general, the sample is pursued at several different stages of the research process (Robson, 2002; Byrne, 2002 in Angelson *et al.*, 2011). The researcher met with the Minister of Education and Senior Education Officers to discuss the purpose, aim, objectives and other issues pertaining to the operationalisation of the study.

In an investigation of the number of colleges and Technical Vocation Centres offering education programme to youth within 18-24 age group, the researcher was told that there are four colleges (including Teachers, Technical, School of Nursing and the Community College) and 6 TECH VOC Centres. A decision was made by the researcher and the officials of the Ministry of Education to conduct Focus Group Discussions with youth in all of the education facilities. All of the educational facilities participated in the Focus Group Discussions (FGD) except one college that was unable to participate because students were at home preparing for their end of year examinations. (Note: The other colleges and universities on the island are mainly run by American offshore universities and colleges which cater mainly for international students; very few local persons would attend. Students would typically travel to Trinidad, Jamaica and Barbados to attend the University of the West Indies. Other students would attend universities and colleges in Canada, USA, UK and the EU.)

#### **3.2.4.1 The sampling of Young people**

With the assistance of the officials of the Ministry of Education, the researcher visited the Colleges and Technical Vocation Training Centres to brief the Dean, Heads and senior staff of the purpose of the study and to provide leaflets on the research process. The next stage of the sampling process involved the researcher working with the Dean

of the colleges and Heads of the Technical Vocation Centres or his/her designated person to put the names of all young people in a bag and randomly selected the names of ten young people to participate in the Focus Group Discussions. All of the youth selected in the random sample participated in the Focus Group Discussions. A similar selection process was instituted in Georgetown and Chateaubelair by the Youth Officer and the Community Development Officer to select unattached and out of school youth to participate in the two Focus Group Discussions carried out in these towns on the windward and leeward part of the country respectively. The names of all the participants present were placed into a hat whereby the names of ten participants were randomly selected.

#### *3.2.4.2 The sampling of Policymakers and Senior Officials*

The researcher worked with Senior Officials of the Ministry of Education and the Ministry of Planning and Sustainable Development to prepare a list of the Senior Officials in the Public Service and beyond as well as Ministers whose jobs are relevant to the research process (Officials were directly involved in the formulation and implementation of policies including Education, Climate Change, Environment and Sustainable Development). In-depth interviews were held with 15 Ministers of Government, Directors and Senior Officials in the public service and Chief Executive Officers of private sector agencies including the Chamber of Industry and Commerce and the Tourism Authority (Chaudhery, 2008 in Angelson *et al.*, 2011). Due to the small number of persons involved in Climate Change Education and Training, and the policy formulation and implementation process, a decision was taken by the researcher to interview the pool of senior officials and ministers for the study. The views of these agencies were collected to assess the impact of climate change on youth, and what is currently being done in the education system to prepare youth to build resilience to adapt to climate change now and in the future. Meetings were initially organised with the Minister of Planning and Sustainable Development. However, he was no longer able to participate due to unforeseen circumstances.

#### *3.2.4.3 Concerns with random sampling*

The Community Development Officers and Youth Officers worked alongside the community leaders to mobilise youth to participate in the Focus Group Discussions (FGD) in Georgetown and Chateaubelair communities. Although these are classified as



small towns, they are very rural in composition, culture and remotely located from the capital. The community leaders did not think it was necessary to conduct random sampling among the youth to select the participants for the Focus Group Discussions. Both communities are located in the extreme north of the island adjacent to the La Soufriere volcano. The local leader felt that if 25 to 30 youths turned up for the activity, then the researcher should allow them to participate in the focus group discussion. Although this did not hamper the research process, it took away valuable time that could have been used in the research to explain the concept of sampling to the community leaders and youth. Those youth who were not selected left the community centre very dejected. The researcher praised the youth for their enthusiasm and apologised to those who were not selected in the sample.

### ***3.2.5 Pre-testing of Research Instruments***

The Focus Group Discussion (Appendix II) and interview (Appendix III) instruments were pilots tested with two groups of young people and three Senior Officials in the Public Service of the Government of St Vincent and the Grenadines during the first week of the field research in March 2016.

The JEMS Progressive Community Organisation selected youth who participated in the pretesting focus group discussion from the village of Enhams and South East Development Inc. based in the village of Stubbs. During the piloting of the instruments, the researcher observed the participants' understanding of the questions in terms of the vocabulary and content of the instruments as well as the relevance of the questions to achieve the answers to the research questions and the objectives of the research (Robson, 2002).

After the pilot testing was completed, the researcher held a workshop with the participants to discuss a) the difficulties in understanding the questions, b) nature of the questions in the instruments and c) whether the participants were comfortable with the vocabulary/format of the questions. Grounded in the responses from the respondents in the workshop, the instruments were refined and necessary amendments were made to facilitate ease of response and recording of data. The feedback also indicated the validity and reliability of the instruments. The researcher took time to translate the questions into the local dialect.

### 3.2.6 Textual Analysis

A desk review of documents relating to the impact of climate change on small island states was conducted. These include government policies, UNFCCC documents, journals, school Curriculum/Guidance and other related documents. The contents of these documents were examined to inform the researcher of any policy/s, strategic programmes and development projects regarding climate change education and training implemented in the state.

Textual analysis is described as any technique for making inferences by identifying specified characteristics of messages. It enables researchers to sift through large volumes of data with relative ease in a systematic fashion and is a useful technique for allowing one to discover the focus of individual, group, institutional, or social attention. Krippendorff (1980) contends that this type of analysis is useful for examining trends and patterns in documents (Krippendorff & Brook, 1990). Textual analysis has several disadvantages:

- (a) It is often devoid of the theoretical base or attempts too liberally to draw meaningful inferences about the relationships and impacts implied in the text.
- (b) It often disregards the context that produced the text, as well as the state of things after the text is produced.
- (c) It can be extremely time-consuming. ([http://writing@csu:writing\\_guide](http://writing@csu:writing_guide) )

### 3.2.7 Research instruments

Each of these approaches possessed its peculiar strengths and weaknesses (Smith, 1995) and was applied to the specific area of the research which best fits its use.

#### 3.2.7.1 Interview

An interview can be defined as a purposeful discussion between two or more people (Kahn & Cannel, 1957 in Saunders *et al.*, 2000). Robson (2002) stated that an interview is a flexible and adaptable way of finding things. He states that an interview is a research method, which involves the researcher asking questions and receiving answers from the people he/she is interviewing. Interviews can be structured, unstructured or semi-structured and are intended to provide the respondents with maximum freedom in

determining their response. Unlike questionnaires, interviews tend to be open-ended questions in which participants can express their views freely, thus reducing confusion. Interviews have the potential of providing substantial and highly illuminating information/data (Robson, 2002). Opportunities arise during an interview to enable the interviewer to probe answers and use prompts to encourage and expand responses from the interviewee. This will add significance and depth to the data obtained (Saunders *et al.*, 2000).

In this research, semi-structured interview (Appendix III) was used to solicit policymakers' views on the impact of climate change on youth within small island communities, the mechanism within the education system to prepare youth to build skills, knowledge and livelihoods to build resilience to adapt to climate change, and the policies and institutional mechanism in place for small island communities to adapt to Climate Change. The data obtained in the interviews can either confirm or contradict other stakeholders' views and provide a better insight of the situation thereby assist in forming recommendations.

Interactions with participants during the interview session allow the researcher to observe behaviour and body language. The researcher was also able to modify his line of enquiry and follow up interesting responses (Robson, 2002). Another purpose of these interviews was to highlight possible barriers and gaps in the education system to prepare youth to build resilience to adapt to climate change. The researcher used semi-structured interviews with the policymakers to solicit their views. Interviews, however, have disadvantages such as they are time-consuming and require careful preparation. Biases are also difficult to rule out (Robson, 2002). NVivo 11 was used to assist with the analysis of the data (the methodological process for analysing the data is discussed in Chapter 5).

#### *3.2.7.2 Participatory Action Research Path and Mapping*

The researcher used participatory approaches as the leading research methods. The research path provides an analysis of the process used by the researcher to obtain the information required. Participatory research is described as a family of approaches, behaviours and methods for enabling people to do their appraisal, analysis, planning and conducting their monitoring and evaluation (Chamber, 2002). Participatory Action

Research (PAR) shares the belief that the research process can empower people to see multiple realities, generate new knowledge and solve their problems. PAR is unique for working with youth as it can be adapted to the age, experience and social position of youth. This applied to the Focus Group discussions (Appendix II) and the participatory climate mapping exercises, in that it encourages reflection and debate, enabling the creation of consensus and sets the limits of dissent (Chakraborty, 2009).

#### *3.2.7.2.1 Strengths and weaknesses of using the participatory methodology*

Due to the complexity of the political nature and the sensitivity of the Civil Service of St Vincent and the Grenadines, the researcher felt that the participatory research methodologies provide the best option, especially when used in collaboration with other methods.

The advantages of using this methodology are:

- It contributes to heightening the researcher's awareness and knowledge of the social processes and situation within the organisation and its environment;
- It is a valuable approach for explaining what is taking place within a particular social environment;
- It provides opportunities for the researcher to be involved in the real work situation within the organisation, which encourages the development of trust and camaraderie as well as the transfer of skills and values between the researcher and staff.

Critics of this process highlight the disadvantages as:

- It is time-consuming, potentially expensive and the researcher needs specific facilitation skills to implement the research project successfully;
- Biases on the part of the researcher can develop due to the researcher's closeness to the situation he is researching.

The success of the research process was accredited to the researcher's credibility within St Vincent and the Grenadines. He is a professional in the development field, and his work on environment and development issues in St Vincent and the Grenadines and across the Commonwealth is well known and respected by senior managers and

employees in the Ministry of Education and the more extensive Civil Service of St Vincent and the Grenadines.

### *3.2.7.3 Participatory Climate Risk and Vulnerability Mapping exercises*

Participatory climate risk and vulnerability mapping exercise are viewed as a bottom-up approach to collecting data in climate risk and vulnerability at the community level. Maps and diagrams are viewed as important components of any planning activity, specifically in rural and community development initiatives where planning, implementation, monitoring or evaluation are required when the subjects are land use, watershed management, afforestation initiative, agricultural development and other aspects of development planning (IUCN & WRI, 2014). Participatory mapping is defined as a set of methods that combine modern cartography with participatory methods to represent the spatial knowledge of local communities ([http://www.mappingforrights.org/participatory\\_mapping](http://www.mappingforrights.org/participatory_mapping)).

Six participatory mapping exercises were implemented to collect data in forty villages and three towns on mainland St Vincent and one on the island of Bequia in the Grenadines. Over 160 participants participated in the mapping exercises. These exercises were used to provide the researcher with information about the physical characteristics of the community, but can also reveal much about the socio-economic conditions and how the participants perceive their community. The maps were drawn on large sheets of paper by the Arts Class of the Georgetown Secondary School. The exercise often attracts much attention and generates useful debate among the mapmakers and the onlookers. On completion of the participatory mapping exercise, the maps were given to the GIS team of the Physical Planning Division of the Ministry of Planning and Sustainable Development to be digitised.

Advantages of using paper maps in the Participatory Mapping process:

- It has an advantage over mapping on the ground in the sense that it is a record which can be carried away or left with the villagers as a document of their village, recorded at a particular point of time, and which is produced by the villagers;
- It is participatory (though not as much as in the case of mapping on the ground);

- It is an excellent document for generating lots of discussion on the past, present and future needs of the community.

Disadvantages of mapping on paper:

- Its limited size does not allow for greater detail, elaboration or extension of the map;
- It is not as participatory as mapping on the ground. This is mainly because of the limited size of the paper offers only a limited space for the people to surround it and participate. However, this problem was solved by hiring the art students of the Georgetown Secondary School to build the maps according to the scale;
- It is more difficult to correct when there are pen marks or errors in spelling or other permanent marks, unlike making patterns on the ground with coloured powders or chalk, which can be wiped off as corrections are made.

#### *3.2.7.4 Case Study*

Case Studies are bounded by time and activity, and researchers collect detailed information using a variety of data collection procedures over a sustained period (Stake, 1995 in Creswell, 2009). Qualitative case study methodology provides tools for researchers to study complex phenomena within their contexts (Baxter & Jack, 2008). The researcher chose Stake (1995) and Yin (2003) approach to case study development, which is based on a constructivist paradigm, i.e. a claim that truth is relative and that it is dependent on one's perspective. The constructivist paradigm recognises the importance of the personal human creation of meaning but does not reject outright some notions of objectivity.

Constructivism is built upon the premise of a social construct of reality (Searle, 1995 in Baxter & Jack, 2008). One of the advantages of this approach is that the participants tell their stories (Crabtree & Miller, 1999 in Baxter & Jack, 2008) and it is through these stories that there is a collaboration between the researcher and the participant. This collaboration enables the participants to describe their views of reality, which allows the

researcher to better understand the participants' actions (Robottom & Hart, 1993 in Baxter & Jack, 2008).

The researcher decided to use a case study design because he wanted to cover the contextual conditions of the climate risk hazard mapping process of six communities in St Vincent and the Grenadines implemented during the research project. The researcher believed that these maps and the participatory mapping process are relevant to the phenomenon under study. Another reason for choosing this method is that the researcher believes that the boundaries are not clearly defined between the phenomenon and context of the research (Yin, 2003). It is within the context of developing the maps that the researcher was able to observe the manifestation of climate change impacts on youth and small island communities. These maps provided the evidence of how climate change risks and hazards are impacting these communities now and into the future (Baxter & Jack, 2008).

#### *3.2.7.5 Observation*

Although the observation approach is prone to numerous ethical considerations (Saunders *et al.*, op. cit.), the researcher viewed it as a handy research tool. The observation was carried out to examine the organisation's cultural practice, the relationship between Senior Managers and employees, leadership, team building and power relationships in the civil service. The researcher studied the process between policy formulation (Cabinet) and implementation (Ministry of Education) to determine information flow, the role of stakeholders in the process and identification of bottlenecks. The researcher ensured that employees were aware of his presence and the nature of his work.

There are weaknesses in using observation as a research tool. These include a) the disadvantage of informing participants of your presence might lead to non-participation or altering of the behaviour of employees in such a way as to present invalid information (Bryman, 1988). This is an area over which the researcher had no control. He met with Senior Managers and other members of staff of the various line Ministries to brief them on the outcomes of his observation; b) an observer may be biased in his observation and therefore the interpretation and conclusions drawn from the observation may also be biased, c) if the researcher's attention is on observing, he/she may also forget to record

essential pieces of interaction and information (Creswell, 2009). The researcher bears the above factors in mind when recording his observations on the activities implemented in the field.

#### ***3.2.7.6 Conducting the Study in the field***

The researcher selected and trained eight Community Development Practitioners (CDPs) and 12 Community leaders as volunteers to assist with the mobilisation of youth and community leaders to participate in the Focus Group Discussions (FGD), Participatory Community Mapping exercises and organising community meetings. The selection of these practitioners was based on the following criteria: their knowledge of the community; their skills in community mobilization; their ability to communicate effectively; and in light of the wide geographic spread of the research process, the persons having the time to mobilise the youth and the broader community to attend the activities as well as organising the space to host the Focus Group Discussion and the Participatory Climate Risk Mapping exercises.

These practitioners are professional community development officers employed with the government's Community Development Department and the Youth Division with over five years' experience working within these communities; thus they are well-known by participants in the areas (IUCN & WRI, 2014). The risk of having a biased sample was therefore quite low. However, the researcher was quite vigilant by rechecking the sampling procedure before and after the selection of participants. A weekend workshop was conducted. Participants gathered on Friday at the camping facility at 6:30 pm and stayed until Sunday at 5pm. The researcher shared the purpose and objectives of the research. He and other resource persons provided information on current research evidence on the impact of climate change on small island states. Presentations were made by Mr Bentley Brown, Director of the Social and Environment Division of the OECS Secretariat in St Lucia on the impact of Climate Change in the Caribbean and strategies in the OECS to build resilience. Ottis Joslyn, Science Officer of the Caribbean Community Centre for Climate Change (5Cs) presented a paper on the work of the agency on combating climate change in the Caribbean Region.

Research techniques on how to administer survey instruments such as interviews, Focus Group Discussions and Participatory Mapping Exercises and strategies for mobilising



communities to participate in the focus group discussions (FGD) and the climate risks and vulnerability mapping process were discussed. Participants went into the community to conduct interviews and a mock FGD. As this study is not an end itself, the researcher hopes that the activities would (i) motivate Community Development Practitioners and youth peer volunteers to raise people's awareness of the impact of climate change and (ii) build a cadre of persons on the ground who will continue to advocate for this sector of the population.

The participants were very active in mobilising and organising communities to participate in all aspects of the research process. The researcher visited the six districts (forty villages, three towns and one island) that participated in the Participatory Climate Risk Hazard Mapping as well as the three colleges, five Technical Vocation Education Centres and the two rural towns participating in the Focus Group Discussions (FGD). Eleven FGDs were conducted. The researcher conducted 15 interviews with Ministers of Government and Senior Officials of the Public Service involved in the formulation and implementation of policies. The researcher also collected any available documents on Climate Change adaptation and mitigation in St. Vincent and the Grenadines.

Young researchers participated voluntarily in the project because the project was understood to be providing them with useful and technical capacity-development research as well as the opportunity to undertake analysis to be presented to a national audience. During the first phase of the project, the young researchers were involved in pilot testing the survey instruments. Their views were addressed to ensure that they better reflect the ideas and comments of the local people. During the second phase of the research process, the research instruments were entirely reshaped to reflect the issues that the young researchers identified during the pilot as most relevant for youth, based on their work in the communities and tertiary institutions (Angelsen *et al.*, 2011; IUCN & WRI, 2014).

Of the over 30 activities organised all were successfully implemented except one of the colleges where the required participants were preparing for their final end-of-year external exams.

The high response rate was attributed to the following factors:

- By participating, the policymakers and senior officers anticipated that the findings of this research would give them some insights on how to actively and effectively engage the education system and training facilities to prepare youth to build resilience to adapt and mitigate climate change. They were convinced that there are benefits to be gained from their involvement;
- The government would be challenged to strengthen their policy framework and provide more resources to support the programmes to reduce the impact of climate change on the country as a whole and communities in particular;
- This was the first study to be conducted on the impact of climate change on youth in small island communities in St Vincent and the Grenadines, and it is hoped that this will raise the profile of the island in its fight to build the resilience of the next generation to reduce the impact of climate change.

#### **3.2.7.7 Reliability, Replicability and Validity**

Reliability, replicability and validity are important in all forms of research, but they mean different things, and have different implications, in the case of qualitative research.

Reliability is defined by Robson (2002) as:

*‘The extent to which a measuring device, or a whole research project, would produce the same results if used on different occasions with the same object of the study,’ (Robson, 2002 pg.551).*

The researcher, therefore, ensured that there was no bias in the collection of the data to distort the data collection process. Many steps were taken by the researcher to reduce biases of data. These include:

- (a) Reducing the perception of the questions in the interview and FGD by piloting the survey instruments and making changes in simplifying the vocabulary and sentence structures;
- (b) Use of triangulation, i.e. using different methods to collect data, e.g. Interviews, FGD, Participatory mapping, observation and case studies. Triangulation provided opportunities for the researcher to examine data for verification;

- (c) Use of local enumerators who are knowledgeable of the communities (teams of local youth) to provide support to the researcher when collecting data in rural communities;
- (d) Conduct FGD in local dialect to reduce misinterpretation of the questions and enhance fluency and quality of data;
- (e) Asking probing questions to enhance the quality of response from respondents;
- (f) Training of all volunteer enumerators on how to conduct the research.

Validity has specific meanings within each research paradigm. In quantitative research, validity is all about the proximate truth of inferences or conditions regarding the relationship between what a test measures, and what it will predict (Angelsen *et al.*, 2011). For the qualitative researcher, validity is a matter of being able to offer a sound representation of the field of study as the research methods allow, i.e. the validity of a study is a judgment about the extent to which it can be said that the research has captured important features of the field and has analysed them with integrity. The validity of the findings cannot, therefore, be generalised to other settings.

The researcher utilised some strategies such as checking and triangulation of data sources to ensure the validity of the research process (Creswell, 2009). This is an approach where more than one data collection technique is employed. Triangulation was used as a validation process where the responses of youth, Policymakers and Senior Officials of Government during the interview process were compared and contrasted with each other and with the data collected from youth participating in the FGD, and the documentary information collected from desk reviews of government and other information sources (Angelsen *et al.*, 2011).

#### *3.2.7.8 Limitations of the study*

The research project has provided the environment for continuous dialogue with officials of the Ministry of Education, Ministry of Planning and Sustainable Development and other critical line ministries and institutions on the integration of Climate Change Education in the school curriculum and exploring strategies for making the education system more relevant to the development needs of the island and appropriately

achieving policy outcomes. However, there were factors which have affected the smooth implementation of this research.

#### *3.2.7.8.1 Time and Financial Limitations*

Time and financial challenges are recognised by researchers (Patton, 2002; Ezzy & Liamputtong, 2005; Hennink *et al.*, 2011) as significant challenges, which can influence the successes or failure of a research project. The success of a research project is mainly measured by the extent to which the research objectives are achieved (Ezzy & Liamputtong, 2005).

It is important to note that the availability of financial resources can determine whether the researcher achieves the research objectives. The availability of financial resources can influence a) the size of the sample for data collection (Patton, 2002) b) the time available for the researcher to collect data in the field, c) the amount of data to be collected and d) where the field research will be located. These factors can lead to unrealistic conclusions if the number of financial resources and time are not available to carry out the research. The financial constraint was a significant issue because the research activity was funded solely by the researcher. The researcher had to devise innovative strategies to cover the cost of travelling and accommodation in order to collect data in the field in Vincent and the Grenadines.

During the execution of this research, there were some instances where the researcher was available for interviews, but the interviewees were either not ready or were unavailable even though appointments were made in advance. In some instances when the researcher arrived in remote communities, he was informed that the participants for the focus group discussions were not available for the meetings. This issue was resolved by the researcher going into communities at earlier times to assist Community Development Officials and local leaders in encouraging participants to attend the FGD meetings. Some meetings were held later than planned, but participants were happy to participate in these activities. There were instances where Policymakers and senior officials were involved in emergency meetings in their respective ministries; therefore, the interviews had to be rescheduled for later during the day or for another day.

### *3.2.7.8.2 Language*

Overall, most of the participants from the colleges participating in the FGDs used a combination of English and the local dialect interchangeably whereas, those attending Technical and Vocation Education Centres and those representing unattached/unemployed youth communicated solely in the local dialect. The researcher worked with a team of local youth researchers to transcribe the conversations verbatim from the FGDs in the local dialect. During the data analysis process, the researcher worked with the youth researchers to translate the notes that were taken in dialect into Standard English. Analysis of the data was conducted using NVivo 11 (Chapter 5).

Koulourioris (2011) states that when conducting research with non-native English speakers, sometimes their language skills may prevent them from sharing their whole experiences during the research process, therefore the participants' first language(s) are usually preferred since it facilitates them representing their sense of self and worldview (Shimpuku & Norr, 2011; Lu & Gatua, 2014). It is important to note that not all researchers would have the language skills in the target population's first language(s). Such deficiency in language may pose difficulties in the collection of data in the field (Temple & Young, 2004). Although the researcher is a native of St Vincent and the Grenadines and fluent in the local dialect he had to ask the participants to speak slowly because there were instances when he found it quite difficult to comprehend the dialect due to variations at the community level. As stated above the researcher recruited and trained a group of youth volunteers to assist him with the translation of dialect to English and vice versa. The young volunteers were instrumental in either requesting participants to explain further what they were saying, or to speak more slowly. In most instances, the volunteers assisted with the translation of the local dialect.

Other aspects pertaining to choice of language which was considered by the researcher included a) the language which is generally used in discussing the research topic outside of the research project among the participants involved in the research process and b) the level of impact the choice of language would have on the study (Lu & Gatua, 2014). English is viewed by most youth as a colonial (oppressive / "Babylonian") language used by adults, the government / institutions, and the elite. It is not commonly spoken in most homes nor during social and cultural activities conducted by youth. Therefore, it is not an excellent choice to engage young people in such a research process. However,

English is quite popular among Policymakers and Senior Officials because it is the language of instruction in the public services and other formal settings in St Vincent and the Grenadines.

Translation is defined as the process, which enables the researcher to package the data into a form that fits the tools he has for handling it. The challenges for consideration by the researcher was whether there is a potential semantic loss of data during translation or whether there are inherent difficulties in translating the cultural meanings that are rooted in language (Simon, 1996; Temple, & Young 2004). To minimise this issue, the researcher trained and engaged young people from the communities as volunteers to participate in the FGD, assist with taking notes and with the interpretation of the language. Questions were asked during the FGD to seek clarification on any issue that arose during the actual session.

Temple & Young (2004) state that the choice of when and how to translate language is an important consideration for the researcher and will depend on the level of resources available to the researcher. Translating data into English is an expensive and time-consuming process. During the research process, the translators were also involved in discussions about perspective and outcomes of the research process. This was supported by the researcher meeting with FGD groups and engaging the same translators one year after the initial data was collected to clarify issues relating to the content and the research process.

#### ***3.2.7.8.2.1 Researcher/translator role***

The researcher/translator role offers the researcher a) significant opportunity for close attention to cross-cultural meanings and analyses of the data under consideration and b) the chance to be up close and personal with the difficulties of meanings and nuances within the language and the overall research process.

#### ***3.2.7.8.2.2 The researcher working with translators***

As stated above the researcher engaged a set of volunteers to assist with the translation of data for the research. This provided the opportunity for the researcher to engage with translators on the choices they had to make in producing written text from one language to the other (Riessman, 2000; Temple, 2002). Consequently, the interaction with translators provided opportunities for the researcher to talk to the interpreters

about their views on the issues being discussed and allow for differences in understanding of the words, concepts and worldviews across the two languages.

#### **3.2.7.8.3 Cultural sensitivities**

The researcher ensured that nuances, such as cultural values and the targeted population's lifestyle were considered to ensure that the research was conducted in a culturally appropriate manner (Lu & Gatua, 2014). Even though youth are treated in popular discourse as a homogenous group whose composition and structure is universally agreed, the fact remains that the concept of youth is subject to all relatives - cultural, temporal, spatial and otherwise typically associated with a socially different concept (Carter, 2008). Youth in St Vincent develop their cultural norms and practices depicted in the way they dress, speak and the music they listen to and the way they dance. Although these youth speak the local dialect, there was an entirely new form of language that was emerging with its distinct vocabulary and rhythmic patterns. As a way of overcoming this barrier, the youth research volunteers accompanied the researcher to the FGDs and participated either as interviewers, translators or note takers. They then worked with the researcher to transcribe the notes from the FGDs and participatory climate risk mapping exercises.

The dialect in St Vincent and the Grenadines constitutes a combination of English, French and a blend of African languages. It is a spoken language, and the context determines the majority of the words or their meaning. Also, the youth themselves have their language which, even if they utilise a common English word, will have a completely different meaning to the original word.

#### **3.2.8 Summary of Section 2, Chapter 3**

Education and health are the two areas of human capital which are of concern when dealing with climate change. They are perceived as keys to improving resilience to climate shocks as well as significant development goals. Research shows that additional stresses brought about by global warming will make it more challenging to achieve existing development targets for health and education (Bowen *et al.*, 2012) by the increasing vulnerability. Therefore, vulnerability to climate change is a function of two socioeconomic variables (Barr *et al.*, 2010) i.e. a) the senility of a country/community to climate event, which in turn determines the physical impact of a given climate exposure

and b) a country/community adaptive capacity, that is, its ability to deal with the climate change impact.

The study employs a range of methodology including review of documents, interviews, focus group discussions, observations and case studies to a) collect and analyse empirical data on issues pertaining to the impact of climate change on youth in small island developing communities, b) assess the applicability of top-down and bottom-up approaches to climate change adaptation, c) assess how youth are prepared in the education system and the broader community with skills and knowledge to adapt to climate change in the future, and the proposed climate change adaption actions required by youth to build resilience to adapt to climate change. The assurance of anonymity both in the design of the interview and focus group discussions and the nature of administration ensured responses were given without any influence of fear and favour.

### ***3.3 Overall summary of Chapter 3***

This chapter presented the methodology used by the researcher for the collection of data. The overall purpose of the chapter is to present how the framework developed in Section 1 was used in the research to guide the data collection process (the section is linked to objective 5 of Chapter 1). The researcher chose qualitative research as the dominant methodology for the research because it enabled him to understand the participants' actions better, experience and criteria for decision making (Lather, 1992), particularly their behaviour, belief and process that control their relationship with each other and their environment (Hennick, Hutter & Bailey, 2011). The research is grounded in Qualitative Research System Theory (System Thinking). The central theme of this application is the recognition that climate change adaptation, specifically of youth in small island communities is composed of many interconnected subcomponents which cannot be studied by separating them into their parts; therefore data is collected from a range of different stakeholders utilising a range of different data tools/methodologies.



# Chapter 4

## Case Studies

This chapter highlights the socio-economic and development perspectives of St. Vincent and the Grenadines. It presents an analysis of the main economic drivers of the island including agriculture, tourism and fisheries as well as a chronological account of over 400 years of history as the island continues to build the resilience of its communities to adapt to the impact of climate change. It also presents an analysis of the utilisation of climate change mapping to identify the climate stressors impacting SIDS.

### ***4.1 Section 1: the Geographic and Socio-Economic perspective of St. Vincent and the Grenadines***

St. Vincent and the Grenadines (SVG) is a member of a category of countries called Small Island Developing States (SIDS) (Figure 14). SIDS, comprising fifty-eight countries, form a distinct group of developing countries across three main geographic regions spanning the ocean regions of the Pacific, Indian and Atlantic as well as the Mediterranean and Caribbean Seas, stand to be among the first and foremost states diversely affected by

the impact of climate change (Lazarus, 2012). They are particularly vulnerable to climate change and its effects. SLR, changing precipitation and rainfall regimes, changes in tropical storms and cyclone frequency or intensity, increasing air and sea surface temperatures, changes in atmospheric chemistry and melting of mountain glaciers are some of the phenomena and disruptions related to climate change (Gomez, 2013). SIDS are by no means a homogenous group of countries; they differ in terms of geography, physical, climate, social, political, cultural and ethnic characteristics and by stages of economic development.

Besides these differences, the islands tend to share several characteristics that not only identify them as a distinct group but also underscore their vulnerability in the context of sustainable development and climate change (Nurse *et al.*, 2014; IPCC, 2014). These include:

- (a) Limited physical size, which effectively reduces some adaptation options to climate change and SLR;
- (b) General limited availability of natural resources, i.e. Many of the resources are already under severe stress from unsustainable use by human activities;
- (c) Relatively thin water lenses that are highly sensitive to SLR, generally high population densities and in some cases high population growth;
- (d) A poorly developed infrastructure (UNEP, 2013).

These development challenges are compounded by the limited financial and human development skills, which can severely limit the capacity of small islands to adapt to climate change from a global economic perspective.

The International Community has defined St. Vincent and the Grenadines as a SIDS. It is a member of the region's economic and political sub-grouping the OECS, comprising the Windward and the Leeward Islands and also of the larger regional grouping, the Caribbean Community (CARICOM). The island is located between 13° 05'N, 61° 15'W in the South Eastern corner of the Caribbean archipelago, north of Grenada and south of St. Lucia and comprises one main-island (St. Vincent) and thirty-two small islands and cays (The Grenadines). It has an area of 150.3 sq. miles. The largest island St. Vincent is

mountainous with steep shelves and volcanic in origin and has a dense population, while the islands of the Grenadines form an archipelago with small populations, little agricultural activities and a strong reliance on tourism.

Fishing is an important livelihood in both SVG. St. Vincent lies at the northern portion of the island chain and comprises of remnants of eroded volcanoes of which the most renowned is the active La Soufriere volcano which last erupted in 1979 (five volcanic eruptions recorded), and stands at 1234 m above sea level. The rugged nature of the island lends itself to the formation of wet upland forests with valleys drenched with flowing streams.

The island of St. Vincent is approximately 35 km long and 15 km wide. Volcanic hills extend their steep slopes from the land with narrow shelves that can be found on the leeward side of the island. A slightly wider shelf is located on the windward side of the island. These areas are prone to incidence of landslides and flooding during hurricane and storm events. St. Vincent has over 100km of coastal area with predominantly black volcanic sandy beaches on the mainland, while in the Grenadines the beaches are mainly white coralline sand. Most of the beaches on mainland St. Vincent have completely disappeared to feed the construction expansion and erosion from storm surges and SLR (CARIBSAVE, 2012).

The islands of the Grenadines stretch for 70 miles from St. Vincent in the north to Grenada in the south and are remnants of a series of submerged and merged volcanic islands and cays, and over 40 miles of coral reefs. The Grenadines possess two submerged active volcanoes, which make the area vulnerable to volcanic eruptions and tsunamis. The capital, Kingstown, is located on the southern tip of mainland St. Vincent and is the main seat of government and the main commercial centre (CARIBSERVE, 2012). In contrast to St. Vincent, the Grenadines have hills ranging from 150 to 300 metres, but their geology lacked the forests and streams, which are present on the mainland (Mills, 2001).

#### ***4.1.1 Climate and natural resources***

SVG lies in the path of the northeast trade winds with temperature ranging between 18°C to 33°C. The island has a series of microclimate, which is caused due to its rugged mountainous terrain and El Nino/La Nina events, which are affected by elevation and

location orientation. The annual precipitation varies from 150 cm on the coast on the south of the island to 381 cm in the interior of St. Vincent, whereas the Grenadines may receive less than 46cm per annum. St. Vincent has two distinct seasons, a dry season (January to May) followed by a wet season. The island is located south of the hurricane belt and has been struck by a series of storms and hurricanes annually since Hurricane Thomas in 2010. Over the past seven years, there have been increases in hurricanes and other climate-related risks causing flooding and high tides. According to records from the National Emergency Management Organisation (NEMO), the 2013 storm resulted in 13 deaths and destroyed US\$330 million in water supplies, roads, housing and other infrastructure across St. Vincent and the Grenadines. In 2010 Hurricane Thomas cost EC\$100 million, the 2011 April floods cost EC\$120 million, and the November 2016 storm costs a similar amount. The storms have had devastating effects on the livelihoods of residents from participating villages in areas of agriculture, tourism and housing, thus contributing significantly to the incidence of poverty.

The natural variation in topography and climatic areas in St. Vincent and the Grenadines has contributed to the creation of a diverse range of ecosystems, habitats and species across the country. Over the period 1960 - 2006, the gridded observation of rainfall over SVG shows a statistically significant declining trend in all seasons. The annual rainfall trend shows -7.7mm per decade, with the strongest seen in the wet season. Across three emission scenarios, the projected rainfall change in annual rainfall in SVG is from 34mm to 6mm per month (-66% to +13%) by 2080s (CARIBSAVE, 2012).

The island is endowed with 163 species of ferns, four species of amphibians, 111 species of birds and 15 species of primary forests. There are over 500 marine species identified in SVG, including 450 species of finfishes, four species of turtles, nine species of gastropods, 11 species of seaweeds and 30 species of coral (Government of St. Vincent and the Grenadines, 2010). Twelve species of marine mammals can be found in the waters in SVG including humpback whales, sperm whales, pilot whales, bottlenose dolphins and spinner dolphins. SVG is permitted to hunt four whales per annum by the International Whaling Commission due to aboriginal subsistence hunting (CARIBSERVE, 2012; Mills, 2001). This has been an area of serious contention in recent years for both local people and tourists alike. The whaling issue has become such a contentious one that tourists have threatened to boycott the island if this practice continues. Youth

environment activists posit that SVG is being used by countries like Japan to campaign for the lifting of the international ban on whaling and to support their hunting of whale programmes in the Pacific and Arctic Oceans.

The national resources of SVG have extended through an Economic Exclusion Zone (EEZ) 200 miles to the west and 50-100 km between St. Vincent and Barbados to the east and St Lucia to the north and Grenada to the south (CARIBSERVE, 2012; Mills, 2001). This has provided an abundance of natural resources for the country to exploit for its development. However, it has placed an additional burden on the island because it lacks the resources to police such a vast area of sea water. Illicit international trawlers currently exploit the waters, and the uninhabited islands in the Grenadines are the transshipment points for drugs from Latin America on their way to the USA and Europe. Some unemployed local youth would participate in the lucrative illegal drug trade, and the state has had to deal with the consequences of their actions. Larger numbers of youth are experiencing mental and physical problems resulting from drug overuse and other social problems.

As part of the Caribbean Islands Biodiversity Hotspot project, SVG was identified as an area with seven significant globally threatened species. These biological hotspots form part of the central forest reserve, which provides a home to four of the world's endangered species and the watershed area which provides all the fresh water for SVG (CARIBSERVE, 2012; Mills, 2001). This area is vulnerable to climate stressors such as hurricanes, storms and drought as well as calamities such as volcanic eruptions. Rapid deforestation is also threatening the area by unemployed youth cutting down the rainforest to plant the illegal marijuana cash crop to sustain their livelihoods. The illegal cultivation of marijuana is becoming very attractive to young people because youth can earn US\$10,000 after growing three crops per year (Klein, 2007). Marijuana farming has brought a range of other social problems to the youth in SVG.

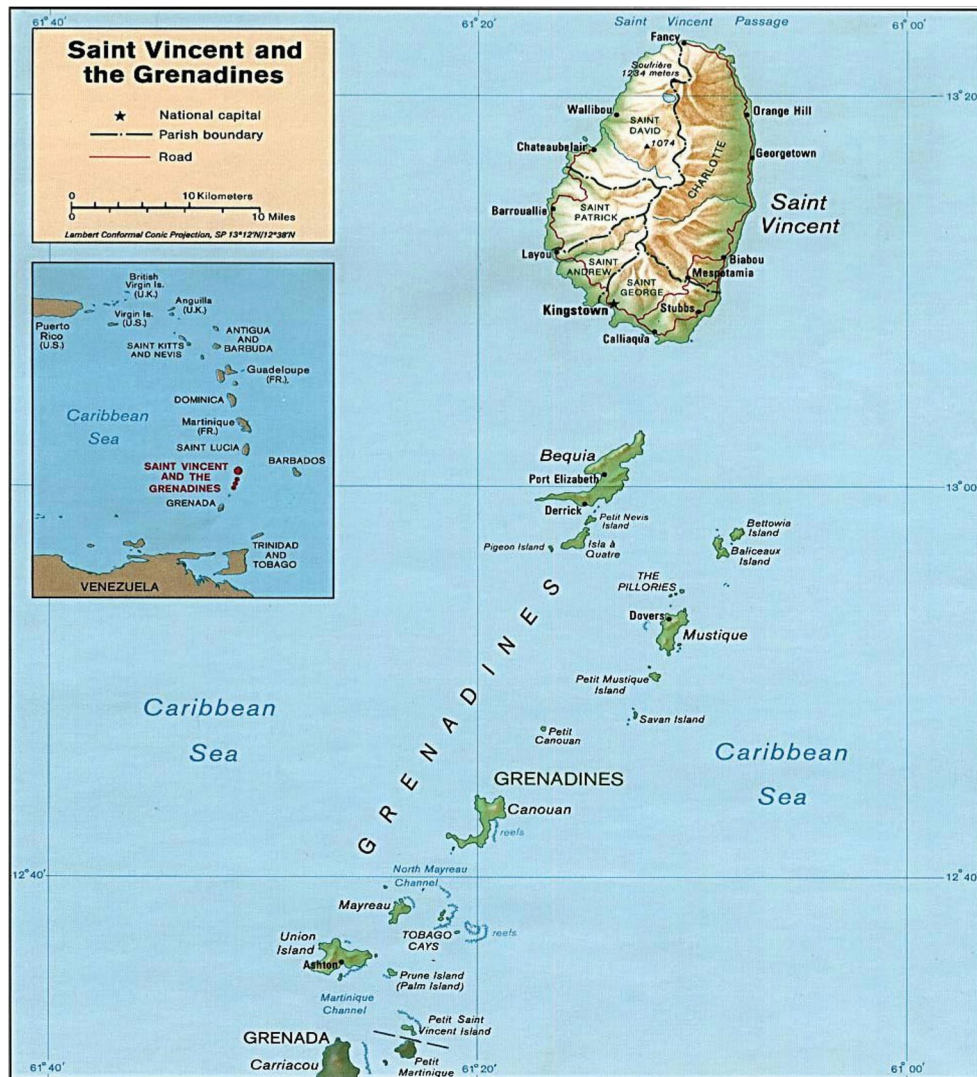
#### **4.1.2 Population**

The country's population is predominantly of African descent and is estimated at 109,991 (Government of St. Vincent and the Grenadines, 2012), comprising of 56,419 males and 53,572 females, of which 91.9% live on mainland St. Vincent. It is estimated that over 45% of the population is designated as youth. The mountainous interior of the

island has forced 90% of the population to live on a narrow coastal belt of land 5 metres high and 5 miles inland. Due to the high population density, housing settlement areas are now extended on lands that were designated for agricultural purposes and on slopes of central mountain ranges, along hilltops and in old riverbeds (CARIBSERVE, 2012). The practice has created a number of difficulties that are detrimental to the environment including:

- (a) increased deforestation and runoff water which has resulted in landslides and flooding for persons living downstream;
- (b) reducing the penetration of rainwater into the soil;
- (c) decreased food security by reducing the amount of land available for farming;
- (d) increased pollution of streams and coastal areas; and
- (e) exposure of the poor, marginal and most vulnerable members of society, mainly the youth, to live in areas that are prone to climate events because they do not have the resources to purchase land nor build sturdy houses to withstand the intensity of the storms.

This problem is compounded by limited adherence to physical planning and land management policies and laws.



**Figure 14:** Map of St. Vincent and the Grenadines

[http://www.islandtimeholidays.com/Map\\_of\\_Caribbean\\_and\\_St.\\_Vincent\\_and\\_the\\_Grenadines.htm](http://www.islandtimeholidays.com/Map_of_Caribbean_and_St._Vincent_and_the_Grenadines.htm)

#### 4.1.3 Economic

SVG is described as a small low-middle income economy, which is exposed to external economic shocks and natural disasters (CARIBSERVE, 2012; IMF, 2017). The country is plagued with a high incidence of unemployment resulting from the lack of appropriate skills of the workforce for the jobs that are available in the market. Only 5.4% of the population has attained tertiary level education (CARIBSERVE, 2012). Economically, agriculture and tourism are the main economic earners of the country accounting for 35% of the GDP respectively. Currently, both sectors are experiencing severe reductions in economic growth due to the destruction of the banana cash crop by invasive diseases and the global economic crisis. The resulting impact of such economic difficulties has

resulted in a decrease in economic growth from 5% in 2000 - 01 to below 1% in 2017 (IMF, 2017).

The economy of SVG is not diversified as approximately 75% of its economic output is derived from two sectors, namely agriculture and tourism. The global economic crisis has resulted in a fall in per capita GDP in 2010-11 (Table 3). The economic problem was further compounded by the destruction of the banana industry by invasive species such as Moko and Black Sigatoka diseases, which have contributed significantly to the reduction in the number of persons earning their livelihoods from the agriculture sector. Youth were severely impacted. Before its demise, the banana industry brought in over \$150 million per annum into the economy of SVG and was responsible for employing approximately 20,000 persons (Informant - Director of Agriculture). The economy of SVG is vulnerable to external and internal shocks and stressors. Further to losing the market in Europe for its bananas, the country was struck by a series of natural disasters; sluggish global demand, and slow implementation of key infrastructure projects further hampered the economic recovery of Vincent and the Grenadines from the global financial crisis (IMF, 2016).

Poor income distribution and high poverty incidence continue to plague youth in SVG. A poverty study conducted under the Country Poverty Assessment 2008 (CPA) revealed that between 2007 and 2008 the Poverty Head Count Index was at 30.2% a reduction of 7.3% over the 1995 - 96 figures (Government of St. Vincent and the Grenadines, 2008). The “rural banana farming population was identified as being at high risk and need particular poverty reduction strategies,” (Government of St. Vincent and the Grenadines, 2013 pp. 44-5). The poverty report brought out the growing inequality in wellbeing and the lack of resources injected in rural and urban communities after the financial crisis in 2008-2010 due to the demise of the banana industry. The considerable increase in social welfare payment to the destitute and the poor is an indication of the worsening poverty situation in the country (Government of St. Vincent and the Grenadines, 2017). The IMF (2017) country report on SVG indicates that unemployment rates are estimated at 25% of the workforce and has reached 46 per cent among the youth (15-24 years of age). The report states that the unemployment rate is high, particularly for the youth, the less educated, and women. While there has been an



increase in the participation of women in the labour market from 45% to 65%, unemployment among women rose from 18% to 30% between 2001 and 2017.

The Government of St. Vincent and the Grenadines has utilised a substantial amount of its resources to the repairing of infrastructure, particularly after calamities. It has also used its limited resources to build prestigious projects, which further increased the national debt burden (IMF, 2017). These projects also require high maintenance support, which is an additional increase to the national debt.

#### *4.1.3.1 Vulnerabilities in the Agriculture Sector*

Over the past decades, agriculture was deemed to be the most economically productive activity in SVG. It contributed significantly to economic and social development, specifically livelihoods of youth. However, the banana industry has declined considerably due to the restrictive trade regime in Europe, compounded by drought and invasive diseases. The main challenge facing the agricultural sector is the limited diversity in agricultural practices. The government is struggling to establish a viable set of crops and agribusiness strategy for the future. The Agricultural industry, however, continues to contribute to the economic development of SVG. It enables the island to maintain its food security, sustain international trade and contribute to the overall sustainable livelihood of farmers, youth and women.

The Director of Agriculture attributed this growth in the sector to the implementation of the 'Education Revolution' initiative by the government of SVG as the strategy which is responsible for the growth in the agricultural industry (unstructured interview with Director of Agriculture during field research). He claimed that the education revolution is making Science and Technology work for farmers and the farming communities. This is enabling farmers to adapt and implement the external international trading standards required by the European Union (EU) and the World Trade Organisation (WTO) to ensure effective access to international markets for local agricultural and fisheries products.

The destruction of the banana industry by invasive species such as Moko and Black Sigatoka diseases has significantly impacted on the overall performance of the economy. This situation has contributed to the reduction in the number of persons earning their livelihood from the agriculture sector. The former banana farmers have limited

experience and training in the implementation of viable agricultural diversification alternatives, and reduced cash flow has worsened their capacity to adapt to such changes (CARIBSERVE, 2012). Another factor which affects the sector is the high cost of agricultural investment caused by extreme weather events. The majority of small farmers in SVG do not have insurance to replant their crops when they are destroyed by storms, invasive species, drought and other calamities (CARIBSERVE, 2012). Many of these farmers are unable to recover from such loss of earnings and may further end up in poverty.

Increases in temperature would effect changes in weather systems. This has resulted in short periods of intense rain and longer periods of drought. Over the past five years, the agricultural sector was hampered by drought which extended up to 8 months per annum making it impossible for farmers to prepare the land for planting crops. During heavy rains, a considerable amount of agriculture lands was either flooded and/or sustained severe landslides triggering the erosion of fertile soil (CARIBSERVE, 2012).

SLR and storm surge actions have caused the erosion of fertile agriculture lands from coastal areas across SVG. Simpson *and colleagues* (2010) stated that the projected loss to agriculture from SLR across the Caribbean is estimated to cost US\$370 million in 2050 and 2080 a loss of approximately US\$2 billion is projected. It is estimated that it will impact on 2% of the land available for agricultural purposes and 1% of crops and plantations in SVG .

Storms are also responsible for destroying a substantive percentage of crops. During the hurricanes a substantial number of tree crops were destroyed; those that resisted the strong winds were then swept away by flooding or landslides. This has contributed to the increase in economic difficulties, reduction in food security and increase in poverty in rural communities (CARIBSERVE, 2012; Simpson, 2010; FAO, 2008). It is important to note that the consequences of the climatic shocks to the agriculture sector were not factored into the national development planning process.

#### *4.1.3.2 Vulnerabilities in the Fisheries Sector*

SVG has access to rich fertile land and vast marine resources (150 square miles of land and 11,000 square miles of sea/ocean (Gonsalves, 2017). According to Mills (2001), only 657 persons are directly employed in fishing, a sizable number of which are youth. The

Fisheries Division is responsible for the management and extraction of this valuable resource. The division utilises the Food and Agriculture Organization (FAO) code of conduct on responsible fishing to manage the fishing activities of fisher folks and to educate civil society and the wider community to comply with fisheries regulations and standards. The purpose of this initiative is to make fishing more sustainable and to adhere to the internationally agreed fishing practices. Offshore fishing is important. However, it is predominantly small-scale and artisanal (Government of St. Vincent and the Grenadines, 2015).

The Government of St. Vincent and the Grenadines is a signatory to the Convention on Biological Diversity (UNFCBD) and the Convention on International Trade in Endangered Species (CITES). The island has developed national Fisheries and Aquaculture Policy and Action Plan to reflect the obligations of both conventions and treaties. Through CARICOM, it is working with a range of partners within the Caribbean Regional Fisheries Management (CRFM) initiative to manage regional fish stocks. Although there are no specific figures available relating to the reduction of fish stock in SVG, fisher folks complained of the reduction in the availability of fishes on the traditional fishing banks across the country. Shallow reef fisheries are reported to be overexploited due to the following factors a) the boat size in St. Vincent and the Grenadines is generally less than 10 metres in length and only about 69% have engines which restrict how far they can travel out to sea and b) most of the fisher folks would fish during the day and very few would stay aboard on ships or in the small islands (Mills, 2001). Through informal discussions, it was deduced that fishes tend to travel further out into the ocean due to the warming effects of sea surface temperatures and coral bleaching (IPCC 2014; Nurse *et al.*, 2014).

Climate Change will have possible consequences for fish stock and marine diversity. These consequences include a reduction in abundance and diversity of reef fish. This will have serious implication for livelihoods and food security and the availability of seafood for the tourism market (CARIBSERVE, 2012). Warmer waters will drive pelagic species further away from the tropics in search of cooler temperatures and would affect the breeding and migration patterns of the fishes. Some fisher folks have already attributed the reduction in catch to changes in the ocean current, which they believe is affecting the distribution of fishes in the Eastern Caribbean.

It is also believed that the projected increase in the intensity and magnitude of storms would increase the impact on the livelihoods of the sector, damages to boats and infrastructure as well as impact on the fishing handling sites (CARIBSERVE, 2012). Increase in the impact of climate change would also result in an escalation of invasive diseases, which can negatively affect the fish stock, e.g. algal bloom, which can contaminate seafood species. There is increasing evidence of sargassum seaweeds which when washed ashore can cause discomfort to locals and tourists alike. They are also making it very challenging for fisher folks by tangling their lines and nets and affecting the engines of their boats (CARIBSERVE, 2012).

#### *4.1.3.3 Vulnerability to the Tourism Sector*

SVG is not endowed with natural resources such as oil and gas or minerals as found in Trinidad & Tobago, but its main natural resources are parks, beaches and the coral reefs. **Tourism** is the key economic driver in SVG. The total visitor arrival for 2012 was 199,825 a decrease of 71,000 compared to that in 2008-9 (global financial crisis) (Government of St. Vincent and the Grenadines, 2012). The IMF described the tourism sector as the machinery for leading the economic recovery of SVG.

(<https://www.imf.org/en/News/Articles/2016/07/19/21/23/PR16345-St-Vincent-and-the-Grenadines-IMF-Executive-Board-Concludes-2016-Article-IV-Consultation>).  
(<https://www.imf.org/en/News/Articles/2016/07/19/21/23/PR16345-St-Vincent-and-the-Grenadines-IMF-Executive-Board-Concludes-2016-Article-IV-Consultation>).

Due to its exotic beauty, mainland St. Vincent has developed a novel brand of tourism around ecotourism and culture. However, the main tourism activities are concentrated in the islands of the Grenadines. Bequia is viewed as a paradise for yachting, and exclusive world-class resorts are located on Mustique, Canouan, Palm Island and Petit St. Vincent. All livelihood activities on these islands are linked to tourism and fisheries. The expected increase in the frequency and magnitude of weather and climate extremes in the future as a result of climate change will affect the tourism industry through increases in infrastructure damages, additional emergency requirements, high operating expenses and business interruptions.

The tourism sector is very vulnerable to climate change and SLR (CARIBSERVE, 2012). Over 90% of tourism infrastructure is located on the coastal areas of the island. SVG, like

other SIDS, depend on the tourism industry to generate its national income; therefore, the impact of SLR and storms on the tourism industry is of grave concern to development planners. Erosion of beaches is another major factor affecting the industry. There are numerous evidence of erosion in Bequia and Union Island as well as along the Villa and Indian Bay beaches on mainland St. Vincent (CARIBSERVE, 2012).

The coral reef is an important factor in the tourism industry in SVG. These reefs provide habitat for fishes and other organisms. They form the main attraction for tourists who visit them to snorkel and dive. Large fringes of coral reefs are located on Port Elizabeth Bay, Friendship Bay and Princess Margaret Bay in Bequia. However, most of these reefs are dead and covered by algae (Mills, 2001). It is believed that the main cause of death of the coral reefs is sewage discharged from yachts anchored along the reefs (Mills, 2001). Another factor that is responsible for the death of coral reefs is coral bleaching, which is caused by a rise in temperature and ocean acidification (Nurse *et al.*, 2014). The tourism industry in the Caribbean is very vulnerable to climatic stressors such as temperature rise, SLR, storms and invasive species as well as the impact of the global economic crisis. Approximately 40% of the tourism workforce are youth.

#### *4.1.3.4 Vulnerability of Coastal Zone*

Like other SIDS, over 90% of infrastructure and communication facilities of SVG are located on the narrow coastal zone. This coastal zone is less than 8 metres above sea level and includes all the communications, emergency response structures such as roads, telecommunications, financial and technical support centres. All the coastal protection systems such as dunes, mangroves and reefs have been removed or are degraded in order to build tourism infrastructure. This has contributed to worsening the vulnerability of coastal infrastructures, communities and settlements to SLR, storms and hurricanes (Nurse *et al.*, 2014; Hernandez-Delgado, 2015). Engineered structures and the natural environment can protect against the impacts of climate change on coastal areas. However, it will be necessary to implement some adaptation strategies to the coastal infrastructures and communities to enable them to effectively withstand these impacts.

#### *4.1.3.5 Vulnerability in the Water Resource sector*

The watershed areas throughout SVG have been affected by land degradation due to squatting and mono-cropping coupled with poor agricultural and land conservation techniques. Climate change brings about changes in rainfall and precipitation distribution, drought and rise in atmospheric temperatures. Reduction in precipitation and rainfalls will have a serious impact on water supply in rivers and streams in SVG and the availability of water in the islands of the Grenadines, which are dependent on rainwater harvesting for its water supply. This will also have serious consequences for youth, especially those who are employed in the agriculture industry who would not be able to work their land due to drought. Those who are employed in the tourism sector in the Grenadines would not be able to work due to a shortage of water. Overall the consequence of reduced water supplies for youth health and wellbeing would be devastating. However, there is the absence of research to quantify the overall impact of climate stressors on youth in SIDS.

The climate change models have predicted an increase in rainfall intensity and a decrease in the number of rainy days in the future. This means that while the country is vulnerable to drought, it will also be vulnerable to the effects of torrential rains. This will increase the possibilities for flooding and landslides as well as increasing the likelihood of contamination of water supplies, and vector related diseases such as Dengue Fever.

#### ***4.2 Section 2: The Historical heritage of dealing with calamities over time: Case of St. Vincent and the Grenadines***

This section of the chapter presents the historical heritage of SVG on the impact of climate change and other calamities. The table below presents a summary of the adaptive efforts implemented by the island state to build resilience to reduce the impact of climate change and other calamities over the past 400 years.

**Table 7: Chronology of the impact of climate change and other calamities in St. Vincent and the Grenadines**

| Dates | Event  | Impact   |
|-------|--|--|
| 1718  | Volcanic eruption  | Destruction of forests and settlements of indigenous people (Adams, 2002 & 2007; Taylor, 2012).  |
| 1765  | Beginning of colonialism in St Vincent and the Grenadines      | British and French competing for dominance. French living on the leeward side of the island and working in friendship with the Garifuna Chiefs. The British established settlements in Arnos Vale -Kingstown area (Adams, 2002 & 2007; Taylor, 2012).  |
| 1765  | Creation of the Botanical Gardens                              | Establishment of settlement responsible for testing and experimenting with new plants and medicinal crops. It was used as the hub for the introduction and propagation of valuable and commercial plants from the East Indies for distribution later to the Americas (Adams, 2002 & 2007; Taylor, 2012). <a href="http://www.bgci.org/garden.php?id=314">http://www.bgci.org/garden.php?id=314</a> |
| 1777  | Hurricane  | Record of a hurricane striking Barbados and boat shipwrecked on SVG (Adams, 2002 & 2007; Taylor, 2012).  |
| 1791  | Introduction of the breadfruit to St. Vincent by Captain Bligh | Expansion of the plant propagation programme at the Botanical Gardens to supply the Americas. Expansion of colonialism across the Americas.  |

| 1791  | Rapid deforestation for sugar expansion                         | Rapid deforestation due to war veterans returning from the war who were promised lands in St. Vincent for farming. The beginning of the American War of independence (Taylor, 2012).  |
|-------|---|---|
| Dates | Event   | Impact  |
| 1791  | Longest and most severe El Nino event recorded in the Americas. | Terrible drought caused by deforestation – worst drought known in the history of the region, as a result of the longest and most severe El Nino event (Grove, 2000).  |
| 1791  | Establishment of the Kings Hill Forest Reserve                  | The first environmental law recorded; the beginning of observed climate change impacts. First record of the Top-down approach to CCA (Grove, 2000).   |
| 1795  | The Garifuna War of Liberation                                  | Garifuna Chiefs united to fight the British to liberate their lands from British Colonial rule. Indigenous people fought for their autonomy and self-rule. No record on the role of youth during the war (Taylor, 2012).                                    |
| 1796  | Hunting of Garifuna people by British mercenaries               | Large areas of the mountainous interiors were deforested to hunt the Garifuna people. Garifuna settlements were torched (Taylor, 2012).   |
| 1796  | Garifuna people captured and shipped to the island of Baliceaux | 1000s of indigenous people were left to starve to death (rationing of water and food). 4336 prisoners (1002 men, 1779 women and 1555 children) were shipped to a small holding camp on the small island of Baliceaux (less than 320 acres). (Taylor, 2012). |



| 1797  | Garifuna people were deported from their homeland by the British | 2248 residents were exiled from their homeland on the HMS Experience to the Spanish ruled Roatan Island in the Bay of Honduras (Taylor, 2012).                                     |
|-------|--|--|
| 1797  | The beginning of large-scale deforestation to plant sugarcane    | Provision of lands for veterans who fought in the American War of Independence against the British Aristocracy (Taylor, 2012).   |
| Dates | Event  | Impact   |
| 1812  | The eruption of the La Soufriere volcano                         | Destruction of forest, properties and loss of lives  |
| 1838  | Emancipation of Slavery  | Deforestation of crown lands by former slaves for the cultivation of food crops  |
| 1838  | Introduction of paid labour on plantations                       | Brought in of paid labour from India and Madeira to work on the plantations  |
| 1900  | Introduction of Crown Land Act                                   | Reduction of the impact of deforestation on the forested interior of the island (no farming activities 1000ft above the contour line).   |
| 1900  | Introduction of alternative cropping techniques                  | New crops were introduced to the island such as cocoa, coffee and cotton   |
| 1900  | Conversion of sugar mills into arrowroot mills                   | Manufacturing of arrowroot crop to extra starch for shipping to the USA and Europe.  |
| 1902  | The eruption of La Soufriere volcano                             | Mass destruction of properties and crops. Over 3000 deaths. Triggered the eruption of Mt. Pelee volcano in Martinique. Dust covered neighbouring islands of Barbados and St Lucia. |
| 1902  | Introduction of coconut  | Successful rehabilitation of lands devastated by the volcanic eruption and sugar cane production.  |

| 1902        | Small-scale farming activities              | Introduction of small-scale farming models. Introduction of soil conservation and adaptation strategies.  |
|-------------|---|---|
| 1934        | Riot by farm labourers                      | Led to the rise of democracy and political party system. Youth workers burned the farms and great houses on the sugar estates.  |
| 1939 - 1945 | Expansion of sea island cotton              | Support of war effort (clothing and parachutes)   |
| Date        | Event                                       | Impact  |
|             | Breaking down of the health system          | New diseases (Invasive disease) that impacted on health and agriculture. No statistics are available on the impact on youth.  |
| 1951        | Introduction of Adult suffrage              | One man one vote model. Youth, 21 years and over were able to vote and contributed to influencing the governance and democratic process in St. Vincent and the Grenadines. Youth have not been recognised as an important political actor in society. |
| 1970s       | Introduction of the banana crop             | The development of the mono-cropping system, increase in deforestation, increase and overuse of pesticides and poor soil conservation practices.  |
| 1970s       | Introduction of animal grazing on hillsides | Loss of terracing and soil conservation practices.  |

| 1980s - 2010  | Youth-led Bottom-Up approaches to adapt to Climate Change.  | The proliferation of actions from the community (bottom-up) supported by 'piecemeal' approaches from the government (top-down) to address climate change and ecosystem development challenges. The emergence of strong dynamic community organisations led by youth engaging their communities in bottom-up community Adaptation actions to raise the awareness of residence on the impact of climate change and other calamities. The work of JEMS, SUDO, TBPO, Rose Hall Working Group, CYEN, and National Youth Council are significant in the area. |
|---------------|---|---|
| 2008 - 2017   | Destruction of banana industry by invasive species and disease  | Destruction of the banana crop by Moko disease and Black Sigatoka. The economy lost over EC\$150 million annually and over 20,000 persons lost their livelihoods, over half were youth. Increased unemployment and poverty. Unemployment is estimated at 47% of youth (IMF, 2017).  |
| Dates         | Event   | Impact  |
| 2010 - 2016   | Increased in violent storms, drought, high temperatures, landslides and flooding                            | Destruction of properties, housing and infrastructures (bridges, roads, water supplies and others), increased deaths, loss of crops, coral reef bleaching. Storms damages estimated at over US\$0.5 billion.  |
| 2010 - 2016   | Increased in invasive diseases in humans  | Increased in vector and water-borne diseases such as Dengue, Zika, and Chikungunya - overstretched health system. Over 10,000 persons sick and incapacitated and were unable to work  |
| 2015- present | Increase in the availability of funding from international funders to support bottom-up adaptation projects | Low capacity of NGOs and CBOs to access funding to support adaptation programmes. The need for programmes to enhance the capacity of NGOs to develop a funding proposal, manage and implement Climate Change Community Adaptation projects.   |

#### *4.2.1. Section 2 Summary*

The chapter highlights the socio-economic and development perspective of St. Vincent and the Grenadines. It presents an analysis of the main socio-economic drivers of the island as well as a chronological account of the impact of calamities on the island and the response of the people to deal with such calamities over the last four centuries (Table 6).

Human interference has always been driven by the profits motive, income generation and other incentives. Therefore, if people cannot survive comfortably in terms of finding viable and sustainable livelihoods within the national economy, they will engage in illegal practices such as deforestation and encroach on the natural resource base of the country as a way to eke out a living. It is believed that this is the main factor for the rise in the number of persons involved in the illegal marijuana trade. The destruction of forests and other unsustainable conservation practices have caused large areas of land to be exposed to landslides and flooding resulting in death, destruction of housing and infrastructure (Government of St. Vincent and the Grenadines, 2014).

The researcher observed that throughout the history of St. Vincent and the Grenadines tensions exist between obtaining economic benefits in the short term, such as the destruction of mangroves swamps, coral reefs and seagrasses to build mariners and expand the tourism industry, and putting measures in place to enhance the environment and achieve sustainable development in the long term. Our ancestors lived within their environmental limits by implementing environmental laws such as the Kings Hill Forest Reserve Act and created institutions, e.g. the Botanical Gardens, as a way of enabling them to create sustainable living and lifestyles.

Another important lesson, which evolved from the chapter, is that when people are faced with development problems caused by calamities such as climate change, environmental degradation and natural disasters they would devise proactive bottom-up approaches to address these development problems. Youth in SVG have created a range of viable CCA projects and programmes to address these calamities, some of which would be reviewed in Chapter 6.

### ***4.3 Section 3: Participatory Climate Risk and Vulnerability Mapping exercises***

Maps and diagrams are viewed as important components of any planning activity, specifically in rural and community development initiatives where planning, implementation, monitoring or evaluation are required when the subjects are land use, watershed management, afforestation initiative, agricultural development and other aspects of development planning. Participatory mapping is an approach, which combines the modern cartography skills with participatory methods to represent the spatial knowledge of local communities. ([http://www.mappingforrights.org/participatory\\_mapping](http://www.mappingforrights.org/participatory_mapping).). The participatory mapping exercises provided the researcher with information about the physical characteristics of the community, the climatic stressors and calamities found in the area, the impact of climate change on the socio-economic situation of the community and the strategies these communities are putting in place to adapt to these climatic calamities.

#### ***4.3.1 Methodology***

The researcher worked with officials of the Community Development Division, the Ministry of Planning and Sustainable Development, Forestry Division and National Parks Authority to decide on the areas where the participatory climate risks and vulnerability mapping exercises would be held. The GIS maps on the various districts were provided by the Physical Planning Division of the Ministry of Planning and Sustainable Development. After realising that the GIS maps contained a limited amount of data, the researcher concluded that he would have to use “knowledge mapping” to generate the data required. Knowledge mapping deploys local knowledge and involves a crowd-sourcing approach, whereby different stakeholders transfer this knowledge (challenges each other’s ideas) onto a base map (IUCN and WRI, 2014).

#### ***4.3.2 The strength of knowledge mapping***

While digital mapping can be too precise and risk ignoring local realities, the knowledge mapping captures a richness of the undocumented local and technical insights but not

very specific when it comes to landscape levels of biophysical constraints. The researcher decided to use both approaches (IUCN and WRI, 2014).

**Preparation of paper maps:** These maps were drawn to scale by the Art Class of the Georgetown Secondary School on large sheets of paper about five by 10 metres. The researcher visited the communities prior to the implementation of the participatory mapping exercises to identify specific landmarks on the map such as different types of agricultural fields, specific areas of the coastline that are affected by SLR and coastal erosion, different forest types and extent of deforestation, different ecosystems and areas where natural resources are extracted (Angelson et al., 2011).

**Selection of participants:** Strict criteria were provided to community development officials who worked in collaboration with local community leaders, health officials, agriculture officers and public health officials to assist with the selection of participants for the Community Climate Risk Mapping Consultative workshops. The researcher attended the meetings as an observer to understand the level and quality of the consultative process involved in the selection of the participants. These criteria consist of gender equity, wide age representation (from 15-80 years), all social classes, people with all levels of education, representatives of major political parties and representatives from all the participating villages in the district. These criteria were used to ensure diversity in views and perceptions of participants in the consultative process. After the selection process, the dates were set for the implementation of the participatory mapping exercise.

**Implementation of the participatory mapping process:** The researcher arranged for participants to stand or sit around the huge drawn map of the community, which highlighted the main physical features in the community. He then made a short presentation on the impact of climate change and other calamities on the communities and requested the participants to ask questions to seek clarification on issues raised in his presentation. After responding to the questions, the researcher told the participants to rank the calamities from the most severe to the least severe in terms of their impact on the community. "Ranking of exercise is one of the most effective methods of understanding preferences and is usually conducted during participatory workshops or focus groups discussion exercises," (Angelson et al., 2011 pg.77). It involves placing

issues or objects in order of significance. It is important to note that the actual rank is not as important as the comments and the debates that are generated by the exercise (Sithole, 2002).

**Ranking of calamities:** After the ranking process, a colour was given to each of the calamities. The exercises attracted much attention and generated useful debate among the mapmakers and the onlookers. The final map was then recorded by the research team to be used in the community climate risk mapping consultative exercise. Historical mapping was done to a minimal by participants, e.g. some participants were involved in drawing maps for the same areas for different dates in the past to illustrate changes of coastal erosion in the Georgetown area and the areas that were destroyed by the 1902 and 1997 volcanic eruptions (Angelson *et al.*, 2011). The exercises in Chateaubelair, Vermont and Mespo used the historical mapping exercise to show changes in livelihoods, specifically the disappearance of the banana and the emergence of new livelihoods such as marijuana farming and fishing.



**Figure 15:** Participants in Vermont identifying areas that are vulnerable to climate risk hazards and other calamities.

As stated above this technique was done as part of a group discussion to generate a consensus view of the community's social infrastructure and indicate their level of vulnerability and the impact of climate risk hazards and other calamities on the community.



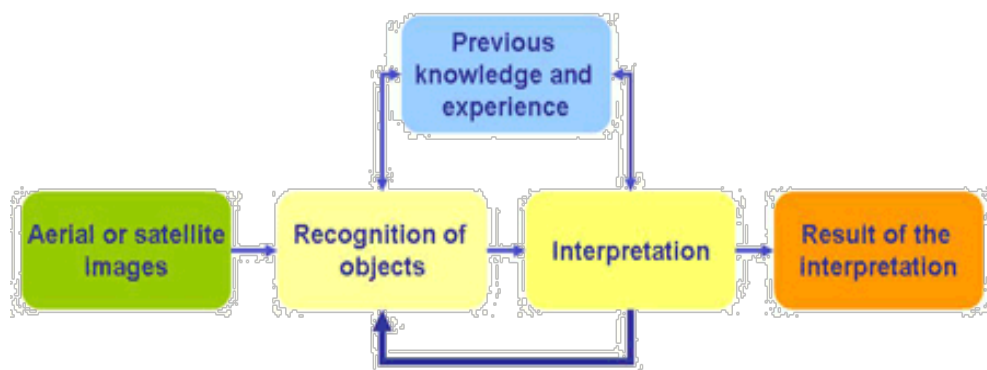
**Figure 16:** Climate risk hazards map produced by participants of the Vermont Community

An important part of the community mapping exercise is the discussion of seasonal trends. This was supported by a calendar drawn by the local people to generate information about the seasonal trends within the community. This also enabled the identification of research areas of particular stress and vulnerability. The seasonal calendars were drawn on the ground or the floor by participants using stones or seeds in a preference-ranking matrix (Angelson *et al.*, 2011)

Some communities drew line graphs to show seasonal increases or decreases. Seasonal variables can be included in one calendar to give an overview of the situation throughout the year. These variables can include rainfall, crop sequences, employment demand, availability of paid employment, the incidence of invasive diseases such as Zika, hurricane seasons and festivals. On completion of the community mapping exercise (agreement by stakeholders that this represents their best collective knowledge), the maps were then taken to the Physical Planning Division in the Ministry of Sustainable Development to be digitised by officials of the Ministry and used for further analysis (Angelson, *et al.*, 2011; IUCN & WRI, 2014). Digital mapping is defined as a “*classic GIS approach that builds up a spatial picture by combining layers of digital information and developing algorithms to test and visualize specific options,*” (IUCN & WRI, 2014 pg.68).



**Refinement and digitising the result:** After the knowledge mapping exercise the team at the GIS Unit of the Physical Planning Division, Ministry of Planning and Sustainable Development finalised the result and captured data on the maps in GIS software and produced a digital version of the maps across the assessment area. First, the team copied the shapes/colours into the GIS map, adjusting them in the process so that they reflect the intent of the group and the characteristics of the landscape, that is, by following the contours of the landscape more precisely than those done by the participants. The officials also made further refinements and adjustments to the map whenever they have additional data to do so (IUCN & WRI, 2014). Below is the analysis of the GIS maps produced from the participatory mapping exercises.



**Figure 17:** Figure showing map interpretation process

<http://www.seos-project.eu/modules/remotesensing/remotesensing-c04-p01.html>

After the GIS team completed work on digitising the map, the researcher began the task of interpreting the maps and other images. This included identifying and listing the meaning of the image content but went beyond what could be seen in the image in order to recognise spatial and landscape patterns. This process can be divided into two parts:

- (a) *Simple recognition of objects such as streets, fields, rivers; i.e. The quality of recognition depends on the expertise in image interpretation and visual perception*



The participatory risk hazard and vulnerability mapping exercises were produced through in-depth discussions with community teams (25-30 persons) representing each of the districts participating in the exercise. The six districts represented over half of the population of the multi-island state of St Vincent and the Grenadines.

The researcher views the GIS community climate and calamities maps evolving from the participatory mapping exercise as an important asset in communicating climate science risk and vulnerability to a diverse range of audiences at national and community levels. It is critical to note that one-third of the households experienced shortages of food in St Vincent and the Grenadines with high dependence on external food supply. This view was validated by data collected from youth from the focus group discussions who complained about the high prices of food due to food scarcity and the dependency on imported food to fill this void resulting from the drought. The issues pertaining to the erosion of coastal areas and an annual loss of tourism due to the reduced amenity value of beach loss due to SLR was validated by data from youth participating in FGDs, interviews with Policymakers and senior officials and information from the review of the literature.

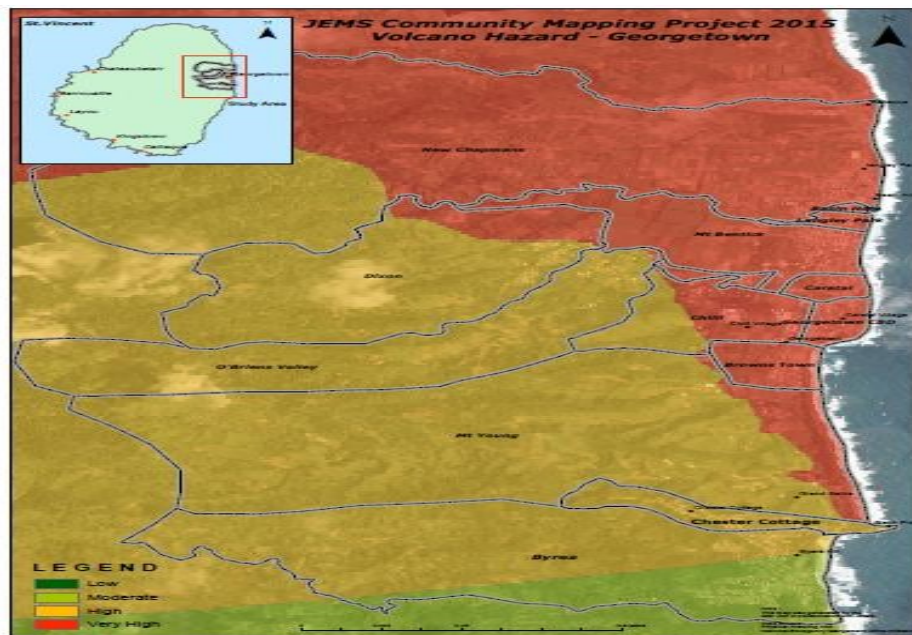
The Geographic Information Systems (GIS) are frequently used to store, process and visualise climate and other calamities data (Nocke, 2008, Kaye et al., 2012). The researcher found that there are similarities regarding the data on the impact of climate change on community livelihood and coastal erosion evolving from the community mapping exercises and those done by CARIBSAVE (2012).

#### ***4.3.4 Georgetown District, North Windward, St Vincent and the Grenadines***

The representatives of the Georgetown, North Windward District, selected volcanic eruption, SLR and tsunami, landslides, flooding, hurricanes and storms, earthquakes and drought as the main climate change hazards/vulnerabilities facing the community. Volcanic eruptions and its impact were viewed as the most critical of the climate change stressors impacting the Georgetown district. The district is located on the north windward side of the island approximately 3 miles from the base of the La Soufriere volcano. The Georgetown District was evacuated during the 1971 and 1979 volcanic eruptions. These experiences were still fresh in the minds of many of the community representatives. Some of the older participants were very vocal in retelling the horror

they experienced during the evacuation process. Three of the elderly participants in their 80s recalled stories told by their parents of the calamities encountered during the 1902 volcanic eruption. They cogitated about the hundreds of workers on the sugar cane plantations on the Orange Hill estate who tried to seek shelter in an old brick building during the 1902 volcanic eruption and were killed by exposure to dangerous gases. Some of the gases emitted from volcanoes included carbon dioxide, sulphur dioxide, hydrogen sulphide, hydrochloric acid and carbon monoxide. Most of these gases were poisonous and contributed to climate change effects in the area.

The risk posed by the La Soufriere volcano to the district as a whole was classified as high to very high by the participants attending the Climate Risk Mapping exercise (Figure 3). Besides destroying housing and property, volcanic eruptions destroy plants and animals and can drive large numbers of the population into poverty.

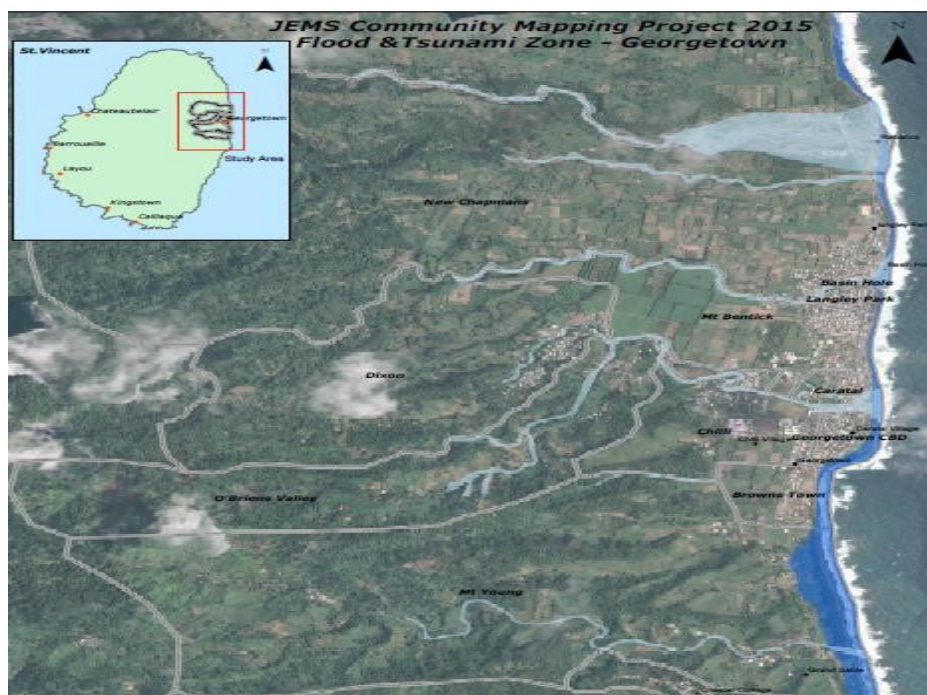


**Figure 19:** GIS map of the volcanic risk hazard and vulnerabilities in the Georgetown area,  
North Windward, mainland St Vincent and the Grenadines.

Tsunamis and SLR were viewed by participants as the second most climate hazard risks affecting the community. The entire coastal area of the district lost large acres of beach and lands over the past 20 years. The community playing field and a large portion of the Browns Town community on the periphery of Georgetown were destroyed by SLR.



Further north in the coastal community of Sandy Bay, high tides have destroyed the school, clinic, playing field, houses and half of the community. Lower down the coast to the community of Byrea had to be evacuated and was resettled further inland due to the devastating impact of tsunamis and SLR in the 1980 and 90s. Government is in the process of developing plans to implement an extensive coastal rehabilitation project to protect the north windward coast from the impact of climate change. The map below shows the section of the community that is currently affected by the impact of flooding (light blue) and Tsunami/SLR (blue). During the past seven years (2010-2016) over 70% of roads, bridges, electricity and water systems were destroyed, and over 40% of households were either flooded out or destroyed by storms and hurricanes.



**Figure 20:** GIS map of the Flooding, Sea Level Rise and Tsunami vulnerabilities in the Georgetown area, North Windward, mainland St Vincent and the Grenadines.

Georgetown District is more gently sloped than other communities in St Vincent and the Grenadines and is exposed to the full impact of storms coming in from the Atlantic Ocean.



**Figure 21:** Photo of the lower North Windward coast of Goss/Byrea showing the area where the entire community was evacuated and had to be relocated due to the impact of sea level rise on the coast (Photo from CARIBSAVE, 2012).

The community representatives participating in the community mapping exercise stated that the frequency of occurrence of the climate change impacts on the community had enabled them to develop coping mechanisms and adaptive capacity to deal with these challenges facing their community. This has also enabled the community to develop and tap into local knowledge and understanding of local level changes and responses (McNamara & Buggy, 2016).

There were lots of disagreements in terms of which hazards should be prioritised by the community as the third most impacting climate stressors. After a lengthy discussion, the landslide was listed at number 3, followed by hurricanes and then flooding. Due to the proximity to the La Soufriere volcano, earthquakes were listed as sixth followed by drought. Residents highlighted the fact that frequent earth tremors can be felt in the community on a fortnightly basis. They do not have any explanation of how these tremors can affect climate change, but they are convinced that they are linked to future volcanic activities. An elderly resident said that these earthquakes are early warning signs to save lives during volcanic eruptions and tsunami activity. They agreed that earth tremors are a precursor to volcanic eruption and tsunami and this will give the

community enough time to move to higher ground or to move south away from the volcano and the coast. The community representatives said that they are constantly on the alert for these eventualities. The critical lesson emerging from the mapping and consultative exercise in the Georgetown district was the need to understand adaptation at the scale at which the impact of climate change is felt and experienced at the community level (McNamara & Buggy, 2016; Ayers & Forsth, 2009).

St Vincent experienced over eight months of drought resulting from high temperatures in 2014-2015. The impact on communities was severe. A large number of employees in the agricultural sector became unemployed because they were unable to farm their lands, resulting in high food prices and an increase in poverty for a large number of marginalised householders. It has also resulted in an increase in agriculture-related crimes to the extent where the government had to employ Farm Police to patrol agricultural farms.

The findings above were supported by a CARIBSAVE (2012) study which was conducted in three of the six communities where the Climate Risk Mapping exercises were conducted. These communities are Georgetown, Brighton (South East) and on the island of Bequia.

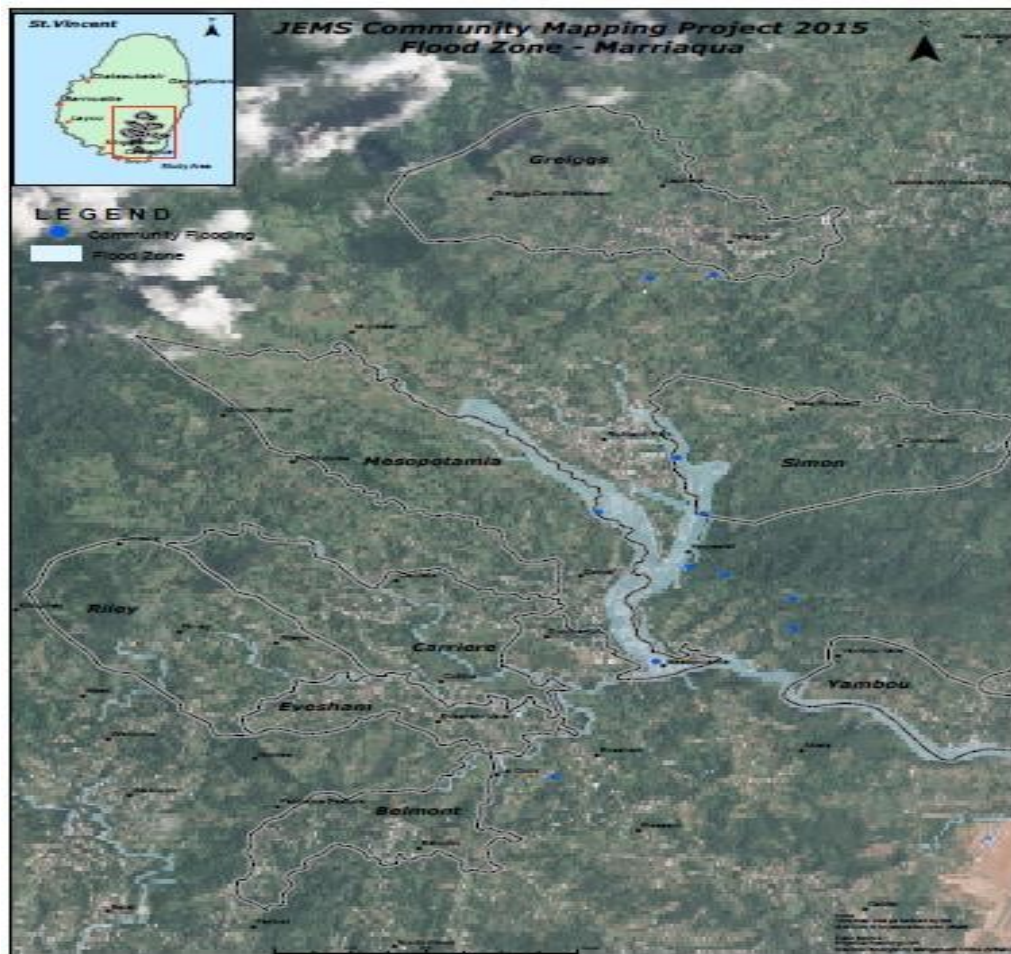
Climate Change study conducted by CARIBSAVE (2012) stated:

*“Climate Change effects are evident in the decline of some of the coastal tourism resources, but also in the socio-economic sectors which support tourism, such as agriculture, water resources, health and biodiversity” (2012 pg.2).*

The CARIBSAVE report further predicted that detailed Climate modelling projections for St Vincent and the Grenadines include:

*“Increase in average atmospheric temperatures, reduced average annual rainfall, increase in sea surface temperatures and the potential for an increase in the intensity of tropical storms,” (CARIBSAVE, 2012 pg.2).*

#### 4.3.5 Flooding in the Marriagua (Mespo) District, located in the interior of the island



**Figure 22:** GIS map on flooding in the Marriagua Valley, the mainland of St Vincent and the Grenadines.

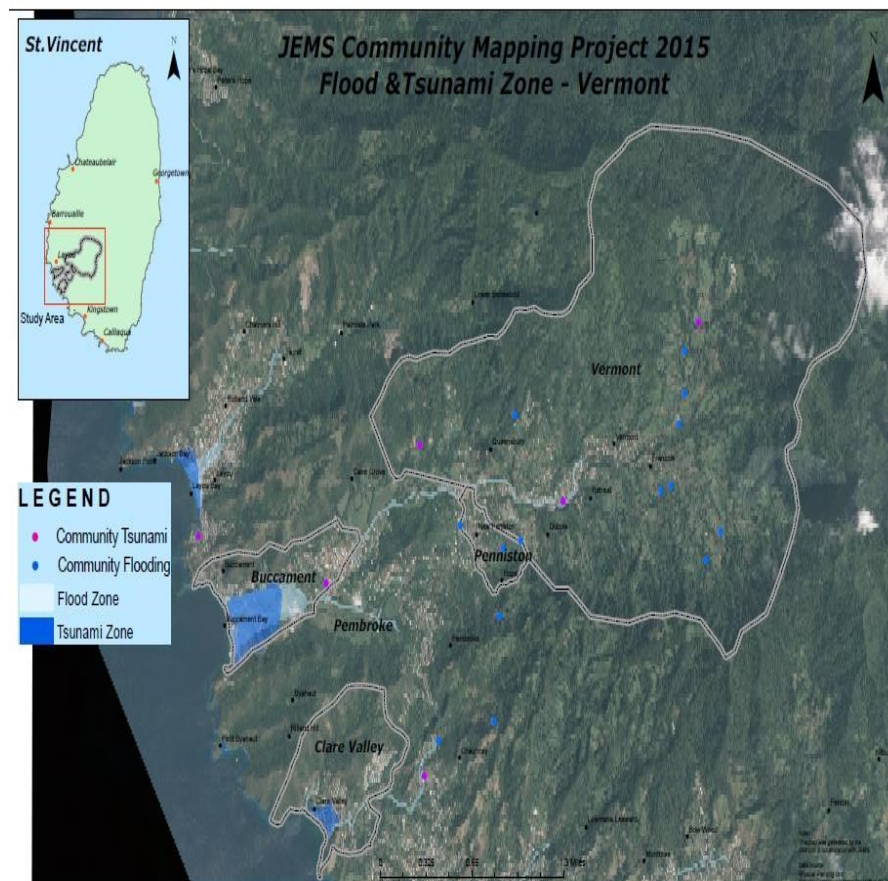
Districts such as Marriagua are endowed with a rich network of rivers and streams flowing from the mountain, crisscrossing the rich fertile valley. One of the main hazards faced by these communities is flooding. During storms, rivers would overflow their banks causing severe destruction to properties, infrastructure, housing, crops and lives. Thirteen (13) deaths and over US\$350 million in damages to infrastructure and properties were officially recorded by the Government of SVG in 2013 (Government of St Vincent and the Grenadines, 2015; IMF, 2017). Participants accorded the problem of flooding to the rapid deforestation in the mountainous interior of the country to grow illegal marijuana leaving tree logs lying on the mountains sides and along the waterways. During storms, the logs would block the free flow of water and create dams. When these dams burst, they would drive the water and tree logs/branches furiously



downstream causing damages to houses and infrastructure in the interior and coastal communities.



**Figure 23:** Photos of the destruction caused to roads and deposit of logs on beaches



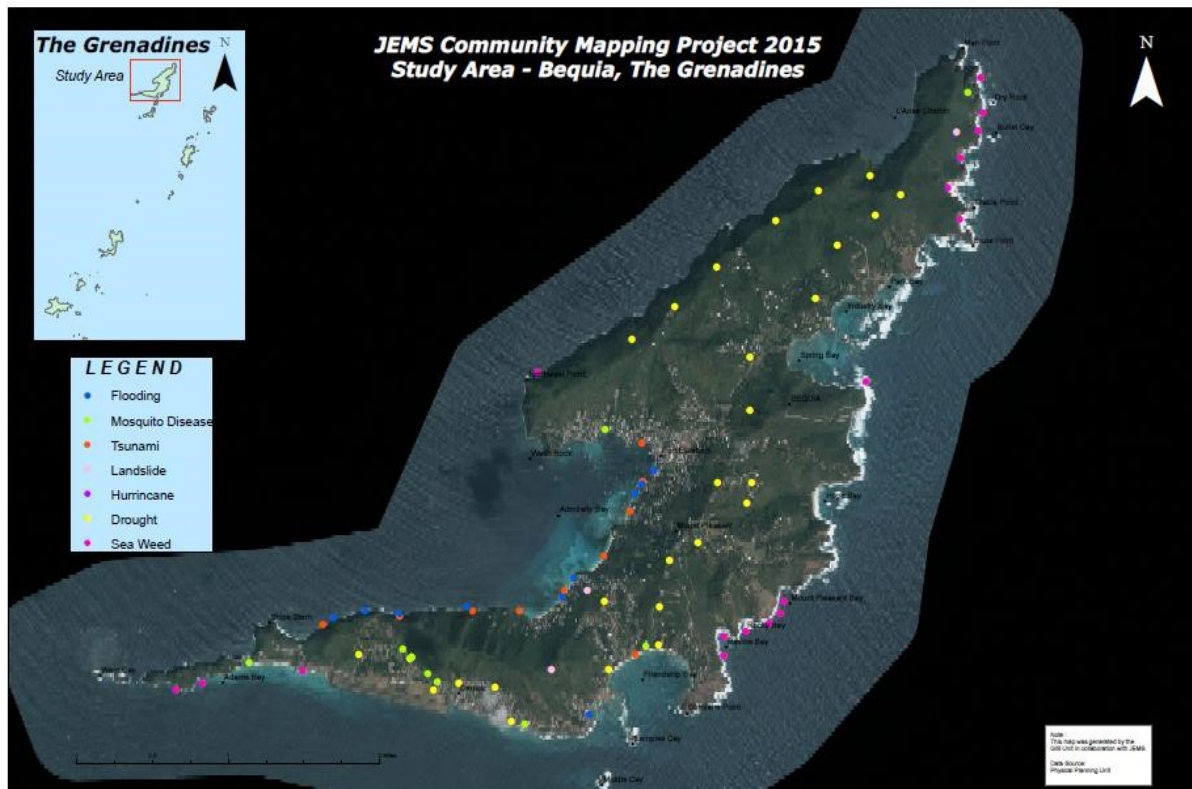
**Figure 24:** GIS map on Sea Level Rise and Tsunami in the Vermont valley area, mainland St Vincent and the Grenadines.

#### *4.3.6 Flooding from SLR/tsunami and storms in Vermont Valley*

Participants in the Vermont Valley view SLR as having the most devastating impact on communities in the lower coastal section of the valley. During the December 2013 and November 2016 storms, the Buccament community (Lower Vermont Valley) was flooded by water flowing down from the mountains and high tides coming in from the sea. The floods in 2013 killed three persons, flooded out hundreds of houses and destroyed the 5-star Buccament Bay Resort. The participants attending the Community Risk Hazard Vulnerability mapping exercise attributed the flooding upstream to the rapid deforestation taking place in the mountainous interior of the island resulting mostly from marijuana cultivation.

Participants recalled the moment that the river overflowed its banks and people disappeared in the swollen rivers. They credited their survival to their local knowledge and enhanced capacity which developed their resilience to adapt to climate change (McNamara & Buggy, 2016).

Communities such as Buccament, Layou and Clare Valley, located on the coastal South Western section of mainland SVG, are constantly flooded by rivers and streams overflowing their banks due to the factors highlighted above. These problems are compounded by an increase in wave actions resulting from SLR. The town of Layou has completely lost its shoreline, and the government has had to build an expensive dyke system to stop the sea from further encroaching on the town. Buccament, Clare Valley and Layou were once thriving artisanal fishing communities 20 - 30 years ago; the industry is now almost destroyed due to the lack of fishing banks attributed to warmer temperatures and higher tides caused by SLR. Based on information from informants and GIS mapping, it is projected that there would be increased Tsunami activities triggered by the volcanic activities of Kick-em Jenny and Kick-'em Jim (two underwater volcanoes) in the future, which would have a serious impact on these communities.



**Figure 25:** GIS map on Climate risk and vulnerability on the island of Bequia, Grenadines of SVG.

#### ***4.3.7 Climate change and other calamities impact on the island of Bequia***

Although there are similarities regarding how climate change is impacting on mainland St Vincent, there are differences in how impacts are prioritised as indicated by participants in the consultation. Although the islands of the Grenadines are much drier than that of mainland St Vincent and the Grenadines, flooding followed by diseases associated with mosquitoes were listed as two of the main climate change related problems facing the people on the island of Bequia.

Participants highlighted two types of flooding affecting the island a) flooding caused by heavy rain runoffs affecting the capital, Port Elizabeth, the airport and Paget Farm area and b) during high tides the airport, the capital and the main tourism infrastructure area would also be flooded. Tourism is the main economic activity on the island. Therefore, flooding is negatively impacting on the economy of the island. The mangrove swamps and coral reefs which over the years form the first line of defence against SLR/high tides were destroyed to construct the airport and to build the infrastructure which supports

the tourism industry. Coral reefs and coastal ecosystem have rarely been reflected as a component of the essential coastal infrastructure, a value which has been poorly recognised and documented by government and local authority (Emerton, 2006; Hernandez-Delgado, 2015).

The development of hotels and tourism-related infrastructure on the coast of the island has increased its vulnerability to climate change and SLR and is also responsible for increasing the degradation of coastal and marine diversity (CARIBSAVE, 2012). This is responsible for reducing the resilience of the island on the impact of SLR and storm surges. It is also one of the main causes of flooding mentioned above.

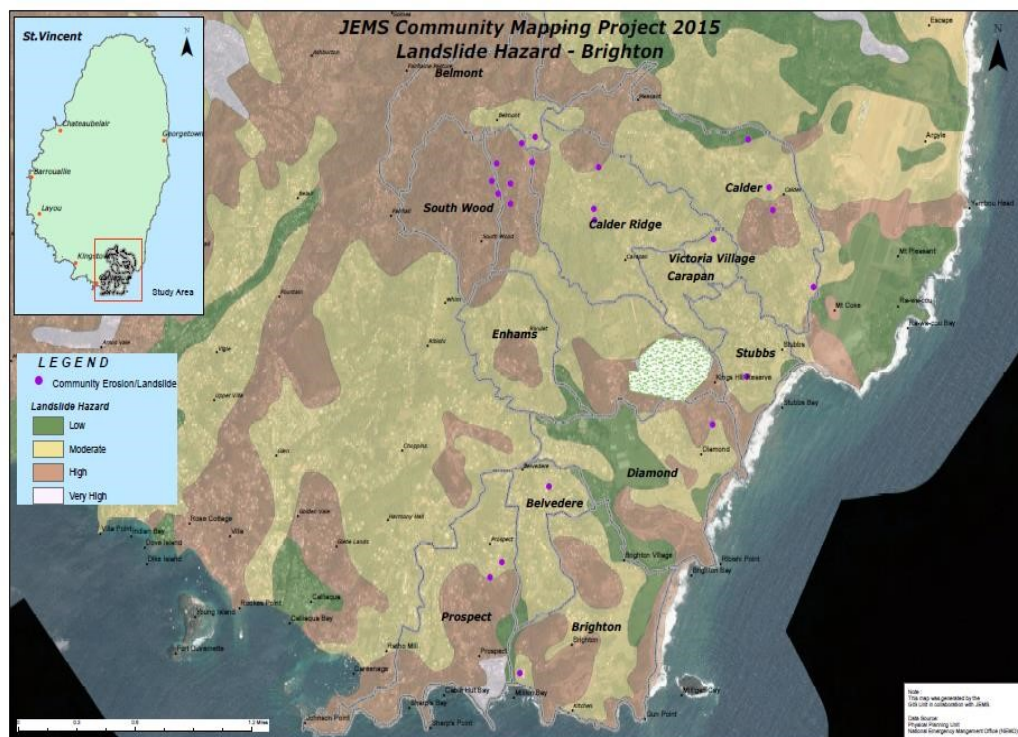
The changes in temperature, rainfall, atmospheric circulation patterns and soil moisture can influence the distribution and prevalence of human diseases and their vectors (Griffin, 2007; Hernandez-Delgado, 2015). Invasive mosquito-related diseases such as Chikungunya and Dengue Fever are the main cause of concerns within the community. During the climate mapping, exercise persons retold stories of the outbreak and impact of these diseases on themselves and the entire community. Some participants said they were unable to work for as long as three months and they were partially paralysed by these diseases. Other participants observed economic slowdown and overstretching of the already dysfunctional health system during the outbreak of the diseases (CARIBSAVE, 2012).

Although the increase in seagrass infestation was placed last on the participants' list of priorities, it was viewed by them as invasive species which is negatively impacting their health and the tourism and fishing industries. Participants complained that seagrass covered every beach on the island resulting in a noticeable reduction in tourist visiting the island. The stench of seagrass was so repulsive that it affected the operation of tour operators who take visitors to the Tobago Cays Marine Park in the southern Grenadines. It also affected the operation of Water Taxi Operators who provide services to the yachts that are anchored within the sheltered bay of Port Elizabeth, capital of Bequia. Besides the seagrass getting tangled in the propeller of boats and destroying their engines, a large proportion of fishes and turtles were poisoned. The reduction in tourism has had serious implications on the economy of Bequia and has ricocheted through the economy of St. Vincent and the Grenadines. The tsunami was underscored by participants as a severe threat to the island due to the proximity of Bequia to the



submerged volcanoes of Kick-'em-Jenny and Kick-'em Jim located in the southern Grenadines corridor between St Vincent and Grenada. Hurricanes and drought are other climate problems faced by the island. Although the island is located in the pathway of hurricanes, it has one of the most sheltered harbours in the Eastern Caribbean.

Like other islands of the Grenadines, drought is a major challenge confronting the residents of Bequia. Through financial support from the World Bank and the Global Environment Facility, the community of Paget Farm has collaborated with the Government of St Vincent and the Grenadines to construct a desalination plant to produce fresh water to meet the needs of the community. Technical support was provided by 5Cs. The plant is powered by a photovoltaic system which provides excess energy to the central grid (Jaja *et al.*, 2016). The project is a unique case study to observe the role institutional integration can play in enabling the implementation of large-scale adaptation measures that enhance community-based climate change adaptation capabilities at the community level (Jaja *et al.*, 2016).



**Figure 26:** GIS map on Landslide risk hazard on Stubbs District located on the southeast of mainland St Vincent.

#### ***4.3.8 Climate change and other calamities impact on the South East of mainland St. Vincent***

The Stubbs District is located on the south-east of mainland St Vincent and the Grenadines. The district has a population of 26,000 and is impacted by all of the climate stressors affecting the island of St Vincent and the Grenadines. There are fifteen villages located in the district along with an industrial park and the newly constructed international airport. The community is directly exposed to storms and hurricanes coming in from the Atlantic Ocean. Hurricanes have not severely impacted the community over the past 30 years; however, in 1988 hurricanes destroyed over 250 houses in the district. The vibrant JEMS Community Organisation is located in this district and has been involved in climate change and sustainable development programmes over the past 38 years.

The district is located on the coast along the windward side of the island and is classified as a dry area with low rainfalls. However, due to the presence of the Kings Hill Forest Reserve, it is attracting a moderate deposit of relief and convectional rainfall all year around. Most of the area is denuded of trees due to hundreds of years of poor agricultural practices. The topography of the area is hilly, and participants at the Climate Risk mapping exercise stated that the main climate change risk hazard is landslides resulting from storms.

Sand mining is viewed by participants as another serious problem affecting the area. The removal of sand dunes through commercial means has resulted in severe coastal erosion as a result of SLR and wave actions. The sand dunes, which over the years act as barriers to prevent the sea from eroding the beaches of Diamond and Brighton, were cleared by commercial sand mining. Evidence of the exposure of the Stubbs District to SLR and high tides as a direct result of commercial sand mining was highlighted by Mol & Boomert (2011) in their report entitled Brighton Beach, St Vincent Excavation and Survey (2011).



**Figure 27:** View of Brighton Beach – sand mining of the sand dunes has left the entire area exposed to high tide/tidal waves, tsunami, storms and hurricanes and other impacts of climate change (Mol & Boomert, 2011).



**Figure 28:** Photo showing past and predicted future coastline at Brighton Beach:

blue area = erosion 1972-2008; green line = coastline prediction in 20 years; red line = coastline prediction in 50 years (adapted from Taylor, 2010 in Mol & Boomert, 2011)

Besides acting as a barrier to SLR, storms and high tides, the sand dunes at Brighton Beach is rich in archaeological materials from the Early Ceramic Age through the Early Contact period and is, therefore, an invaluable heritage and scientific resource.

*“Although sand mining has ended in the southern part of the site, where most excavating took place, from photos taken in 2008 it is clear that a large extent of beach containing archaeological materials (perhaps up to  $\pm 5000\text{ m}^2$  or 1.23 acres) has been removed in a period of 18 years...the prognosis is that if this activity continues unabated for another 50 years most of Brighton Valley will then be claimed by the sea,” (Mol & Boomert, 2011 pp.15-16).*

JEMS Community Organisation is working with the community to advocate for the government to put measures in place to stop the sand mining on the beaches of Brighton and Diamond and start consultation on adaptive measures to resuscitate the sand dunes. JEMS is also working with schools and other community-based organisations such as churches and sports groups to develop climate change adaptation and sustainable development programmes to build the resilience of local communities to adapt to climate change and other calamities.

#### **4.3.9 Reflection on the participatory mapping exercise**

Climate change is impacting severely on residents of local communities in St Vincent and the Grenadines affecting the well-being and livelihoods of local communities. These impacts are having long-term effects on the future prospects of socio-economic development of these communities and have contributed to grinding the economy to a halt. The island has experienced economic growth of less than 1% GDP since 2008.

The participatory mapping exercise is an important methodology used in the thesis to assist local people to identify the climate change pressures/stressors that are impacting on their small island communities. The Participatory Climate Risk Vulnerability Mapping exercises provided opportunities for the participants from various communities across



St Vincent and the Grenadines to validate the climate pressures identified through the review of literature via stakeholders' engagement.

Through stakeholder participation, the researcher provided the anecdotal evidence of the effects of climate change on youth in small island communities in the past. For example, the Participatory mapping exercises enabled youth and community leaders from 6 districts (over 40 villages, three towns and an island) to identify the climate pressures and calamities that are impacting on the communities across St Vincent and the Grenadines. This provided an opportunity for local people to discuss the vulnerabilities faced and make decisions on how they are going to respond to the impact of climate change within their respective communities. Although people generally do not possess the capacity to adapt to the impact of climate change on their community, due to the lack of skills and knowledge on climate change, they argued that over the past two decades they had used local traditional knowledge and skills to assist them in dealing with the impact of this phenomenon. Participants attributed this low level in their capacity to respond to climate change as a) climate change education is not integrated in the education system, b) lack of expertise in curriculum development as it relates to climate change education, c) trainers and teachers are not skilled in delivering climate change education, d) absence of a national policy on climate change and e) limited financial resources within St Vincent and the Grenadines to implement climate change education programme. They also attributed this to the decline in youth and community organisations and social networks in their communities that are involved in climate change adaptation and other community self-help activities. They concluded that the level of capacity on climate change that is provided through the education and training at community and national levels is very limited and non-existent.

The mapping exercise also indicated that the perception of climate change threat varies within SVG depending on the local context, and the risks identified by the participants are not the same everywhere. This suggests that a single strategy is unlikely to work and there would be a need for locally adapted solutions. Over the years, commercial gains and the profit motive have influenced resource exploitation and developmental efforts and did not consider the environmental consequences of such actions. This disconnect has continued for centuries and has exposed the country to risks. There is local knowledge to deal with calamities and climatic stresses which can be used for

adaptation, but harnessing this knowledge, maintaining it and passing it on to the next generation will be a major challenge. However, it does not appear that there is a process to make use of this knowledge for the local benefit.

As well as being able to identify and verify the climate stressors impacting on small island communities through stakeholder participation, the participatory mapping exercise provided opportunities for building friendship, respect and partnership among the various members of the communities. It provides opportunities for persons of different age, gender, social class and from other geographic locations to meet to collectively discuss the issues confronting the community and devise strategies to address these issues. Some of these participants were meeting for the first time to explore the critical issues that affect their communities. At the initial stage of their consultation, they selected a co-facilitator to work with the researcher to facilitate the session and ascribe to assist with taking the minutes of the meeting. They discussed a set of ground rules to manage the process of deliberation including a) respecting the views of others, b) raising your hand if you want to make an input into the discussion, c) allowing a person to complete their contribution to the discussion before interjecting their views, d) respecting the views of the facilitators at all times and only speaking when the facilitator asked for contributions to the discussion.

Despite all the rules there were instances when the discussion became heated as participants began to take sides supporting as well as criticising each other. It was amazing to observe persons who had not seen each other before walking across the map on the ground to hug each other when they made a point that they felt echoed their own views on a particular issue. There was an instance in Vermont Valley when a mature woman was describing her ordeals with the flood she became so emotional and as she was about to cry the rest of the group gathered around her providing support. This empowered her to complete her story. This type of occurrence happened throughout the mapping exercise. There were instances where participants from one village agreed to visit other villages to work with the residence to implement drought and or pest resistance cropping techniques to assist farmers who were suffering from drought and or invasive disease. There were also occasions where residents who successfully implemented river defence strategies to protect their households and

villages agreed to travel to other villages to work with them to share their knowledge and implement these strategies.

Besides providing information on climate pressure/stressors affecting the community, one can conclude that the participatory mapping exercise brought additional benefits to the community. Persons who participated in the mapping exercise were empowered when the government officials and community leaders selected them to represent their villages at the district consultative mapping exercise. The participants of the Participatory Mapping exercise went back to their communities empowered with new knowledge, skills and strategies for addressing climate change adaptation. They also worked together through community networks to support each other to build their adaptive capacities to adapt to the impact of climate change at the community level.

#### ***4.3.10 Critical lessons to be learned***

The participatory mapping exercises provided information on the impact of climate change and calamities on the local communities in the past. Therefore, besides participants providing validation of the climate change pressures impacting on their communities and ranking these climate change pressures in terms of their impact, they provided a historical perspective on the extent of the impact of time on the socio-economic and natural resources. Participants also discussed the adaptive strategies they have implemented to reduce the impact of climate change on their communities.

Through discussions which led to the participatory Climate Risk Vulnerability Mapping exercises, the participants were able to provide a picture of the extent of the degradation over the past 25 -30 years. For example, the participants were able to link the removal of coral reefs, mangroves swamps and sand dunes on some coastal communities to the building of tourism facilities, housing and other infrastructures to coastal erosion caused by SLR and high tides and decline in fish stocks. They also linked the clearing of the forested area on the coast and interior of the islands for agriculture (legal and illegal), housing construction and community expansion purposes to environmental problems such as landslides, soil degradation and flooding of communities lower downstream.

It was also necessary for participants to link the various manifestations of climate change impact on the local community to the capacity development and climate change

adaptation initiatives that are implemented in the community to help them adapt to the impact of climate change. Participants spoke of building baskets from metal-wires (Gabion Baskets) and putting stones in them along riverbanks to prevent the river from eroding its banks and flooding the communities lower downstream when there are storms and torrential rains. Through community self-help activities some communities have organised tree planting initiatives along the river banks to stabilise the riverbanks and protect their community from flooding and landslides. Most of these activities were implemented by young people working with their communities utilising a bottom-up approach.

Farmers employed mulching, contouring, terracing and other traditional farming practices to enhance soil fertility by trapping moisture in the soil during drought (extended dry season) in order to reduce soil erosion during the rainy season. During the rainy season communities, specifically, those on the islands of the Grenadines such as Bequia would harvest the water running off the roofs of their houses to use for domestic and sanitary purposes such as washing, flushing toilets, as well as for feeding their animals and irrigating their crops during the dry season. These climate change adaptation activities are also utilised at the community level on mainland St Vincent and the Grenadines.

The outcomes from the mapping exercises were important. The researcher shared the 36 GIS maps developed through the Participatory Risk Vulnerability Mapping exercises with the Physical Planning Division of the Ministry of Planning and Sustainable Development (Ministry with responsibility for Climate Change) and National Emergency Management Unit (NEMO). These maps form the first level of GIS vulnerability risk maps developed in St Vincent and the Grenadines. The researcher will work with both agencies between November 15<sup>th</sup> and December 15<sup>th</sup>, 2018 to implement a series of capacity building workshop in the communities that participated in the Climate risk and vulnerability mapping exercises. These workshops will train residents of communities on how to use the information generated from the maps to reduce the exposure from climate stressors and enhance the capacity of the community to build resilience to adapt to the impact of climate change. This work will involve the identification of the areas in the community that area prone to the respective climate pressures and the development of climate change adaptation activities to respond to climate risk and

vulnerability. An outcome of this activity will be the development of disaster emergency plans for each of the community participating in the capacity-building project.

On the issue of climate change adaptation, the researcher will work with young people from the technical and teachers colleges to document the adaptive actions implemented within communities to adapt to the impact of climate change. The researcher will also work with NEMO and the other appropriate government departments and NGOs to train participants at the community level in how to up-scale and implement these climate change adaptive actions.

Besides being equipped with new knowledge, skills and strategies for addressing climate change adaptation, the process implemented by the researcher empowered the participants to work together to create community networks. These community networks were instrumental in supporting each other to build their adaptive capacities to adapt to the impact of climate change at the community level.

#### ***4.3.11 Section 3 Summary***

The researcher employed a participatory mapping approach to produce GIS maps, which show the impact of climate change and other calamities in six districts across St Vincent and the Grenadines. These GIS maps and photos provide evidence of the devastating impact of climate change and other calamities on St Vincent and the Grenadines. Research has shown that these calamities will increase in severity in the future (Simpson, 2010; Nurse, 2014). The participatory mapping exercise implemented by the researcher utilised a Bottom-up Knowledge Mapping Approach to spatial analysis where the researcher and participants manually constructed assessment maps at the district level. This was the first step in the data collection process on the impact of climate change and other calamities on communities in St Vincent and the Grenadines. It brought 25 - 30 participants representing a diversity of communities, a wide range of ages, gender, social class and other pertinent demographic categories to develop these spatial maps.

The next step consisted of collaboration among all stakeholders to take appropriate actions to move the process to the next level which involved:

- (a) Assessing maps and other datasets to derive adaptive strategies; and,

- (b) Evaluating each success factor (adaptive strategy) guided by a set of questions to determine whether they were fully in place, partially in place or missing. For example, policies relating to enabling conditions were thoroughly explored, and strategies identified that would address the missing key success factors (those that were not in place or only partially in place and ensuring that those that are already in place remain so).

This step was to ensure that strategies were identified that maximise the likelihood that adaptation measures are at the scale to achieve success (IUCN & WRI, 2014). This approach has led to building the capacity of the communities to adapt to the impact of climate change and other calamities in the future. In terms of moving forward, the next step of the process would consist of holding an analytical workshop to consider, test and review other non-spatial analyses such as valuation of the cost and benefits of the different types of restoration and adaption interventions identified by the participants for consideration (IUCN & WRI, 2014).

#### ***4.4 Summary of the Chapter***

The chapter is linked to both Research Objective and Question 1. It highlights the socioeconomic and development perspective of St. Vincent and the Grenadines. It presents an analysis of the main socio-economic drivers of the island as well as a chronological account of the impact of calamities on the island and the response of the people to deal with such calamities over the centuries.

Human interference has always been driven by the profits motive, income generation and other incentives. Therefore, if people cannot survive comfortably in terms of finding viable, sustainable livelihoods within the national economy, they will engage in illegal practices such as deforestation and encroaching on the natural resource base of the country as a way to eke out a living. Lack of steady incomes may be the main reason for the rise in the number of persons involved in the illegal marijuana trade. The destruction of forests and other unsustainable conservation practices have caused large areas of land to be exposed to landslides and flooding resulting in death, destruction of housing and infrastructure (Government of St. Vincent and the Grenadines, 2014).

Throughout the history of SVG, the evidence has shown that our ancestors lived within their environmental limits by implementing Environmental Laws such as the 1791 Kings Hill Forest Reserve Act, and the creation of institutions, e.g. the Botanical Gardens in 1765, as a way of enabling them to create sustainable living and lifestyles.

Another important lesson, which evolved from the chapter, is that when people are faced with development problems caused by calamities such as climate change, environmental degradation and natural disasters they would devise proactive bottom-up approaches to address these development problems. Youth in SVG have created a range of viable CCA projects and programmes to address these calamities, some of which would be reviewed in Chapter 6.

# Chapter 5

## Analysis – Top-Down Approach

This Chapter is divided into two sections. Section 1 deals with the utilisation of the thematic analysis tool for analysing the data from the interviews with Policymakers and Senior Officials, and the Focus Group Discussions with youth. Section 2 presents the outcomes report on the analysis of the data from the interviews with Policymakers and Senior Officials and FGD with youth.

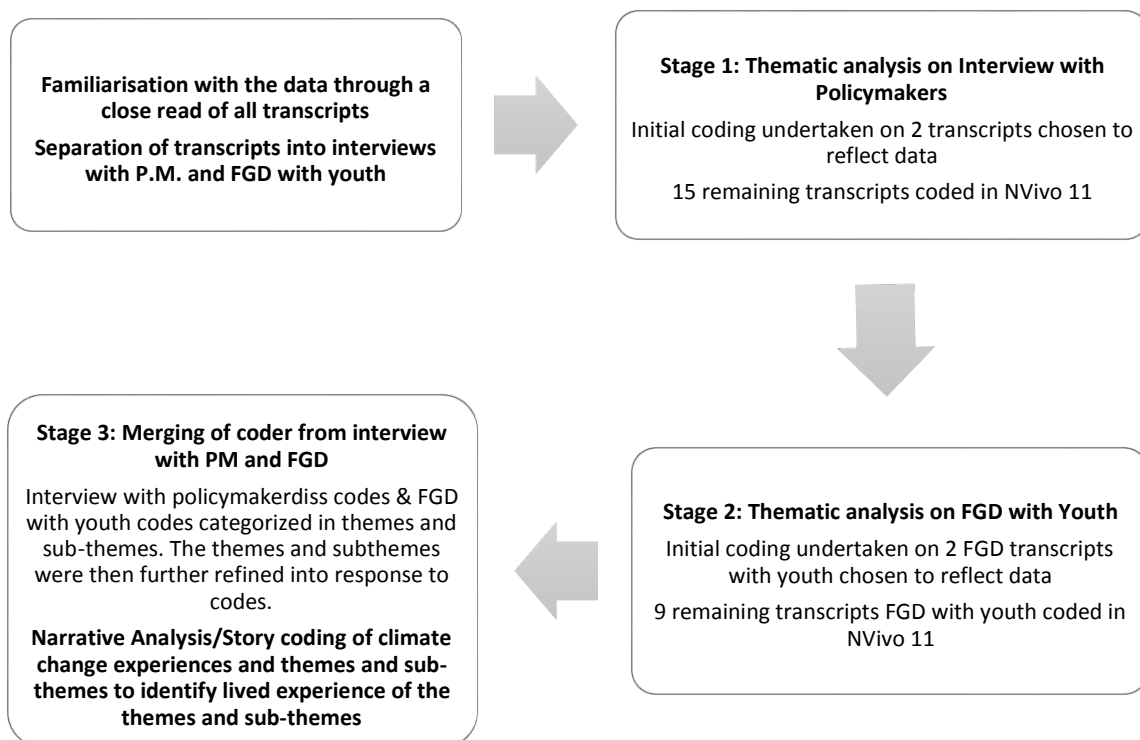
### ***5.1 Section 1: Process for the utilising thematic analysis tool to analyse data from FGD and Interview***

The researcher utilized thematic analysis approach to analyse the research data from 16 interviews with Policymakers and Senior Officials and 11 Focus Group Discussions (FGD). Thematic analysis is defined as a method for identifying and analysing patterns in qualitative data (Clarke and Braun, 2013). Thematic Analysis has recently been recognized as a qualitative analytical approach. It is described by some authors as a phenomenological method (Guest *et al.*, 2012). Other researchers identify the approach as an analytical method rather than a full-fledged methodology (Clarke and Braun, 2013). Thematic analysis is an exciting process requiring a considerable investment of time and effort by the researcher. It focuses on what is said rather than how it was said, allowing key themes to emerge from the data. It is also a method because it a) works with a range of research questions, b) can be used to analyse different types of data, c) works with a range of different datasets and d) can be applied to produce data-driven or theory-driven analysis. While there is no accepted, standardised approach for carrying out thematic analysis, Braun and Clarke (2006) in Braun and Clarke (2013) put forward a systematic approach to implementing thematic analysis. This process is comprised of a



six steps analytic approach including 1) familiarisation with the data, 2) generating initial codes, 3) searching for themes, 4) reviewing themes, 5) defining and naming themes and 6) producing the report.

To analyse the data, the researchers utilised the six (6) steps of the thematic analysis as put forward by Braun and Clarke (2006) in Braun and Clarke (2013). The figure below (Figure 29) shows a general overview of the thematic analysis process employed by the researcher.



**Figure 29:** The process of data analysis

The summary of steps below describes how the researcher undertook the coding process:

- Copies of all interview transcripts were prepared and printed by the researcher. The researcher read through all the transcript along with the notes taken after each interview and FGD were completed in the field. This exercise provided the researcher with an overview of the dataset as well as an opportunity for him to identify preliminary themes evolving from the data.
- An initial set of 182 codes was developed by the researcher based on a close reading of a sample of 4 transcripts (2 interviews with Policymakers and 2 FGD with youth). These codes consisted of one word or a phrase that summarises a cluster of quotes from interviews and FGD.
- The initial codes were put into a coding framework which included a definition of each code and quotes that reflected the specific code (examples of which can be seen in Table 8). The descriptions given for each code were created, combining the word as used by participants with a dictionary definition of the phrase. The researcher took into consideration the actual definition of the word along with the participants' interpretation of the words/codes.
- Once the initial coding framework was established and the definitions of the code completed, the researcher applied them to the rest of the data using NVivo 11. Data fitting into codes were categorised. Data that did not fit into code were categorised as 'outliers'.

The section below provides more details on the steps taken by the researcher to analyse the data from the Top-down interviews with policymakers and Bottom-up FGD with youth.

## **Step 1: Familiarisation with the data**

Over the past weeks, the researcher transcribed the data and then familiarised himself with the data by immersing himself in it (read and reread entire datasets). This was to search for and identify meanings and patterns in the data source. During this process, the researcher took notes of the data patterns but resisted any attempt to code the data.

## **Step 2: Generating the initial codes**

A large volume of data was collected in the field. A structured approach to the analysis was taken, beginning with initial codes of the data involving working through the body of data line by line. The researcher used NVivo (version 11) to assist with the analysis of the data (Crowley, Harre & Fogg, 2001; Marshall, 2011). The main limitation of the software programme is that it does not make decisions for the researcher, i.e. what to do or what is meant by the data (Marshall, 2011). Therefore, it is the responsibility of the researcher to make decisions on what to do with the data or what meaning should be extracted from it. The software assisted the researcher with the analysis of the data, i.e. organising the data into themes by a process called coding. The researcher organised the responses from the interview and the FGDs according to themes. After coding all the data, the researcher began collating the data identified by the same codes. The initial theme from the review provided a basis for coding complemented with emerging themes evolving from the coding process. The initial coding process identified all the possible codes appearing within the individual data set. The researcher assigned code names to the codes (refer to Table 8, Figures 30-32 and Appendix VII for examples of codes, theme and subthemes).

## **Step 3: Searching for themes**

The researcher reviewed the codes and sorted different codes into potential themes by using mind-maps, tables and word-clouds. The codes were sorted into themes, sub-themes and outliers. The theme presented a coding of initial codes (Braun and Clarke, 2013). Some themes emerged with a substantial incidence of codes from participants transcripts whereas other groups of codes emerged as sub-themes, relevant to the overarching themes. Theme and sub-theme emerged from a combination of both, i.e. some emerged from participants work as well as some created by the researcher. As these themes emerged, the researcher added a description to each of them. This enabled the researcher to define distinct themes and their features. The interviews with policymakers and senior officials show that climate change, education, community and youth are the most frequent words, whereas the focus group discussions with youth show that climate change, community, youth and people are the most frequent words mentioned by youth (refer to Table 8, Figures 30-32 and Appendix VII for examples of codes, theme and sub-themes).

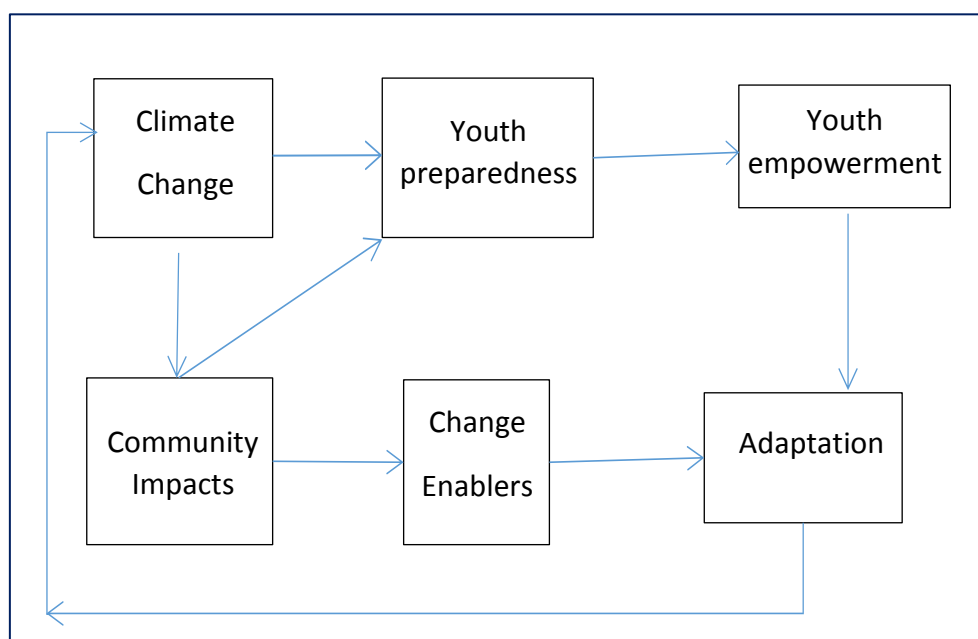


**Figure 30:** NVIVO Cloud Interview visualisation of Word Frequency from interview transcripts with Policymakers and Senior Officials



**Figure 31:** NVIVO Cloud Interview visualisation of Word Frequency from FGDs with Youth

The above section provides four main themes evolving from the thematic analysis. These are climate, community, youth and change. As stated above the theme evolved from a mixture of themes evolving out of participants' language.



**Figure 32:** Themes evolving from the thematic analysis of data from Interviews and Focus Group Discussions

#### *Step 4: Reviewing themes*

Throughout the coding process, the researcher took a substantial body of notes of the emerging themes evolving from the data sets. This was done to assist him with the organisation of his thought process and structuring the write-up process. This process was very complex. The researcher required a strict process of coding, naming and revising codes and emerging codes and note-taking in order to keep track of the numerous threads of this vast body of data.

This stage was concerned with the refinement of themes. It had two levels:

**Level 1: Reviewing of the coded data** which involved the researcher rereading all the data to review how they fit into each theme to ensure that they form coherent patterns and **Level 2: Reviewing at the level of themes** which involved reviewing the themes in relation to the data corpus (17 interviews and 11 Focus Group Discussions). The researcher used a thematic map to assist him with visualising the relationship between the themes. He then focused on whether the relationship between the themes reflects the meaning of the data (Figure 30). The clusters of themes and sub-themes emerging were Climate, Community, Youth and Change.

As indicated in Figure 31, the climate is changing, which is affecting the community in various ways. Therefore, the business-as-usual scenario will further aggravate the climate change situation in the future. The youth would not be adequately prepared to face the challenges that climate change is predicted to unleash on small island communities if measures are not taken to prepare communities to adapt to climate change. This situation needs to change to enable youth empowerment and better adaptation. These processes were worked through many times by the researcher. The notes that were taken began to form the basis for writing the data chapters. These notes were also used in the data analysis section of the research.

#### *Step 5: Defining and naming the themes*

At this stage, the researcher captured the core of what the various themes were all about and what aspects of the data each theme captured. The researcher created a narrative with the data by analysing each theme and its narrative. Here the researcher identified whether or not any of the themes contained sub-themes, which include the names of the themes. This component concerned the precise identification of the

themes. The researcher began an intensive process of printing the data from each theme and cross-checking the data to ensure all data relevant to the respective themes were included in the notes. A final thematic map was produced after constant revision of the themes in relation to the data (Figure. 29). The researcher then revised the description of each theme where necessary.

As indicated above, the central theme evolving from the activities were climate, community, youth and change. A coding tree was used. The theme climate was coded as the parent node, and the identified climate change stressors were established and coded under the parent node and sub-themes. The climate change stressors/pressures include SLR, storms and hurricanes, temperature rise, rainfall patterns and drought.

The theme community pertaining to the data collected from interviews with Policymakers and FGD with youth were coded as parent node community and enlisted sub-themes/clusters including unsustainable livelihoods (tourism, agriculture and fisheries) and low community capacity.

The theme youth was coded as a parent node with youth preparedness, and the identified youth preparedness events were enlisted and coded under the parent node as sub-themes. Any information relating to sub-themes was recorded under each sub-theme. The theme youth preparedness evolving from the data collected from interviews with Policymakers and Youth from the FGD have the following enlisted sub-themes/clusters including irrelevant education and lack of understanding of climate change concept.

The theme change was coded as change enablers' parent node, and the enlisted sub-themes were sub-divided into two further themes, which include a) youth empowerment and b) adaptation. The change enablers for youth empowerment parent node from the data collected from Policymakers and Youth have the following enlisted sub-themes including capacity development (skills development), technological innovation and creativity and opportunities for decision making.

The Change Enabler Adaptation parent node emerging from data collected from an interview with policymakers had the following sub-themes/clusters a) integration of climate change education, b) new CCA policy and c) innovations in sustainable livelihoods.

The table below shows the summary of the coding process of qualitative study on the impact of climate change on youth in SIDS.

**Table 8:** The coding process of qualitative study on the impact of climate change on youth in SIDS

| Examples of quotes  | Example of codes            | Sub-theme mapping<br>against data | Themes mapping<br>against data |
|---|-----------------------------|-----------------------------------|--------------------------------|
| Due to the high volume of deforestation taking place in the mountainous interior of the island we see notable reductions in the flow of streams (rivers)...resulted in the reduction of water going to the water catchment tanks. | Deforestation               | Human Interference                | Climate Change                 |
| Large areas of coral reefs in the Caribbean are dying from coral bleaching as a result of increased sea surface temperature and sea level rise.   | Coral bleaching             |                                   |                                |
| There is an increased frequency of storms in 2010, 2011, 2012 and 2013 resulting in flooding and landslides.  | Increase in storm frequency | Hurricane and storms              |                                |
| Hurricanes are getting stronger and more dangerous over the past five years. They are ranging from 150-250 miles per hour blowing away everything in their path.  | Upsurge in intensity        |                                   |                                |



| Examples of quotes  | Example of codes                              | Sub-theme mapping<br>against data                            | Themes mapping<br>against data |
|---|---|--|--------------------------------|
| Climate change is having a negative impact on SVG, i.e. a negative impact regarding how it affects livelihoods such as tourism, agriculture and fisheries.                                | Threat  | Unsustainable livelihoods/<br>Youth unemployment<br>increase | Community                      |
| Reductions in the tourism industry, due to poor dive sites and other problems, have caused many youths to lose their jobs.  | Youth unemployment                            |  |                                |
| People are self-centred and selfish concerning how they respond to the issues. There is no sense of community reacting collectively to address a development issue that may confront them | Self-centredness/lack<br>a sense of community | Low capacity   |                                |
| Climate Change impact caused people to put their differences aside to help each other recover from the effects of storms.   | Capacity building                             |  |                                |

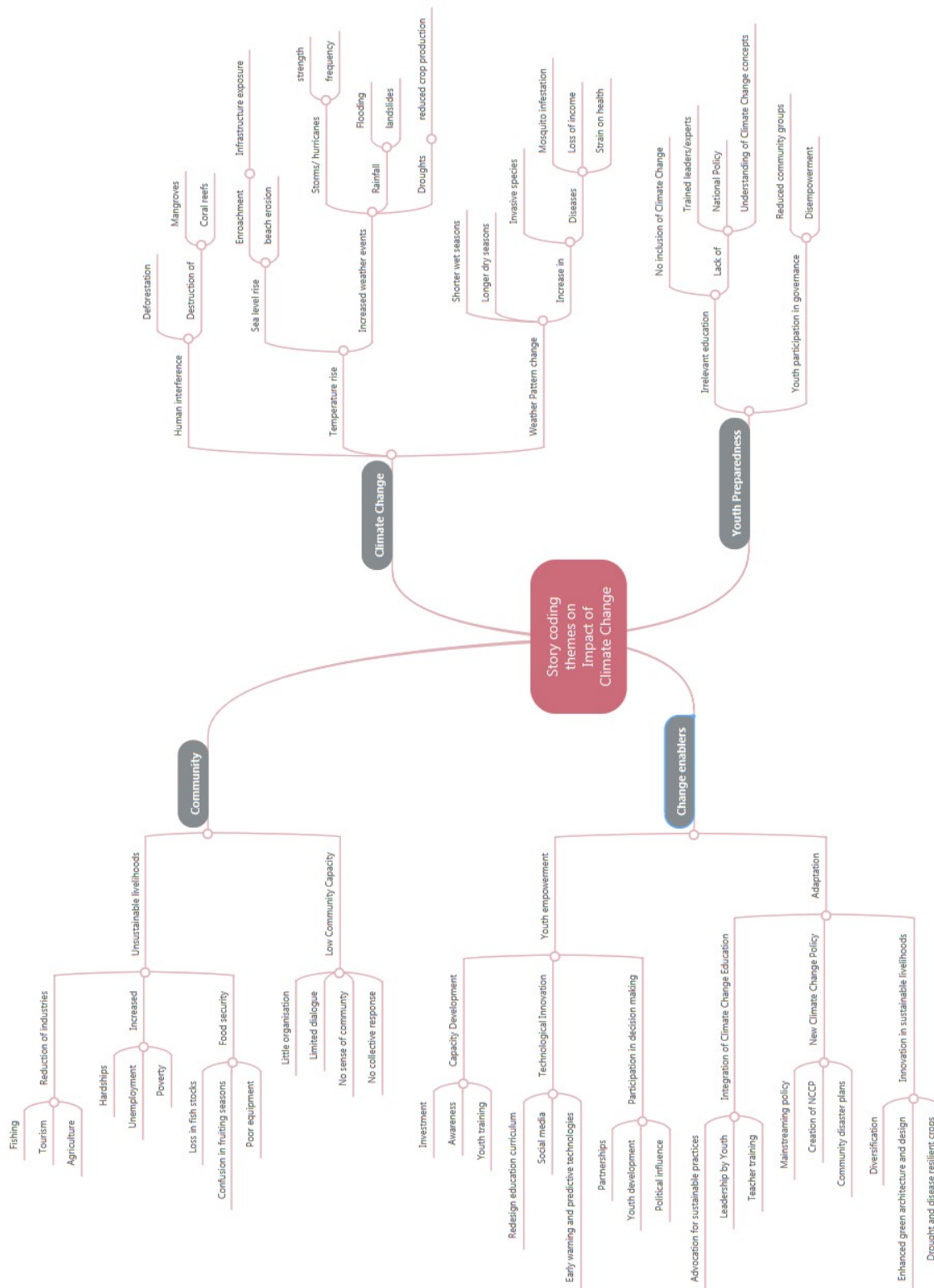
| Examples of quotes  | Example of codes                | Sub-theme mapping<br>against data | Themes mapping<br>against data |
|---|---------------------------------|-----------------------------------|--------------------------------|
| No, no, no, we are not satisfied with the level of skills and knowledge provided to us in the schools and colleges. We are not given the necessary skills, which will enable us to adapt to the impact of climate change. Climate Change is not included in our syllabus. | Irrelevant skills and knowledge | Irrelevant education              | Youth Preparedness             |
| I did not know anything about Climate Change until I started a PADF (Pan American Development Foundation) training course a few months ago. I also know that most people in Chateaubelair community have never attended any training on Climate Change.                   | Climate knowledge and skills    |                                   |                                |

| Examples of quotes   | Example of codes                           | Sub-theme mapping<br>against data | Themes mapping<br>against data |
|--|--|-----------------------------------|--------------------------------|
| The government needs to invest in capacity building programmes for youth. Lots of resources are now going towards infrastructure development activities such as airports, main roads but not enough is going to youth and people development needs | Balanced development                       | Youth empowerment                 | Change enablers                |
| I enjoyed this part of the work – providing voluntary services to members of our community. It was pleasant and rewarding to help out the homeless and other persons of the population who are less fortunate                                      | Voluntary service                          |                                   |                                |
| The focus should be on the development of Climate Change Sustainable Education in the schools, colleges and adult and continuing education programmes. Youth should be provided with basic knowledge of environmental laws.                        | Integration of Climate Change in education | Adaptation                        |                                |
| The subject of Climate Change is too important for the government to treat with disrespect. Youth would have to take the lead to ensure that we are provided with proper knowledge and skills on the subject.                                      | Youth Preparedness                         |                                   |                                |

| Examples of quotes   | Example of codes              | Sub-theme mapping<br>against data | Themes mapping<br>against data |
|--|-------------------------------|-----------------------------------|--------------------------------|
| He (farmer) would integrate the production of his livestock on his land. He would put aside part of the farm for planting grass to feed his livestock. He used traditional practices to conserve his lands such as contouring, terracing and mulching. He would use the 'dung' from the animals as manure for his crops. | Innovation growth<br>practice | Sustainable<br>livelihoods        | Change enablers                |
| Acquired knowledge and skills in building solar, wind and other forms of renewable energy to enhance energy efficiency as well as reducing greenhouse gases into the atmosphere are vital in the future. This will reduce the impact of climate change in the future   | Energy efficiency             |                                   |                                |

### ***Step 6: Producing the report***

The researcher would like to note that some of the themes emerging from the data were unexpected. A rigorous process of data analysis was implemented by the researcher to ensure that a) the data do not only represent the charismatic participants and b) the entire body of data and the voices of all participants are reflected. The researcher would also like to highlight that the rigorous thematic analysis he employed to analyse such large body of data is a much more intensive process than is possible in order to capture the description of the process. Figure 30 breaks down the codes, sub-themes and themes created for research on the impact of climate change on youth in SIDS.



**Figure 33:** Showing codes, sub-themes and themes for research on the impact of climate change on youth in SIDS.

### ***5.1.1 Summary of the thematic analytical process***

The thematic analysis brought together data from each interview and focus-group discussion datasets relevant to a particular theme. This was to ensure that during the writing up process a clear and concise depiction of the experience of the body of contributors would be given in a comprehensible manner. In essence, the thematic analysis transformed the individual life stories of the participants to a body of accessible/available information concerning a particular life experience. The data presented central themes with sub-themes on the perceptions and experiences of Policymakers/Senior Officials and Youth adapting to climate change in Small Island Developing States.

## ***5.2 Section 2: Analysis of the Top-down approach of data from Interviews with Policymakers and Senior Officials and Bottom-up approach from FGD with Youth***

As indicated in Chapter 5 Section 1 the researcher used thematic analysis to classify the codes evolving from the interviews with Policymakers and Senior Officials of the Government of St. Vincent and the Grenadines and FGD with Youth into clusters. These clusters were further refined into themes and sub-themes. The key themes which evolved from the thematic analysis exercise were Climate Change, Community, Youth Preparedness and Change enablers. Change enablers are divided into two categories a) change enablers, which lead to Youth Empowerment and b) change enablers, which lead to Adaptation. The researcher read each transcript thoroughly, set these codes on a coding framework with appropriate codes and quote along with the notes taken during the interviews and FGD sessions. He then utilised NVivo 11 to aid the selection and analysis of the appropriate the quotes relating to each of the theme and sub-theme.

The researcher then selected a set of quotes which fit specific sub-themes and themes from the data collected from Interviews and FGD. He then selected the appropriate matching quotes from the coding framework (NVivo 11), and the notes were taken during each interview and FGD sessions and began writing-up the analysis to the specific themes and subthemes. The researcher reviewed and rewrote the content of the

analysis until he was satisfied with it. He then shared these analyses with colleagues and supervisors to get their feedback on the work done. (Refer to Table 8 the coding process of qualitative study on the impact of climate change on youth in SIDS)

### **5.2.1 Climate Change**

All the policymakers and senior officials participating in the interviews acknowledged climate change as the most devastation challenge facing the people in SIDS, including St. Vincent and the Grenadines. The Youth who participated in the FGD felt that Climate Change and other calamities are negatively impacting on their lives. They strongly agreed that climate change stressors are wreaking havoc on small island communities. Policymaker V2 complained that:

*It (Climate Change) is one of the most severe issues that is facing the world.*

*It [Climate change] is making people more vulnerable to stronger storms, droughts and diseases.*

A similar view was echoed by a young woman from X4 participating in the focus group discussion:

*Climate change is a severe problem impacting dangerously on our small islands. We have some low lying islands which can be entirely covered by the sea (dis climate change is ah seras ting. E rale sick (dangerous) affectin bad pon ahwe smarl islan. Ahwe ha alat af smarl islan dat de sea can cover dem an all ahwe up).*

To highlight the seriousness of the impact of climate change on SIDS such as St. Vincent and the Grenadines, Policymaker and Senior Official Y15 opined:

*As a small island developing state, SVG is particularly vulnerable to Climate Change and Climate variables. Anyone of the climate shocks will have a significant impact on the economy and overall way of life.*

About the seriousness of the impact of climate change, a young man from the Focus Group Discussion FX8 said that Climate Change is viewed as a real threat to the lives of people living on SIDS:

*Yes, climate change is a real threat to our island. Besides the scientists saying it is real, we are experiencing lots of things like increases in*

*temperature, increases in storms, long dry seasons which result in drought and also sea level rise due to the amount of water going into the oceans from melting snow and ice from the Arctic. (Yah, climate change ah rale tret to arl ahwe. Arl de scientis dem say it ahfe real. Ahwe ah see an increas in hurricane. E weada ah geh drya an drya, an ahwe ah ge mo drout, an e sea ah ge hire an hire. Cars arl eh wata way ah melt arf fram de ice ina de Artik Circul ah go ina e sea).*

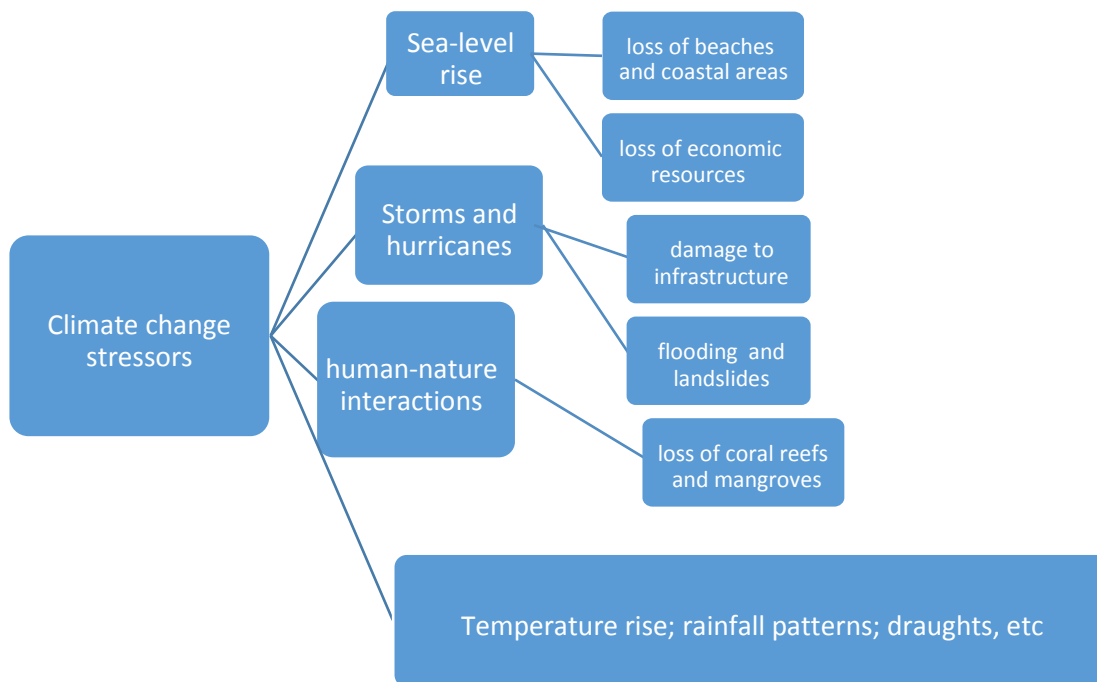
Some policymakers and senior officials highlighted the peculiar characteristic of small island developing states as the basis for its vulnerability. Policymaker and senior official Y1 stated:

*Climate change is a threat to St. Vincent and the Grenadines , and other Small Island Developing States... peculiar characteristic makes it (SIDS) vulnerable to climate change, i.e. small size, rapid population growth, subsistence agriculture and high endemism regarding biodiversity, distance from main economic markets and economy in transition.*

All Policymakers and senior officials emphasised the fear they have regarding the impact of climate change and other calamities on their small island communities. Youth showed a similar level of fear regarding the impact of climate change. Youth recalled that it is affecting them in different ways such the slow creeping impact of SLR eating away the land around their coastal communities and beaches, and the instant violent impact of storms and hurricanes, which blew down everything in their path. These fears are supported in the literature which states that increased frequency of storms and cyclones, SLR, temperature rise, invasive species and diseases are already threatening the health system, local economies and livelihoods of SIDS (Gomez, 2013; Hernandez-Delgado, 2015). These islands are facing risks from both climate hazards that have occurred over centuries, as well as from new risks from climate change. Therefore people living in SIDS are particularly vulnerable to the impact of climate change (Gomez, 2013; Nurse, 2014; Economist, 2017; Fieser, 2017).



The researcher presents an analysis of the perspective of the policymakers and senior officials on the climate change stressors that are impacting on SIDS as highlighted in Figure 33.



**Figure 34:** Indicates the climate change stressors impacting on young people in small island communities.

### 5.2.2 Human interference

Policymakers and senior officials recognised the wide-ranging negative impact of humans on the environment and their contribution to worsening the impact of climate change on small island developing communities. Policymaker Y1 explained:

*St. Vincent and the Grenadines collect surface water from the abundant forests. Due to the high volume of deforestation taking place in the mountainous interior of the island, we see notable reductions in the flow of streams (rivers), resulting in the reduction of water going to the water catchment tanks.*

Youth also highlighted the issue of deforestation in the mountainous interior of the island as significant human interference. A young man from X10 stated:

*Over three-quarters of the forest cover on the island is destroyed. Thousands of acreages of the forest is cleared for marijuana growing. After 2 to 3 crops planting Ganga in the mountains, the soil becomes poor (infertile), so the*

*Ganga farmers moved on to clear another area of the forest to start planting another crop. When the rain falls, the loose soil would be washed away by the rain. It will travel down to flood the villages. (Yeh ova ¼ of de tree dem don cut down. Dem Ganga man cut down de trees fuh plant dem Ganga. Afta dem don plant 2-3 time (crops) de dutty (soil) get poor so de Ganga man ah move to ah next place feh cut down mo tree feh plant e Ganga. So wen e rain ah fall de dutty go wash way by e rain. Ah dah wata fram e mountin way ah wash way de villeg ah dem belo).*

Both youth and policymakers recalled a notable reduction of water from the rainforest for domestic purposes, such as drinking, support irrigation of crops/farming and industrial purposes. The illegal marijuana farmers cut down large acreages of the forest to plant their crops in the mountainous interior of the island. This has increased flooding and landslides in coastal communities lower downstream as highlighted by Policymaker Y7:

*Again looking at 2010, 2011 and 2013 climate disasters, we can observe that the removal of the forest would affect the water reserves and can cause flooding in the villages. The true defence systems that were in place are not adequate due to the force of the river flooding out of the valleys.*

Youth linked the deforestation problem to the rationing of water in the communities. This link was made by a young woman from X7 who claimed that:

*Water shortages and water rationing is a frequent occurrence during the dry season. This problem is worsened due to the high level of deforestation taking place in the mountains. (So yo see dem arlways rashan wata wen ahwe ha rale dry season. Now ah days e gettin rale bad cars ah e large amount ah tree dem ah cut down in ah e mountin)*

Over 70% of Policymakers and Senior Officials highlighted the wanton destruction of coral reefs and mangrove swamps by developers in the Grenadines and the southern portion of mainland St. Vincent to develop tourism facilities as having serious implication for worsening the impact of climate change on these islands. Policymaker and Senior Official Y1 best describe this:

*Reefs and mangroves swamps are responsible for slowing down the rate of tidal wave energy impacting on the coast of these islands. Where reefs and swamps are not present, the entire coastal areas will be exposed to the direct impact of wave action, storms and sea level rise. Most of the wetland around are destroyed by developers in the tourism industry and for housing expansion. Lots of mangrove swamps were destroyed in the Grenadines to build hotels and mariners for anchoring yachts to support tour operators' enterprises.*

Policymakers and senior officials expressed their concerns regarding the continuous destruction of the islands' natural resources by foreign tourism developers and by the illegal marijuana producers. Over 90% of the policymakers and senior officials interviewed expressed concerns about the relaxed government planning and environment laws for tourism developers. Two issues of grave concerns were raised by policymakers including a) the dynamiting of vast acreages of coral reefs by tourism developers in the Grenadines island of Canouan for the development of a yacht mariner on the island and b) the changing the course of the river in Buccament Valley by the tourism developers who were developing the Five-Star Buccama Resort. The river was diverted into the local community and was the cause of flooding of hundreds of households and deaths of residents during the 2013 Christmas Eve storm. Policymakers and senior officials were adamant that two parallel states be operating in St. Vincent and the Grenadines , i.e. one where local planning laws and standards are enforced for some local people and the other where foreign developers can do whatever they like when constructing tourism facilities. This is suggesting that economic concerns override other factors in the decision-making process and there may be an element of corruption as well.

Over three-quarters of the youth who participated in the focus group discussions expressed anger regarding the high levels of deforestation taking place in the mountains by illegal marijuana farmers who cleared large acreages of virgin forest to plant their marijuana. Most of the youth indicated that they are also aware of the destruction of mangrove swamps and coral reefs by tourism developers to develop mariners and tourism facilities on the islands of the Grenadines. Approximately one-third of the youth

who participated in the FGD, mainly young women, called for new leadership in St. Vincent and the Grenadines to address the deforestation problem. Most youths felt that the 'current crop of leaders' do not have the interest nor the political will to address the deforestation problem in the mountains.

Most policymakers and senior officials are of the opinion that the marijuana producers are viewed by the state as a free set of persons, despite their involvement in illicit practices such as a) planting an illegal, banned product and b) farming in the prohibited interior of the island above the 1000ft contour line. On the other hand, despite their resentments, over 50% of them argued that the government lacked the resources to patrol the interior of the island. They estimated that there are over 5000 people involved in this illicit practice, and due to the high unemployment and weak economic performance of the country's economy, the government tends to leave them to their own accord. Even though the state is discouraging such illicit practices through high charges and penalties for those caught in the act, this does not stop the youth from participating in this illegal activity. This appears to suggest the ineffective governance and policy influence of the state in condoning human inference. The current focus of the government seemed to be on promoting economic activities hence no real concern is shown about the origin or nature of such activities.

### **5.2.3 Rise in temperature**

Policymaker and Senior Official Y7 highlighted the consequences of temperature rise on the Caribbean Island States:

*Increase in temperature causing the ice around the Arctic Circle to melt resulting in Sea Level rise. Increase in temperature escalates the severity and intensity of hurricanes and other weather events such as droughts and heavy rains, which are causing flooding and landslides.*

This view was supported by over three quarters of the policymakers and senior officials who participated in the interview sessions. The rise in the temperature is viewed by most youth who participated in the FGD as a significant climate stressor impacting on their communities.

A young woman from FGD X2 said:

*Lots of dust is around because the earth and air are getting hotter as the temperature continues to increase due to climate change. High temperature caused drought, which stunted our cash crops and food. **(Dus dey arl ova de place. De dutty tough an de air ah gey hata an hata. Climate change mek e temprecha hata. E high temprecha mek ahwe crap dem dry up).***

Besides the residents and visitors being affected due to the rise in temperature, climate change will affect the natural resources base of these islands in other ways. Policymaker Y1 stated:

*Coral bleaching is caused by a rise in sea surface temperature, which is caused by Climate Change.*

Policymaker and senior official Y15 expanded on the impact of temperature rise on coral reef and the tourism industry:

*Large areas of coral reefs in the Caribbean are dying from coral bleaching as a result of increased sea surface temperature and sea level rise. This is having a negative impact on tourism product because visitors come to St. Vincent and the Grenadines to snorkel and to see the beautiful diversity of the coral reefs.*

During the interviews, rather than looking at the link between temperature rise and the other climate stressors and their ensuing impact on the country as a whole, policymakers and senior officials focused their attention on the impact of temperature rise on the tourism sector. They are very concerned that with the destruction of the agriculture industry by drought and invasive species/diseases, the tourism industry is the only economically viable sector that is showing signs of increased outcomes on the islands, especially within the context that the economy is growing at below 1% GDP.

All of the youth who participated in the FGD said that they have observed increases in temperature year on year and such an increase in temperature is impacting negatively on their livelihoods, health and their overall well-being. They highlighted the direct impact of high temperature on the crops they are growing for food consumption as well as for exports. Over half of the youth are of the view that the scarcity in food production has resulted in food items being too costly for most people thereby increasing

nutritional problems and poverty. The literature shows that the temperature in some Caribbean island states has already risen to the 1°C mark (Benjamin, 2009). This will also have serious consequences for coral reefs survival in the future. Therefore, if temperatures are projected to increase over time (IPCC, 2014), travellers may choose not to visit tropical Caribbean destinations for a vacation in the future (Benjamin, 2009).

#### **5.2.4 Sea Level Rise**

SLR is emerging as a serious problem in most coastal communities. Policymaker and Senior Official Y1 states:

*The excess water in the ocean and seas are encroaching on the limited land space of small islands. We see evidence of encroachment in communities such as Georgetown and other coastal communities. The increase in sea level rise would result in causing more erosion on our beaches, and coastal areas, i.e. an increase in sea level rise would severely impact the tourism industry.*

Like policymakers, over two-thirds of the youth who participated in the FGD are very worried about the large areas of land and coastal areas that their communities are losing to the sea.

A young woman from FGD X1 indicated that:

*The rough seas and sea level rise are also affecting the beaches along the coast. We are losing our beaches. **(De sea getin rof an rofa cars ah sea levo rise. E sea ah tek arl e beach ah dem).***

Although the participants emphasised the implications of sea level rise on the coastal areas, specifically the tourism industry, Y15 looked at the impact of SLR from a more holistic perspective, i.e. the impact on the social and productive sectors of the island:

*Most of the infrastructure in St. Vincent and the Grenadines is located on the coastal areas. Yes, it is close to 80% of the infrastructure that is located along the coastline. This includes tourism infrastructure, airports, roads, bridges, communication lines, especially electric and cables and electric*

*generation centres. Therefore Sea Level Rise will impact severely on electricity generation, water availability and communities.*

According to the majority of youth in the FGDs, SLR is not only impacting on growing communities such as mariners and other tourism facilities, but it is also impacting negatively on the natural resource base of the island as well as on housing. A young man from FGD X7 stated:

*The sea was very rough and was continually coming in like a roaring lion devouring everything in its path. Large acreages of beaches, mangrove swamps and lands that were once used as playing fields and for community housing, were washed away by high tides and rising sea levels. (Bwoy me notis dese days e sea ah like ah hungree lion ynammin up everytin roun um. Arl roun ahwe ah lose e beach dem, mangrove swamp, arl e lan dem ahwe binah use fuh playin feel. De hous dem ah wash way by tide comin en and sea levlo risin).*

All policymakers, senior officials and youth alike recognised the severity of the impact of SLR on coastal areas of the island. This is in the context that over 85 % of the population live on a narrow belt 5 metres above sea level and five miles inland, and 80% of infrastructure important for the economic development of the nation are located in this narrow coastal belt. This makes the island extremely vulnerable to the impact of climate change.

The constant flooding of these businesses and facilities by the sea has resulted in a number of youth unable to operate their businesses. In light of the high level of unemployment among youth in St. Vincent and the Grenadines, over three-quarters of the youth expressed serious concerns that any further negative impact of SLR on the tourism and agriculture sectors would result in increasing the rate of unemployment among youth, thus further increasing the level of poverty. There is no real evidence that the government has any strategic programme to deal with the impact of SLR.

The literature also supports the vulnerability of the population of the Caribbean island states to SLR, which threatens lives, property and livelihoods throughout the Caribbean region (Nurse *et al.*, 2014, Hernandez-Delgado, 2015, UNEP, 2013, Simpson, 2010).

### 5.2.5 Storms and hurricanes

All policymakers and senior officials attested to experiencing the increases in the frequency and intensity of storms over the past decade and its impending impact on the economy and other sectors. Policymaker and Senior Official Y1 summed this up as:

*There is an increased frequency of storms in 2010, 2011, 2012 and 2013 resulting in flooding and landslides. These hurricanes destroyed large acreages of watersheds. This has implications for the quality and quantity of water produced and supplied to householders. Storms destroyed over 1000 houses, water supply and storage tanks, 17 bridges and miles of roads between 2010 and 2013.*

Similar views were expressed by over 90% of the youth participating in the FGD. They claimed that over the past five years they had experienced major storms annually. A young woman from FGD X4 expressed her opinion of storms during the focus group discussion:

*Hurricanes are getting stronger and more dangerous over the past five years. They are ranging from 150-250 miles per hour blowing away everything in their way. They are destroying housing, tree crops and forested areas. (Bway dem hurricane ah geh stranga an badder. Win ah blo between 150-250 mile ena owa. Dem blo down plente house, tree like mango an dem inah e faris).*

In the Caribbean region, there is a defined hurricane season, June to November. However, climate change has caused these storms to occur outside of the designated hurricane season. Policymaker and Senior Official Y2 states:

*In 2013 we were struck by storms which occurred outside of the hurricane season. Over US\$100 million in damages to property and 13 deaths were recorded. In some instances, parts of the country were completely cut off.*

Youth also recalled their experience during the 2013 Christmas Eve storm. This view is supported by a male youth from FGD X1 who described the ordeal encountered during the 2013 Christmas Eve storm:



*We have been having lots of storms which affect lots of the communities across St. Vincent and the Grenadines. That is true; the storm was sick (terrible). It messed up (severely affected) our Christmas. We could not celebrate Christmas because we lost everything. Our house was washed away. Our goats were also washed away by the river and the few we had remaining after thieves stole the storm. **(Ah notis ahwe bin ah ha plente starm dese days. Dem starm damag nuff villig cras de ilan. Yes bway de starm bin sick. E mess up ahwe Chrismus. Eh wash way ahwe house and everytin fuh ahwe. Bway e smarl guta behin e house wash way e goat ah dem and den teef man tek e rest).***

One Policymaker and Senior Official (Y10) who was involved in estimating the damages caused by the storm on the country's economy stated:

*Mainly due to the storms on St. Vincent and the Grenadines over US\$650 million in damages to properties and infrastructure was estimated over the past five years. This is equivalent to one-third of the GDP of the country. In real terms, critical infrastructure including the hospital was damaged including the only Cat-Scan machine on the island.*

All of the youth who participated in the FGD said that storms tend to impact more severely on communities that are predominantly inhabited by poor people than those that are inhabited by more affluent persons. A young woman from FGD X3 stated:

*Heavy storms caused flooding and landslides in poor communities such as Caratal in the Georgetown and Sharpes in Chateaubelair. Young people built most of the houses destroyed by the storms. Youth do not have the money to build sturdy houses to meet the national building codes. They would also squat on lands close to river banks or hills prone to landslides. Their homes would be the first to be flooded or washed away by the river. **(E storm cars floodin an lanslide in Caratal in ah Gargetown an Sharpes in Chatbelae. Bway mose af e house dem wey wash way ah ahwe own. Ahwe nah hav e money fuh buil house fuh meet up de buildin code. Ahwe hav fo squat pan lan pan riva bank or pan hillside. Ahwe house ah e fus fuh flood or wash way by e riva).***

A Policymaker and Senior Official from a rural community recalled the horrible experiences encountered while escaping the terrible Christmas Eve storm in 2013. She said the members of the community helped her and her daughters to escape to the Disaster Emergency Centre, which was housed in the Community Centre in the village.

Over half of Policymakers spoke of the crippling effects of the storm on small business operators who lost their businesses and had no insurance to cover their losses. Due to the high cost of insurance in SIDS, many of these small business operators were unable to restart their businesses and are now living in poverty. Storms are regularly occurring and more severely year on year. The government has responded by establishing NEMO to deal with disaster preparedness activities. However, the response is inadequate because the office lacks the human and financial resources to respond to these disasters adequately. Although NEMO conducted training programmes to train volunteers to work on District Disaster Committees (DDCs), it cannot develop and implement programmes to learn from these experiences effectively. There is the absence of a viable mechanism in place to ensure learning takes place from these occurrences. There is also the absence of an active monitoring and evaluation mechanism to provide feedback to NEMO on the effectiveness of the DDCs.

Youth, like policymakers, took the opportunity to talk about the devastating impact of storms during the FGD. Each of the youth was desperate to retell their own stories in detail about how the storms have impacted their lives over the past five years. The descriptions of their various experiences were very graphic, and at times a number of the youth 'broke down' in tears while recounting the events. All of the youth who participated in the FGD stated that the impact of storms on youth is more devastating than on the other population groups because youth are deemed more marginalised, vulnerable and poorer than the other sectors of the population. Climate extremes such as storms...tend to be linked with a lower rate of growth (ILO, 2010) and severe destruction of property and lives. The literature supports this (Sem, 2007; CARIBSAVE, 2012; IPCC, 2014; Economist, 2017).

#### ***5.2.6 Changes in weather patterns***

All the policymakers and senior officials interviewed claimed that they had seen changes in the weather patterns over the past decade. Policymaker and senior official Y1 stated:

*The months of November, December, January and February are traditionally dry season. Now, these months are depositing the highest amount of rainfall annually over the past five years. There is also evidence of less rainfall and more dry days. Climate Change has resulted in a longer dry season and shorter wet season due to an increase in the rise in temperature.*

Some policymakers spoke of the 'confusion in the weather system'. Rain is falling when it is not supposed to fall, and sometimes you are experiencing extended periods of dryness.

Policymaker and Senior Official Y2 stated:

*We are experiencing drought at this time, on the windward side of the island...we are having rains on the leeward side of the country. We are experiencing a complete change in patterns of weather and locations across St. Vincent and the Grenadines. We are seeing something happening about the impact of Climate Change.*

Drought caused by increases in temperature is making it difficult for crops to grow. Drought affects every area of life, specifically reducing the supply of fresh drinking water and local food supplies on small island states. Such changes in weather patterns are having a severe impact on agriculture and food production and water supply as explained by Policymaker Y7:

*Droughts are having a serious impact on agriculture and food production. We are experiencing dry spells that are now going on for eight months...can see the impact of drought on the number of rivers that are drying up.*

All of the youth who participated in the FGD highlighted the impact of drought and changes in rain patterns as serious climate stressors facing small island communities. A young woman from FGD X5 indicated that:

*There is hardly any rain falling in these areas these days. This is an area where rain was falling throughout the year. However, in recent times the area is getting dryer and dryer. Most of the rivers around the community that used to be flowing with water are now drying up. There is not even a*

*trickle of water flowing from some of these rivers (Hardle ene rain ah farl ena dis place. Dis is ah place wey plenti plenti rain youse to farl ina de year. Now mose ah de riva dem dah youse fuh run wid wata ah dry up. Nat ah grane ah rain ah farl).*

A young male from FGD X7 spoke of the effect of the rainy season:

*The heavy rains will come for shorter periods and leave lots of pools of water which become breeding grounds for mosquitoes and water-borne diseases. These diseases caused widespread problems across the Caribbean. (Yoh see de heavee rain ah cum feh ah shart tyme an yoh cud see plenti pool ah wata afta de rain stap cum. De mosketo dem ah breed in eh wata. De dutty wata cud mek peplo ge sic. Plenti disease en ah e dutty wata. Dem disease day arl ova de Caribyan. Plenti peplo geh sick cars ah e disease ah dem).*

All policymakers and senior officials highlighted the impact of drought on food production and water supply. They complained that the extended eight (8) months drought on the island had prevented farmers from cultivating their lands. In normal dry weather period, farmers would use the water from streams to irrigate their lands. However, most of these streams are without water due to the high temperatures. The harsh weather condition has led to a scarcity of food in most communities and a resultant rise in the prices of basic food items. The extended drought has resulted in pushing most farm families into poverty. Most of these families are also unable to purchase books, and school supplies for their children to attend school thus further impacting on the quality of education young people are receiving. Although youth recognised the link between the change in weather pattern and causes of drought, over two-thirds of the youth who participated in the FGD stated that the rainy periods are much shorter and more intense, i.e. heavier rainfalls which increasing mosquito-related and water-borne diseases. Both youth and policymakers claimed that lots of people are affected by these diseases. Changes in weather patterns were supported by the literature (IPCC, 2014, Nurse, 2014).

#### **5.2.7 Invasive species and diseases**

All the policymakers and youth admitted that invasive diseases are affecting humans as well as the productive sector of the island's economy. These are having devastation

effects on peoples' health as well as their overall well-being. Policymaker and Senior Official Y1 stated:

*There is an increase in water-borne diseases and the increase in mosquito infestation, which produce diseases such as Zika and Chikungunya. Chikungunya disease affected over 100,000 persons across the Caribbean (in 2015) and resulted in millions of dollars in lost income.*

A young woman from FDG X7 discussed the impact of invasive diseases on the agriculture sector in St. Vincent and the Grenadines:

*The negative effects of Climate Change on our crops are having a big impact on the economy. This is a country that was selling over \$150 million per annum in banana before the disease started affecting the crops. Now we are not producing any banana for the market. The loss of foreign exchange means that the island cannot buy medicine and other goods from overseas. A large % of the population lost their jobs due to the loss of the market for bananas. **(Climate change ah troblo ahwe rale bad. Ahwe bin ah sell over \$150 millyan ah bonana every year befo eh dizeas troblo eh bonana dem. Ahwe lose arl ah dat monee fram farin. So ahwe nah hah money fuh buy medson and oda ting fram ovasea. Plenti plenti peplo las dem wuk cars ahwe las de markit fuh bonana).***

These diseases have a crippling impact on the already stretched health system and economy of small island communities. The impact of invasive diseases on the economic and productive sector of SIDS according to Policymaker and Senior Official Y1 was devastating:

*Invasive diseases impacting on the banana industry has resulted in the complete destruction of the banana industry leaving over 20,000 people unemployed.*

The majority of the persons who lost their jobs in the banana industry were mainly unskilled youth who would find it extremely difficult to gain employment in other areas of the economy. The unemployment among youth in St. Vincent in 2017 is estimated at

47% of the workforce (IMF, 2017). The government has not been able to put measures in place to address the problem of youth unemployment.

Diseases such as chikungunya and dengue fever are relatively new to St. Vincent and the Grenadines. These diseases were endemic to regions of East Africa and South East Asia and parts of Africa. The Black Sigatoka, the disease, which devastated the banana industry, was also endemic to South East Asia. This disease, also called the Panama disease, devastated the banana industry in the Caribbean and Latin America in the 1950s and then disappeared. Interviewees expressed concerns with other invasive species on the tourism industry in St. Vincent and the Grenadines. The seagrass infestation prevented water taxi and tour operators, who take tourist to the reefs to dive and snorkel from plying their trade and making a livelihood. The participants expressed concerns regarding the unavailability of financial and technical resources to address the invasive diseases problem.

St. Vincent and the Grenadines, due to its limited human and financial resources, are already faced with a stretched health system. The island does not have the resources to employ more nurses, doctors nor purchase additional medicines to take care of the sick. Youth are of the view that the outbreak of Zika, Chikungunya, Dengue Fever and other respiratory diseases has created long-lasting pressures on the health system. It has also created additional stress on the island's economy due to the large numbers of persons who were unable to work for long periods of time due to being ill, thereby unable to contribute to the development of the nation or earn an income. This view is supported by the literature that states that human capital can be affected by poor health outcomes (Hernandez-Delgado, 2015). Diseases limit the ability of a country to develop as well as stunted their capacity to deal with climate shocks.

It is clear from the discussion above that policymakers are aware of the issues associated with the climatic stressors, but they may be somewhat less interested in bringing about any major changes to address these challenges and put the machinery in place through which their work may be effective. Therefore, their good intentions may not reach the target population. They also appear to give priority to economic output, i.e. everything else is secondary in their priority list.

### 5.2.8 Community

The literature states that many coastal communities and reef-based industries are likely to struggle to cope with challenges of Climate Change, with very likely adverse impact on local economies and livelihood sustainability (Hernandez-Delgado, 2015). The cluster community is divided into sub-themes/clusters: a) unsustainable livelihoods, b) health and wellbeing, c) housing and infrastructure and d) community development and organisation.

#### 5.2.8.1 Unsustainable Livelihoods

Although the researcher alluded to the impact of climate change on livelihoods such as agriculture and tourism in the sections on invasive diseases and changes in weather patterns, in this section, he will explore in more depth the perspectives of policymakers and youth on the impact of climate change on the livelihoods. All the policymakers and youth participating in the research are aware of the linkage between climate change and livelihoods. Policymaker and Senior Official Y7 highlighted the link between Climate Change and the natural resource base of island communities and the impact on the tourism industry:

*“Climate change is having a negative impact on St. Vincent and the Grenadines, i.e. a negative impact regarding how it affects livelihoods such as its impact on tourism, agriculture and fisheries.”*

This view was endorsed by Policymaker and senior official Y1 who highlighted the links between coral reefs and tourism and fisheries livelihoods:

*“Coral reef is the backbone of the fishing and tourism industries in the Caribbean. When coral reefs are dying in large quantities, they would not be able to produce the amount of food that is normally produced (for younger fishes)...this will reduce the number of fishes on the reefs. Tourists go to the reefs to see the diversity of the organisms living on these reefs. Therefore any decrease in the diversity of animals living on these reefs will result in a decrease in the number of tourists visiting St. Vincent and the Grenadines.”* Youth were able to make similar linkages to agriculture and tourism. About agriculture, over three-quarters of the youth viewed

agriculture as an important livelihood for small island communities. An essential aspect of the agricultural cropping system is the fruiting process.

A young male from FDG X5 explained the confusion that Climate Change is causing:

*Climate Change has confused to the fruiting seasons of the crops. Fruits and other crops are not bearing during the dry season when they will normally be bearing their fruits (Climate change ah cars serias confushon fuh e frootin tyme. E froot crap ah dem nah no wen fuh senout dem flowa. Me member wen de froot ah dem use feh bear inah eh deh dry season (pause). Nat agen, e nah hap'nin).*

Tourism accounts for the employment of a large percentage of youth. A female youth from FGD X4 outlined the type of employment opportunities available to youth in the sector:

*Tourism accounts for a large percentage of youth employment. Some of the young people work in hotels as bartenders, waiters and gardeners, while others work on yachts or as tour operators or as tour guides taking people to places of interest such as the Tobago Cays and dive sites. Some youth work as craftsmen and entertainers. Reduction in the tourism industry due to poor dive sites and other problems have caused many youths to lose their jobs (nuff nuff youth ah wok inha de toris industree. Som ah dem ah wok in ah hotel as waita, ina e yard, sum ah dem ah wok pan yat an sum ah dem ah tek peplo ah Tobago Keys and ah dive site feh dive. So yoh see if de dive site dem nah geh betta den nuff youth go lose dem wok).*

Over three-quarters of the youth who participated in the FGD viewed fisheries as a viable livelihood for young people from coastal communities. However, they are concerned that Climate Change is impacting negatively on the fishing sector as explained by a young man from FDG X4:

*There is a huge loss of fishes stocks resulting from the destruction of coral reefs and mangrove swamps. Fishes have to travel further out to sea to find food. This has resulted in the decline of fishes found close to the islands. Fishermen are unable to use the basic fishing equipment and boats to increase fishing income (Ahwe ah lose ahwe fish bank dem cars ahwe ah*



***distroy de coral reef an mangrove swamp dem. De fish adem hav feh go far far outah sea feh fine food. Eh fishaman adem carn go out far outah sea wid dem likklo likklo boat. So yoh see dem carn mek no money).***

A larger number of youth and members of their households are operators of small micro businesses at the community level - they operate small shops, produce crafts and other forms of agro-business to ensure their survival. This is best captured in a concern raised by Policymaker and Senior Official Y2:

*“Climate Change is causing hardships in communities. These hardships contribute to the increase in poverty due to a reduction in food. Most of the people affected (by Climate Change) were operating micro businesses. The cottage industry in which these operators worked were severely impacted by the storm (Christmas Eve, 2013). Some of them completely lost their businesses due to a lack of insurance to cover the cost of rebuilding and restocking. Given that many people are involved in microenterprise as their livelihoods whether, in agriculture, tourism or fisheries, most of these persons lost their businesses as a result of the storm or drought and currently do not have any financial resources to continue their business. These microbusinesses were not insured.”*

Half of the policymakers and senior officials blamed the impact of climate change on the various economic sectors for the high unemployment among youth in St. Vincent and the Grenadines. On the issue about the impact of Climate Change on specific livelihoods sector, they linked the high level of unemployment among youth to the severe impact of climate change on agriculture and tourism. Compounded with problems in agriculture, policymakers and senior officials are of the view that farmers are involved in poor agricultural cropping practices on the hillsides, which are causing poor soil fertility.

All the youth who participated in the FGD were irate and, at times, they were quite agitated regarding the issue under discussion. Sometimes, during the FGD, it was as if they were unable to contain their anger. During the sessions, the researcher often had to halt the discussions because 10 to 12 young people would be shouting at the same time using the local dialect hence it was extremely difficult for him and the other recorders to make any sense of points being raised. The youth cogently argued that not

all of the livelihoods that are available to them are sustainable under the impact of climate change. They spoke of the devastating impact of climate change on agriculture, tourism and fisheries and suggested that governments and all stakeholders should work together to ensure that resources are provided for training, education and research to enable the sustainability of these livelihoods.

The issue of insurance to support micro-business operators was a major concern for both youth and policymakers. They estimated that over 70% of rural business operators lost their businesses due to the impact of climatic events and that the resources generated from these businesses were used by householders to cover the cost of youth and children attending schools and for putting food on the tables on a daily basis. Most of these micro business operators cannot afford the high cost of insurance to cover their business.

Youth recommend that government should work with local insurance companies and the farmers union to develop an insurance system to assist farmers and small business operators to underwrite their businesses from climate change-related businesses. They also request training in soil conservation and sustainable farming practices, research in the production of disease and drought-resistant crops and the creation of marine parks to protect coral reefs and other ecosystems as strategies for developing sustainable livelihoods in the agriculture, tourism and fisheries sectors. Youth stressed that the policymakers are not listening to the views of young people. They are not learning from the experiences in developing CCA, and they are not trying different interventions. The literature states that SIDS depend on agriculture, tourism and fisheries as the main livelihoods (Simpson, 2010; CARIBSAVE, 2012; Nurse *et al.*, 2014; Charenoux & Wolf, 2013). On the issue of tourism, the literature states that the Caribbean is the most tourist dependable region in the world (Charenoux & Wolf, 2013) attracting over 22 million tourists annually and providing a livelihood for over 2.2 million workers.

#### *5.2.8.2 Low Community capacity*

Besides the unsustainable development practices in communities throughout St. Vincent and the Grenadines, over three-quarters of the policymakers and senior officials are distressed by the low level of capacity within the communities to deal with climate change and other development challenges. Policymaker and Senior Official Y2 states:

*“Nowadays we do not have many functioning organisations and groups that can be used as the basis for dialogue and actions at community and national levels. People are self-centred and selfish regarding how they respond to the issues. There is no sense of community responding collectively to address a development issue that may confront them.”*

Policymakers and senior officials were very vocal and expressed their disgust about the weak community capacity existing in communities throughout St. Vincent and the Grenadines. They opined the lack of political will on the part of the government to reinforce basic policies and practice such as the national building codes and standards at community level despite the increase in the frequency of storms and other climate stressors. Policymakers also expressed their annoyance regarding the low capacity within communities to organise themselves to respond to climate change and other development challenges affecting their communities.

Youth presented a different view on the dynamic and capacity within the communities. Notwithstanding the devastating impact of climate change in communities, a young woman from FGD X7 stated that the disaster contributed to bringing friendship and harmony among people in her community:

*The storm assisted in improving the friendship and partnership among people at the community level. People helped out their neighbours who were affected by tending to the sick and disabled within the community **(De starm mek ahwe feh improve frenship and partnaship an feh we wok as wan. Ahwe help ahwe naeba. Ahwe help dem who was sic an dem who ah disablo).***

A young man from FGD X2 highlighted the activities that youth and members of the community were involved in during the storm recovery process:

*Climate Change impact caused people to put their differences aside to help each other recover from the storm. The community came together to clear debris and trees which fell on the roads and blocked public access. It was an amazing experience to see those things happening among people who would normally fight like cats and dogs over political issues. **(Bway, somtyme ahwe cuss loik darg and kyat bo ahwe put ahwe difrans dem aside an wok***

***togeda feh chap de chee dem, move way garbage an arl dem ting wah day pan e rowd and blak e rowd. Me injaiy um vere much. Arl dem peplo who bin ah fite loik kyat and darg fuh politiks cum togeda an help wan ah noda).***

Besides cleaning and clearing of debris and involving in the rebuilding of houses that were damaged by the storms, the community took the lead in setting up Disaster Emergency Centres in schools to assist persons whose homes were destroyed by the storm. A young man from that FGD X1 gave credence to this by stating:

***Members of the community rebuild most of the houses that were destroyed by the storm. There were a few houses that were so badly damaged that we had to leave them for the government to deal with. We collected the keys for the schools and moved the people whose houses were damaged into the buildings. Ladies from the church groups began organising themselves into work teams and started preparing food for the people who were directly affected (Ahwe bill bak arl ah e house dem dat bin blo down by e starm. De house dem dah arwe fin hard fo deal wid arwe lef dem fuh govamen fuh deal wid. Arwe kolek e key dem fram e skool dem a put deh peplo dem who house blo down in ah e skool. De woman dem fram chuch wok ina group fuh kook food fuh de peplo who deh starm blo down dem house ar de dutty wata messup en dey).***

Over 90 per cent of the youth who participated in the FGD stated that communities across St. Vincent and the Grenadines were very quick to organise themselves in response to natural climatic disasters and calamities such as storms and volcanic eruptions. All the youth who participated in the FGD claimed that over the years people had developed a level of competency, knowledge and skills on how to respond to climate change impact. Therefore, despite their differences, as soon as there is a climatic disaster or calamity people will come together to work in harmony to rebuild their communities.

Both policymakers and youth highlighted the non-functioning of youth and community-based organisations in most communities. All the youth who participated in the FGD surmised that there is need to create more community groups in communities across St.

Vincent and the Grenadines to educate youth and the broader community on the impact of Climate Change and the need to develop effective strategies to respond to these occurrences. Youth agreed to move towards setting up community and youth groups to implement education programmes with members of their communities to further explore issues of climate rights and justice.

Between 1978 -2000, the Government of St. Vincent and the Grenadines implemented a vibrant community development policy which invested and supported the development of youth and community organisations, cooperatives and other civil society organisation/institutions. The present ULP government had cut the financial support to these programmes when it came into office in 2001. Presently most of the active groups are organised along political lines thus resulting in tension and antagonism among each other. Although there are efforts on the part of JEMS and other NGOs to enhance the capacity of community groups to implement CCA programme, these organisations are starved of funding and other support from the government and are unlikely to sustain their capacity development programmes.

**Table 9: Community types and economic linkages**

| Community Type          | Strong Economic Linkages  | Poor Economic Linkages                             |
|-------------------------|---|--|
| Vibrant community       | A vibrant community with strong economic linkages               | Vibrant community but poor economic linkages       |
| Poor community strength | Poor community structure /strength but strong economic linkages | Poor community strength and poor economic linkages |

The researcher used the matrix above to categorise communities participating in the research. These communities were categorised on whether they were a) vibrant communities with strong economic linkages, b) vibrant communities with poor

economic linkages, c) poor community structure/strength but strong economic linkages and d) poor community strength and poor economic linkages. This framework was then used by the researcher to develop the Climate Change Adaptation for each of the respective communities.

The literature states that people and communities who possess less capacity to adapt are more vulnerable to climate change and its impact...conditions are extreme among the poorest people and marginalised sectors of the society (IPCC, 2001). The literature also states that lack of opportunities among youth in the Caribbean contributes to breaking down in social cohesion at community and national levels (UNEP, 2013). According to Carter (2008), such problems have led to an escalation of gangs, drugs and violent crime culture among youth.

### **5.2.9 Youth Preparedness**

Factors associated with lack of youth preparedness include the following: irrelevant education, lack of participation in governance and decision-making, and disempowerment.

#### **5.2.9.1 Irrelevant Education**

Policymaker and Senior Official Y1 expressed her disappointment with the education system:

*We in St. Vincent and the Grenadines have a vibrant education policy that is rights-based and is based on the concept of inclusive education for all. However, there is no national climate change policy in place. Climate change Education is not included in the education system, so there is no mechanism in place to enable youth to build resilience to adapt to climate change.*

All the youth are of the view that the education they received does not prepare them with the necessary skills and knowledge to build their resilience to adapt to the impact of climate change and create sustainable livelihoods. A young man from FGD X1 said:

*No, no, no, we are not satisfied with the level of skills and knowledge provided to us in the schools and colleges. We are not given the necessary skills, which will enable us to adapt to the impact of climate change. Climate*

*Change is not included in our syllabus. We do not have any policy on Climate Change (Nah nah nah ahwe nah satisfy wid de levvo af skill and trainin ahwe ah get in skool. Ahwe nah geh enuff skill fuh adap to climate change. Ahwe nah ge no trainin bowt climate change inah skool. Ahwe nah geh eney palicee a climate change).*

All the policymakers and youth view Climate Change as the most ‘single phenomenon that can influence development’ in small island developing states negatively, yet climate change is not included in the school curriculum in St. Vincent and the Grenadines.

Agriculture is one of the primary livelihoods in St. Vincent and the Grenadines and accounts for employing over 25% of the workforce, and before the destruction of the banana industry by invasive diseases, it accounted for over 20% of the GDP of St. Vincent and the Grenadines.

Policymaker and Senior Official Y2 is very critical of the education offered to youth:

*Nothing much is being done regarding preparing youth to deal with the risks and challenges associated with climate change. Traditional farming cropping techniques are not being taught in schools, and they are not part of the school curriculum. These techniques are lost for generations to come.*

All policymakers and senior officials participating in the interview expressed concerns regarding the lack of financial and technical resources within the education system to develop and implement climate change education programme. They also spoke of the physical and emotional impact of climate change on the education of youth in small island developing states. Policymaker and Senior Official Y10 states:

*The storms are seriously affecting the schooling of youth. Some homes belonging to the youth were either flooded out or destroyed, including their books, uniforms and education implements. These youth have also undergone traumatic experiences resulting from the storms to the extent that some of them need psychological counselling.*

Youth were very critical of the problems associated with the education system. Besides lacking technical expertise and resources to implement climate change education in

schools, a major problem is a methodology that is used in the education system to transfer skills and knowledge to youth as stated by a young woman from FGD X3:

*We lack trained teachers and expertise on the island to help us implement a climate change education programme to provide knowledge and skills to build our capacity to deal with climate change. The education system does not use the rich historical resources in the community to train us on how to do things in our communities. The climate change education models should focus on using the community as a classroom (Ahwe nah ha no train teachas nar eksport in ah yard fuh set up climate change so wefe geh eh rite nalige an skill fuh bill ahwe capacitee fuh deel wid climate change. Ahwe nah youse ahwe rich histree inah ahwe kommunittee fuh chane ahwe an how ting ah ha fodo in ah de kommunittee. Ahwe climate change class dem shodah youse e kommunittee like wan classroom)*

The issue of the irrelevant education was viewed as the main development challenge facing youth to build resilience to adapt to climate change in communities in St. Vincent and the Grenadines. This issue generated the most discussions among policymakers during the interviews. Most policymakers and senior officials were very passionate about the issue and promised to influence the government to take urgent actions to integrate climate change education in the education curriculum. Policymakers possess a similar view to UNESCO (2014) on climate change education, i.e. focussing on preparing people to plan for, cope with and find solutions for issues that threaten the sustainability of the island rather than know basic trivia.

When asked why actions have not been taken earlier to integrate climate change education in the school curriculum, they responded that although they are cognizant of the gaps in the education system, they emphasised the high cost to implement this, and claimed that the government lacked the financial and technical expertise to implement such actions.

All policymakers and senior officials recognised the ‘mismatch’ between the skills and knowledge provided by the education system and those that are required by the job market. Over two-thirds of policymakers and senior officials said the issue is worse than just basically matching the skills provided by the education curriculum with that



required by the job market. There are two fundamental issues for consideration a) there is over-consumption of some skills in the workplace and b) there are persons who are trained at the tertiary level but cannot function in the workplace. They observed that there are many people with certification of technical skills and good degrees from respectable institutions, but they cannot function effectively within the working environment in the context of a small island developing state. This is because most of these persons were trained outside of the Caribbean region and the skills set they acquired within their specific field are not relevant in SIDS, thus the reasons for the high numbers of persons with University degrees who are unemployed. They also view that the government must take urgent actions to work with all stakeholders to mobilise the necessary finances and technical assistance to integrate climate change education into the school curriculum.

Youth have a more simplistic view of climate change education. Supporting the integration of climate change in the curriculum, youth believe that education should enable them to acquire appropriate skills and knowledge to prepare them to respond to natural disasters, sustain existing livelihoods and create new and emerging livelihoods. Youth discussed the views on the mismatch in skills provided through the education system and those required in the market. All youth involved in TVET education and colleges said that they are pursuing training in either electrical engineering, agriculture and food technology but climate change is not included in these courses. They claimed that there are lots of opportunities to work in installing solar electric light, water heaters and wind energy generation systems in the tourism facilities in the Grenadines and across the islands but they missed out on these opportunities because these skills were not included in their electrical and or building construction courses at college and TVET centres. Youth strongly believed that there is a mismatch between the courses offered by the education system and the skills and knowledge required by the workplace and the market.

This discussion also highlights the awareness of the policymakers about the issues within the education system, but no changes will be forthcoming because of excuses around lack of finance. The information provided shows that the education budget is significant and that some reallocation of funds could be made to finance the necessary changes to the education system. However, the evidence points to the fact that the political will is

lacking on the part of policymakers to take actions to resolve the problem. Based on this situation it can be deduced that the government is not interested in anything that is not politically visible or does not bring monetary and political gains directly. This may be an issue of political capture, i.e. politicians are interested in power and policymakers are working to support them to achieve such power even though it is not in the interest or benefit to the society.

According to the literature, education is the key to improving resilience to climate change as well as the attainment of global development goals, i.e. better-educated people help to develop a clear understanding on how to cope with and respond to changing climate conditions (Crossly & Sprague, 2014). The literature states that Climate Change is impacting youth and their communities, their enterprises and their overall well-being, especially in locations exposed to storms, flooding, droughts and fires (ILO, 2013).

#### *5.2.9.2 Lack of understanding of climate change concepts*

Policymaker and Senior Official Y2 highlighted a fundamental problem which was expressed by all the policymakers participating in the research process:

*We, policymakers and educators, are still grappling with the understanding of climate change science and the language associated with the concept.*

Policymaker and Senior Official Y1 said that this issue is compounded with a lack of understanding of the climate change science concepts and that youth are not being prepared appropriately:

*Youth are not being prepared to choose appropriate careers that allow them to work in CCA areas. Careers programmes should be redesigned to allow young people to explore career paths in marine culture, aquaculture, sustainable fisheries, sustainable agriculture practices and farming conservation practices.*

This view is also highlighted by a young woman from FGD X1, an unattached and out of school youth from the rural community of north leeward who stated:

*I did not know anything about Climate Change until I started a PADF (Pan American Development Foundation) training course a few months ago. I*

*also know that most people in Chateaubelair community have never attended any training on Climate Change. Their knowledge of Climate Change will be nil. Numerous persons never heard about climate change. Those who heard about it think that it is something that is far away and would not affect us in*

*Chateaubelair. (Me nah binno nottn bout climate change until me start de PADF chanin ah few monts ago. Meno dat plente peplo inah Chato nevo goah eney chanin pan climate change. Me sho dem nano notnu bout climate change. Ah latta peplo neva hay bout climate change. Dem peple way hay tink dat climate change dah farfar ahwey an wud neva troblo we in Chato).*

The lack of knowledge on climate change is not only a problem for policymakers and senior officials but is a problem associated with the rest of the society as explained by Policymaker and senior official Y1:

*Schools and colleges are struggling with understanding the language associated with climate change, far less being able to implement courses on Climate Change. Staff are not qualified to develop and implement Climate change resilience, and adaptation programmes...teachers are not knowledgeable on what Climate Change is, how it is impacting on SIDS and the appropriate programmes to be implemented to reduce its impact.*

Over 75% of the policymakers and senior officials said they are experiencing difficulties understanding the language and concepts associated with climate science. Some policymakers and senior officials are of the view that the lack of comprehension of the climate change concepts maybe one of the fundamental challenge why they are not that eager to develop CCA programmes. Therefore, the fundamental question to be asked is if the policymakers and senior officials who are responsible for the development of climate change policies, the development and implementation of the adaptation strategic programmes and the mobilisation of financial and technical resources to build the capacity of youth and their communities to adapt to impact of climate change are experiencing difficulties understanding and applying the concepts associated with climate science, how are they going to be motivated to implement CCA programmes?

Some policymakers and youth state that the emphasis by the government is to respond to disasters and calamities such as hurricanes and storms and volcanic eruptions because this is more physical and visible to respond to than the slow creeping erosion caused by SLR. Approximately a third of policymakers and senior officials who participated in the interviews said that the government is responding to climate risk disasters because it has the potential to generate more political votes. Parliamentarians would be visible when they go out into communities to physically participate in the handing out relief to people who are affected by the disaster.

Another major factor highlighted by policymakers during the interviews is that there are not enough linkages within the public service to ensure that the technical officials who are working on climate change issues attend consultations organised by other divisions on the issues. The policymaker and senior official with responsibility for the government's CCA programme said that "My colleagues and I have not been invited to any activity or had the privilege to participate in the planning and development of any Climate Change initiative with other departmental partners working on the ground in areas of education for climate change".

It has become clear that government place more interest in working on projects and programmes that would provide visibility for them in the community such as implementing prestigious projects, e.g. the international airport and north windward and south leeward highways. Government is more interested in implementing highly visible projects from a political perspective, i.e. projects that would translate into votes.

#### ***5.2.10 Change Enablers***

Change enablers/drivers are divided into two categories. These are 1) change enablers/drivers that lead to Youth empowerment and 2) Change enablers/drivers that lead to Adaptation.

##### ***5.2.10.1 Change enabler - Youth empowerment***

The youth empowerment sub-clusters include a) capacity building programme, b) technological innovation and c) participation in decision-making.

##### ***5.2.10.1.1 Capacity development***

Policymakers view building the capacity of youth as a critical area of youth empowerment. Policy Maker and Senior Official Y1 stated that:

*The government needs to invest in capacity building programmes for youth. Lots of resources are now going towards infrastructure development activities such as an airport, main roads but not enough is going to youth and people development needs. The government should work with youth and community organisations to assist them in developing and implementing Climate Change Education programmes within their respective communities to build awareness and take actions to reduce the impact of Climate change.*

Policy maker and Senior Official Y10 highlighted the positive response of youth during the 2013 Christmas Eve storm as a change enabler effort that should be commended and encouraged:

*The response of youth during 2013 was rapid. Over the past ten years of being exposed to climate change disasters, youth were able to develop local knowledge. Their knowledge of how to respond to natural disasters related incidence was enhanced enormously. They were able to develop competencies on how to respond to natural disasters, how to prepare a timely assessment and provide appraisals on what progress they are making in response to these climate-related disasters.*

All the youth who participated in the FGD recognised themselves as important change enablers especially when they are empowered as indicated by a young woman from FGD X1:

*I enjoyed this part of the work – providing voluntary services to members of our community. It was good and rewarding to help out the homeless and other persons of the community who are less fortunate. We need to start organising ourselves in groups as soon as possible so we can play more positive roles in the future **(Me rayle injaiy dis part ah de wok na. Me like fuh wok as a valanteer inah ahwe kommunité. Me injaiy helpin de homeless an de peplo inah ahwe vileeg whoah les ablo fuh help demself. Me feel real good inna me hart. Ahwe hav feh farm groep fuh help mo peplo inah de fuchur).***

The role of government in taking the lead to provide training and resources would be essential as indicated by a young man from FGD X5:

*We should encourage the government to take the lead to facilitate the training of youth at the community level. They should also encourage communities to organise themselves to take action to adapt to climate change (ahwe hav feh incurige govament an dem feh tek de leed feh chane ahwe in arl dem kommunité. De govament dem shod incurige arl de kommunité feh tek akshon fo adap fo climate change).*

Youth voluntarily respond to the incidence of climate risk vulnerability and natural disasters without being prompted by anyone in authority despite their lack of formal training in Climate Change Education. Most policymakers state that youth should be viewed as a key change enabler to respond to the impact of climate change on their communities. Therefore, efforts should be made to explore strategies to enhance this role. St. Vincent had some of the most vibrant and active youth groups in the Caribbean region in the 1980s-2000. However, many of these groups are dormant due to lack of funding and support from the government. Therefore policymakers and youth are of the view that if these organisations are reactivated, they will provide excellent opportunities for the development of the capacity of youth to adapt to climate change.

Over two-thirds of the policymakers and senior officials attributed their activism, careers and education later in life to their participation in youth and community groups. They said that the first time they travelled overseas was to participate in some regional or international youth development forum to discuss global or regional development issues. They opined the fact that some youth are not benefiting from such opportunities because of the absence of groups at community and national levels. They reiterated their call on government and other stakeholders to invest in the activation of youth and community organisations and the broader youth development agenda.

Youth believed that government could play a leading role by providing the enabling conditions for changes to take place. Such enabling conditions should include a) provision of training and support resources, b) creating a viable youth and climate change policy and c) integrating climate change education in the education curriculum. Youth claimed that St. Vincent has a rich history of youth and environmental activism

regarding the work of JEMS, the National Youth Council and other civil society organisations.

The literature supports capacity building as a strategy for building the resilience of people to adapt to climate change. The literature also states that developing countries should implement strategies to enhance their education, training delivery and the use of technology to boost their education system to provide knowledge and skills to build the resilience of the people to adapt to climate change (UNICEF, 2015).

#### *5.2.10.2 Technological innovation and creativity*

As discussed above technology is a major enabler for empowering young people with new knowledge and skills on CCA. A young woman from FGD X2 called for the use of social media and ICT to enhance the delivery of the Climate Change Education/adaptation programme:

*The education curriculum should be redesigned to reflect climate change education. ITC should be used to enhance and deliver the content on Climate Change Education in all of the schools and college. Social media including - twitter, facebook should be used to raise people awareness on climate change and to encourage them to take actions at community and national level to adapt to climate change (deh educashon silabus shod be don ova to puteen climate change. Ahwe shod youse ICT feh improv an deliva climate change educashon ena arl e skool an colige dem. Ahwe shod youse soshal medya – fasebook, twittah feh rase aweernes pan climate change an peplo feh tek akshon ah kommunita an nashanal levlo feh adap feh climate change).*

Policymakers supported the need for the inclusion of technology in the curriculum. However, they looked at the use of ICT from a more holistic perspective. A Policymaker and Senior Official Y2 stated:

*There is a range of technologies available to strengthen responses to disasters and reduce the impact of climate change. Early warning technologies that will inform us on the magnitude, strength and intensity of storms, rivers flooding, seismic activities that may trigger tsunamis and volcanic eruptions. Young people are more in tune with technologies than*

*older persons; therefore, they must be trained to use these technologies such as early warning systems to warn their communities of approaching disasters and also the use of GIS mapping exercises to identify areas that are prone to climate risk vulnerability and disasters.*

Policymaker and Senior Official Y7 also highlighted the value of youth acquiring local knowledge and the use of indigenous technologies:

*Local knowledge and the use of indigenous technologies to predict when and where a disaster may occur should form part of the skills that youth would be required to develop. They should be encouraged to integrate such principle and practices in the construction of buildings, farming and production of agriculture products and fisheries.*

Although there are technical knowledge and technology to predict storms and other climate-related calamities and enhance adaptive capacity to various livelihoods at the community level, this knowledge is not integrated into formal sustainable practices. Policymaker and Senior Official Y15 further highlighted the gap between climate change and indigenous knowledge as an area, which needs urgent attention: *“There is a gap between Climate Change and traditional knowledge. The challenge is how to manage Climate Change knowledge in the traditional subjects in schools.”*

Technological innovation and creativity were viewed by most policymakers and senior officials who participated in the interviews as the solution to empower youth with knowledge and skills to build their capacity to adapt to climate change since youth are more easily adapted to the use of technology than an older person. This issue was viewed from the widest of perspective. Policymakers spoke of the potential that technology possesses to empower youth to develop green energy and technology to build a stronger and cooler building to respond to storms and temperature rise. Technology can also be the change enabler/driver to empower youth to create drought and disease resistant crops that would enable SIDS to provide food all year round and reduce the number of persons falling into the poverty cracks.

Youth share similar concerns as policymakers pertaining to the role that ICT could play in the overall development of their education system and CCA actions in the future. However, youth were more conservative in their recommendation for action by focusing



on the redesigning of the education curriculum to ensure that technology is integrated into enhancing the overall content and delivery of the education product in schools.

Most policymakers expressed concern that they do not consider the value of local adaptive technological tools/apparatuses because they are not written down in any scientific manual or journal. They recognised that there is a gap in the knowledge and the link between local adaptive technological tools and modern scientific knowledge and advocate for the development of a viable framework to link both scientific knowledge and modern technology with local knowledge and local/traditional technology. They also advocated for actions to be taken urgently to integrate both knowledge and technologies in the formal education system so that students would realise such benefits. It is quite clear that policymakers are aware of the need for capacity development, but they are not proactive in taking the necessary steps to build the capacity of youth. It shows that they have good intention, but this intention is not translating into real changes on the ground within communities. There is a need to do further research into investigating why the top-down approach is disconnected from the desire of youth and perhaps that of the local population.

The literature supports the use of technology to enhance the capacity of youth. It states that education and the creation of human capital are responsible for both the changes in labour and changes in the overall creation of new levels of technology (Mulongo, 2012).

#### *5.2.10.3 Opportunity for Decision-making*

Policymakers should see young people as future leaders, such as entrepreneurs and scientists, who are capable of creating solutions for the development challenges facing SIDS. According to Policymaker and Senior Official Y1, we need to provide opportunities for youth to participate in the decision-making processes to develop such competencies:

*We need to give youth a sense that we need to be working in partnership with them to get things done within the community...developing skills in caring and developing a sense of community are very important to strengthen cooperation and partnership among people.*

Most policymakers and senior officials declared that they could not leave this as part of the “business as usual” scenario. They are not taking any action to provide opportunities for youth to participate in the decision-making process. Some policymakers decried the lack of resources (human and financial) as the main reason for the lack of action. Policymaker and Senior Official Y2 requested a concerted effort on the part of the government and other stakeholders to invest in youth:

*We need to invest in programmes that assist us to find ways of involving more people (young) in making decisions and taking actions to address these challenges...national and community level.*

Although youth did recommend specific actions regarding what can be done by policymakers and the state to create the enabling conditions for them to participate in the decision-making process, they were not happy about the treatment metered out to them by these same people. A young man from FDG X9 stated:

*This thing (Climate change) is affecting young people three times more than how it is affecting the rest of the population. They (Policymakers) need to bear this point in mind when we are talking about the impact of climate change on young people. Older persons have a choice (pause) youth were not involved in making decisions on anything relating to disaster relief. The government came in later and controlled everything. Politics played the major role in determining who received assistance. Some people received assistance at the discretion of the Minister or the Parliamentary Representatives on the government side. **(Dis ting ah afek ahwe tree time mo dan how e ah afek olda peplo. Dem nede fo put dis inna dere mine wen dem ah tark bout de impak ah climate change. Dem olda peplo hah chyce ahwe nah hah non. Ahwe nah hahna say in eney decejon pan enetin fe do wid desasta releaf. De govament peplo dem a cumeen lata an kantrool tings. Fuh ge eney asistance politiks havfo be in dey. Yoh can onle ge ting if de Minista ar Parlimentry Rep inna de ULP sayso...Haha!)***

Most policymakers and senior officials who participated in the interviews affirmed that providing opportunities for young people to participate in decision making at

community and national levels would contribute to the empowerment of youth in small island states such as St. Vincent and the Grenadines. They believed that providing such an opportunity for youth would give them a sense of partnership and ownership in what is happening within their communities and the nation as a whole. This effort should be led by the government, i.e. the development of appropriate programmes. Therefore, resources should be invested in programmes and projects to enable this opportunity to become a reality.

Youth are of the view that they are not involved in decision making because they are disorganised and lack representation in government. They recognised the absence of a unified voice to speak on their behalf. The youth are putting measures in place to organise themselves into a National Youth Council that will represent the views of youth across the country. In policy discourse, the literature tends to view youth in a future-oriented way, i.e. youth - the person as human capital, and youth - the condition, as a typical period of transition (White, 2012).

#### **5.2.11 Change enabler - Adaptation**

Change enabler sub-theme is divided into the following cluster a) integration of Climate Change Education in the Education Curriculum, b) new CCA policy and c) innovations in sustainable livelihoods.

##### *5.2.11.1 Integration of Climate Change Education*

The integration of climate change education is viewed by both policymakers and youth as viable change enablers for youth to participate in Climate Change adaptation action. A Policymaker and Senior Official Y1 suggested that:

*The focus should be on the development of climate change sustainable Education in the schools, colleges and adult and continuing education programmes. Youth should be provided with basic knowledge on environmental law, land management and conservation strategies to enhance their knowledge on their rights as citizens and empower them to take actions or advocate for sustainable practices when they see that such rights or laws are violated.*

The inclusion of Climate Change Education in the Education curriculum was reiterated by Policy Maker and Senior Official Y7 who was also critical at how training was delivered and advocated for changes in the methodology:

*Climate Change has to be a major part of the education curriculum. It should start in primary and go up and beyond tertiary levels. This must include informal education and the adult and continuing education. Besides the inclusion of CCE in the education curriculum, we need to change the way people teach at the school levels...more emphasis should be put on enhancing the methodologies used by trainers, teachers and lecturers to impart knowledge and skills. The focus should be on the methodologies and the use of technology in the classroom.*

Over three-quarters of the policymakers and senior officials asserted that the methods used in the classroom were too focused on “chalk and talk”. They stated that trainers need to explore more practical approaches to training and engaging youth, including the use of technology in the classroom to enhance the delivery of content. All the youth who participated in the FGD are concerned with the lack of climate change education in the school curriculum and expressed their concerns regarding how the government is dealing with the integration of climate change education in the school curriculum, as stated by a young woman from FGD X9:

*The subject of Climate Change is too important for the government to treat with disrespect. Youth would have to take the lead to ensure that we are provided with proper knowledge and skills on the subject. There is a need to implement Climate Change Education in the education system at all levels (de subjik af climate change ah too impohtant fuh govament fuh treet wid disrespek. Ahwe go hah fuh tek eh lead fuh mek shor we geh deh rite nalege and skill pon climate change. Govament hah feh implement climate change edukashon enah arla de skool dem).*

All of the youth who participated in the FGD stated that they would put pressure on the government to include Climate Change Education (CC Ed) in the education curriculum. A young woman from FGD X3 sets out a series of steps that should be taken by the government to integrate CC Ed in schools throughout St. Vincent and the Grenadines:

*First, we need to ensure that Climate Change Education is included in the education curriculum, especially in all Technical Vocation Education courses including carpentry, agriculture, electrical wiring, plumbing, auto mechanic, food and beverage and others. We have to ensure that special training courses are offered to teachers, facilitators and lecturers utilising innovative and creative approaches and methodologies. It (Ministry of Education) should work by piloting Climate Change Education in courses such as science, geography and social studies. They should review the outcomes of the pilot, then open up opportunities for people to study these and other subjects/courses (Fus ting we ha feh do is fuh mek sho dat climate change educashon in deh educashan system, espeshaly in arl Teknical courses like carpintree, agiculcha, electrical wirin, plumin, attomecanik, food an bevrage an odas. Ahwe hah feh mek sho dat dem chane de teacha dem propaly, dem peplo who ah leccha and odas usin new metad an approach. Dem shod pilot test climate change educashon in subjc like sciance, gargraphy an social studies. Dem shod look at deh result of the pilot test den dem shod roll out inah arl de skool dem an mek ev'rybade do de cose dem).*

Most of the policymakers and senior officials who participated in the interview sessions were very excited when discussing the urgency and value of integrating Climate Change Education in the school curriculum. They argued that the new education curriculum should not only focus on providing knowledge and content but on building activism among youth and changing their overall attitude towards responding to challenges within their community.

On the issue of enhancing teaching methodologies, policymakers and senior officials suggested that trainers and teachers should use the community to conduct their teaching and research because there are lots of climate change scenarios and experience to draw on in the community. Therefore, case studies around specific experiences on climate change and how the community responds to adapt to the climate change challenge can be developed.

Along with the provision of training in entrepreneurship, policymakers and senior officials said that counselling, career guidance, credit and entrepreneurial development facility should be provided in schools to assist young people who are desirous of setting up green and sustainable businesses. They emphasised the point that efforts should be made to use technology to enhance the delivery of training in the classroom. Technology should be used to enhance business processes and products and to link businesses to markets outside of the island and globally. They stated that for Climate Change Education programmes to be effective, the Prime Minister should take the lead as the 'champion' for the development of the programme.

From all accounts, the policymakers recognised the need for curriculum change and modernisation of the education system. Policymakers from the Ministry of Education and the Ministry of Planning and Sustainable Development stated that after years of raising the issues at ministerial consultations, the government had mobilised resources from international funding agencies to hire consultants to prepare climate change education curriculum and a national climate change policy. They said that the terms of reference for the consultants were advertised in regional and international media.

Youth expressed a similar high level of enthusiasm pertaining to integrating climate change education in the school system. Although they are not too familiar with the specifics of climate change education, they are aware that the education they are receiving is not adequate to prepare them to deal with the impact of climate now and in the future. They put forward recommendations pertaining to a) the retraining of teachers, facilitators and lecturers in new methodologies and approaches to enhance delivery of content and skills and b) the redesigning of the education curriculum to provide them with appropriate knowledge and skills to enable them to adapt to climate change. They have seen the impact of climatic disasters that may be arising from climate change and can link education as a vehicle for building the adaptive capacity of SIDS to adapt to the impact of climate change. Youth will require skills in disaster management to deal with the increases in natural disasters in the Caribbean as well as skills and knowledge in CCA to prepare them to function in the long term.

This view is supported by the literature, which states that adaptive capacity is mainly influenced by the appropriateness of a prevailing institution and education (Joop *et al.*,

2010). Therefore, to ensure the enhancement of adaptive capacity, there is a need for strong interaction between the world of work and the world of education and training to ensure that adequate skills and knowledge are provided to guarantee the greening of the economy (ILO, 2010; Paschen, 2015).

#### *5.2.11.2 New Climate change adaptation policy*

The government has created a Ministry of Sustainable Development, which is responsible for the coordination of all agencies/ministries responsible for the environment and Climate Change. Therefore, the enactment of a climate change policy is viewed by policymakers as an excellent change enabler to build on. Policymaker and Senior Official Y15 stressed the relevance of developing a national Climate Change Policy:

*Many things need to be done to improve the development of Climate Change Education and to train to make the education system more effective and responsive to prepare youth to build resilience to adapt to Climate Change in the future. We should start by developing and implementing a National Climate Change Policy in St. Vincent and the Grenadines. The policy must be mainstreamed across all sectors and integrated within all sectoral policies such as agriculture, tourism, industry, education.*

Mainstreaming of the Climate Change policy across all the productive sectorial policies is of critical importance to ensure that these sectors develop the capacity to adapt to the impact of Climate Change. It is critical for the CCA policy to be linked with international standards and practices such as the MDGs as stated by Policymaker and Senior Official Y1:

*We should explore and develop programmes to enhance the relationship between the Millennium Development Goals and climate change adaption initiatives implemented at the regional and global levels.*

The implementation of a national climate change policy is viewed by all youth who participated in the FGD as a crucial part on the effort of the government to create the enabling conditions for CCA to take place. A young woman from FGD X1 said:

*The creation of a national policy on Climate Change is very important. This policy should be linked to all the sectors including agriculture, industry, forestry, tourism and others (Deh creashon of ah nashonal palicee pan climate change is ah supa ting. Dis palicee ha fah link wid deh oda secta like agiculcha, industre, foristre and arl dem res ah secta).*

Although St. Vincent and the Grenadines, like many SIDS, lacks the human and financial resources to implement a national climate change programme effectively. All the youth who participated in the FGD expressed concerns with the constant poor effort from government and stakeholders in their response to climate risk and disasters. They believe that the creation of a national policy on climate change would put the issue higher on the government's list of development priorities and enable the government to respond more proactively. A young woman from FGD X4 called on the government to be more proactive in dealing with climate risk and disasters:

*Instead of being proactive the country is always reactive. There is a tendency for officials to respond every year after the event occurred. We know that disasters would occur at any time, yet when these climate events occur we are never able to respond to them promptly. There is a need to develop community disaster plans. There is a national disaster plan, but people at community level do not know about it (de govamen dem ah jus ah reac to disasta ratha dan beh proactiv. Yof hah feh be proactiv in dem tyme yah. Dem govamen peeplo arlways do ting ev'ry year afta eh don hap'n. Ahwe no dah disasta ah cum anytyme, yet wen dem cum ahwe nah reddy. Ahwe need fuh dev'lop disasta plan inah ahwe kommunitate. Me hear dem say ahwe hah ah nashonal disasta plan buh ahwe neva see um).*

All of the policymakers and senior officials who participated in the interviews recognised the development of a national climate change policy as an important change enable to ensure the building of the resilience of youth to adapt to the impact of climate change. This view is also supported by over 75% of the youth who participated in the FGD.



Despite the challenges in financial and technical resources to develop the national CCA policy, over half of the policymakers and senior officials claimed that there are competencies in policy development which are available within the island that they can draw on to develop the national climate change adaption policy. In February – March 2017 the researcher did a follow-up a visit to St. Vincent and the Grenadines to meet with policymakers and youth to verify the content of the transcript/interpretation that was prepared from the interviews and FGD. Also, the mission was to assess the progress that was made after the initial data collection process in 2016. Policymaker was happy to report that they have since access financial resources from an international donor agency to prepare the climate change policy and the terms of reference for hiring a consultant was prepared and is being advertised regionally and internationally. They are hoping that work will begin early in 2018. Youth supported this proposal during the follow-up meetings.

The literature states that adaptation is an important measure of policy response in the environmental governance of SIDS as climate change is projected to cause more intense and extreme events and less encouraging conditions for the main productive economic sectors such as agriculture and tourism (Scobie, 2016). A number of Small Island Developing states including St. Vincent and the Grenadines do not have a national climate change policy in place and are now grappling with accessing financial and technical resources from GEF, GCF and the Commonwealth Secretariat Climate Change Hub to develop national CCA policies and programmes. The researcher followed up and monitored how the government is progressing on this initiative.

#### *5.2.11.3 Innovations in Sustainable livelihoods*

Policymakers and senior officials are aware of the severe impact of Climate Change on the livelihoods of young people living in small island developing states. However, they are cognizant that there are key change enablers that can be drawn on to enhance and sustain the livelihoods that are already in place and support the creation of new livelihoods. Over the past 400 years, farmers have developed a considerable amount of traditional knowledge and practices which were used to adapt to various aspects of climate variability. Policymaker and Senior Official Y2 states:

*He (farmer) would integrate the production of his livestock on his land. He would put aside part of the farm for planting grass to feed his livestock. He used traditional practices to conserve his lands such as contouring, terracing and mulching. He would use the 'dung' from the animals as manure for his crops. These cropping techniques have the potential for enhancing food production and reducing the impact of Climate Change on the sector. We also need to engage the youth in agriculture and food production to ensure that the next generation retains these innovative cropping practices and knowledge.*

The recognition of the value accredited to traditional knowledge and practices in agriculture, fisheries and manufacturing was supported by all policymakers as a vehicle to enhance sustainable livelihoods. Agriculture and food production to feed the nation was also highlighted by youth as a necessary livelihood in the future. A young man from FGD X5 in light of projected future increases in drought and invasive diseases stated:

*Youth would need skills and knowledge in alternative farming techniques. Being able to feed yourself as a country would be very important rather than depending on anyone one from outside to feed us. Therefore, being able to produce enough food to make yourself efficient and sufficient in food production is very important. Skills in growing drought and disease resistant crops will be very important in the future. **(Ahwe go warnt new skil and nalige in diffrent farmin technique. Ahwe hah feh be ablo fuh feed ahwe self in deh fuchur. Ahwe nah go see down pan awhe backside an depen pan anybodi feh feed ahwe. Yeh ahwe hah feh produce arl eh food ahwe need fuh beh efishment. Yeh ahwe hah feh produce enuf food. Dis is good fo in deh future. Ahwe hah feh ge skill fuh grow crap feh stan up toh dizeas and drout).***

Youth proposed that small island developing states such as St. Vincent and the Grenadines need to raise their game regarding energy generation. A young man from FGD X7 supports this view:

*Acquired knowledge and skills in building solar, wind and other forms of renewable energy to enhance energy efficiency as well as reducing greenhouse gases into the atmosphere are important in the future. This will reduce the impact of climate change in the future (Bway, ahwe hah fuh geh new skil and nalige fuh buil sola, win an oda renewablo enagy ting fuh mek ahwe eficent. Ah we hah feh reduce the greenhouse gyas ahwe put up inah e air. Me no fuh sho dat dis go reduce deh impack of climate change inah eh fushur).*

Policymaker and Senior Official Y1 emphasised the need for providing training and skills to youth away from the traditional livelihoods of agriculture, tourism and fisheries to new and emerging areas such green architectural design, energy conservation as a way of adapting to Climate Change:

*There is a need for training and skills programmes to focus on green architecture and designs including designing energy conservation houses and public buildings.*

Besides highlighting the specific skill livelihoods skills and knowledge required for the future by both policymakers and youth, Youth stated they would need to have general skills in project management, money management and disaster management to prepare them for their future. In the area of agriculture, they will need skills in land management, soil conservation practices such as terracing and contouring, and design and implementation of new forms of livelihoods. In the area of new knowledge for the future, the youth said they would need awareness and knowledge on issues relating to national resources management and how “business as usual” practices are negatively impacting on the natural resources.

All of the policymakers and senior officials who participated in the interviews believed that the focus should be on a) sustaining the livelihoods that are already in place through retraining of workers by providing them with relevant skills to enable them to respond to the changes in market needs as brought about by climate change and the market and b) investment in the development of research and training into new and emerging livelihoods so as to facilitate SIDS moving to the green economy. Due to the similarities of the development challenges facing Caribbean SIDS and the scarcity in

financial and technical resources, this would be better addressed through cooperation among small island states, e.g. through CARICOM and the OECS in the Caribbean and OASIS at the global level. While it would not be possible for each island nation to mobilise the finance and technical staff required to carry out such needed interventions in livelihoods due to a) the magnitude of the livelihoods problems facing SIDS Caribbean and b) the lack of capacity on the ground, it would be more feasible to be done at the regional level because these agencies already possess some level of capacity and competencies to implement such programmes.

In the areas of creating sustainable livelihoods and other aspects of Climate Change Adaptation, most policymakers and senior officials believed that there is a lot that we can learn from the traditional practices in agriculture, industries and fisheries that have passed down through the generations. However, there seems to be no interest nor urgency on the part of policymakers to take the initiative to mobilise the funding and expertise necessary to a) provide training to teachers and lecturers to integrate climate change education in the TVET programme, b) integrate technology to the training curriculum to boost livelihoods training, c) work with business sector and industries to link the skills that are required by the market to those provided by training institutions run by government, private and civil society and d) create a viable apprenticeship system that will transit youth from school to the world of work (ILO, 2013; ILO, 2015). Education is already receiving over 20% of the government's recurrent budget. Therefore, this work may not require any new funding from donor agencies; it may require closer assessment of how the funding for education is allocated in relation to the national development goals and may require minor modifications and reallocation of funding to support these new and emerging areas.

Policymakers stated that they had mobilised financial resources to hire consultants to revise the curriculum and integrate climate change education in the curriculum. When prompted by the researcher for a specific timeframe to deliver such work and for more details in terms of outcomes for the work, the policymakers were not in any position to provide the information. The government has an abysmal track record of utilising external project funds due to its limited project development capacity. Therefore the researcher is not convinced that this project will be successfully implemented within a reasonable time frame. St. Vincent has a history of project funding going back to funding

agencies because they were not utilised within the timeframe allocated. Informants stated that the island has a history of reallocating donor resources that are provided for specific projects to other areas of development without the permission of these donor agencies.

### ***5.3 Summary of Chapter***

Chapter 5 presented an analysis of the top-down perspective of the interviews the researcher conducted with policymakers and senior officials on the impact of climate change on youth in small island communities. The researcher utilised NVivo computer software to classify the data into themes/clusters and sub-themes/sub-clusters. The clusters identified are Climate Change, Community, Youth Preparedness and Change Enablers. The Change Enablers cluster is sub-divided into two categories a) change enablers, which lead to Youth Empowerment and b) Change enablers, which lead to Adaptation. Overall, this section is linked to Objective 3 and responds to Question 3 of the research to review evidence of the top-down and bottom-up approaches.

The key outcomes from the interviews include a) from a bottom-up approach – it shows that youth are frustrated with the system of leadership and governance. The leaders are very insensitive to the development issues that are important to young people. This is compounded by the fact that governmental institutions including the Ministry of Education are not providing the necessary skills and knowledge to support and harness the development of the youth and transit them to adulthood and the way of work (Objective 2 and question 2), build resilience to deal with the impact of climate change (Objective 1 and question 1), and provide strategies to deliver CCA policies and programmes (Objective 4 and question 3). B) From a Top-down approach, the researcher deduced that policymakers are mainly concerned with visibility and profitability, i.e. big projects, such as the construction of the international airport, 5 Star hotel and mariners projects which will enable them to harness enough votes to win the next general election and stay in power for as long as possible. Policymakers are also interested in providing support to communities following a disaster because of the visibility to be gained from such projects. Conversely, they are not demonstrating much

concern with the development of adaptation projects as well as youth development because these do not contribute significantly to votes to keep them in political power.

## Chapter 6

### Case Studies on Top-down and Bottom-up Approaches

This chapter presents an analysis of the Top down approach implemented by the Government of St. Vincent and the Grenadines to create the Tobago Cays Marine Park in the Southern Grenadines and the Bottom-up approach implemented by JEMS to build the capacity of youth to adapt to climate change.

#### ***6.1 Section 1: Case Study on the Top-down approach to establishing the Tobago Cays Marine Park (TCMP) Livelihoods Initiative***

The Government of St. Vincent and the Grenadines has successfully achieved the effective management of 10% of its marine area by 2012 and intends to expand the marine protected area system to include 20% of the marine habitats by 2020. Over the years, the government has been active in the area of environmental conservation as a strategy to reduce the impact of climate change on its coasts and marine biophysical systems, terrestrial systems and human system (Government of St. Vincent and the Grenadines, 2010). The government views adaptation as an essential part of policy response for environmental governance as climate change is projected to cause more intense extreme events and less favourable conditions for the main sectors such as tourism and agriculture (Scobie, 2016). The government has created 23 terrestrial reserve areas, including the St. Vincent Parrot Reserve, several forest reserve areas, one marine park (Tobago Cays Marine Park), and six marine reserves (CARIBSAVE, 2012).

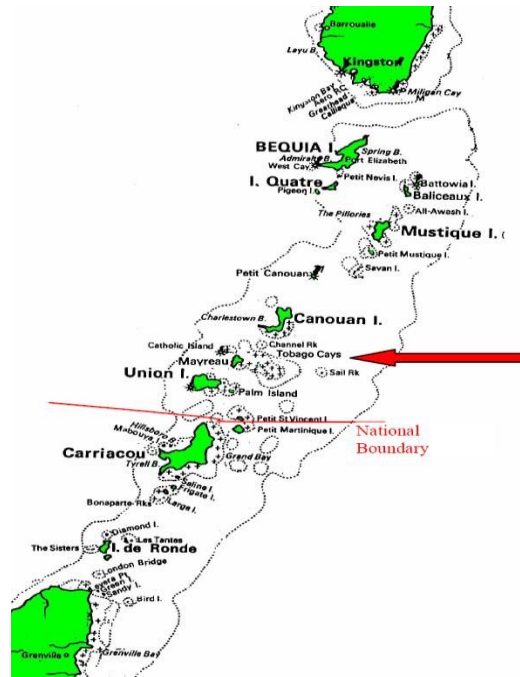
This is a significant achievement from an international perspective, i.e. fulfilling its obligations to the Biodiversity and Climate Change Conventions. However, the major challenge facing the government is how to mobilise the necessary technical and financial resources to sustain such initiatives in order to build the capacity of residents to adapt to the impact of climate change and ensure sustainable livelihoods.

#### ***6.1.1 The objective of the Case Study***

This case study presents an analysis of the top-down approach used to create the Tobago Cays Marine Park (TCMP). It will highlight the strengths and the weaknesses, opportunities and threats of using the approach, as well as present an assessment of the strategies implemented by the government to address the challenges encountered.

#### ***6.1.2 Location and biological resources of the TCMP***

The TCMP is located in the southern Grenadines (Espeut, 2006 in Doyle, 2011). The park is rectangular and has a total area of approximately 66 km<sup>2</sup>. Four of the Cays – Petit Rameau, Petit Bateau, Jamesby and Baradal, are enclosed within the Horseshoe Reef, while the fifth Cay, the Petit Tabac, is situated to the east of the leading group of inhabited islands. These islands are surrounded by a series of other reefs and shallows and include Egg Reef and World's End Reef on the eastern side and Mayreau Gardens to the west. All the islands within the Tobago Cays are uninhabited. The populated islands nearby include Mayreau, which lies inside the park boundary on the western side, Canouan to the north, and on the southeast is Union Island (Doyle, 2011). The tourist resorts of Palm Island and Petit St. Vincent lie to the south of the park.



**Figure 35:** The Location of the Tobago Cays in the southern waters of St. Vincent and the Grenadines (Espeut, 2006 in Doyle, 2011).

The marine park has a unique blend of coral reefs and other marine eco-systems, valuable marine resources such as conch, lobsters, turtles and fish. Coral reefs represent one of the most valued resources for sustainability of livelihoods in SIDS (Hernandez-Delgado, 2015, IPCC, 2014)

#### *6.1.2.1 Livelihoods activities in the Southern Grenadines*

The Tobago Cays are surrounded by the larger populated islands of the Southern Grenadines. Approximately 5000 people are living in the Southern Grenadines. These islands have an unemployment rate of approximately 20 percent. Therefore the success of the TCMP sustaining local livelihoods to these islands is tremendously essential.

##### *6.1.2.1.1 Tourism and recreation*

Tourism is the primary source of income in the Southern Grenadines. St. Vincent and the Grenadines was designated as the “7<sup>th</sup> Most Spectacular Island Paradise” by the Travel Channel and received the ‘Travel Weekly Five-Star Magellan’ Awards for 2009 Honeymoon Destination. In 2009, it received the ‘Best Sailing and Yacht Island of the Year Award by Caribbean Travel’ Award (St. Vincent and the Grenadines Tourism Authority, 2009). Even when St. Vincent and the Grenadines is experiencing stagnation in the tourism sector, the Southern Grenadines is experiencing growth of 15% of the



country's gross domestic product (GDP) and its overall benefit to the economy in average is US\$82.4 million. The Tobago Cays Marine Park is deemed as the main attraction for marine tourism in the Southern Grenadines. It experienced an average of 75,000 visitors per annum with peak visitor arrival of 90,000 in 2008 (Doyle, 2012). It generates fees of EC\$634,000 in 2012, which peaked in 2008 to almost EC\$1 million.



**Figure 36:** Yachts anchored in the Tobago Cays Lagoon

#### 6.1.2.2 Yachting

The Tobago Cays Marine Park is known internationally as a predominant yachting destination. Bareboat Charters, crewed charters and private yachts all appreciate the quiet and safe waters of the Tobago Cays lagoon for anchoring. The number of yachts anchored in the lagoon far exceeded its carrying capacity. Officials at TCMP said that up 28-30 yachts would be found anchored in the lagoon during an average day. However, during the high tourist season of November to March an estimated 3,000 yachts would anchor in the lagoon per annum.

#### 6.1.2.3 Diving and Snorkelling

TCMP has clear, tranquil and shallow waters. This makes the area very attractive for snorkelling, scuba diving and other sea sports activities. Approximately 5% of visitors to the TCMP said they are involved in scuba diving activities. The Mayreau Garden, which offers an exceptional diversity of marine life and the wreck of the HMS Puruni on the western side of Mayreau, is viewed as the most popular diving site in the Southern Grenadines. Degraded reefs are visible in the TCMP. These coral reefs yield limited goods and services and result in a magnifying negative socio-economic impact in small

tropical island communities with a firm reliance on coral reefs, thus increasing the risk of poverty (Turner *et al.* 2007 in Hernandez-Delgado, 2016).

#### ***6.1.2.4 Beach tourism***

Tourists visit the TCMP mainly to relax on the beaches, sunbathe and relish the tranquillity and scenery of the Cays. There are a proper linkage and network of flights between St. Lucia, Barbados, Martinique and the Cays. Tourists can fly from any of these destinations to the Southern Grenadines, while others would arrive on cruise liners.

#### ***6.1.2.5 Fishing***

Fishing was deemed as the most widespread economic activity among males in the South Grenadines (TCMP, 2007). It was estimated that 200 fishermen were living on Union Island and 60 in Canouan. Due to the abundant supply of fishes, lobsters, conchs, shellfish and reef fish coming from the Tobago Cays area, there is little exploitation of the more off-shore fish stocks. Fisher folks use a range of traditional techniques including fish pots, nets, and spears to catch fishes. Illegal fishing was highlighted as a serious concern in the Tobago Cays by the government of St. Vincent and the Grenadines before the establishment of the Conservation Area in 1987. This concern prompted the government to intervene by sending armed police officers to dismantle the camps of fishermen who were located in the Cays. This action contributed to reducing this unlawful practice; however illegal fishing still continues.

#### ***6.1.2.6 The building of capacity on the ground***

##### ***6.1.2.6.1 Fisherfolk Cooperatives***

The government has utilised the top-down approach to establish TCMP. The TCMP was managed by a group of government officials and civil servants in Union Island under the directorship of policymakers in Kingstown, the capital. The government officials realised there was always conflict between officials and stakeholders in the southern Grenadines regarding the management and operation of the marine park, which has resulted in the ineffective collection of fees and provision of substandard services by TCMP officials. Consultations were held, and decisions were taken to form a fisher folks group. This has evolved in a change of the top-down approach to a hybrid approach.

#### ***6.1.2.6.2 Yachting network***

There are many local and foreign companies operating in the Grenadines. Three major charter companies are operating out of St. Vincent, and two smaller companies are operating out of Bequia offering a combined national charter fleet comprising approximately 85 vessels. The current national charter fleet is estimated as being over 100 yachts. The TCMP officials implemented consultations with these charter companies to find out their specific needs and solicit their participation in the overall development of strategies to enhance the management and operation of TCMP.

#### ***6.1.2.6.3 Diving operators group***

Local dive shops undertake an average of 3,000 dives per annum. The dive shops in Union Island (Grenadines Dive) and Canouan (Canouan Dive Centre) operate most of the scuba diving operations in the TCMP. There are five other dive operations based on Bequia, Mustique and St. Vincent that operate their dive operations in the park. Parks officials organised consultations with diver operators and involved them in the overall management of the park.

#### ***6.1.2.6.4 Cruise Liners and operators network***

The TCMP is a prominent fixture on the schedules of many of the cruise liners operating in the Eastern Caribbean during the high tourist season from November to March each year. It is estimated that there can be a total of over 74 cruise ships scheduled to visit the Cays in any tourist season and a total of up to 16 visits per month in the peak months of December and January. These ships are estimated to carry up to 750 tourists per trip. There can also be an additional four trips per day by other operators in the park with an average of between 40 100 tourists per trip to TCMP. Such overcrowding has resulted in deterioration of the quality of coral reefs and the marine ecosystem. The management, therefore, needs to put measures in place urgently to address this issue.

#### **6.1.2.6.5 Water Taxi Operators Association**



**Figure 37:** Photo of Water Taxi

Water Taxi operators organised themselves into the Southern Grenadines Water Taxi Operators. They are responsible for working with the management of TCMP to provide training to members on the relevance of the park to the community and how to conduct themselves responsibly. Approximately 55 water taxis are operating in the park. These vessels (Figure 37) provide actual ‘taxi’ services as a part of their business. Some water taxi operators said they have real concerns about a) lack of additional services in the park to attract persons to stay for long periods and b) lack of adequate support to assist them to enhance their operation.

#### **6.1.2.7 Vendors Association**

Some vendors ply their businesses in the TCMP, trading in T-shirts, handicrafts, ice, bread, fresh fish, fruits and vegetables to the visitors. The park is strictly zoned, i.e. trading in TCMP is controlled to the northern beach of Petit Bateau. However, some speedboats travel from one yacht to the other selling bread, fruits, T-shirts, conchs and lobsters. Some vendors are accused of being involved in illegal spearfishing in the lagoon, which they will then sell to tourists. Vulnerable people, specifically vendors and water taxi operators, would need guidance and support to anticipate the impact of

climate change and implement adaptation strategies if they are to sustain their livelihoods and quality of life into the future (Hernandez-Delgado, 2015).

#### **6.1.2.8 Reflection**

The research utilised the SWOT analysis, i.e. a tool that identifies the strengths, weaknesses, opportunities and threats of an organisation to assess the outcomes of the TCMP project. Specifically, **SWOT** is a basic, straightforward model that assesses what an organisation can and cannot do as well as its potential opportunities and threats

(<https://www.investopedia.com/terms/s/swot.asp>). SWOT analysis is also defined as the strength, weakness, opportunity strategy matrix, which helps managers develop strategies (David, 2005).

**Table 10:** SWOT Analysis of the Tobago Cays Marine Park (TCMP)

| Strengths | Weaknesses |
|-----------|------------|
|-----------|------------|

|   |   |
|---|---|
| <p>The legal power to establish marine parks in SVG was created by the Marine Parks Act (No. 9 of 1997) and supported by the Government's policy, technical and financial resources.</p> <p>Establishment of a Marine Park Board, responsible for regulating the use of marine parks, issuing permits and employing staff.</p> <p>Implementation of zoning - no fishing allowed, no objects removed or damaged, no pollution caused, no commercial activities allowed except in designated areas.</p> | <p>No one Ministry in the Government with responsibility for coordination and development of the government's Environment and Climate Change Adaptation Policies and Programmes.</p> <p>Over the carrying capacity - One of the most common problems faced by yachtsmen in the Tobago Cays is overcrowding of visiting boats. (The TCMP has a carrying capacity of 30 yachts, yet there are over 100 yachts along with other boats doing daily tours in the park).</p> <p>Negative impacts such as physical damages by anchoring, diving and snorkelling can be observed.</p> |
| <p>The National Parks and Marine Parks - managed jointly for ecosystem protection and recreation.</p> <p>Over 100 yachts on a daily basis during high season and over 3000 yachts per annum.</p> <p>Approximately 75,000 visitors per annum visit TCMP.</p> <p>Over 74 cruise ships scheduled to visit the Cays in any tourist season.</p>  | <p>A large number of yachts are without holding tanks. Therefore, the impacts of sewage from yachts can be observed in the lagoon.</p> <p>The carrying capacity issue extended to the number of water taxis and vendors plying their trade in the park.</p> <p>Overcrowding of vendors &amp; operators in the Cays has negative experiences for the visitors, and the profits of the individual vendors are suffering</p>   |
| <b>Opportunities</b>  | <b>Threats</b>  |

|  |  |
|--|--|
| <p>More consideration to be given to the carrying capacity of the Tobago Cays using many different approaches</p> <p>Refinement of a hybrid approach to make it more applicable to TCMP.</p> <p>Greater involvement of local stakeholders such as water taxi operators, vendors, fisher folks, tour operators and others in the overall management of the TCMP.</p> <p>Change in the culture of the organisation from a rigid top-down civil service culture to one that provides opportunities for all stakeholders to participate in the management and development of the TCMP.</p> | <p>Evidence of degradation of the ecosystem of the TCMP (OPAAL, 2006 in Hoggarth, 2007) due to overfishing and overcrowding</p> <p>Natural threats to coral reefs include storm damage and white band disease as well as human-induced impacts (OPAAL, 2006 in Hoggarth, 2007)</p> <p>Physical impacts associated with visiting yachts (anchor damage and running aground);</p> <p>Water pollution from the sun-cream used by bathers was reported as a visible problem on days with many visitors.</p> <p>The coral bleaching associated with global warming is also presumed to be a cause of mortality in some reefs.</p> |
|--|--|

Overall, the TCMP was implemented by central government utilising a top-down approach towards achieving CCA and sustainable livelihoods in the Southern Grenadines. During the latter half of 1980, the government recognised the destruction of the resources in the Cays both by human actions and also by the impact of climate change on coral reefs, seagrass and other natural resources. The combined long-term impacts of climate change, chronic coastal environmental degradation, ecosystem decline and increased human vulnerability were having a severe impact on the local tourism economies of the Southern Grenadines (Hernandez-Delgado, 2015). Over the years there was a severe reduction in tourists to the park due to over-crowding and degradation of the coral reefs and other ecosystems from over 90,000 in 2008 visitors to around 50,000 in 2012 (Doyle, 2012). Tourists were continually complaining of being harassed by vendors, water taxi operators and fisher folks. The lagoon was devoid of turtles, conch and fishes due to overfishing and dumping of sewage from yachts

anchoring in the Cays. These islands were overexploited by extensive tourism and non-sustainable development practices, which have the potential to show up their limited natural resources thus placing the local economies and livelihoods at risk (Hernandez-Delgado *et al.*, 2012).

The former Prime Minister requested planning officials in Kingstown, the capital, to work on the creation of a national marine park. In a top-down approach, policy designers are viewed as the central players and focus their attention on factors that can be manipulated at the central level to ensure that the approach work (Matland, 1995). The government spearheaded the development of the National Parks Act, which was pushed through Parliament and created a National Entity to manage the TCMP and other parks. The creation of the TCMP caused confusion and tensions among civil servants who were charged with the implementation of the TCMP project and the local community mainly in the Southern Grenadines who accused the government of destroying their livelihoods. This problem was compounded by resentment and, at times, hostilities from local stakeholders (vendors, water taxi operators, yachts and tour operators) due to the lack of consultations with the government. Overall, the policymakers were motivated to implement the TCMP project because it gives high visibility and economic capital to the government. Such high visibility has the power to translate into votes during national elections and ensure that the governing political party stays in office for a more extended period.

The situation further resulted in conflict between the local vendors and water taxi operators on the one hand and wealthy yacht owners and tours operators on the other hand. The local water taxi operators and vendors accused wealthy yacht owners and tour operators of working with the government to prevent them from achieving sustainable livelihoods. An analysis of the TCMP organisational culture during the implementation of the top-down approach was conducted using the Cultural Web (David, 2005). The TCMP was described as having a rigid civil service culture (Appendix I).

The government realised that the top-down approach was not working (Step 2 in the conceptual framework). Due to the failure of the Top down approach, a decision was



taken to change to a hybrid approach, which involved utilising the strengths of both approaches.

The unique strengths of the TCMP include a) the establishment of the Marine Parks Conservation policy supported by appropriate legal framework and strategic plans; b) the development and implementation of zoning including no fishing would be allowed, no objects removed or damaged, no pollution caused, nor any commercial activities allowed except in designated areas; and c) the development of a Board and a division to manage parks and marine parks, including the TCMP in St. Vincent and the Grenadines (TCMP, 2007).

Some of the key weaknesses of the TCMP include: a) overcrowding of yachts and other boats in the lagoon of the Cays, which is over the carrying capacity of 30 yachts; b) the negative impacts of physical damages by anchoring, diving and snorkelling to the coral reefs and seagrasses; c) a large number of yachts are without holding tanks. Therefore, the devastating impacts of sewage from yachts on the lagoon and d) the overcrowding of vendors. The culture of the TCMP is related to the top-down approach from St. Vincent and the Grenadines civil servants who are accustomed to their rigid way of delivering services. This is the primary cause of the tension with the stakeholders.

Key threats are affecting the TCMP. Sources of natural threats to coral reefs include storm damage, sewage from yachts and white band disease. This is compounded by key human-induced impacts (OPAAL,2006 in Hoggarth, 2007): i) overfishing attributed to both local fishermen and visiting yachts (particularly in the use of spear guns which was illegal since 1987 (Hoggarth, 2007 in TCMP, 2007, Doyle, 2012); ii) the physical impacts associated with visiting yachts (anchor damage and running aground); iii) damages due to snorkelling and diving, both in touching fragile corals, either deliberately or accidentally, and in stirring up sediments and wastewater discharged from yachts and other boats or passing ocean liners; and iv) water pollution from the sunscreen used by bathers was reported as a visible problem on days with many visitors (TCMP, 2007). After a series of consultations among the key stakeholders, the government decided to implement a hybrid approach to the development and management of the TCMP (relating to Section 3 & 4 of the conceptual framework in Chapter 3, Section 1).

The hybrid approach involves combining the micro-level variables of bottom-up and the macro-level variables of the top-down approaches in the development and implementation of climate adaptation projects in order to benefit from the advantages and strengths of both approaches by enabling the various levels of stakeholders to interact and influence project outcomes (Matland 1995; OECD, 2013; Stochowiak *et al.*, 2016). The combining of both approaches highlight their strengths and minimise the weaknesses. Policy implementation has become more successful when all stakeholders at various levels can interact with each other. This provides adequate opportunities for both central Policymakers (government officials) and local stakeholders (Vendors, Water Taxi Operators, Tour Operators (Yacht and day tours) in the islands surrounding the TCMP to work with each other. Management and strategic plans for the TCMP were established and approved by all stakeholders along with the setting up of the various stakeholders' associations to give voice to the stakeholder groups on the various aspects of management and operations of the TCMP. This was what led to the successful implementation of the policy and strategic programmes of the TCMP (Doyle, 2012; OECD, 2013).

Overall, the governance of the TCMP has been enhanced since the implementation of the hybrid approach. All the local stakeholder groups have a better understanding of their role and are participating actively to ensure that the TCMP achieves its successful outcomes. The role of central government in the implementation of the TCMP project was significant in that it provided policy support and technical advice and finances to the TCMP Management Committee in Union Island to ensure the successful management of the TCMP. Additionally, the centrally located officials in Kingstown continued to exercise their influence by providing resources and incentives, focusing attention on critical development issues, establishing strong leadership around a vision for the policy and engaging with networks of interest of local groups and communities in the Southern Grenadines (Stochowiak *et al.*, 2016). The TCMP Management Committee includes representatives of the various local stakeholder groups who provided a voice for their groups on all aspects of management and operation of the TCMP (Cloutier *et al.*, 2018).

#### **6.1.2.9 Summary of the Case Study**

The Government of St. Vincent and the Grenadines used the top-down approach to establish TCMP conservation and nature protection initiative in the Southern

Grenadines to protect marine resources and ensure a livelihood for the present and future generations. This was implemented because the marine resources were significantly degraded since the 1980s. The top-down approach of the government was to create a protected area to restrict or control activities and improve marine life. Its implementation, however, was not easy due to lack of consultation with the key stakeholders. The project met with failure, so a hybrid approach was subsequently adopted which improved compliance and received support and buy-in from all the resource users.

### **6.1.3 Section 2: The case study on JEMS Bottom–Up approach to capacity building for youth to adapt to climate change.**

#### **6.1.3.1 Introduction**

The case study discusses the approaches and process involved in the development and implementation of a project to enhance the capacity of youth to build their resilience to adapt to climate change. The case study is divided into three (3) main sections namely: a) strategies for delivering a capacity building, d) community engagement in CCA and c) a reflection from the researcher on the case study.

This case study presents a bottom-up approach to CCA in Small Island Developing States from the perspective of young people. One of the advantages of this approach is that the participants (who are the young people) tell their stories (Crabtree & Miller, 1999 in Baxter & Jack, 2008) and it is through these stories that there is a collaboration between the researcher and the participant. This collaboration enabled the participants to describe their views of reality, which then allowed the researcher to better understand their actions (Robottom & Hart, 1993 in Baxter & Jack, 2008).

The capacity-building project was developed and implemented by young people through the JEMS Progressive Community Organisation (NGO) in St. Vincent and the Grenadines. These young people participated in all aspects of the project cycle namely design, development, management, evaluation and monitoring. The researcher provided technical advice to the young people during the development and implementation of the Climate Change Adaptation (CCA) project, the preparation of the project proposal, identification of funding sources and mobilisation of funding to support the implementation of the project.

JEMS is a community organisation based in St. Vincent and the Grenadines which acts as a development catalyst to enhance the capacity of youth and residents, and empower them through training and other innovative strategies to manage the natural resource base of their communities, in an effort to alleviate poverty, develop sustainable livelihoods and make positive impact on national policies and programmes ([www.jemssvg.org](http://www.jemssvg.org)).

#### ***6.1.3.2 The aim of the case study project***

The overall aim of the project was to develop a bottom-up approach to build the capacity of youth and their communities to adapt to the impact of climate change on Small Island Developing States (SIDS).

The components of the case are:

#### ***6.1.3.3 Capacity building training for youth leaders on CCA***

The Climate Change Capacity building for community leaders was implemented to enhance the awareness, knowledge and competencies of youth and community leaders on CCA. On completion of the capacity building training, the participants developed Climate Change adaptation strategic actions plans for implementation in their respective communities. Over 120 youth and community leaders participated in the training programme; over 65% of them were females between the ages of 18-24. The researcher observed that there are difficulties in engaging young men in education and training activities both in urban and rural areas (Carter, 2007). This is an area, which needs further research. The leaders were trained through a series of 6 community-based CCA workshops followed by two National Climate Change adaptation workshops held in Kingstown, the Capital from 2015-2016.

##### ***6.1.3.3.1 The Capacity building workshops on CCA – Community level***

The community one-day training workshop on CCA was delivered through a series of one-day training programmes on CCA implemented in six communities across St. Vincent and the Grenadines. A minimum of 25-30 participants represented their communities participated in each of the sessions. The workshop explored topics such as the impact of climate change on the communities, the extent of the impact on natural resources, housing and infrastructure, health and livelihoods, and the strategies implemented by the community to adapt to climate change. The second part of the

workshop focused on the strategies that local people and government are implementing to reduce the impact of climate change on their communities (community level). This took the form of an open discussion among participants. A key outcome of the workshop consists of a call from participants for further work on the exploration of the adaptation strategies implemented within communities and the development of a programme to further develop and roll out these adaptation strategies across the island.

#### *6.1.3.3.2 The national capacity building training workshops*

The youth and community leaders were trained through two National Climate Change workshops held in Stubbs on 19-21<sup>th</sup> June 2015 and in Kingstown on 23<sup>rd</sup> April 2016. The workshop in Stubbs was a two days 'live in' workshop on Climate Change Adaptation followed by a one-day workshop in Kingstown on Funding Climate Change Adaptation projects.

A group of six youth who participated in each of the community CCA workshops was selected to participate in the national training camp workshop on Climate Change Adaptation in Stubbs. These youth were selected to participate in the workshop based on their a) leadership capacity, b) ability to mobilise residents to participate in climate change and other community activities and c) knowledge of climate change and its impact on communities. An additional 10 participants were selected from JEMS and other community groups from the South East area.

To raise the profile of the workshop, the researcher worked through JEMS to mobilise support from the OECS Secretariat and the Caribbean Community Climate Change Centre (5Cs) to participate in the workshop. Bentley Brown, Director of the Social Development and Sustainable Development Division, OECS Secretariat in St Lucia, and Ottis Joslyn, Science Officer, 5Cs participated as resource persons in the workshop. They were supported by local resource persons from government, civil society and community-based organisations. Sixty (60) youth leaders participated in the training workshop. The main outcome of the workshop was the development of community CCA plans for participants to implement when they return to their various communities. A National Climate Change Adaptation Network for Civil Society Organisation was established to provide support to participants in their work at the community level to build the capacity of their communities to adapt to climate change.

The second workshop was a National one-day workshop on Funding Climate Change adaptation projects at the community level and was held on 23<sup>rd</sup> April 2016. The workshop was facilitated by Ottis Joslyn, Science Officer, 5Cs and the researcher. The workshop provided participants with knowledge on climate finance and skills for preparing project proposal to access financial resources (grants) from the 5Cs and the Caribbean Central Bank (CCB) to fund Community Climate Change Adaptation projects. The outcomes of the workshop were a) enhancing the knowledge and skills on how to access funds to implement Climate Change Adaptation projects, b) enhance project writing and management capacity of youth leaders and b) provision of strategies for utilising social media to promote CCA to a broad audience.

#### **6.1.3.3.3 Strategies used for delivering the capacity building training**

The methodological approach utilised in undertaking the Capacity Building project was as crucial to this study as the outcomes evolving from the implementation of the project. The implementers of the capacity-building project employed a combination of participatory research and peer education approaches to mobilise participants from communities to participate in the project and enhance the delivery of the project outcomes. Participatory Research approach is understood as a family of research approaches, behaviour and methods for enabling people to do their appraisal, analysis and planning, take their action and do their monitoring and evaluation (Chambers, 2002). Participatory Action Research is difficult to define because it is an overarching term that encompasses similar collaborative approaches such as participatory research, action research, community-based participatory research, and other collaborative methods.

The participatory action research approach focused on increasing participants' voices and power in the training and research context, while the action research was more focused on empowering the young people to facilitate social action to solve problems. The community-based participatory research approach put more emphasis on the community as a group of participants that share common identities and interests to address community challenges (Pereznieto *et al.*, 2011; Stock, 2014; McNamara & Buggy, 2016). Overall, the project took on a strong capacity-building element, focusing on working with local young people with limited prior experience in how to conduct research and CCA initiatives (Pereznieto *et al.*, 2011).

#### *6.1.3.3.4 The effectiveness of the capacity building training*

From all accounts, the capacity-building training project was very effective. An evaluation report on the training shows that the workshop received high scores on all of the assessed criteria. It appears that one of the critical success factors of the workshop has been the overall level and quality of participation. The participants said that they highly favoured the theme of the workshop, the quality of content delivered, its structure and time management. General comments showed that the participants found the workshop to be very informative as they were enlightened on the impact of Climate Change and its attendant problems, particularly concerning small developing countries.

Seven of the community groups that participated in the workshops prepared project proposals, which successfully received funding from JEMS to implement Community Based Climate Change Adaptation projects in their respective communities. This is a tremendous success on the part of the quality provided, where participants used the skills acquired to prepare successful fundable projects. The funding for the projects was provided by JEMS through funding from the USA based Gold Environment Prize and the Jewish Community Federation. The young people utilised the skills learned in training to mobilise their communities to implement successful bottom-up Climate Change Adaptation projects.

#### *6.1.3.3.5 Issues arising from the training and strategies implemented to resolve them*

The decision to develop the projects evolved from discussions with youth in St. Vincent and the Grenadines on the impact of climate change after the 2013 Christmas Eve storm, which killed 13 people and destroyed over \$300 million in housing and infrastructure. They highlighted issues that prevent them from achieving their goals (Table 11). The researcher then worked with a group of youth to identify a set of strategies to address the issues.

**Table 11: Issues arising from the training and strategies implemented to resolve them**

| Issues  | Strategies for addressing problems   |
|---|--|
| The absence of knowledge on the impact of CCA due to climate change education not included in the school curriculum | Mobilise a group of experts from government, CARICOM and the OECS to train youth to enhance their knowledge and skills on CCA.   |
| Lack of financial resources to implement CCA capacity develop training  | Train youth in project and bid writing and financial mobilisation  |
| Unavailability of experts in St. Vincent and the Grenadines to deliver the capacity building programme on CCA       | Utilise networks to mobilise a group of experts from government, CARICOM and the OECS to mentor youth and deliver the training   |
| Lack of confidence to manage such capacity building projects  | Utilise a range of strategies to empower and build the confidence of youth by providing them with opportunities to enhance their leadership and project management capacity. |

The successful implementation of the Climate Change Adaptation Capacity Development initiative was based on the interactions between the researcher and JEMS project management team including all aspects such as the micro level institutional settings, the local actors and the social difference among the target communities with regards to the availability of resources, access, power dynamics and social capital within the local community (Stochowiak *et al.*, 2016).

#### **6.1.3.4 The suitability of the workshop programme as a youth empowerment initiative**

Research shows that the education and training provided by Caribbean island states do not equip young people to meet the current development needs of the region, as well as preparing them to meet future needs (Carter, 2008). Young people participating in the evaluation exercise stated that the project empowered them because it enabled them to acknowledge the conditions in which they find themselves and then take action to enhance access to resources (human, financial and natural) in order to transform their



wellbeing by changing their beliefs, values, and attitudes. Table 12 below shows the effectiveness of the bottom up capacity development training when compared with conventional training

**Table 12:** Presents an analysis of outcomes of the Top-down conventional training and Bottom-up capacity building initiative

| Criteria                                       | Conventional training model   | Bottom-Up Approach  |
|--|---|---|
| <b>Selection of participants</b>               | Government official selects participants randomly   | Participants are recommended by local leaders based on a set of criteria. Participants are assessed according to the criterion to ensure that they have an interest in the training that will be provided and be able to use the skills and knowledge gained. |
| <b>Level of involvement of local community</b> | No participation of local community in the selection of the participant. This is done centrally by officials.           | Full participation of the local community in recommending youth to participate in the training; sitting on committees to interview youth and select them to participate in the capacity building exercise.  |
| <b>Methodology</b>                             | Mainly “chalk and talk” - lecture and to some extent use of technology to assist the trainer with his/her presentation. | The utilisation of a range of participatory strategies and technology to support the delivery of training content. Provision of opportunities for youth to manipulate the technology and other devices during the training.                                   |
| <b>Role of participants</b>                    | Mainly sit-back to receive knowledge and content from the trainer/presenter.  | Actively participating in field exercises in the community, working in groups and facilitating small group exercises.   |
| <b>Sustainability</b>                          | Less likely to retain skills and knowledge for an extended period after the training is delivered.                      | Longer retention of knowledge and skills. Youth are more likely to transfer knowledge and skills to others and are more likely to use the knowledge and skills to benefit   |

|   |  |  |
|---|--|--|
|   |  | other areas of their daily life, e.g. job and family.  |
| <b>Distribution of the benefits</b>         | Mainly benefit the participants themselves.  | More likely to benefit the group the youth and the broader community. Youth utilise the skills in project preparation training to access funding. They also use their community mobilisation skills to mobilise residents from 7 communities to participate in the Climate Change Adaptation project. These projects were distributed across the island. |
| <b>Monitoring, evaluation and feedback.</b> | Not much emphasis is placed on monitoring and evaluation of the outcomes of the capacity development activity. Participants may be asked to fill in a feedback form to submit to the organisers. | Participants are encouraged to build indicators to enable them to monitor the performance of their capacity building CCA project. This is done in partnership with the rest of the group/community.  |

The leaders from the local community participated in the identification and selection of participants for the capacity-building programme. The implementation of the project was comprehensively tied to the contextual factors in the local implementing community. Based on the analysis of the table above, one can deduce that a bottom-up approach to capacity development is an alternative to the delivery of conventional training.

#### ***6.1.3.5 Community engagement in Climate Change Adaptation***

After the successful implementation of the Community and National Capacity Development Training Programme, JEMS requested the communities and NGOs to submit Climate Change Adaptation projects for funding. A set of criteria was sent out along with an advertisement on radio, TV and through social networks. Information was

also sent directly to the 120 youth and community leaders who had participated in the Capacity Building Training Programme.

Over 20 groups submitted project proposals to JEMS for financial and technical support. After assessing the project proposals, seven community groups received financial and technical support to implement CCA projects in their communities. The organisation provided \$20,000 to fund the projects. The projects ranged from community clean-up campaigns and tree planting projects, implementation of community workshops and consultations to enhancing the knowledge and skills of residents to build their resilience to adapt to climate change. JEMS identified and provided mentors to work with community-based organisations to assist them with the overall management and implementation of the project (McNamara & Buggy, 2016). The community participated in all aspects of the project.

#### *6.1.3.5.1 The effectiveness of the community engagement*

Over three-quarters of the residents of the communities were fully engaged in the development and implementation of the CCA projects. Although there was only a core group representing the various organisations in the initial training and preparation of project proposal, the residents were mobilised through the implementation of cultural wakes and other education awareness building activities implemented in these villages. Steel pan music, calypsos, African drumming and other cultural art forms were used as media for raising awareness on the impact of Climate Change and mobilise residents of the selected communities to participate in the Climate Change Adaptation Action Initiative within their respective villages. Between 60-80% of the population of these communities actively participated in these 'Cultural Wake' activities by singing popular environmental songs, reciting famous dub poetry, beating African drums or clapping out the rhythms and chanting songs (McNamara & Buggy, 2016; Cloutier *et al.*, 2018).

A similar number of residents participated in community projects. Besides benefiting from the various CCA activities, permanent relationships were built among the residents of the community (Cloutier *et al.*, 2018). Support was also mobilised from government agencies and other civil society organisation to participate in the project, thus expanding the bottom-up approach to a hybrid approach (OECD, 2013; Stochowiak *et al.*, 2016).

#### *6.1.3.6 Outcomes of the project*

Overall, the project has demonstrated the effectiveness of the bottom-up approach as a viable alternative to conventional capacity development training projects. It shows that when youth are empowered through programmes to develop their capacity to build their resilience to adapt to climate change, they can be successful in providing the leadership to implement a positive and beneficial bottom up Climate Change Adaptation Programmes within their respective communities/localities.

The case study demonstrated that the dissemination of knowledge and action on CCA would enable scale to be achieved quickly. Overall, it validated the importance of adapting to the local policy context by engaging the right local stakeholders in the implementation of CCA projects.

The case study also indicated that the investment required to prepare a programme for implementation could be demanding for a small community organisation such as JEMS. However, despite this situation, the case study demonstrated that if an organisation invests sufficiently in building the capacity of its youth, promotes the case for Climate Change adaptation service at local/community levels, and if it is adaptable to the changing political and social environment context, then funding can be mobilised to finance the initiative. The mobilisation of funding was also supported by a resurgence of interest by international development agencies and practitioners to provide direct support to community-led bottom-up development initiatives to build the capacity of communities to implement community-based Climate Change Adaptation actions (McNamara & Buggy, 2016; Jaja, Dawon & Gaude, 2016).

The project has contributed towards heightening the level of interest and enthusiasm of community residents across the country on the impact of climate change and other aspects of environmental degradation on the island. Due to the enhanced high visibility of the JEMS bottom-up approach, the government has now mobilised financial resources from donors and prepared the terms of reference for consultants to a) develop a national policy on Climate Change and b) integrate climate change education into the education curriculum.

The enhancement of the capacity of youth has led to an increase in the participation of youth and their communities in CCA activities. It has also led to higher levels of

environmental activism among youth and community leaders across the island. Another positive outcome is the community meetings between youth and community leaders and their Parliamentary Representatives to discuss strategies for tackling the specific climate hazard vulnerability affecting their community.

#### **6.1.3.7 Lesson learned**

The project provided a model for the contribution of the bottom-up approach to capacity building of youth to enhance their resilience to adapt to the impact of climate change on SIDS. The case study demonstrated that community-led bottom-up approach to Climate Change Adaptation is deemed to be more successful than top-down approach because it is a) more flexible to implement, b) less controlled by external agencies/partners and/or governments and c) more relevant to the development context of the vulnerability of the local area (Adger *et al.*, 2005; Barnett & O'Neill 2010; Stochowiak *et al.*, 2016).

In relationship to the work of JEMS, the case study demonstrated that when an organisation is grounded and prepared to engage and listen to the views and concerns of the local community, especially the youth, and possesses the capacity and supporting infrastructure to develop programmes based on the needs of its constituents, it will be more capable of expanding its programme to deliver valuable services to the broader community (Cloutier *et al.*, 2018). Although JEMS is based on the south-east of St. Vincent, the organisation has used its infrastructure and community-oriented practices to expand its programme to support communities across St. Vincent and the Grenadines. The literature shows that organisations such as JEMS have a better success rate of delivering CCA projects when they are working in partnership with other development partners to deliver programmes, (Jaja, Dawon & Gaude, 2016; Cloutier *et al.*, 2018).

#### **6.1.3.8 Reflection and summary of the case study**

The researcher utilised the SWOT analysis to assess the performance of the JEMS Capacity building for youth to adapt to climate change project. The SWOT analysis is a tool that identifies the strengths, weaknesses, opportunities and threats of an organisation or a project.

There is no doubt that the lessons learned and strategies implemented have relevance to the effectiveness of using the bottom-up approaches to develop and implement

capacity building programme to provide knowledge and skills to youth, thereby enabling them to build resilience to adapt to climate change (ILO, 2013). The case study attested to the fact that the bottom-up approach is a very practical approach to empower the youth and their community to make informed decisions to enhance their environmental integrity, strengthen economic viability and create a just society for present and future generation, while at the same time enabling them to respect the cultural diversity including the local knowledge of the community (UNESCO, 2014).

The SWOT analysis was used to analyse the effectiveness of the case study (Appendix V):

#### **6.1.3.8.1 Strengths**

The unique strengths of JEMS gave rise to the success of the project. JEMS is an NGO with a rich history of utilising bottom-up participatory approaches to develop innovative strategies to deal with climate change and environment and sustainable livelihood issues at community and national levels. One hundred per cent of JEMS' work is provided by a cadre of youth volunteers and community leaders across the country who are skilled and committed to working with communities to build their capacity and resilience to adapt to climate change. This is compounded by the unique skills and knowledge possessed by the leadership of the organisation in project management, sustainable development, project proposal development and resources mobilisation which enable them to prepare projects proposal and access financial resources from international donors to implement CCA projects.

A major strength of the bottom-up approach is that the approach does not present prescriptive advice but describes the factors causing difficulties in reaching the stated goals of the project (Matland, 1995), i.e. ensuring that strategies are flexible to enable them to adapt to local difficulties and the contextual aspects of the respective programme (OECD, 2013).

#### **6.1.3.8.2 Weaknesses**

Despite the unique strengths of the organisation in the CCA project development and implementation process, JEMS has its own set of organisational weaknesses, which to some extent has limited the successful outcomes of the project implementation process. Based on the current socio-economic situation within the community, it may not be possible for the organisation to maintain and deliver CCA projects to these communities

using only voluntary staff and limited resources over a longer period. Also, if these communities are not supported, it would not be possible for them to implement these projects for an extended period without sustained funding and technical expertise. These communities do not have the technical expertise on CCA neither do they possess the financial resources to enable them to implement such projects. The literature supports this view that bottom-up approaches do not consider the long-term implications of climate change (Dessai & Hulme, 2004). Bottom-up theories also overemphasise the level and value of local communities, however, while such variation can be a strength it can also be a disadvantage (Stochowiak *et al.*, 2016).

#### **6.1.3.8.3 Threats**

The researcher identified some major threats that the project team has to navigate to ensure the successful completion of the project. There was reluctance on the part of certain residents and community leaders to participate actively in the implementation of the Climate Change Adaptation Action project. This was due to ignorance on the part of these community members about climate change. Due to the socio-economic challenge facing youth and community leaders in their respective community, they claimed that they have to use their limited time to deal with their personal needs rather than responding to CCA which they do not understand. Many youth and community leaders said their knowledge of climate change was close to nil.

There was also a lack of political will on the part of the government to implement CCA projects at community and national levels. The government claimed that they lacked technical and financial resources to respond adequately to building the resilience at the community level. However, on close examination of this claim, it shows that the government only has interest in big projects that can give them the visibility and financial capital gains.

#### **6.1.3.8.4 Opportunities**

Despite the weaknesses and threats identified above, the researcher focused on developing a set of opportunities that JEMS and the communities can build on to make the CCA projects more successful in the future. On the issue of creating sustainable funding facility to support project implementation at the community level, the

researcher proposed the creation of a Sustainable Trust Fund facility within JEMS to mobilise financial resources to fund the implementation of CCA projects.

To deal with youth and community leaders who may be reluctant to participate in CCA programme, the researcher proposed the continuation of using popular and participatory bottom-up approach mobilisation strategies such as popular theatre, and education awareness programmes on radio and TV programmes. In the situation where government lacked the political will to address Climate Change adaptation, JEMS should work with communities to lobby the government to develop appropriate CCA policies, mainstreaming Climate Change policy across sectors and put in place the necessary mechanism to integrate climate change education in the education curriculum.

It may be difficult to replicate any of the projects as argued by Meyers *et al.* (1998) because bottom-up cases are limited in their applicability outside of their specific context. Therefore, if the coping thresholds change, or if additional climate risks are emerging that are outside the range of recent experiences, the conventional bottom-up approach would be less suited to guide the adaptive capacity of youth.

## 6.2 Summary of the Case Studies

Table 13 presents a summary of the case studies and responds to Objective 3 and Question 3 in Chapter 1. It is also important to note that the case studies respond to Objective 4 of the research simultaneously, i.e. it explores mechanisms for delivering CCA outcomes to build the resilience of youth in small island communities. The case studies on the

TCMP Top Down approach to creating a marine park in the Southern Grenadines and the JEMS Bottom–Up approach to capacity building for youth to adapt to climate change shows the advantages and disadvantages of using both approaches (Stochowiak *et al.*, 2016). As demonstrated by the case study on TCMP, the Top-Down approach is inadequate and is not working hence leaving a vacuum. NGOs, like JEMS, are trying to fill these gaps to some extent through innovative approaches to community engagement and relevant initiatives (Cloutier *et al.*, 2018). On the other hand, the bottom-up options can be more effective in delivering the adaptation and capacity building projects locally.



The experience so far has been limited to short-term activities and mainstreaming them can be demanding. Therefore, a middle ground can be reached where the government, civil society and other stakeholders work together through a hybrid approach (Cloutier *et al.*, 2018, OECD, 2013, Stochowiak *et al.*, 2016).

The hybrid approach draws on the strengths of the top down and bottoms up approaches to respond to building the resilience of local communities to adapt to climate change. The major strength of the bottom-up approach is the formation of a local level coalition to determine the outcomes of the Climate Change adaptation projects. While successful implementation of the project and processes is important in the local areas, the role of government is fundamentally significant to the overall project success. The government centrally located officials can play their role by providing resources and incentives to civil society organisations to implement CCA projects. They can provide stern leadership around the vision for the policy, facilitate engagement with networks and key stakeholders as well as focus attention on areas of critical development (Suggett, 2011).

**Table 13: Summary of Outcomes in case studies**

| Case                    | Profile             | Problems Addressed   | Mode of Action  | Relationship to CCA  | Impact on Socio-Economic space  | Impact on CCA & Governance  |
|-------------------------|---------------------|--|---|--|---|---|
| Tobago Cays Marine Park | Governmental agency | <p>Degradation of coral reefs, fisheries and other marine resources</p> <p>-</p> <p>Overcrowding of yachts, and cruise-ship visitors and vendors on the Cays</p> <p>-</p> <p>Dumping of sewage in the lagoon by yachts</p> <p>-</p> <p>Damage to the environment of the Cays</p> | <p>A top-down approach to creating a marine park</p> <p>-</p> <p>Lack of consultation with stakeholders</p> <p>-</p> <p>Police burned fisherfolk camps and threw them off the Cays</p> <p>resulted in further tension.</p> <p>-</p> <p>Central government passed marine park legislation and set up office staff with civil servants.</p> | <p>Directly addressed coral bleaching and degradation of the environment</p> <p>-</p> <p>Create sustainable livelihoods for communities</p> <p>-</p> <p>Top-down approach created tension among stakeholders</p> <p>triggered Gov't to change to a hybrid approach</p> | <p>-</p> <p>Failure of the top-down approach forced the government to adopt a hybrid approach to address CCA</p> <p>-</p> <p>Economic &amp; social sustainability communities</p> | <p>Legitimised park and protected areas as a viable strategy to deal with CCA, biodiversity and sustainable livelihoods in SIDS</p> |

|  |  |   |   |   |   |   |
|--|--|---|---|---|---|---|
|  |  | <p>The severe impact of Climate Change (CC) on island communities</p> <p>Marginalisation of youth</p> <p>-</p> <p>Decline in livelihoods due to the impact of CC pressures -</p> <p>Lack of awareness of the population on CC</p> | <p>-</p> <p>A bottom-up approach to CCA</p> <p>-</p> <p>Consultation with youth and training of youth and community leaders</p> <p>-</p> <p>The mobilisation of youth to take on the leadership of the project -</p> <p>Preparation of project proposals and mobilisation of funding for CCA project</p> <p>-</p> <p>The mobilisation of technical resources &amp; support (GIS mapping etc.) from the government, OECS and the 5Cs</p> | <p>-</p> <p>Directly addressed CCA through the mobilisation of youth to take leadership to build the knowledge &amp; skills of the populace and take actions.</p> | <p>-</p> <p>The bottom-up approach resulted in building social cohesion and partnership among youth and the rest of the population.</p> <p>-</p> <p>Enhance knowledge of farmers, women and the rest of the population on the specific impact of CC on the sector and actions they can take to build resilience to adapt to the impact of CC</p> <p>.</p> | <p>Recognition of the role of youth in addressing CCA</p> <p>-</p> <p>Validation of Civic organisations in addressing CCA</p> |
|--|--|---|---|---|---|---|

# Chapter 7

## Discussion

The overall aim of the thesis is to explore the knowledge deficit between that which is known and that which is necessary for young people to enhance local resilience to climate change. This chapter summarises the findings from Chapters 4, 5 and 6 and relates them back to the literature discussed in Chapter 2 and the conceptual framework in Chapter 3 Section 1. The discussion is structured concerning the five objectives of the thesis outlined in Chapter 1, which discussed findings relating to:

- (a) Assess the vulnerability of youth in SIDS;
- (b) Skills and knowledge required to build the resilience of youth in SIDS;
- (c) Evidence of top down and bottom up approaches to Climate Change Adaptation;
- (d) The mechanism for the delivery of Climate Change Adaptation actions;
- (e) Development of the conceptual framework.

The research questions set out in Chapter 1 are addressed in Sections 7.2 to 7.4. The researcher will discuss the conceptual framework and propose views on the implication of the research to policy development and implication. The study sought to address three questions relating to building the resilience of youth in small island communities to adapt to the impact of climate change.

### ***7.1. Question 1: How vulnerable are the youth to the impacts of climate change?***

From the data collected from interviews with policymakers and FDG with youth, the climate change pressures impacting on youth in SIDS include increases in storms, SLR, temperature rise, drought, invasive species and diseases and human interference. These climatic pressures were verified through a mapping exercise implemented in six

communities across the island. The mapping exercise provided opportunities for participants at the community level to validate the climate change pressures identified in the review of literature via stakeholders' engagement. Through stakeholder participation, the researcher provided anecdotal evidence of the severe effects of climate change on youth in small island communities across St. Vincent and the Grenadines in the past and at present. This view is supported by the literature, which states that climate change has impacted negatively on natural and human systems in all continents and oceans across the globe, specifically in SIDS (IPCC, 2014). It also states that Climate Change has the potential to produce substantial impacts across temporal and spatial scales (Marshall & Johnson, 2007), with significant consequences on local economies and livelihoods, particularly in Small Island Developing Communities (Mills, 2005; Hernandez-Delgado, 2015).

These climate change pressures are impacting negatively on the lives and livelihoods of young people and the natural environment of SIDS. The literature indicated that such impact would get worse in the future due to increase in sea surface temperature which will increase the frequency and magnitude of storms and hurricanes, storm surges and erosion of coastal areas in SIDs (IPCC, 2014, Nurse *et al.*, 2014, Hernandez-Delgado, 2015). The literature recognised that the rise in temperature and increase in storms possess the capacity to destroy entire communities in SIDS, causing hardships to communities and contribute to rising in poverty due to a reduction in food production as a result of drought (Marshall & Johnson, 2007).

Youth and policymakers in SIDS are already experiencing difficulties due to the severity of these impacts. They are also experiencing difficulties understanding the complexities of climate change concepts, and the lack of understanding of climate science is a serious concern for the entire country. This lack of understanding of the concepts relating to climate change is attributed to the absence of climate change education in the school curriculum.

Direct and indirect human activities are one of the significant causes of climate change, which are altering the composition of the global atmosphere by emissions of greenhouse gases into the atmosphere. Youth are experiencing a severe reduction in their livelihoods, recreation facilities and housing stocks are destroyed by SLR, storms

and drought, and their quality of health is eroded due to increase in invasive diseases resulting from climate stressors. This view was supported by the literature which concluded that the growing accumulation of greenhouse gases in the atmosphere is as a result of human activity, such that the building up of greenhouse gases exceeds historical levels that keep the earth liveable (Nurse *et al.*, 2014, IPCC, 2014). The literature also states that human stressors such as poor land use patterns (as experienced in the agriculture sector), deforestation in the mountainous rainforest, mangrove and wetland filling (as experienced in the Grenadines), increase in construction on coastal belts and on islands in the Grenadines, pollution of streams and rivers by pesticides, and a history of over-fishing and species degradation (as experienced in the southern Grenadines) have already contributed to a decline of species, biomass and resilience, benefits and services of most tropical coastal ecosystems of the islands (McLeod & Salm, 2006; Hernandez-Delgado, 2012; Hernandez-Delgado, 2015).

#### **7.1.1 Socio-economic impact of Climate Change**

As mentioned above, a large percentage of youth participating in the research claimed that they had lost their livelihoods as a result of climate change impacting on the fisheries, agriculture and tourism sectors. St. Vincent and the Grenadines once had a thriving banana industry, which employed over 40% of youth; however, invasive species and diseases such as Moko disease and Black Sigatoka have destroyed the industry. Statistics show that over 46% of youth are now unemployed (IMF, 2017).

The severity of the impact of climate change on agriculture and food production has resulted in a scarcity of food and a steep rise in the cost of living thus putting a large percentage of young people and other sectors of the population in poverty. The government has been unsuccessful in coming up with a viable alternative to banana production as a strategy to provide sustainable employment. The increase in unemployment has severe consequences for the escalation of unlawful practices among youth such as crime, drugs and gang culture. Drought and temperature rise have also impacted negatively on agricultural production.

The impact of climate change on the tourism sector was highlighted as a dangerous development issue by participants and researchers (literature) alike. The contamination

of the entire beachfront and dive sites by seaweeds and seagrasses have prevented tourists from bathing in the sea and participating in dive tours and snorkelling along the coral reefs. This situation is compounded by coral bleaching, which has resulted in the death of the coral reefs due to increase in sea surface temperature (Nurse *et al.*, 2014, IPCC, 2014; Hernandez-Delgado, 2015). The destruction of coral reefs is also having severe consequences for the fisheries sector as well as for the tourism industry (Charenoux & Wolf, 2013; Nurse *et al.*, 2014, Hernandez-Delgado, 2015). The negative impacts on the tourism and fisheries sectors have caused a reduction in livelihoods in both sectors and have led to economic hardships in these small island communities (Poschen, 2015; UNDP, 2015). The literature supports this view by stating that the economies of small island communities could be significantly susceptible to environmental disasters (Adrianto & Matsuda, 2002) and extreme weather events such as hurricanes (Scavia *et al.*, 2002), and predicted further increase in the impact of climate pressures/stressors on SIDS communities, which would further increase social and economic vulnerability (Nurse *et al.*, 2014, IPCC, 2014)

Youth are frustrated with the lack of investments by the government to prepare them for the future; they have no faith nor trust in the government. The training currently provided in schools and colleges should focus on providing youth with the necessary skills and knowledge to develop employment and sustainable livelihoods in the future, including green jobs and renewable technologies such as wind, solar and geothermal energy (ILO, 2010, Poschen, 2015). Therefore, such knowledge and skills in the construction of solar, wind and other forms of renewable energy would enhance energy efficiency as well as reduce greenhouse gas emissions into the atmosphere, thus reducing the impact of climate change in the future (Poschen, 2015). In reality, such training programme is not available in the education curriculum.

Youth are the resources to drive the future development of SIDS, and it is unfortunate that they are not given adequate resources to develop themselves. Ultimately, this would have serious long-term consequences on the effectiveness of society to build its adaptive capacity and resilience to adapt to climate change.

The literature cogently argued that climate change would bring severe changes to existing enterprises and the economic sectors. Therefore a number of jobs and

livelihoods that are currently in existence today will not be in existence in the future. Those jobs that will still be in existence in the future will require new knowledge and skills to carry them out efficiently (ILO, 2010; ILO, 2013; UNDP, 2015).

St. Vincent and the Grenadines has a rich history of how livelihoods over the past 400 years have changed from sugar to arrowroot and then to bananas to ensure the survival of the population (Chapter 4), however, one can conclude that no learning has taken place on the adaptive strategies implemented over its history. The mono-cropping system implemented during the period under review was influenced by colonialism, i.e. providing what was required by the 'mother' country. These top-down mono-cropping approaches did not work, and to some extent, they are the main cause of the socio-economic predicament the country is currently facing. The government is not diversifying its economy away from agriculture and tourism. There seems to be a vested interest prevailing in St. Vincent and the Grenadines to maintain this backward development practice, or it may be a situation where the government is bankrupt of development ideas and lacks the political will to move forward. This may be an area for future research.

The government would have to change gear urgently to ensure that appropriate programmes are implemented to provide skills and knowledge to youth to enable them to develop their adaptive capacity to deal with the vulnerability plaguing the island. A range of new skills and knowledge will be needed to ensure youth acquire these skills and competencies to adapt to climate change. Part of this preparation would be to protect existing enterprises, workplace and communities from the negative impacts of climate change (ILO, 2013; Nurse *et al.*, 2014; Paschen, 2015; UNDP, 2015).

### **7.1.2 Poverty reduction and well being**

In order to enhance food security and reduce the number of persons living in poverty, youth need to be trained in scientific knowledge and skills to cultivate drought and disease resistant crops, as well as implementing more viable sustainable farming practices (this will be discussed later in the chapter in the change enablers section). Whilst working on the JEMS capacity building project (Chapter 6) youth acquired valuable skills and knowledge in climate science literacy, communication, negotiation, project proposal writing, fundraising and mobilisation from local and international



donors, community organising and mobilisation, event planning, management and implementation as well as understanding bureaucracy and governance and how to use diplomacy to access resources and support. The lessons evolving from the case study is that opportunities should be created to enable youth to acquire practical opportunities to learn and develop skills through internship, workshops and other media as well as through mentorship support, i.e. learning from adults. These projects should provide opportunities for reverse mentorship to take place, where youth are provided with opportunities to mentor adults in the use of technology to enhance social networking while they learned new skills from the adult. This will provide an opportunity for youth to engage in livelihood and enterprise development projects as well as building respect between youth and the rest of the community. This view is supported by the literature, which states that such youth development programmes should support lifelong learning and skills development focusing on future market needs (ILO, 2010, Poschen, 2015).

## ***7.2 Question 2: How vulnerable are the youth to the impacts of climate change?***

This question is related to the third step of the conceptual framework, i.e. the analysis of skills and knowledge of youth to enhance human capital adaptation. The literature shows that climate change is impacting negatively on human capital, specifically on education and health causing further marginalisation and poverty on the poor and marginalised sectors of the society, of which youth is a critical sector (ILO, 2010; Nurse, 2014; Hernandez-Delgado, 2015). Climate change is already destroying livelihoods, resulting in increased unemployment and poverty among youth. Unemployment accounts for 46% of youth in St. Vincent and the Grenadines, 24.3% of the population is inactive (IMF, 2017; IWN, 2018) and almost one-third (30.2 poverty index) of the population are deemed indigent (KAIRI, 2008). The impact of the global financial crisis and climate change on the Caribbean has resulted in worsening the overall wellbeing of youth and driving a substantial percentage of the population into poverty.

### 7.2.1 Education and training

Although agriculture and tourism each employ 35% of the workforce, those persons who are employed in these sectors are mainly low skilled workers who have been educated at the primary level or lower. The situation is compounded by the fact that climate change education is not integrated into the education curriculum. There is the absence of experts on the island who are skilled in the integration of Climate Change Education (CCE) in the education system and who can facilitate the training of teachers/trainers to deliver CCE to students. This view is supported by the literature which states that there is a miss-match between the skills that are offered by the education system and that which is required by the labour market (Carter, 2007; ILO, 2010; UN, 2015).

The achievement of sustainable livelihoods is an important pillar to assess youth capacity to deal with climate change in the future. Therefore the approach to livelihoods in the future must be 'sensible and sustainable,' e.g. farmers will need to be educated on how to farm in such predicted hostile drought and disease infested future environment. Fisher folks would need to be trained in new fishing methods such as using GIS to locate fishing banks. Therefore, the literature states that education and training is an important vehicle to provide adequate knowledge and skills to enhance youth capacity to develop sustainable livelihoods and acquire competencies to build resilience to create sustainable green energy, green construction, eco-tourism and other forms of sustainable livelihoods (ILO, 2010; UNESCO, 2015; UNDP, 2015). Training in the development of sustainable green energy and livelihoods facility will be a major area of focus for the future.

The literature supports the view that education is the key to improving resilience to climate change as well as the attainment of the UN global development goals (UNDP, 2015). However, pressure from global warming will make it more challenging for developing countries, especially SIDS, to achieve existing development targets for health and education in the future (Brown *et al.*, 2012). Education must focus on building the capacity of youth to improve their understanding of the ecosystem of coastal and terrestrial areas as well as providing the necessary knowledge and skills to build the resilience of youth to adapt to the impact of climate change and ensure sustainable livelihoods (Pereznieto *et al.*, 2011). As indicated in Article 6 of the UNFCCC (UN, 2015),

education provides people with the motivation and know-how to combat changes locally, nationally and globally. The literature indicated that solutions to address human capital should be built on the local development system involving cooperation with local people themselves (ILO, 2013). This is advocating for a bottom-up approach to address education and training in St. Vincent and the Grenadines. Although the Government of St. Vincent and the Grenadines talk a lot about consultation with stakeholders this talk is not effective when it comes to the implementation of consultative, participatory practices. It can be deduced from the case studies and the interviews with policymakers that the government has adopted an approach where 'things' are imposed on the population without any thought regarding the implications of the decision/action.

Policymakers and senior officials support the need for robust and viable training and CCA process. The integration of CCE in the school curriculum will help youth to understand the impact of global warming and increase climate science literacy in the society (UNESCO, 2015). In recognising the technical and technological resource constraints faced by SIDS, it is advised that climate change education should be introduced incrementally across the education system, i.e. it should be piloted through traditional subjects such as science, geography and maths and TEVT courses/centres. This should be evaluated to assess the effectiveness of the pilot before it is rolled out in all the schools.

The piloting of the CCE would provide opportunities for assessing whether there are improvements in the learning content (knowledge and skills) as well as innovations in teaching/training delivery approaches (methodologies). It will also review the strategies for enhancing non-formal education programmes through the use of social media, networks and partnership. This will provide opportunities to test whether the Climate Change Education programme is grounded in the community, i.e. learners are taken into the communities to observe and meet with persons whose lives are impacted by climate change. The improvement in content and knowledge on climate change should be broad-based and focused on raising youth awareness of environmental issues, risks reduction, sustainable consumption and lifestyles. The education provided to youth should focus on enhancing and sustaining the institutional environment in which that content is learned to ensure that schools and education systems are climate-proofed, resilient as well as sustainable and green (ILO, 2010; ILO, 2015, UNESCO, 2015).

### **7.2.2 Governance and decision-making process**

This strategy supports a bottom-up approach to building local capacity through enhancing human capital, emphasising the inclusion of women, youth and other marginalised sectors of the population in the planning and development process to address emerging contexts such as climate change and other development calamities. Although the government publicly recognised the sterling contributions provided by youth during periods of climate risk disasters, the participation of youth in governance and decision-making process is lacking, specifically in the area of CCA. This leads to frustration and a lack of confidence and trust in the government.

Youth recognised that they currently have ‘no voice’ to participate in the development process, i.e. there is the absence of an entity such as a National Youth Council (NYC) and National Youth Commission (NYC) to give them a voice in the national development planning process. The youth pledged to work with civil society groups to enable them to establish such entities to provide them with a voice. This view is supported by the literature, which highlights the involvement of organisations such as cooperatives, community-based groups and networks as critical to enable youth and local communities to acquire the capabilities to develop successful climate change adaptive capacity (Commonwealth, 2007; ILO, 2013; Cloutier *et al.*, 2018).

## **7.3 Question 3: How can adaptation measures be delivered?**

Before exploring how adaptation measures can be delivered, the researcher would discuss the conceptual framework that is responsible for delivering these measures. He will highlight how it can be used and the adjustments to be made to enhance its operationalisation.

### **7.3.1 The Operationalisation of the Conceptual Framework on the Adaptation of Youth to new Climate Conditions**

The conceptual framework is divided into four steps: 1) identification of climate change stressors, 2) assessment of the social-economic impact of climate change on SIDS, 3) analysis of skills and knowledge of youth to enhance Human Capital adaptation 4)

adjustments to youth development policy, strategy and actions to enhance the capacity and resilience of youth to adapt to climate change in small island communities.

The first stage of the operationalisation of the conceptual framework was the review of the literature to identify the climate change pressures that are impacting on small island communities. During this stage, the researcher provided the theoretical base for understanding climate change and the complexities surrounding these emerging climate phenomena. The researcher collected data from top-down interviews with policymakers and senior officials of government and bottom-up focus group discussions (FGD) with youth to assess their perspectives on the climate change pressures impacting on their small island communities (Chapter 5). Data collected from a) participatory mapping exercises implemented in six communities and b) an analysis of historical approaches, were used to identify climate stressors/pressures impacting on these communities (Chapter 4).

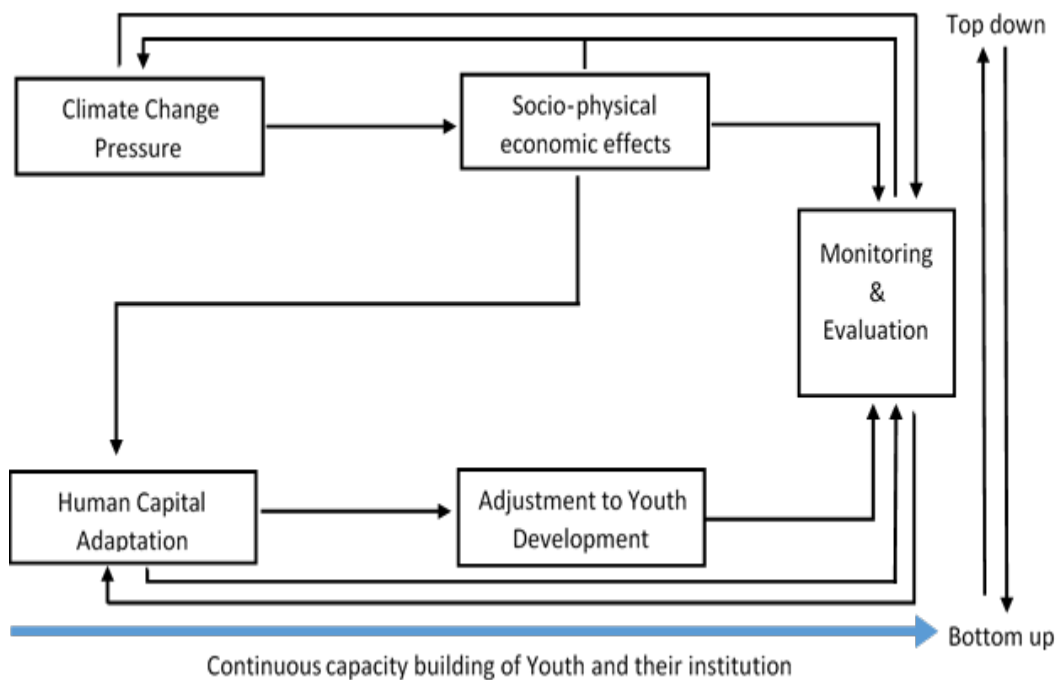
The second stage of the operationalisation of the conceptual framework process focused on assessment of the social-economic impact of climate change on SIDS. This involved reviewing the literature to investigate the impact of climate change pressures on the social-economic situation of youth and their communities in SIDS, i.e. the impact on the economy, health and overall social life. The researcher collected data from top-down interviews with policymakers and bottom-up FGD with youth to assess their perspectives on how climate change is impacting on youth in SIDS and to link climate change pressures to the overall vulnerability of youth (Chapter 6). Information was also gathered from the literature on historical evidence through the participatory mapping exercise (Chapter 4).

The third stage in the operationalisation of the conceptual framework focused on analysing the skills and knowledge of youth to enhance Human Capital adaptation. It consists of a review of the literature concerning the impact of climate change on youth focusing on the knowledge and skills needs that will be required to prepare youth to build resilience to adapt to climate change and to enhance sustainable livelihoods in the future. This aspect was also analysed through data collected from top-down interviews with policymakers and senior officials, bottom-up Focus Group Discussions (FGD) with

youth, and case studies on top-down approach to the implementation of the TCMP (Chapter 6) and bottom-up approach to the JEMS capacity building project (Chapter 6).

The final stage in the operationalisation of the conceptual framework was focused on adjustments to youth development policy, strategy and actions to enhance the capacity and resilience of youth to adapt to climate change in small island communities. This enabled the researcher to create mechanisms to adjust to or make changes (change enablers) to processes, policies and or strategies to empower and build the resilience of youth to take action to adapt to the impact of climate change and build sustainable livelihoods. This is divided into two areas a) change enablers leading to youth empowerment and b) change enablers leading to adaptation. This step was analysed through data collected via the review of literature, case studies from the top-down TCMP project and the bottom-up bottom up JEMS Capacity building project (Chapter 6), top-down interviews with policymakers, bottom-up FGD with youth (Chapter 5), case studies on a historical summary of adaptation measures in St. Vincent and the Grenadines, and Participatory Mapping exercises (Chapter 4).

Although monitoring and evaluation was not initially a component of the framework, after careful analysis of the processes comprised within the various steps, the researcher concluded that it would be essential that policymakers and youth development practitioners receive feedback on how well a particular stage of the framework has performed before moving on to the next stage of the framework. Therefore, the researcher incorporated monitoring and evaluation as an important part of the framework to provide feedback to implementers to assess or test the overall performance of each stage of the conceptual framework.



**Figure 38:** Revised Conceptual Framework on the Adaptation of Youth to new Climate Conditions

The researcher explored a number of approaches to deliver CCA measures to enhance the resilience of youth in small island communities to adapt to climate change. These measures include a) short-term versus long-term sustainable development measures and b) top-down and bottom-up approaches to CCA.

### **7.3.2 Short-term versus Long-term measures/approaches**

IPCC (2007 & 2014) attributed 97% of greenhouse gases to human interference. Human interference in St. Vincent and the Grenadines has always been driven by the profits motive, income generation and other incentives. The destruction of the forest by illegal 'Ganga' farmers to grow their marijuana was motivated by the need to acquire cash as the short-term gain. Throughout the history of St. Vincent and the Grenadines, tensions existed between gaining economic benefits in the short term on the one hand and putting measures in place to enhance the environment and achieve sustainable development in the long term.

Other short-term measures consist of the destruction of mangroves swamps, coral reefs and seagrass beds in Canouan to build mariners and tourism facilities to expand the tourism industry, and the displacement of 100s of small-scale, self-sufficient farmers in

Argyle, Stubbs, Carapan and other communities on the south-east of St. Vincent to construct the Argyle International Airport. It may be construed that the government has a preference to support large visible short-term projects when compared to their support for long-term and more sustainable measures. Although the natural resource base in St. Vincent and Grenadines is insufficient and is deteriorating at rapid rates, the evidence shows that the government is less interested in adaptation and more interested in supporting the implementation of projects that are more visible and would give them more opportunity to gain votes at general elections. Adaptation measures were less emphasised by policymakers participating in the top-down interviews. The literature states that government and other stakeholders must implement sustainable measures to ensure that the resources would be intact for generations to come (UN 2015).

Another important lesson evolving from the research is that when people are faced with developmental problems caused by calamities such as climate change, environmental degradation and natural disasters they would devise proactive or reactive bottom-up approaches to address these development problems. The JEMS' case study in Chapter 6 is a positive example where youth implemented measures to deal with deficiencies in their awareness of Climate change adaptation and mobilised the communities to take action. In the same breath, as seen from the marijuana farmers who were mainly youth, due to their frustration because of high levels of sustained unemployment, they began clearing the valuable rain forest to plant marijuana. This practice has destroyed the environment because those youth were motivated with profits and survival motives. As shown by the JEMS Capacity building project, the youth participating in these measures should be guided and supported through the implementation of adaptation projects. The fundamental question to be asked is whether the JEMS Capacity building measures can be sustained over the long-term or whether the lessons from this Climate Change adaptation approach can be scaled-up to ensure that benefits are shared for the broader population cohort (to be discussed below).

#### *7.3.2.1 Bottom-up and top-down approaches*

As observed from the TCMP project, top-down approaches to CCA are mainly government led, planned, controlled, national in focus and much slower in their implementation due to the challenges of financing and technical know-how. Conversely,



the bottom-up approach as indicated in the JEMS capacity building case study is focused on addressing the vulnerability, community-based in orientation and focusing on local players and the local situation. The Review of Literature, Chapter 3 of the research, shows that top-down and bottom-up approaches to CCA have been widely accepted and dominated by empirical studies (Matlan, 1995; Dessai & Hulme, 2004; Fussel & Klein, 2006, OCD, 2013).

The key outcomes evolving from the focus group discussions from a bottom-up approach highlight the fact that youth are frustrated with the system of leadership and governance, and the current crop of leaders is very insensitive to the development issues that are important to the young people. This is compounded by governmental institutions not providing the necessary support to harness the overall development of the youth to support their transition to adulthood and the way of work. The literature tends to lean more favourable to a bottom-up approach as a more favourable CCA approach than the top-down approach due to the ease of implementing CCA programmes at local level. The bottom-up approach also tends to focus on vulnerability, which makes it more attractive for local people hence they are easier to mobilise to participate in CCA initiatives. The bottom-up approach assumes that if you can address real vulnerability today, you will eventually reduce its impact on communities in the future (Burton *et al.* 2002).

The researcher observed that over the past ten years, there has been a resurgence in SIDS in the use of bottom-up approaches to CCA due to increase interest by international donor agencies and practitioners to provide direct support to community-led bottom-up development initiatives to build the capacity of communities as seen in the Paget Farm Climate Change adaptation initiative in Bequia, SVG (McNamara & Buggy, 2006; Jaja, Danson & Gaude, 2016). JEMS Climate Change adaptation project was also supported by a grant fund from international donor agencies.

The bottom-up approach considers vulnerability as representative of social and ecological structures that are generated by multiple factors and processes (O'Brien *et al.*, 2007). The findings from the research show that youth want to engage in the transformation of their communities in SIDS and that their actions reflect the on-going change in civil and community participation in SIDS governance. Youth chose to

collaborate with governmental agencies and other stakeholders such as OECS, 5Cs and Ministry of Planning and Sustainable Development rather than taking on a confrontational approach. The bottom-up approach implemented by youth serves to build bridges between the youth, government and the broader communities.

The case of the JEMS bottom up Capacity Development project (Chapter 6) and the Participatory Mapping exercise (Chapter 4) show how small-scale, bottom-up approach can bring about climate changes adaptation in concrete ways. This effort was supported by policymakers who testified about the sterling contributions of youth prior, during and after a climate disaster to organise disaster relief in the communities that were affected by disasters. The neglect of youth from participating in the decision-making process to determine who and where the authorities should provide relief is viewed by the researcher as demotivation on the part of youth themselves to take civic action. Literature supports this case on civic actions (Wittmayer *et al.*, 2014, Cloutier *et al.*, 2018). The bottom-up case implemented by JEMS youth is in line with the literature relating to bottom-up approaches to CCA (OECD, 2013, Stochowiak, 2016) and community CCA (McNamara & Buggy, 2015; Hernandez-Delgado, 2015). The JEMS case study and the FGD with youth show that the best way to acquire knowledge and resolve a perceive development problem (impact of climate change on the community) was through learning by doing (Loorback, 2010). The project provided opportunities for youth to acquire a wide array of skills while participating in the various components of the project.

Throughout the implementation of the cases (JEMS Capacity building of youth (Chapter 6) and the Climate Risk Mapping exercise (Chapter 4), JEMS was able to bring in and use its own professional skills and experiences, which enabled the group to obtain recognition and support for its work (including recognition from the UN for its work in CCA leading up to the COP 21 of UNFCCC in 2015 in Paris). This recognition provided JEMS with significant legitimacy in the field of CCA. This recognition also influenced the public action, i.e. the government through NEMO, and the Ministry of Planning and Sustainable Development has utilised the GIS Climate Risk maps evolving from the participatory mapping exercises to assist communities with their CCA planning. The government has also mobilised resources from International donors to fund a) the development of the national climate change policy and b) the integration of climate

change education into the education curriculum (Project to be implemented in the latter half of 2018) (Cloutier *et al.*, 2018).

#### *7.3.2.2 Challenges of implementing the bottom-up approach*

Research shows that a bottom-up approach is more applicable to local and less complexed vulnerabilities. It is also context specific. Therefore in instances where the climate change impact is more complexed, i.e. where new climate risks are emerging that are outside of the range of experience, a bottom-up approach is less suited to guide the adaptation process. As shown with the JEMS case study (Chapter 6), bottom-up approaches are more successful when dealing with less complicated vulnerabilities, short-term in orientation, and it does not consider the long-term implications of climate change (Dessi & Hulme, 2004). Therefore, if left on its own to replicate the JEMS case study, the community may experience difficulties due to lack of technical expertise, financial resources and the absence of a network of individuals and agencies to support the Climate Change Adaptation project.

#### *7.3.2.3 Top-down approach*

Judging from the analysis of the interviews with policymakers and the case study on the TCMP, the researcher observed that adaptation is less emphasised with policymakers. The researcher deduced that Policymakers are mainly concerned with projects that will provide high visibility and profitability to the government, i.e. the construction of the international airports, the construction of a five-star hotel in Buccament and the mariner projects in the Grenadines. These projects will enable the government to harness enough resources and votes that will allow them to win the upcoming general election and stay in power for longer periods. The current government is in its fourth term in office.

Rather than working with communities to build their adaptive capacity, Policymakers are more interested in providing relief support to communities after a disaster because such mayhem would enhance the visibility of the governing party and would provide opportunities for these parties to maintain political power. The policymakers seemed not interested in working with youth to develop their resilience to adapt to climate change because such efforts will not provide visibility. Youth do not have the political

voice, the level of organisation and gravitas to generate such visibility nor the platform to air their grievances; therefore, their voice will never be heard.

The literature shows that St. Vincent and the Grenadines has one of the earliest records in SIDS of the implementation of an effective top-down approach to CCA action. This resulted in the creation of the Botanical Gardens in 1765 and Kings Hill Forest Reserve in 1791 by the then colonial government as highlighted in Chapter 4 (Grove, 2000). However, there is a lack of data to show the participation of youth in the implementation of these projects and the challenges encountered regarding the implementation of the top-down approach. Due to this absence of data, the researcher was unable to make any judgement on the effectiveness of the approach.

The government approach to utilising the top-down approach to create the Tobago Cay Marine Park in the South Grenadines (Chapter 5) was met with failure. The case study shows that due to the lack of consultation amongst stakeholders during the implementation of the TCMP, the project disintegrated into chaos. This case shows that the government approach is ineffective as it was a knee-jerk reaction without any consideration of the implications of the approach on the population. This view is supported by the literature, which highlights the challenges of implementing top-down and bottom-up approaches to CCA (Loorbeach 2010; OECD, 2013; Stochowiak, 2016).

The literature states that the top-down approach is a command and control approach, which relies heavily on future climate change predictions and depends on climate models based on greenhouse gas emissions. Although this area is outside of the scope of the research, it is important to note that due to the lack of reliable information provided to Policymakers in SIDS, they are unable to work with a high level of confidence in tackling climate change uncertainties. Such poor quality and unreliability of the Climate Science information provided have caused researchers and practitioners in the field of CCA in SIDS to stop work at the impact assessment stage. The literature argues that in order to be successful in CCA, Policymakers in SIDS need accurate information and increasingly precise assessment of the future impact of climate change to be able to develop appropriate adaptation policies (Dessai *et al.*, 2009). Therefore, despite all the technologies available, there is still a high level of uncertainty about the quality of

Climate Science information provided to these policymakers. This may be the main reason for policymakers not emphasising CCA in the interview.

The government of St. Vincent and the Grenadines on realising that the top-down approach was not working (Chapter 6), conducted a series of consultations among key stakeholders to investigate the reasons for the failure of the approach. A decision was taken to change from the top-down to a hybrid approach, which involved utilising the strengths of both approaches to implementing the TCMP.

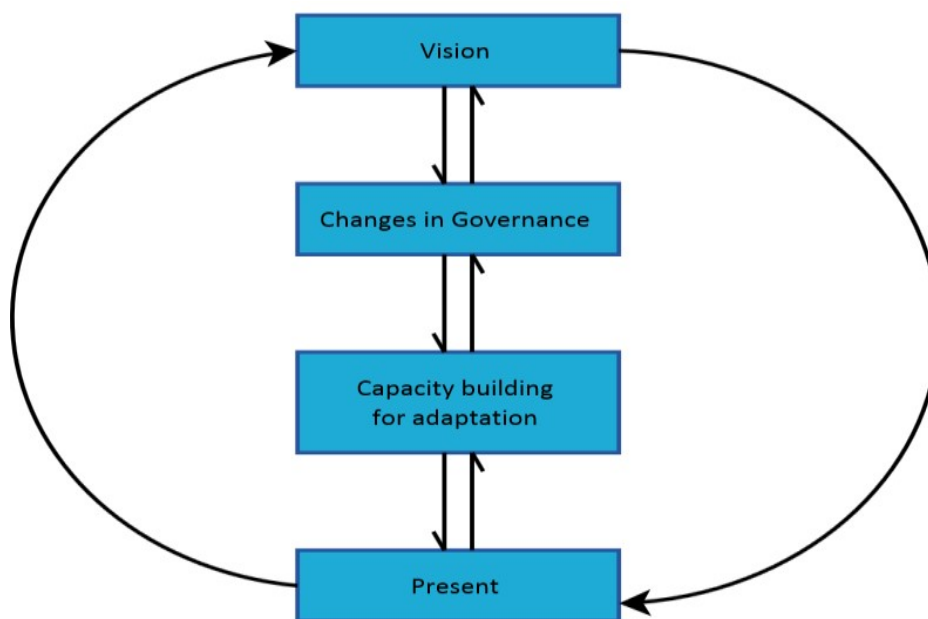
The shift from the top-down approach to the hybrid approach enabled the government to enhance the participation of local communities and key stakeholders in the development of the TCMP project as well as achieving the desired project outcomes. This hybrid approach resulted in the reduction of the excessive control and rigidity that was exerted by the former civil servants who were managing the TCMP project on the ground in Union Island as well as the control exerted by civil servants in the Capital, Kingstown.

The hybrid approach enabled the various levels of stakeholders to interact and influence project outcomes (Matland 1995; Sabatier & Jenkins-Smith, 1999 in OECD, 2013; Stochowiak *et al.*, 2016). One of the key outcomes of the hybrid approach is that policy implementation becomes more successful when all stakeholders at various levels can interact with each other. This approach provided adequate opportunities for both central policymakers (government officials) and local stakeholders (Vendors, Water Taxi Operators, Tour Operators and Yacht and day tour operators) in the islands surrounding the TCMP to work together and participate in making decisions on critical areas of the management of TCMP. The literature claims that the hybrid approach is a viable approach to deal with issues of high conflict and high uncertainty such as CCA, specifically the TCMP (OECD, 2013; Stochowiak *et al.*, 2016).

The success of the JEMS capacity-building project and the Risk Mapping exercise (Chapter 6 & 4), was as a result of its utilisation of aspects of the hybrid approach. The organisation was able to identify and work with networks of actors, stakeholders and communities including government agencies and NGOs that are involved in the delivery of services and programmes in local areas as well as those involved in making a policy decision. Through consultations with these stakeholders, JEMS became cognizant

of their goals, strategies, activities and contacts (Hanji, Hjem & Porter, 1978; Danson & Gaude, 2016; Jaja, Danson & Gaude, 2016; McNamara & Buggy, 2016; Cloutier *et al.*, 2018,). JEMS, on behalf of the youth, used these contacts to develop networks and identified local, regional and national actors involved in the planning, financing and execution of the relevant government and non-governmental CCA programmes. The organisation then used donor funds provided by the OECS, GEP and JCF to finance the Climate Change Adaptation Capacity Building project (Jaja, Danson & Gaude, 2016; McNamara & Buggy, 2016).

#### ***7.4 Policy change enablers and action to enhance youth development and adaptation***



**Figure 39:** Strategic change for building sustainable communities

The findings from figure 39 show that presently there are severe failings on the path of the government when implementing the top-down approach. Rather than using the top-down approach to address CCA issues effectively, the approach was designed to enable them [the ruling political party] to have more terms in office. On the other hand, while there are positive results with the bottom-up approach due to their participation in community development activities, a significant weakness is that youth are frustrated as

they lack the resources and opportunities to participate in national decision making. As a consequence, they lack faith and trust in the government. The impact of climate change and calamities are so severe that youth are proposing urgent injection of resources (human and financial) to build their capacity for adaptation to take place, and a change in the governance and political landscape of St. Vincent and the Grenadines, i.e. change in the current crop of politicians and the political system. In summary, there need to be changes in the overall system of governance as well as more effective adaptation strategies to ensure the effective implementation of change enablers.

Change enablers are divided into two categories, namely i) Change enablers/drivers that lead to youth empowerment; and ii) Change enablers/drivers that lead to adaptation. This aspect of the research is linked to Step 4 of the conceptual framework; the adjustment to Youth Development Policy Strategy. This step focuses on creating the mechanisms to adjust to or make changes (change enablers) to processes, policies and or strategies to empower and build the resilience of youth to adapt to the impact of climate change and build sustainable livelihoods.

#### ***7.4.1 Youth Empowerment***

The youth empowerment is concerned with creating policies and programmes that focus on involving youth in the national development decision-making process. This involves putting specific actions forwards and approaches to ensure the full participation of youth in all Climate Change adaptation programmes. This strategy starts from the premise where government and key stakeholders recognise youth as having an important role to play in the national development processes. This recognition will give youth the confidence and the drive to create changes at all levels of society. The government's role should focus on providing the enabling environment for such changes to take place (Commonwealth, 2007).

The empowerment of youth must take place at two levels, i.e. at the individual level and the community/national level. At the individual level, youth development and life-skills programmes should be provided to enable youth to exert control, improve competencies and develop critical awareness to collaborate with a range of stakeholders and institutions effectively. At the community/national level, efforts must be put in place to improve the community's reaction to climate, social and economic

stressors, risk/vulnerability and threats to the quality of life at all levels. An important component of this should be the participation of youth in decision making at all levels. The focus should be on the provision of opportunities for youth to develop leadership and participate in the governance process at community and within national institutions. The development of youth and community organisations and networks is an important component of youth empowerment. The government should provide the resources to support the creation and maintenance of such entities.

The following actions are proposed under the youth empowerment change enablers: enhancing sustainable livelihoods, building technological innovations, and building community resilience.

#### **7.4.2 Sustainable Livelihoods**

The literature states that livelihood is sustainable when it helps people to cope and recover from shocks and stresses such as natural disasters, economic and social upheavals, and enhances their well-being and that of the future generation. Therefore, adaptation can be successful when people and communities can reduce the vulnerabilities that confront them (Adger *et al.*, 2005; Sem, 2007) by enhancing their adaptive capacity (Hernandez-Delgado, 2015). The livelihoods that are available to youth in SIDS are not sustainable under climate change; therefore, climate change is already having devastating effects on agriculture, tourism and fisheries. Governments and key stakeholders should ensure that resources are provided for training, education and research to ensure that livelihoods become sustainable. They need to emphasise the following strategies: a) sustaining the livelihoods that are already in place through retraining of workers to provide them with relevant skills to respond to the changes in market needs as brought about by climate change, and b) investments in research and training in new and emerging livelihoods to facilitate SIDS moving to a green economy (Paschen, 2015). These measures should include the protection of enterprises, workplace and communities from the negative impact of climate change (ILO, 2013; Nurse *et al.* 2014; Paschen, 2015; UNDP, 2015).

Currently, the education and training provided in schools in SIDS are of inferior quality and irrelevant to the development needs of SIDS. Good quality primary and secondary education, complemented by relevant vocational training and skills development opportunities, is required in SIDS to prepare future generations for productive lives,



endowing them with core skills that will enable them to continue learning (ILO, 2015). A critical part of achieving sustainable livelihoods in SIDS is through the protection of the natural resource-based of communities. The rapid rate of degradation of the natural resource base of communities by climate change has resulted in the vulnerability of tourism, agriculture and fisheries sectors.

The government must focus resources on the provision of training to enhance work within the agriculture, tourism and fisheries sectors. The policy must link education and training to market needs to ensure adequate skills and knowledge are provided to support the greening of the economy in SIDS (ILO, 2010; Paschen, 2015). Skills training should be supported by new investments in technology focusing on the development of renewable energy and building energy efficiency in the tourism, manufacturing and agriculture sectors. The training provided should emphasise helping workers to develop the necessary skills to transit to the new types of jobs or work with new materials, processes and technologies in existing jobs (Paschen, 2015). Traditional knowledge and practices in agriculture, fisheries and manufacturing should be viewed as a vehicle for enhancing sustainable livelihoods (Nurse *et al.*, 2014).

#### **7.4.3 Technological innovation**

The government must increase investment in and the promotion of technology as a strategy for enhancing CCA. Technology can play a critical role in building the resilience of youth in small island communities to adapt to climate change. Technological innovation should be viewed in its broadest form comprising development, implementation and production of new products, procedures and processes to meet market needs. The strategy should focus on enhancing the adaptive capacity of the community to help people to manage climate change uncertainties and provide them with the tools to enhance sustainable development (Smith & Pilifososova, 2003).

Technological innovation and creativity must be viewed as the solution to empower youth with knowledge and skills to build their capacity to adapt to climate change. Since youth are more easily adapted to the use of technology than an older person is, the government should invest in technology to provide early warning systems to inform communities of approaching climatic weather systems and other climate-related calamities. Technology programmes should also be provided to assist youth in

developing green energy and new technology to build stronger and cooler houses to respond to storms, temperature rise and other climate stressors. Such technology should be used to enable youth to create drought and disease resistant crops to enable SIDS to feed its people. Training should allow youth to use the internet to enhance their adaptive capacity effectively; the internet should be promoted as a mechanism to enhance commerce. This strategy should be supported by governments in SIDS to create the enabling environment to enhance financial payment and postal facilities to take products to international markets.

#### **7.4.4 Building community resilience**

Adaptation is viewed broadly from the perspective of building resilience. The strategic action should focus on building the adaptive capacity of youth to adapt to climate change. The adaptive capacity of most communities is very weak, and there is a perceived lack of political will on the part of the government to reinforce necessary policies and practice such as the national building codes at the community level, despite the increased destruction of houses and buildings due to storms and other climate stressors at the community level.

At the national level, the focus should be on building the institutional capacity of national agencies to adapt to the impact of climate change. This strategic action should be realised through a) enhancing the general public understanding on climate change issues, b) enhancing the practice/demonstration as a way of creating opportunities to develop the capacity of youth to adapt to climate change, and c) strengthening the policy and administrative mechanism by developing a national policy on climate change.

At the regional level, the focus should be on building the resilience of small island communities to adapt to climate change rather than focusing on the vulnerability resulting from climatic actions (Campbell, 2009). This strategic action should be supported by a programme of mainstreaming climate change policy across other sectoral policies. The building of resilience at the community level is timely and of necessity and must involve the participation of all stakeholders in the development of the CCA action. The literature supports the active participation and input of local stakeholders in designing, planning, implementing, monitoring and evaluation and management of adaptation initiatives (Kwiatkowski, 2001; Adger, 2003; Smith &

Wandel, 2006; Lasage *et al.*, 2015; Jaja, Danson & Gaude, 2016; McNamara & Buggy, 2016).

Although adaptation is crucial, there is an urgent need for the implementation of climate risk/disaster preparedness training to enhance the adaptive capacity of communities. This strategic action should focus on enhancing the institutional capacity of communities by strengthening civil society and youth organisations. This view is supported by the literature, which states that building community engagement processes, social capital and learning are important aspects of CCA work (Hardoy *et al.*, 2004; Defra, 2010; Goosen *et al.* 2013).

#### **7.4.5 Adaptation Platform**

The following actions are to be taken under the adaptation platform: a) implementation of Climate Change Education, development of Climate Change Policy and building cooperation and partnership:

##### *7.4.5.1 Climate Change Education*

A policymaker from the government stated that they had mobilised financial resources from international donors to integrate climate change education in the education curriculum. This strategic action must be implemented urgently to enhance the quality and relevance of the overall education system to the development needs of the society (UNESCO, 2015). The first stage of this strategy is to help people to understand the impact of global warming and increase literacy among youth and society. In light of the economic difficulties affecting the island and the limitation in financial resources, this should be rolled out in stages across the education system. The lifelong learning approach should be embraced as a strategic approach for the future. The classroom environment should be extended to include the broader community; and monitoring and evaluation should be viewed and practised as an essential model for enhancing and extracting the overall learning experience, lesson learned, good practices and learning outcomes (UNESCO, 2014).

A critical part of the education reform process would be the sharing of best practices among educational institutions as a way of improving and sustaining learning outcomes. Climate Change Education should be integrated into all TVET courses as a way of enabling youth to take up viable livelihood opportunities available in the tourism,

construction and manufacturing sectors. This approach is in support of the UNESCO CCE SD, which prepares people to plan for, cope with and find solutions for issues that threaten the sustainability of the planet (UNESCO, 2014).

#### *7.4.5.2 Climate Change Policy*

The literature states that adaptation is an important measure of policy response in the environmental governance of SIDS as climate change is projected to cause more intense and extreme events and less bright conditions for the main productive economic sectors such as agriculture and tourism (Scobie, 2016). A policymaker informed the researcher that the Government of St. Vincent and the Grenadines had mobilised financial resources to fund the process which would lead to the development of a climate change policy. Given the fact that the Terms of Reference for the policy development process was not seen, the researcher will suggest what this policy should entail.

The researcher recognised the development of a national climate change policy as a necessary change enabler to ensure the building of the resilience of youth to adapt to the impact of climate change in the future. The proposed policy should explore mainstreaming of the climate change policy across all sectoral policies and programmes. This view is supported by the literature, which calls for mainstreaming and a greater focus on ensuring compatibility and integration of climate change policy and the international development goals (IPCC, 2014, Nurse, 2014). Most stakeholders viewed the policy as an important mechanism to achieve CCA and sustainability at the community levels; therefore the government should implement a comprehensive consultative process involving all stakeholders at community, district and national levels. This view is supported by the literature which views community awareness as key enablers of adaptation (David *et al.*, 2013), achieved through a process of fostering community conversation and discussion and promoting knowledge and experience exchanges (Picketts *et al.*, 2012; IPCC, 2014; Hernandez-Delgado, 2015)

#### *7.4.5.3 The building of cooperation and partnership*

Due to the competing demands for the limited resources available to the governments of SIDS and the limitation in financial resources to fund CCA initiative, the governments must put measures in place to work in partnership to mobilise technical and financial resources to fund Climate Change Adaptation initiatives. Although there is a resurgence

by international donors to provide financial support to civil society to implement bottom-up community-based CCA actions (Jaja, Dawon & Gaude, 2016; McNamara & Buggy, 2016), governments should provide technical support to youth to set up and register civil society agencies to access these resources. The governments should work with institutions such as Commonwealth Secretariat Climate Finance Hub, OECS Secretariat and 5Cs to prepare project proposals to mobilise financial resources from the Green Climate Funds (GCF), Global Environment Facility (GEF) and other sources to support the implementation of regional CCA initiatives.

## Chapter 8

### The conclusion of the Research

The chapter includes a) a statement regarding the research problem, the aim and research questions, b) a summary of the findings including the contributions the research will be making to the global body of knowledge and a summary and limitations of the conceptual framework, c) practical application of the research and opportunities for future research in the field and d) recommendations for the future.

SIDS, due to their location, are extremely prone to climate change impacts. These islands are low-lying population centres with most of their central infrastructure located less than 5 metres above sea level making them severely vulnerable to SLR, hurricanes and other forms of climate change impact (Simpson et al., 2010; Chatenoux & Wolf, 2013). Consequently, climate change will affect the population, specifically the youth, and destroy the ecosystem, infrastructure and their livelihoods. This would impede the ability of youth in SIDS to achieve their development goals by mid-century and will become a security risk that would steadily intensify under greater warming scenarios (Simpson et al., 2010).

Despite the challenges confronting youth, the researcher observed the deficiency in the body of knowledge on Climate Change Adaptation and the impact of climate change on youth in small island communities (Ogarro & Speek-Warney, 2009; Samberg et al., 2012) in policy documents and national development plans in most SIDS. There are inadequate knowledge and capacity by policymakers and senior officials on climate change impact and adaptation in SIDS (Chapter 5 Section 2).

The aim of the thesis is to explore the knowledge deficit between that which is known and that which is necessary for young people to enhance local resilience to climate change.

Despite the difficulties experienced in researching the field, the researcher achieved the stated objectives. The research questions were as followed:

- How vulnerable are the youth to the impacts of climate change?
- How can these impacts be mitigated and the resilience of the youth be built?
- How can adaptation measures be delivered?

The research utilised innovative participatory methodologies such as participatory mapping and Focus Group Discussions as well as interviews and case studies to collect data in the field. Young volunteers aged 19-24, without prior experience in conducting research, were trained and mentored during the period to conduct qualitative research and data collection in the field. This approach resulted in the development of the research capacity of youth and enhanced their interest in the development challenges facing youth in small island communities. The approach provided opportunities for young researchers to engage with policies and decision makers and youth across the island using actual evidence of how climate change is impacting on young people and their communities. The approach also inspired more open discussions among young people participating in the FGDs and Participatory Mapping exercises to discuss details about their own experience and concerns with researchers of the same group.

### ***8.1 The contribution of the research to new knowledge***

The research will explore the contribution of the project to new knowledge by focusing on a) being the first of its kind in SIDS, b) youth capacity building, c) theoretical contribution to knowledge and d) new methodology and conceptual framework.

#### ***8.1.1 First research of its kind in SIDS***

Gaps were identified in the literature regarding the impact of climate change on youth in Small Island Communities (Ogarro & Speek-Warney, 20009; Pereznieta *et al.*, 2011; Samberg *et al.*, 2012) and this study will provide insights into climate change development for the future. The research is the first of its kind and aims to fill the gap in the body of knowledge on youth development, sustainable development and climate change adaptation.

The findings from the research show that the rise in temperature and increase in storms possess the capacity to destroy entire communities in SIDS, causing hardships to youth and their communities. Reduction in food production as a consequence of drought, invasive diseases and other calamities (Marshall & Johnson, 2007) and poor land use practices (IPCC, 2014; CARIBSAVE, 2012) contribute to the rise in poverty among youth

and communities. This situation is compounded by youth and policymakers in SIDS experiencing difficulties understanding the complexities of climate change concepts and the sciences associated with climate change.

Although this research is the first of its kind, it offers benefits to Governments in Small Island Development Communities by providing opportunities for policymakers and development practitioners to engage in the development of strategies and programmes aimed at enhancing youth capacity through building their resilience to adapt to climate change. Governments can use the body of knowledge to implement climate change adaptation projects within local areas. This strategy would provide excellent opportunities for governments to be involved in more strategic activities such as the evaluation and monitoring of project outcomes; mobilisation of local and external funding and resources activities; and provision of technical assistance and support to local groups/organisations to implement Climate Change Adaptation initiatives. By providing new and relevant information on youth development, the research would enable policymakers to create the necessary policies and enabling environment to prepare youth with the prerequisite skills and knowledge to build their resilience and the adaptive capacity of their communities to respond to climate change as active citizens.

#### ***8.1.2 Building the capacity of youth***

This research confirms the notion that youth have been neglected in the area of climate change adaptation schemes, having inadequate knowledge and skills to adapt to the devastating impact of climate change which affects their daily lives. It also identifies a new approach to deal with youth capacity development in St Vincent and the Grenadines and the wider Caribbean.

The lack of understanding of the impact of climate change among policymakers and youth is attributed to the absence of Climate Change Education in the school curriculum. Youth are also frustrated by the lack of investment provided by the government to prepare them to adapt to climate change in the future. This is as a consequence of the quality of the skills and training provided by the education system in SIDS which does not prepare youth with the necessary skills and knowledge to build their resilience to adapt to climate change and create sustainable livelihoods (Carter,



2008; ILO, 2010; Poschen, 2015). The findings also show that youth want to engage in the transformation of their communities in SIDS and that their actions reflect the ongoing change in civil and community participation in SIDS governance (Cloutier et al., 2018). Therefore, there is a need for the integration of Climate Change Education in the school curriculum as a strategy for enhancing the resilience of youth to adapt to the impact of climate change in small island communities (as discussed later in the recommendations).

### ***8.1.3 Theoretical contribution to knowledge***

Besides favouring the development of a longer-term approach to achieve sustainable development, the findings support the added value of a bottom-up approach to climate change adaptation when compared to the top-down approach within the framework to improve youth practicality, awareness and adaptation.

The research also reiterates the view that added value can be gained when using a hybrid approach to the development and implementation of climate change adaptation. The hybrid approach combines the strengths of top-down and bottom-up approaches. The findings from the research show that when faced with problems in implementing a top-down approach, it is more feasible to shift to the hybrid approach (Chapter 6, TCMP Case study). This approach presents an integrated way of analysing climate change adaptation issues by demonstrating a judicious blending of the two approaches. It is also more structured and provides a model for dealing with climate change adaptation. The hybrid approach reduces the excessive control and rigidity that was exerted by the government officials who centrally managed adaptation projects from the capital, Kingstown (OECD, 2013; Desai and Hulme, 2004).

The research highlights the view that key change enablers, such as technological innovations, financial and technical resources support, key official engagement, conducive policy, enabling environment and regional collaboration, empower youth to build their resilience to adapt to climate change in small island communities.

### ***8.1.4 Methodological contribution***

The methodological contribution of the research to the new body of knowledge is divided into two sections: a) participatory climate mapping methodology when used

with other methods and b) conceptual framework which informed the research approach.

#### ***8.1.4.1 Participatory mapping and other methods***

The purpose of the climatic mapping exercises was to gather information on the climate change pressures impacting on youth in SIDS. The climatic mapping exercises also provided opportunities for stakeholders to validate and verify the climate change pressures/stressors impacting on youth in small island communities through stakeholder participation. When implemented with other research methods, it provides opportunities for triangulation.

Although the research focuses on a case-study in St Vincent and the Grenadines, it has relevance to the development challenges facing other developing states across the Caribbean, Indian, Pacific and other regions. The outcomes of the research can also be replicated in other developing countries and LDCs in Africa, Asia and Latin America. The researcher is currently working as lead development consultant applying the methodology (including the conceptual framework) on a Youth Entrepreneurship and Employment Project (YEEP) in Sierra Leone implemented through the National Youth Commission (NAYCOM) of the Government of Sierra Leone and funded by African Development Bank (ADB). The project is performing successfully, and the sponsors have already made the decision to up-scale the project nationally and replicate it in other countries in West Africa. Sierra Leone is not a SIDS. Therefore, the framework and methodology have wider applicability than originally indicated in the thesis.

#### ***8.1.4.2 The contribution of the new framework to knowledge***

The development and implementation of a new conceptual framework will provide new and appropriate approaches to build the capacity of youth in SIDS to adapt to climate change impacts in the future. The framework will provide policymakers and researchers with an approach to enable them to prepare youth with the necessary knowledge and skills to build their resilience to adapt to climate change and create sustainable livelihoods in small-island developing communities. It brings youth development and climate change adaptation to the forefront of the broader global sustainable development agenda.

The framework presented in the study makes an academic contribution to the global body of knowledge on youth development, sustainable development and climate change adaptation within the SIDS development context. It is also applicable for assessing the impact of Climate Change in the area of youth development effects on communities in SIDS and its effects on capacity development.

This framework can be applied by policymakers and senior officials in SIDS to develop policies and programmes to enable youth to adapt to the impact of climate change. It is applicable for conducting further research on vulnerabilities and resilience in areas of disaster preparedness, economic development, tourism, agriculture, fisheries and forestry development.

## ***8.2. Limitations of the new Conceptual framework***

Although the framework is applicable for addressing issues pertaining to the impact of climate change among young people in SIDS, it is essential to bear in mind that the research was conducted in one Caribbean SIDS - the multi-island state of St Vincent and the Grenadines. Hence, in implementing the framework, there may be difficulties with generalising the outcomes of the research due to the differences and variance in the development context of SIDS, although, as stated above it has been adapted for Sierra Leone and other West African states.

Climate Change is context specific; therefore there may be instances whereby the framework developed in this research does not apply to building the resilience of youth to adapt to climate change in another SIDS. Despite the uncertainty in achieving a similar outcome when applying the framework across different regional and national contexts of SIDS, the researcher would encourage other researchers to test the conceptual framework in other areas of study to explore its applicability to other contexts and environments. The researcher believes that such variations in the context of SIDS would provide opportunities for other research to enhance and add value to the framework.

Notwithstanding the broad body of knowledge on the impact and adaptation of climate change in SIDS (IPCC, 2014; Nurse, 2016; Scobie, 2016; Hernandez-Delgado, 2016), the researcher believes that the framework may not contain the full body of knowledge that would make it robust enough to respond to and possess the capacity and capability to assist all stakeholders who may wish to use it. Despite these limitations, the application of the framework could assist policymakers, Senior Officials, youth development practitioners, researchers and Climate Change adaptation practitioners to identify opportunities to enhance the overall functioning and to build the resilience of youth to adapt to climate change in SIDS in the future.

### **8.3 Further research**

The research process was time and resource consuming. The researcher had to use his limited personal resources to finance the research because of the lack of financial support for the research process. The limited time available to conduct the research prevented the researcher from fully exploring all the issues that may evolve from the research process. The researcher referred to the absence of a national policy on climate change in St Vincent the Grenadines and the absence of climate change education integrated into the curriculum and across sectorial policies. There is also the absence of climate change adaptation in most SIDS' national development plan reports. The development and implementation of a national climate change policy would need to be informed by research to ensure its successful implementation and adaptation across the relevant sectors of SIDS.

The research will contribute to shaping and influencing the policy development process and determine the outcomes of the climate change adaptation process. For example, if one is considering developing a policy on strategies to overcome barriers to adaptation in SIDS, they will need to conduct research on climate change impact on SIDS and the effectiveness of the climate adaptation strategies implemented in the past as a topic of research (Nurse *et al.*, 2014). There will be a need for detailed research to gather the necessary data to inform the climate change adaptation policy to be developed. Currently, there is no published research in this area.

This research would give rise to further research on youth in exceptional circumstances and across different sectors in SIDS and beyond. There are defined gaps in the body of knowledge on the impact of climate change on youth and children in the Caribbean SIDS as highlighted by Ogarro & Speek-Warney (2009) in a study on in the Eastern Caribbean commissioned by UNICEF. The authors complained of the "lack of relevant and scientifically-linked information from SIDS and regional data source," (Ogarro & Speek-Warney, 2009 pg. 1). Therefore, researchers will need to engage in further work in areas such as climate change impacts, vulnerability and adaptation, and the impact of climate change on specific sectors of the population such as youth, children, farmers and women in small island states.

Research on the impact of climate change on small-island nations is understudied, fragmented and in need of robust evidence (Sem, 2007; Ogarro & Speek-Warney, 2009). Sem (2007) argues that there is a lack of baseline data for understanding the complicated relationship between and within natural and human systems. He contends that most SIDS have been unable to undertake in-depth nationwide climate change and vulnerability assessment in an integrated manner. National assessments provide a sound basis for island states to begin work on designing and planning adaptation policies, strategies and programmes. The absence of these assessment measures in SIDS would result in the delay or uncertainty in decisions on adaptation (Sem, 2007). Therefore, the researcher is recommending the implementation of climate change and vulnerability assessment in SIDS to support work on the design and development of climate change adaptation policies, strategies and programmes.

On the issue of the impact of Sea-level Rise (SLR) on small island communities, the literature states that there remains limited evidence as to which region (Caribbean, Pacific and Indian Oceans or West African Islands) will experience the worst impact of SLR (Simpson *et al.*, 2010). Consequently, there is a need for further research in this area to develop confidence among residents of SIDS on the type of adaptation strategies that should be developed to build resilience to adapt to climate change.

Researchers are mindful that more research is required to produce robust agreement on the impact of SLR and other climate pressures on small islands communities and on the type of adaptation strategies that could be appropriate for different types of

islands under the various climate change scenarios, specifically its impact on young people and other vulnerable sectors of the population. Due to the severe vulnerability of small island states to climate change (IPCC, 2014; Nurse, 2014; CARIBSERVE, 2012; Fieser, 2017; Economist, 2017; Shapiro, 201), and in an effort to gain confidence in an island's future and to avoid depopulation and abandonment of small islands, research into the possible inhabitability of an island needs to be carried out so as to avoid short-term risks (Gomez, 2013; Fieser, 2017; Economist, 2017). The role of youth in such research will be of utmost importance to determine the impact, future needs and outcomes for all youth (Pereznieto *et al.*, 2011).

## 8.4 Recommendations

Although numerous recommendations have evolved from the research findings, the researcher limits these to two key areas that emerge from Chapters 5 & 7 of the thesis. The table below shows the links between the research questions (Chapter 1, Q 2 &3), the research findings (chapter 5& 7) and these recommendations.

**Table 14: Showing research questions, findings and recommendations**

| Research question   | Findings   | Change enablers   | Recommended Strategic Actions  |
|---|--|---|--|
| How can the impacts be mitigated and resilience be built?<br>(Chapter1, Q2) | Mismatch between skills and training provided by training institutions and those that are required by the market (Carter, 2008, UNDP 2015).<br><br>Climate Change Education is not integrated into the Education Curriculum<br>(Chapter 7) | Integration of Climate Change Education in the Education Curriculum | Development of climate change policy which is aligned with youth and education policies.<br><br>Mainstreaming the CC policy into other sectoral policies.<br><br>Development of strategies to mobilise financial and human resources to facilitate the development and integration of Climate Change Education in the school curriculum. |

|   |  |   |   |
|---|--|---|---|
|   |  |   | <p>Development and implementation of teacher training programmes to ensure the availability of skilled climate-friendly teachers and trainers at primary, secondary, TVET and tertiary levels.</p> <p>A major driver of technological changes and innovation in the search for measures and policies to adapt to Climate change, specifically in agriculture, fisheries, tourism and the mining sectors.</p>  |
| <p>How can such adaptation measures be delivered?</p> <p>(Chapter1, Q3)</p> | <p>Youth claimed that they are continually being left out of the decision making and governance processes at local and national levels</p> <p>(Chapter7)</p> | <p>Enhancing governance and decision making</p> | <p>Provision of opportunities for youth to participate in the development of National Adaptation Programmes of Actions on Climate Change (NAPAs).</p> <p>Provision of funding and technical support to youth and community organisations to develop and implement local climate change adaptation initiatives.</p> <p>Resources should be provided to develop the capacity of the National Youth Council (NYC) and other youth networks.</p> <p>Development of local planning and regulatory frameworks to enhance zoning, land use planning and strategic scenario planning to reduce risks and vulnerability to climate change.</p> |

The researcher put forward a set of recommendations to take the work forward. He selected a) Climate Change Education and b) enhancing governance and decision making and recommended these strategic actions as a means of enhancing the resilience and adaptive capacity of youth in small island communities.

#### **8.4.1 Climate Change Education**

Evidence has shown that climate change is a significant development challenge affecting small island states (Nurse *et al.*, 2014; Hernandez-Delgado, 2015; IPCC, 2014). Although education is a viable strategy to address social issues, education alone cannot achieve sustainable development nor can it reduce the impact of climate change on SIDS. However, it can play an essential role in the process to coordinate with socio-economic initiatives and institutions at national, regional and international levels to address development issue (Crossly & Sprague, 2014).

Climate change can become a major driver of technological changes and innovation in the search for measures and policies to adapt to it. This phenomenon is already affecting agriculture, fisheries, tourism and mining sectors in small island communities, thus impacting negatively on the levels and structure of employment and skills needs in these island states.

Over the years, most SIDS experienced cuts in fiscal spending on education and training as a result of the execution of fiscal policies, which significantly contribute to hampering future development. Climate Change Education for Sustainable Development (CCESD) as articulated by UNESCO (Chapter 2, Review of Literature) encompasses elements of a) Basic education, b) Training and up-skilling as well as c) Life-long learning (UNESCO, 2015). Evidence in the European Union shows that 1% increase in training days leads to 3% increase in productivity and that such training contributes to over 16 % of the overall growth in productivity (CEDEFIP, 2007 in ILO, 2010). The evidence also shows that good quality education combines with good quality and relevant training would contribute to a) empower people to develop their full potential; b) enhance size of employment and social opportunities, c) raise in productivity for both work and the overall enterprise, d) improve future innovation and development, and e) encourage investment, job growth and leads to higher wages.



In light of the above and the findings of the research, it is crucial that governments and key stakeholders commit themselves to ensure that education and training in St Vincent and the Grenadines are improved both in terms of access at all levels of education and training by youth in terms of the quality and relevance of the education offered to ensure that it meets present and future development needs. A critical part of this proposed strategy would be to ensure that, where necessary, practical approaches are put in place to enable youth and children to build the resilience necessary to adapt to climate change as well as meet the present and future development needs of the state.

The specific education-related recommendations arising from the study consist of the following:

- Adapting a holistic approach that involves the participation of all key stakeholders in the development of climate change policy, which should be aligned with youth and education policies. The emphasis should be placed on the mainstreaming of the Climate Change policy into other sectoral policies;
- Developing strategies to mobilise financial (donor funds) and human resources (such as curriculum experts) to facilitate the development and integration of Climate Change Education into the school curriculum with emphasis on skills/livelihoods development and technological innovation;
- Facilitating the development of a robust teacher training programme to ensure the availability of skilled teachers and trainers at primary, secondary, TVET and tertiary levels of the education system;
- Developing programmes to strengthen climate change literacy of youth, children and the broader communities to adopt measures for and increase access to youth and other stakeholders to primary education and training at primary and secondary education as well those who are involved in higher learning institutions and processes (Universities, improving TVET and apprenticeship training).;
- Devising strategies for scaling-up and replicating Climate Change Education actions implemented at the community level to national and regional

levels. The emphasis in this area should focus on extracting the lesson learned and best practices from adaptation actions and replicating them at all levels.

#### ***8.4.2 Enhancing governance and decision making***

Youth and communities are experiencing climate change in different ways, and their views vary as a result of their specific experiences. Some youth view consequences of climate change as a) change in precipitation, b) more frequent and severe flooding and landslides, c) rising temperature and its effects, d) Sea level rise and the consequences to tourism facilities, fisheries and salinization of groundwater, e) stronger and more frequent storms and f) more intense drought and invasive diseases which affect their health and food security (UN, 2010; UNDP, 2015; Hernandez-Delgado, 2015).

These outcomes directly affect the poorer sections of the society of which youth are disproportionately represented (46% of youth in SVG are unemployed), making their livelihoods and living conditions unsustainable. Despite all the negative impacts of climate change on their daily lives and their efforts to work with their communities to build their resilience to adapt to climatic risk and disaster on their communities, research findings show that youth are continuously being left out of the decision making and governance processes at local and national levels.

In an effort to address the above challenges, the researcher proposed a set of recommendations to enhance the participation of youth in the decision-making and governance processes relating to climate change adaptation.

These Governance recommendations are as follows:

- Provision of opportunities for youth to participate in the development of National Adaptation Programmes of Actions on Climate Change (NAPAs). The NAPAs network provides opportunities for young people to identify national priorities for adaptation to climate change as well as opportunities for them to be involved in the formulation of comprehensive national climate change strategies, which would offer high-levels of visibility and political engagement for young people.

- Enhance the institutional arrangements at national levels to enable youth to participate at the level of central government by creating special committees on Climate Change Adaptation and other areas of development under the leadership of the Prime Minister and senior policymakers. Youth can be selected from the National Youth Council and or the National Youth Commission (if in existence) to participate in such committees.
- Provision of funding and technical support to youth and community organisations to develop and implement climate change adaptation initiatives at the local and district levels. Such resources should be provided to develop and enhance the capacity of the National Youth Council (NYC) and other youth development networks to enable them to continue to provide technical support and advice to youth organisations operating at local levels.
- Invest in training and research to enhance the capacity and leadership of youth in the development of climate literacy and adaptation action at community and national levels.
- The development of local planning and regulatory frameworks to provide opportunities for young people to enhance zoning, land use and strategic scenario planning to reduce risks and vulnerability to climate change in their small island communities.

### ***8.5. The Conceptual Framework and the Adaptation of Youth to new Climate Conditions***

In constructing the conceptual framework, the researcher explored the gaps in the body of knowledge emanating from the review of the literature on youth, sustainable development and Climate Change Adaptation. He observed the deficiency in information on Climate Change Adaptation and the impact of climate change on youth (Ogarro & Speek-Warney, 2009; Samberg *et al.*, 2012) and other sectors of the population in SIDS in Policy documents and national development plans in most SIDS.

There are inadequate knowledge and capacity by policymakers and senior officials on climate change impacts and adaptation in SIDS (Chapter 5 Section 2). This lack of knowledge on climate change and the fluctuations in the range of perceptions of policymakers and senior officials on climate change, compounded by the absence of a national policy on climate change, and the lack of climate change education in the education curriculum, has left the youth sector and the country as a whole unprepared to deal with predicted climate change impacts in the future.

The research supported the view that although there is a comprehensive body of literature on climate change, there are notable gaps on the impact of climate change on youth and children in SIDS (Ogarro & Speek-Warney, 2009; Pereznieto *et al.*, 2011; Samberg *et al.*, 2012). Therefore, policymakers in SIDS need to focus research on the impact of climate change on young people which would enable them to create the necessary policies and enabling environment to prepare youth with the requisite skills and knowledge to build their resilience to adapt to climate change in SIDS in the future. For this reason, the development of the conceptual framework was motivated by the needs of youth to ensure that climate change is integrated and mainstreamed in the education curriculum and within sectoral policies and programmes in SIDS. The framework is designed to provide policymakers and senior officials in SIDS with the necessary apparatus to build the resilience of youth to adapt to the impact of climate change in the future.

The researcher is of the view that such a framework would be a real device for improving the capacity of policymakers, researchers and practitioners in SIDS to put processes and actions in place to prepare young people to adapt to climate change in the future. The ongoing projects in Sierra Leone and West Africa show that adapting and adopting the framework demonstrates its value outside of small Island communities.

## 9. Bibliography

- Acemoglu, D., Autor, D. (2014) Chapter 1: The Basic Theory of Human Capital, *Lectures in Labour Economics*, Available at: <http://econ.lse.ac.uk/staff>
- Adams, E. (2007) *St. Vincent in the History of the Carib Nation 1625-1797*. Kingstown.
- Kelly, P.M., Adger, W.N. (2000) Theory and practice in assessing vulnerability to climate change and facilitating adaptation. *Climatic Science* 47(4), pp. 325-52.
- Adger, N.W., Arnell, N.W., Tompkins, E.L. (2005) Successful adaptation to climate change across scales. *Global Environmental Change*, 15(2), pp.77–86. Available at: <http://www.sciencedirect.com/science/article/pii/S0959378004000901> [Accessed July 11, 2014].
- Adger, W. (2003) Social Capital, Collective Action, and Adaptation to Climate Change. *Economic Geography*, 79(4), pp.387–404. Available at: [http://link.springer.com/chapter/10.1007/978-3-53192258-4\\_19](http://link.springer.com/chapter/10.1007/978-3-53192258-4_19).
- Adrianto L., Matsuda, Y. (2002) Developing economic vulnerability indices of environmental disasters in Small regions. *Environmental Impact Assessment Review*, 22 pp.393-414.
- Agawal, A., Gibson, C. C. (1999) Enhancement and Disenhancement: The role community in national resource conservation,' *World Development*, 27(4) pp.629-49.
- Albertz, J. (2007) *Einführung in die Fernerkundung Grundlagen Interpretation Von Luftund Satelliten Bildern.3., actual. Underw.Auft.utg.Dormstadt: Wiss.Buchges.x*, 254.S.s.
- Angelsen, A., Larsen, H.O., Lund, J.F., Smith-Hall, C., Wunder S. (2011) *Measuring Livelihoods and Environmental Dependence; Methods for Research and Fieldwork*, Earthscan, London
- Arnell, N.W., Lowe, J.A., Brown S., Lincke D., Price J.T. (2016) *The global impacts of climate change under a 1.5oC pathway: supplement to assessment of impacts under 2, 3 and 4oC pathways*. Report from AVOID2 project to the Committee on Climate Change.
- Ayers, J., Forysth, T. (2009) Community based adaptation to climate change, *Environment Science and Policy for Sustainable development*: 51 (4) pp.22-31.
- Barnett, J. (2001<sup>a</sup>) *The meaning of environmental security: Ecological politics and policy in the new security era*. London and New York: Zed Books.

Barnett, J. (2001<sup>b</sup>) Adapting to Climate change in Pacific Island countries. The problem of uncertainty, *World Development*, 29(6) pp.977-93. University Library, Minerva Access, A Gateway to Melbourne's research publication

Barr, R, Fankhauser, S., Hamilton, K. (2010) Adaptation Investment: A Resource Allocation Framework. In: Barnett J. (Ed.) *Mitigation and adaptation strategies for global change*, Netherlands: Springer, DOI: 10.1007/s11027-010-9242-1

Baxter P., Jack, S. (2008) Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers, *The Qualitative Report*: McMaster University, West Hamilton, Ontario, Canada, 13(4) pp.544-559

Bazeley, P., Jackson, K. (2013) *Qualitative data analysis with NVivo*: Sage Publications Limited.

Benjamin, L. (2009) Climate change and the Caribbean Small Island States: The State of Play: *International Journal of the Bahamian Studies*. 16 pp.78-91. Available at: <http://researchjournal.cob.edu.bs> [Accessed on 30/08/2017]

Bennett, N.J. Blythe, J., Tyler, S., Ban, N.C. (2015) Communities and change in the Anthropocene: understanding socialecological vulnerability and planning adaptations to multiple interacting exposures. *Regional Environmental Change*. Available at: <http://link.springer.com/10.1007/s10113-015-0839-5>. [Accessed on 30/08/2017]

Betts, R. Collins, A.M., Hemming, D.L., Jones, C.D. Lowe, J.A., Sanderson. M.G. (2011) Philosophical Transactions. *Royal Society*, 369 pp.67-84.

Bhatia, S., Bonapace, T., Hidallege, V., Ono, Y., Wu, G. (2010) Protecting Development Gains: Reducing Disaster Vulnerability and Building Resilience in Asia and Pacific. *The Asia Pacific Disaster Report, 2010*. Bangkok.

Birkmann, J. (2007) Risk and vulnerability indicators at different scales: applicability, usefulness and policy implications. *Environmental Hazards*, 7(1) pp.20-31.

Blum, R. (2007) Youth in Sub-Saharan Africa, *Journal of Adolescent Health*, 41(3) pp.230-38

Botanical Gardens Conservation International (n.d.) *St. Vincent and the Grenadines Botanic Gardens*. Available at: <http://www.bgci.org/garden.php?id=314> [accessed 25/10/2015, 10:00]

Bowen A., Cochrone S., Franauser S. (2012) Climate change adaptation and economic growth. *Climate Change*, 113(2) pp 95-106. ISSN 0165-0009

Brown, G. (2005) Mapping spatial attributes in survey research for natural resource management: methods and applications. *Society & Natural Resources*. 18 pp.1–23

- Brown, K, Westaway E. (2011) Agency, Capacity and Resilience to Environmental Change: Lessons from Human Development, Well-Being and Disaster, *Annual Review of Environment and Resources*. 36 pp.321-42.
- Bryman A. (1989) Research Methods and Organisation Studies, Unwin Hyman Publishing, London.
- Bueno, R., Herzfeld, C., Stanton, E.A. Ackerman, F. (2008) *The Caribbean and Climate change: The coast of inaction*, Tuffs University, USA .
- Burton, I, Huq, S., Lim, B., Pilifosova, O., Schipper, E.L. (2002) From impact assessment to adaptation priorities: the shaping of adaptation policy. *Climate Policy*, 2 (23) pp.145-159.
- Calgaro, E. (2011) *Building resilient tourism destination futures in a world of uncertainty: assessing destination vulnerability in Khao Lak, Patong and Phi Don, Thailand to the 2004 Tsunami*/. Macquarie University Research Online.
- Calgaro, E., Dominey-Howes, D., Lloyd, K. (2013) Application of the Destination Sustainability Framework to explore the drivers of vulnerability and resilience in Thailand following the 2004 Indian Ocean Tsunami. *Journal of Sustainable Tourism*, 22(3) pp.361-383.
- Campbell. J., (2009) Islandness, vulnerability and resilience in Oceania. *Shima: International Journal of Research into Island Cultures*. 3 (1) pp.83-97.
- Cannon, T. (2008) *Reducing people's vulnerability to natural hazards communities and resilience*. Research paper/UNU-WIDER.
- CARIBSAVE (2012) The CARIBSAVE: Climate Change Risk Atlas (CCCRA): *Climate Change Risk Profile for Saint Vincent and the Grenadines*, Hastings, Barbados, pp.viii. Available at: <http://www.caribbeanclimate.bz/closed-projects/2009-2011-the-caribsave-climate-change-riskhttp://www.caribbeanclimate.bz/closed-projects/2009-2011-the-caribsave-climate-change-risk-atlas-cccra/pdf.htmlatlas-cccra/pdf.html>, [Accessed 30/12/2015, 1:22pm]
- CARIBSAVE (2012) *Climate Change Risk profile for St. Vincent and the Grenadines*. CARIBSAVE, Ken, UK and Bridgetown Barbados
- Carter, R. (2008) *Caribbean Youth, An integrated Literature Review*. Bridgetown, Barbados
- Cashman A., Nurse, L. Charlery, J. (2010): Climate change in the Caribbean: The water management implication. *Journal of Environment and Development* 19, pp.42-67.
- CCCCC, (2014): *A vulnerability and capacity assessment of food zone of Barbados*. Caribbean

Community Centre for Climate Change and the Government of Barbados, Caribbean Community Centre for Climate Change, Belize.

Chakraborty, K (2009) "The Good Muslim Girl": Conducting qualitative participatory Research to understand the lives of young Muslim women in the Bustees of Kolkata. *Children Geographies*. 7(4) pp. 421-434.

Chamber, R (2002) *Participatory Workshops: A sourcebook of 21 sets of ideas and activities*. London: Earthscan. 794 pp. 421-434.

Chan A.A., Chadee D.D., Rawlins S. (2006) *Climate Change impact on dengue: The Caribbean Experience*. Mona: climate Studies Group Mona, University of the West Indies.

Charles, H. (2006) Redefining the OECS Development Agenda – Empowerment for Sustainable Development. Caribbean Youth Development, Issue 2.

Chatenoux, M., Wolf, A. (2013) *Ecosystem based approaches for CCA in Caribbean SIDS*. UNEP/GRID-Geneva and ZMT Leibniz Centre for Tropical Marine Biology, pp.64.

*Chief informant - Glenroy Brown, Agriculturalist and Historian, St. Vincent and the Grenadines.*

Clarke, V., Braun, V. (2013) Teaching thematic analysis: Overcoming challenges and developing strategies for effective learning. *The Psychologist*, 26(2), pp.120-123.

Clemencon, R., (2016) The two sides of the Paris Climate Agreement: Dismal failure or historic breakthrough? *Journal of Environment and Development*, SAGE, 25(1) pp.3-34.

Cloutier, G., Papin M., Bizier C. (2018) *Do it yourself (DIY) adaptation: Civic initiatives as drivers to address Climate Change at the urban scale*. Elsevier cities 74 pp. 284-291.

Colorado State University Writing Center (n.d.) Writing Guides. Available at: <https://writing.colostate.edu/guides/> [Accessed on 26/10/2017]

Commonwealth Secretariat (2006) *Strategic Plan 2006-2008*. Commonwealth Youth Programme, Commonwealth Secretariat, London, United Kingdom.

Commonwealth Secretariat (2007) *The Commonwealth Plan of Action on Youth Empowerment 2007-2015*. Commonwealth Youth Programme, Commonwealth Secretariat.

Commonwealth Secretariat (2017): *Hurricane Maria: 'If not now then when? If not us then who?'*

Commonwealth Secretariat, London. Available at: <http://thecommonwealth.org/media/news/hurricane-maria-%E2%80%98if-not-now-then-when-if-not-us-then-who%E2%80%99>



- Corson, D. (1990) *Language Policy across the Curriculum*. Clevedon: Multilingual Matters.
- Coulon (1995) Ethnomethodology Research Government of St. Vincent and the Grenadines . In: National Environmental Advisory Board and Ministry of Health and the Environment (2000) *Initial National Communication on Climate Change*. St. Vincent and the Grenadines , CPACC.
- Crates S, Nuttall M, (2009) Anthropology and climate change: From Encounters to Action. *Annual Review of Anthropology*. 40 pp.175-94.
- Crawley, C., Harre, R., Tagg, C. (2001) Qualitative research and compute: Methodological issues and practice in using NVivo and MUD IST. *International Journal of Social Research Methodology*, 5(3), pp.193-197.
- Cresswell J.W, (2007) *Qualitative inquiry and research design: Choosing among five traditions* (2<sup>nd</sup> Ed.) Thousand Oaks, CA, Sage.
- Creswell, John, W. (2009): *Research Design, Qualitative, Quantitative and Mixed methods Approaches*, (3<sup>rd</sup> Ed.), London: Sage.
- Crossley, M. (2011) *Strengthening the development of educational research capacity in small states*. In: Martin, M., Bray, M. (Eds.), *Tertiary Education in Small States: Planning in the Context of Globalisation*. UNESCO/IIEP, Paris.
- Crossley, M., Bray, M., Packer, S. (2011) *Education in Small States: Policies and Priorities*. Commonwealth Secretariat, London.
- Crossly, M., Sprague, T. (2014) *Education for Sustainable Development: Implementation for small island Developing States*, Research Centre for international and Comparative Studies (ICS), Education in Small island Research Group, University of Bristol, Graduate School of Education, International Journal of Education Development, Elsevier, Bristol, United Kingdom.
- Culzac-Wilson, L. (2003) *Report to the Regional Consultation on SIDS Specific Issues*, Government of St. Vincent and the Grenadines , St. Vincent and the Grenadines .
- David, A., Braby, J., Zeidler, J., Kandjiga, L., Ndokosho, J. (2013) Building adaptive capacity in rural Namibia: Community information tool kit on Climate Change. *International Journal of Climate Change Strategies and Management*. 5 (2) pp.215-229.
- David, F. (2005) *Strategic Management, Concepts and cases then edition*. International Edition: Pearson/Prentice Hall, Pearson Education International, New Jersey, USA.
- DEFRA (2010): *Adapting to climate change: A guide to local councils*, London.

- Dessai S, Hulme, M (2004) Does CCA policy need probabilities? *Climate Policy*. 4 pp.107-128.
- Dessai, S., Hulme, M., Lempert, R., Pielke, R. (2009) Climate prediction: a limit to adaptation. In: Adger N., Lorenzani, I., O'Brien, K. (Eds) *Adapting to Climate Change: Thresholds, Values, Governance*. Cambridge University Press: Cambridge, UK
- DfID (1999) *Sustainable livelihood Guiding Sheet: framework*. London. Department for International Development.
- DfID (2012) *Promoting innovation and evidence based approaches to building resilience and responding to humanitarian crisis: A DFID Strategy*. Department for International Development February 2012.
- Doyle, E., (2012) *Tobago Cays Marine Park: Strategic Plan for Tobago Cays Marine Park, 2013-2015*. Clifton Union Island, St. Vincent and the Grenadines.
- Du Toit, A., Skuse, A., Cousins, T. (2007) The Political economy of social capital: Chronic poverty, remoteness and gender in the rural Eastern Cape. *Social Identities*. 13(4) pp.521-540.
- Emerton, L., (2006) *Counting coastal ecosystem as an economic part of development infrastructure*. Ecosystem and livelihoods Groups Asia, World Conservation Union (IUCN), Colombo, Sri Lanka. pp.1-11.
- European Commission (EC) (2010) *New skills for new jobs> Action now*. Report by the Expert Group, Feb (Brussels).
- Ezzy, D., Liamputtong, P. (2005) *Qualitative Research Methods*. South Melbourne, Australia: Oxford University Press.
- FAO (2013) *Climate Smart Agriculture Sourcebook*. Food and Agriculture Organization of the United Nations,
- FAO, (2008): *Second country report on the state of plant genetic resources in St. Vincent and the Grenadines* .
- Fieser, E., (2017) *Irma is the Caribbean's Most Expensive Storm at \$10 Billion and Counting*. Bloomberg Business. Available at: <https://www.bloomberg.com/news/articles/2017-09-08/most-expensivestorm-ever-in-caribbean-did-10-billion-in-damage> [Accessed on 18/11/2017].
- Füssel, H.M. (2007) Adaptation planning for climate change: concepts, assessment approaches, and key lessons. *Sustainability Science*, 2(2), pp.265–275.  
Available at: <http://link.springer.com/10.1007/s11625-007-0032-y> [Accessed September 29, 2015].

Füssel, H.-M., Klein, R.J.T. (2006) Climate change vulnerability assessments: an evolution of conceptual thinking. *Climatic Change*, 75, pp. 301-329.

Garrets, H., Lange, H. (2011) Path Dependencies and Path Change in Complex Fields of Action: Climate Adaptation Policies in Germany in the Realm of Flood Risk Management. *AMBIO: A Journal of the Human Environment*, 40(2), pp.200–209. Available at: <http://link.springer.com/10.1007/s13280-0100131-3> [Accessed September 24, 2015].

Gaulter S. (2016) *Homes destroyed as heavy rains hit the Caribbean*. Aljazeera News / Latin America. Available at: <http://www.aljazeera.com/news/2016/11/homes-destroyed-heavy-rains-hit-caribbean-161130083829180.html> [Accessed on 26/12/2017]

Gill, S.E., Handley, J.F., Ennos, A.R., Pauleit, S., (2007) Adapting Cities for Climate Change: The Role of the Green Infrastructure. *Built Environment*, 33(1) pp.115–133. Available at: [http://www.jstor.org/stable/23289476?seq=1#page\\_scan\\_tab\\_contents](http://www.jstor.org/stable/23289476?seq=1#page_scan_tab_contents) [Accessed September 22, 2015].

Glass, E. Jonsson, A., Hjerpe, M., Andersson-Sköld, Y. (2015) Managing climate change vulnerabilities: formal institutions and knowledge use as determinants of adaptive capacity at the local level in Sweden. *Local Environment*. 15(6) pp.525-539. Available at: <http://www.tandfonline.com/doi/abs/10.1080/13549839.2010.487525> [Accessed September 24, 2015].

Gomez O., (2013) *Climate change and migration: A review of the literature*. International Institute of the Social Studies, The Hague (Erasmus University Rotterdam), Rotterdam

Gonsalves, R. (2017) Prime Minister of St. Vincent and the Grenadines: Budget Address 2017, Fiscal Consolidation and Economic Growth, Job Creation and Sustainable Development in a Vulnerable Small Island Developing State in the Context of a Challenging Global Environment, Government of St. Vincent and the Grenadines

Goosen, H. de Groot-Reichwein, M.A.M., Masselink, L., Koekoek, A., Swart, R., Bessembinder, J., Witte, J.M.P., Stuyt, L., Blom-Zandstra, G., Immerzeel, W. (2013) Climate Adaptation Services for the Netherlands: an operational approach to support spatial adaptation planning. *Regional Environmental Change*. 14 (3) pp.1035-48. Available at: <http://link.springer.com/10.1007/s10113-013-0513-8> [Accessed September 23, 2015]

Gough, L, Mc Greggor, J.A., Camfield, L. (2007) Theorizing wellbeing in international development,' In: Gough, L, Mc Greggor, J. A (Eds.) *Wellbeing in Development Countries*. Cambridge University, pp 3-43.

Government of St. Vincent and the Grenadines (2010) Fourth National Biodiversity Report of St. Vincent and the Grenadines to the UNFBD: Ministry of Health Wellness and the Environment  
Kingstown, St. Vincent and the Grenadines.

Government of St. Vincent and the Grenadines (2013<sup>a</sup>) National Economic and Social Development Plan 2013-2015: Re-engineering Economic Growth: Improving the quality of Life, Kingstown, SVG

Government of St. Vincent and the Grenadines (2013<sup>b</sup>) National Report St. Vincent and the Grenadines: Third International Conference on Small Island Developing States - National Report: Ministry of Health Wellness and the Environment, July 2013.

Government of St. Vincent and the Grenadines (2015) St. Vincent and the Grenadines Intended National Determined Contribution: Communicated to the UNFCCC on November 2015.

Government of St. Vincent and the Grenadines (2012) Digest of Statistics, Statistical Office, Central Planning Division, Ministry of Planning and Economic Planning, Government of St. Vincent and the Grenadines .

Griffin, G.W., (2007) At mosphric movement of microorganism in clouds of desert dust and implications for human health. *Clinical Microbiology Reviews*, 20 pp.459-77.

Grove, R.H. (2000) *The Culture of Islands and the History of Environmental Concern*, Harvard Seminar on Environmental Values, Harvard Divinity School, Harvard University, USA, 18<sup>th</sup> April 2000 pp. 2-10. Available at: <http://ecoethics.net/hsev/200004txt.htm> [Accessed on 26/12/2017]

Guest, G., MacQueen, K. M., Namey, E. E. (2012) *Applied thematic analysis*. Thousand Oaks, CA: Sage.

Hanf, K., Hjem, B, Porter, D (1978): Local network of manpower training in the Federal Republic of Germany and Sweden', in K Hanf and F. Scharpf (Eds.) *Interorganisational Policy Making: Limits to coordination and central control*. London: Sage, pp. 303-344.

Hardoy, J. Hernández, I., Pacheco, J.A., Sierra, G. (2014) Institutionalizing CCA at municipal and state level in Chetumal and Quintana Roo, Mexico. *Environment and Urbanization*, 26(1), pp. 69–85. Available at: <http://eau.sagepub.com/content/26/1/69.short> [Accessed September 22, 2015].

Harley, M., van Minnen, J. (2009) Development of adaptation indicators. European Topic Centre on Air and Climate Change Technical Paper 2009/6, European Environment Agency

Harley, M., van Minnen, J. (2010) Adaptation indicators for biodiversity. European Topic Centre on Air and Climate Change Technical Paper 2010/15, European Environment Agency

- Healey, P. (2003) Place, identity and local politics: analysing partnership initiatives. In: Hajer, M., Wagenaar, H. (Eds.) *Deliberative Policy Analysis: Understanding Governance in the Network Society*. Cambridge University Press, Cambridge.
- Hennink, M., Hutter, I., Bailey, A. (2011) *Qualitative research methods*: Sage.
- Henstra, D., Vogel, B. (2014) *Municipalities and Climate Change : A Framework for Analyzing Local Adaptation Policy*, Available at: <http://www.cpsa-acsp.ca/2014event/Henstra.pdf>
- Hernandez-Delgado, E.A. (2015) *The emerging threats of climate change on tropical coastal ecosystem service, public health, local economies and livelihoods sustainability of small islands: Cumulative Impacts and Synergies*. Marine Pollution Bulletin, University of Puerto Rico, Centre for Applied Tropical Ecology and Conservation, Coral Reef Research Group Puerto Rico, USA.
- Hernandez-Delgado, E.A., Ramos-Scharron, C.E., Guerrero, C., Lucking, M.A., Laureano, R., Mendez-Lararo, P.A., Melendez-Diaz, J.O. (2012) Long terms impact of tourism and urban development in tropical coastal habitat in a changing climate: lessons learned from Puerto Rico 357-398. In: Kasimo Glu, M. (Ed.) *Vision from global tourism industry/creating and sustain competitive strategies*. Intech Publications
- Hjem, H., Hull, C. (1982) Implementation research as empirical constitutionalism. *European Journal of Political Research*. 10 pp.105-116.
- Hoggarth, D (2007) *Organisation of Eastern Caribbean States (OECS) Environment and Sustainable Development Unit (ESDU) The World Bank / GEF / FFEM / OAS under the OECS Protected Areas and Associated Sustainable Livelihoods (OPAAL) Project*, St Lucia. [https://en.wikipedia.org/wiki/Small\\_Island\\_Developing\\_States#/media/File:SIDS\\_map\\_en.svg](https://en.wikipedia.org/wiki/Small_Island_Developing_States#/media/File:SIDS_map_en.svg) [Accessed on 29/07/2017]
- Hunt, A., Watkiss, P. (2010) Climate change impacts and adaptation in cities: a review of the literature. *Climatic Change*, 104(1), pp.13–49. Available at: <http://link.springer.com/10.1007/s10584-010-99756> [Accessed July 22, 2014].
- Hurlimann, A.C. & March, A.P. (2012): The role of spatial planning in adapting to climate change. *Wiley Interdisciplinary Reviews: Climate Change*, 3(5), pp.477–488. Available at: <http://doi.wiley.com/10.1002/wcc.183> [Accessed September 8, 2015].
- ILO (2010) *A skilled workforce for sustainable growth: A G20 Training Strategy*. International Labour Office, Geneva, November 2010.
- ILO (2011) *Greening the global economy: Skills challenge*. Skills for employment policy brief. Geneva

- ILO (2013) *Sustainable Development, Decent work and Green Jobs*. International Labour Conference, 102<sup>nd</sup> Session, International Labour Office, Geneva.
- ILO (2014) *Profit and Poverty: The economics of forces labour*. Geneva
- IMF (2016) *IMF Executive Board Concludes 2016 Article IV Consultation with St. Vincent and the Grenadines*. International Monetary Fund, Press Release No. 16/345, Washington, USA, 19<sup>th</sup> July 2016.
- IMF (2016) *St. Vincent and the Grenadines: Staff Report 2016 Article 1V consultation*. International Monetary Fund, Washington, USA
- IMF (2017) *St. Vincent and the Grenadines , IMF Country Report NO 17/400, Article IV Consultation with St. Vincent and the Grenadines*. International Monetary Fund, Press Release No. 17/400, Washington, USA, December 2017.
- Intergovernmental Panel on Climate Change (2008<sup>a</sup>) *Climate change 2007L Summary for Policymakers*. Contribution of Working Group 11to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK, Cambridge University Press.
- International Cooperation and Development (2017) Rights-based approach to development cooperation. Available at: [https://ec.europa.eu/europeaid/sectors/rights-based-approachdevelopment-cooperation\\_en](https://ec.europa.eu/europeaid/sectors/rights-based-approachdevelopment-cooperation_en) [Accessed on: 26/12/2017]
- International Monetary Fund (2016) IMF Executive Board Concludes 2016 Article IV Consultation with St. Vincent and the Grenadines Press Release no. 16/345. Available at: <https://www.imf.org/en/News/Articles/2016/07/19/21/23/PR16345-St-Vincent-and-the-Grenadines-IMF-Executive-Board-Concludes-2016-Article-IV-Consultation> [Accessed on 26/12/2017]
- IPCC (2001) Climate change 2001: impacts, adaptation, and vulnerability. In: *contribution of Working Group II to the third assessment report of the Intergovernmental Panel on Climate Change*: Cambridge University Press.
- IPCC (2007) Climate Change 2007: Impacts, Adaptation and Vulnerability. In: Parry, M.L. Canziani, O.F., Palutikof, J.P., van der Linden, P.J., Hanson, C.E. (Eds.) *Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, UK, pp.7-22.
- IPCC (2014<sup>a</sup>) Climate Change (2014): Synthesis Report, in: *Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, IPCC Geneva, Switzerland, pp.151, 2014.

IPCC (2014<sup>b</sup>) Summary for Policymakers. In: Climate Change Impacts, Adaptation and Vulnerability. In: C. B., Barros, V. R., Dokken, D., Mach, K. J., Mastrandrea, M. D., Bilir, T. E., Chatterjee, M., Ebi, K. L., Estrada, (Eds.) *Contributions of the Working Group II to the Fifth Assessment Report*, Field,

IPCC (2014<sup>c</sup>) Climate Change: Synthesis Report. In: *Contribution of Working Group 1, 11, 111 to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, IPCC Geneva, Switzerland pg.151.

Island Time Holidays (2001) *Map of the East Caribbean and detailed map of St. Vincent and the Grenadines*. Available at:

[http://www.islandtimeholidays.com/Map\\_of\\_Caribbean\\_and\\_St.\\_Vincent\\_and\\_the\\_Grenadines.html](http://www.islandtimeholidays.com/Map_of_Caribbean_and_St._Vincent_and_the_Grenadines.html) [Accessed on 26/12/2017]

IUCN & WRI (2014) *A guide to Restoration Opportunities Assessment Methodology (ROAM): Assessing forest landscape restoration opportunities at the national and sub-national level*, Working Paper (Road-Test edition), Gland, Switzerland: IUCN, pp.125.

iWitness News (2014) *SVG to Remember Storm Victims on Christmas Eve*. Available at:

<https://www.iwnsvg.com/2014/12/23/svg-to-remember-storm-victims-on-christmas-eve>

[Accessed on 18/11/2017]

iWitness News (2015) *Houses Destroyed As Rains Trigger Floods Across St. Vincent*. Available at:

[https://www.iwnsvg.com/2016/11/29/houses-destroyed-as-rains-trigger-floods-across-st-](https://www.iwnsvg.com/2016/11/29/houses-destroyed-as-rains-trigger-floods-across-st-vincent/)

[vincent/](https://www.iwnsvg.com/2016/11/29/houses-destroyed-as-rains-trigger-floods-across-st-vincent/) [Accessed on 18/11/2017]

iWitness News (2017) *SVG Among World's Most Disaster-Prone Countries*. Available at:

<https://www.iwnsvg.com/2017/06/03/svg-among-worlds-most-disaster-prone-countries/>

[Accessed on 16/11/2017]

Jacka, J.K. (2010) The spirit of conversation; ecology, Christianity, and resource management in highlands Papa New Guinea. *Journal for the Study of Religion, Nature and Culture*. 4(1) pp.24-47.

Jaja, J., Dawson, J., Gaudet, J. (2016) *Using social network analysis to examine the role that institutional integration plays in community based adaptive capacity to climate change in Caribbean small island communities*. Department of Geography, Environment and Geomatic, University of Ottawa, Canada: Routledge, Local Environment

Jiang, M., Wong, E., Klint, L. M., DeLacy, T., Dominey-Howes, D. (2012) Tourism adaptation to climate change-analysing the policy environment of Fiji. *International Journal of Tourism Policy*, 4(3) pp.238-60.

Joffe, H. (2011) Thematic analysis. In: Harper, D., Thompson, A. R. (Eds.) *Qualitative methods in mental health and psychotherapy: A guide for students and practitioners*. pp. 209-224. Chichester: Wiley.

Johnny, C. (1983) *Joshua Gone Barbados*. Johnny 99. Available at:  
<https://www.youtube.com/watch?v=EjabXIFDTi4> [Accessed 7/11/2015, 10.25]

Jones, G.P., McCormick, M.I., Srinivasan, M., Eagles, J.V. (2004) Coral decline threatens fish in marine reserves: *Proceedings of the National Academy of Sciences of the United States of America*. 101 (21) pp.8251-53.

Jopp, R. (2012). *Linking climate change, tourist destination adaptation and tourist attitudes: a case study of the Victorian Surf Coast region*. Victoria University.

Jopp, R., DeLacy, T., & Mair, J. (2010). Developing a framework for regional destination adaptation to climate change. *Current Issues in Tourism*, 13 (6) pp.591-605.

Kahn A.S., Ramachandran, A., Usha, N., Aram, I.A., Selvam, V. (2012) Rising Sea and threatening mangroves: A case study on stakeholders engaging in climate change communication and non-formal education. *International Journal of Sustainable Development and World Ecology*, 19(4) pp.330-8.

Kahn, R. L., Cannell, C. F. (1957) *The dynamics of interviewing; theory, technique, and cases*. Oxford, England: John Wiley & Sons.

Kairi Consultants Ltd. (2007/8): *Poverty Assessment Report – St. Vincent and the Grenadines*. A report to the Caribbean Development Bank, in association with the National Assessment of St. Vincent and the Grenadines.

Karmalhar, V.A., Taylor, M.A., Campbell, J., Stephenson, T., Bew, M., Centella, A., Benzamilla, A., Charlery, J. (2012) A Review of observed and projected changes in climate for the islands of the Caribbean, *Atmósfera*, 26 (2) pp.283-309.

Kaye N.R, A Harley and D. Hemming (2012) Mapping the climate: Guidance on appropriate techniques to map climate variabilities and their uncertainties, *Geoscientific Model Development*, 5 pp.245-56.

Kelman, I., West, J.J. (2009) Climate change and Small Island Developing States: A critical Review: *Ecological and Environmental Anthropology*, 5 (1) pp.1-16.

Klein, A. (2007) Growing cannabis in St. Vincent and the Grenadines. University of Kent, *Kent Academic Repository id21 insights* (10) pg.3.



Klint, L. M., Jiang, M., Law, A., Delacy, T., Filep, S., Calgaro, E., Harrison, D., Dominey-Howes, D. (2012<sup>a</sup>) Dive Tourism in Luganville, Vanuatu: Shocks, Stressors, and Vulnerability to Climate Change. *Tourism in Marine Environments*, 8(1-2), pp.91-109(19).

Klint, L. M., Wong, E., Jiang, M., Delacy, T., Harrison, D., Dominey-Howes, D. (2012<sup>b</sup>) Climate change adaptation in the Pacific Island tourism sector: analysing the policy environment in Vanuatu. *Current Issues in Tourism*, 15(3), pp.247-274.

Kohn M, (2011) Tahiti Beyond the postcard: Place and everyday life, Seattle: University of Washington Press. In: Kohn, J., Gowdy, J., Van der Straaten, J. (Eds.) (2001): *Sustainability in Action: Sectorial and Regional Case Studies*. Cheltenham: Edward Elgar.

Koulourioris, J. (2011) Ethical consideration in conducting research with non-native speakers in English. *TESL Canada Journal*, Special Issue, 5, pp.1-5.

Krippendorff, K. (1980) *Content Analysis: An introduction to its methodology*. New Bury Park, Sage, California, USA

Krippendorff, K., Brook M.A. (1990) *Content Analysis Reader*, Sage publication, California, USA

Kumar R., (2005) *Research Methodology; A step by step Guide for Beginners*; Second Edition, Sage Publication, London.

Kwiatkowski, R.E., (2001) Indigenous community based participatory research and health impact assessment: a Canadian example. *Environmental Impact Assessment Review*, 32, pp.445-50.

Lafale P. (2010) Ua afa fe le Aso. Stormy weather today: traditional ecological knowledge of weather and climate. The Samoa experience. *Climate Change* 100 pp. 317-35.

Lasage R., Sanne, M., Sardella, C.S.E., van Drunen, M.A., Verburg, P.H., Aerts, J.C.J.H. (2015) Stepwise participatory approach to design and implementation of community base adaptation to drought in Peruvian Andes. *Sustainability*, 7 (2) pp.1742-73.

Lather, P. (1992) Critical frames in educational research: Feminist and post-structural perspectives. *Theory into Practice*, 31 (2) pp. 87-99.

Lazrus, Heather (2012) Sea Change: Island Communities and Climate Change. *Annual Review of Anthropology*, 41, pp.285-301.

Leach, M., Mearns, R., Scooners, I. (1999) Environmental entitlement: Dynamics and institutions in community-based natural resources management, *World Development*, 27 (2) pp.225-47.

Loorbach, D. (2010) *Transition management for sustainable Development: A prescriptive complexity- based governance framework*. Governance: An International Journal Policy Administration and Institution 23 (H), pp.161-83.

Lu, Y., Gatua, M.W. (2014) Methodological Considerations for Qualitative Research with Immigrant Populations: Lessons from Two Studies. *The Qualitative Report*, 19 (30), pp.1-16. Available at: <http://nsuworks.nova.edu/tqr/vol19/iss30/3> [Accessed on 18/11/2017]

MacDonald, J.P., Harper, S.L., Wilcox, A.C., Edge, V.L. Rigolet Inuit Community Government (2015) A necessary voice: Climate change and lived experiences of youth in Rigolet, Nunatsiavut, Canada.

*Global Environmental Change*, 23(1), pp.360-71.

Malik, A., Qin, X., Smith, S.C. (2010) *Autonomous adaptation to climate change: A literature review*. Working Paper Series. Institute for International Economic Policy, Elliott School of International Affairs, The George Washington University.

Mapping for Rights(n.d.) Participatory Mapping. Available at:

[http://www.mappingforrights.org/participatory\\_mapping](http://www.mappingforrights.org/participatory_mapping) [Accessed on 18/11/2017]

Marshall, H. (2011) *Introduction to NVivo 9*. RMIT University. Centre for applied Social Science Research.

Marshall, P.A., Johnson, J.E. (2007) *The Great barrier reef and climate change: Vulnerability and management implications*. Climate change and the Great barrier reef Marine Park Authority and the Australian Greenhouse Office, Australia pp. 774-801.

Matland, R. (1995) Synthesising the implementation literature: the ambiguity-conflict model of policy implementation. *Journal of Public Administration Research and Theory*, 5(2) pp.145-174.

McLeod, E., Salm, R.V., (2006) Managing mangrove for resilience to climate change. IUCN Switzerland pp.1-64

McNamara, K.E., Buggy, L. (2016) Community based Climate Change adaptation: a review of academic literature, *Local environment*, DOI: 10.1080/13549839.2016.1216954

Mercer, J., Dominey-Howes, D., Kelman I., Lloyd K. (2007) The potential for combining indigenous and western knowledge in reducing vulnerability to environmental hazards in small island developing states. *Environmental Hazards*, 7, pp.245-56.

Mills, A. (2001) *Reports, St. Vincent and the Grenadines*. Pergamon: Elsevier, Marine Pollution Bulletin 42(12) pp.1220-2001.

- Mills, E. (2005) Insurance in climate of change. *Science*, 309, pp.1040-4.
- Mol, A.A., Boomert, A., (2011) *Brighton Beach, St. Vincent: Excavation and Survey 2011*. Caribbean Research Group, Faculty of Archeology in Cooperation with the SVGNT, Leiden University, Netherlands.
- Monte L., (1994) *A revolution of ideas, interview with Andrew Simmons*, Rare International, USA
- Mulongu, G. (2012) *Human Capital in Education: Principles, critiques and current thinking*. Institute of Education, University of London. UK
- Nocke, T.S., Sterzel, T., Bottinger, T., Wrobel, M. (2008) *Visualisation of climate and climate change Data: An overview*. Digital Earth Summit on Geoinformatics, Tools for Global climate Research Wichman Heidelberg, pp.226-32.
- Nurse, L.A., McLean, R.F., Agard, J., Briguglio, L.P., Duvat-Magnan, V., Pelesikoti, N., Tompkins, E., Webb, A. (2014) Small islands. In: Barros, V.R., Field, C.B., Dokken, D.J., Mastrandrea, M.D., Mach, K.J. Bilir, T.E., Chatterjee, M., Ebi, K.L., Estrada, Y.O., Genova, R.C., Girma, B., Kissel, E.S., Levy, A.N., MacCracken, S., Mastrandrea, P.R., White, L.L. (Eds.) *Climate Change 2014: Impacts, Adaptation, and Vulnerability*. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1613-54.
- O'Brien, K., Leichenko, R., Kelkar, U., Venema, H., Aandahl, G., Tompkins, H., Nygaard, L. (2004) Mapping vulnerability to multiple stressors: climate change and globalization in India. *Global Environmental Change*, 14 (4) pp.303-313.
- OECD (2013) The nature of policy change and implementation: A review of different theoretical approaches: Organisation for Economic Cooperation and Development.
- OECS (2004) Organization of the Eastern Caribbean States, Grenada: Macro Socio-economic Assessment of the Damages Caused by Hurricane Ivan. Castries, St Lucia: Organisation of Eastern Caribbean States.
- Ojeda, L., Flores, L. Y., Meza, R. R., Morales, A. (2011) Culturally competent qualitative research with Latino immigrants. *Hispanic Journal of Behavioral Sciences*, 33(2), pp.184-203.
- Olaniyan, D.A., Okemakinde, T. (2008) Human Capital Theory: Implementation for Education and Development. *Pakistan Journal of Social Development* 5 (5) pp.479-483.
- Olmos, S. (2001) *Vulnerability and adaptation to climate change: Concepts, Issues, Assessment and Methods*, Foundation paper, Climate Change Knowledge Network; July 2001.

- Organisation for Economic Co-operation and Development, (2010): *Jobs for Youth: Synthesis Report*, Paris.
- Palwarty R.S., Nurse, L.A., Trotz, U.O. (2010) Caribbean island in a changing climate. *Environment: Science and policy for Sustainable Development* 52, pp.16-27.
- Park, J.J. (2012) Fostering community energy and equal opportunities between communities. *Local Environment*, 17 (4) pp.387–408. Available at: <http://www.tandfonline.com/doi/abs/10.1080/13549839.2012.678321> [Accessed July 25, 2014].
- Patton, M.Q. (2002) *Qualitative Research and Evaluation Methods* (3<sup>rd</sup> Ed.) Thousand Oaks, CA: Sage Publication.
- Patton, M.Q., Cochran M. (2002) A guide to using qualitative research methodologies. Paris: Médecins Sans Frontières.
- Pearce, T., Ford, J. D., Duerden, F., Smit, B., Andrachuk, M., Berrang-Ford, L., Smith, T. (2011) Advancing adaptation planning for climate change in the Inuvialuit Settlement Region (ISR): a review and critique. *Regional Environmental Change*, 11(1), pp.1-17.
- Pereznieto P., Gbedemah, C., Rosenem G., Haper, C., Jones, N. (2011) *Youth vulnerability and adaptation: Exploring the impact of Macro-level shocks on youth 3F crisis and Climate changes*. Overseas Development Institution, London, United Kingdom.
- Petzold, J., Ratter, B.M.W. (2015) *Climate Change adaption under a social capital approach – An analytical framework for small islands*, Ocean & Coastal Management Elsevier, 112, pp.36-43.
- Picket M.I, Werner, A.T., Murdock, T.Q., Curry, J., Déry, S.J. Dyer, D. (2012) Planning for CCA: Lessons learned from a community based workshop, *Environmental science and policy* pp.1775-1586.
- Piguet, E., Pecoud, A., de Guchteneire, P. (2011) Migration and climate change: An Overview. *Refugee Survey Quarterly*, 30(3) pp.1-30
- Poschen, P. (2015) *Decent work, green jobs and the sustainable economy: Solution for climate change development*. International Labour Organisation, Geneva, Switzerland.
- Pratchett, M.S. Wilson, S.K., Graham, A.J., Munday, P.L., Jones, G.P., Polunin, N.V.C. (2009) Coral bleaching and consequences for motile reef organism; past, present and uncertain future effects. In: Van Oppen, M.J.H., Lough J.M. (Eds.) *Coral bleaching: Patterns, Processes, cause and consequences Ecologic Studies*, Berlin: Springer-Verlag, 205 pp.139-158.

Qaisrani A. (2015) Connecting the dots: linking climate change resilience to human capital; SDPI & PRISE.

Raiser, K. (2014) *Adaptation to Climate Change: Inciting yet another Top-Down/Bottom-Up debate*. Climate Exchange. Available at: <https://climate-exchange.org/2014/02/24/390/>

Ramirez-Esparza, N., Gosling, S. D., Benet-Martinez, V., Potter, J. P., & Pennebaker, J. W. (2006). Do bilinguals have two personalities? A special case of cultural frame switching. *Journal of Research in Personality* 40 pp.90-120.

Reynolds, P. C., & Braithwaite, D. (2001). Towards a conceptual framework for wildlife tourism. *Tourism Management*, 22(1), pp.31-42.

Riessman, C.K. (2000) "Even If We Don't Have Children [We] Can Live": Stigma and Infertility in South India. In: Mattingly, C. Garro, L.C., (Eds.) *Narrative and the Cultural Construction of Illness and Healing*. Berkeley, CA and London: University of California Press.

Ritchie, B. (2008). Tourism disaster planning and management: from response and recovery to reduction and readiness. *Current Issues in Tourism*, 11(4), pp.315-48.

Robson, C. (2002): *Real World Research, a Resource for Social Scientists and Practitioner-Researchers*, Blackwell Publishers, USA

Ryan, C. (2006) Youth enterprise and sustainable enterprise. *Commonwealth Journal on Youth and Development*, UNISA, South Africa, 4(2) pp.58-70

Sabatier, P. (2005) From policy implementation to policy change: a personal odyssey'. In: Gomitzka, A., Kogan, M., Amaral, A. (Eds.) *Reforming and Change in Higher Education: Analysing Policy Implementation*, Dordrecht: Springer, pp.17-34.

Sabatier, P., Mazmanian, D. (1979) The condition of effective implementation: a guide to accomplishing policy objectives. *Policy Analysis* 5 (4), pp.481-504.

Saunders M., Lewis P and Thornhill A. (2000) *Research Methods for Business*, (2<sup>nd</sup> Ed.) Pearson Education Limited, Essex, UK

Scavia, D. Field, J.C., Buddemeier R.W., Burkett, V., Cayan, D.R., Fogarty, M. Harwell M.A., Howarth, R.W., Mason, C., Reed, D.J., Royer, T.C., Sallenger, A.H., Tatus, J.G. (2002) Climate change impact on U.S. coastal and marine ecosystem. *Estuaries* 25, pp.149-64.

Schleussner, C.F., Lissen T.K., Fischer E.M. Wohland, J., Perrette, M., Golly, A., Rogelj, J., Childers, K., Schewe, J., Frieler, K., Mengel, M., Hare, W., Schaeffer, M. (2016 <sup>a</sup>) Different climate impact

for policy relevant limits to global warming: the case of 1.5 °C and 2 °C. *Earth System Dynamics* 7 pp. 327-51.

Schwarz, Ann-Marie; Bene, Christopher; Bennett, Gregory; Boso Delvene; Hilly Zelda; Paul, Chris Posala Ronnie; Sibiti Stephnen and Andrew Neil (2011): "*Vulnerability and resilience of remote rural communities to shocks and global changes: Empirical analysis from Solomon Islands*", Global Environmental Change 21, Elsevier, June 2011

Scobie, M. (2015) Policy coherence in climate governance in Caribbean small island developing states, Elsevier, *Environmental Science & Policy* 58 pp.16-28.

Scobie, M. (2016) *Policy coherence in climate governance in the Caribbean Small Island Developing States*; Environmental Science and Policy; Elsevier; 58 (2016) 16-28

Scooner, I. (1998) *Sustainable rural livelihoods: A framework for analysis*, IDS working paper no 72, Institute of Development Studies, Brighton.

Scott, D., Jones, B., Konopek, J. (2007) Implications of climate and environmental change for naturebased tourism in the Canadian Rocky Mountains: A case study of Waterton Lakes National Park. *Tourism Management*, 28(2), pp. 570-9.

Searchlight Newspaper Friday 17<sup>th</sup> July 2015

Sem, G. (2007) *Vulnerability and Adaptation to Climate Change in Small Island Developing States*. United Nations Development Programme, New York.

Shaprio, E., Hoyos, J., Golembo, M., Allen, K., (2017) Hurricane Maria makes landfall on Dominica as Category 5 storm; islands, including Puerto Rico, brace for impact. ABC News. Available at: <https://abcnews.go.com/US/maria-landfall-dominica-category-5/story?id=49923831>

Shimpuku, Y., Norr, K. F. (2012) Working with interpreters in cross-cultural qualitative research in the context of a developing country: Systematic literature review. *Journal of Advanced Nursing*, 68(8), pp.1694-706.

Simmons, A. (2006) Youth Development Index; Commonwealth Journal on Youth and Development, UNISA, South Africa, 4 (2) pp.100-13.

Simpson, M.C., Scott, D., Harrison, M., Simm, R., Silver, N., O'Keeffe, E., Harrison, S., Taylor M., Lizcano, G., Rutty, M., Stager, H., Oldham, J., Wilson, M., New, M., Clarke, J., Day, O.J., Fields, N., Georges, J., Waithe, R., McSharry, P. (2010) *Quantification and magnitude of losses and damages resulting from the impact of climate change: Modelling the transformational impacts*

*and costs of sea level raise in the Caribbean.* Barbados, West indies: United national Development Programme (UNDP)

Sithole B (2002): *Where the power lies: Multiple stakeholders Politics over Natural Resources: A Participatory Methods Guide.* Centre for Informational Forestry Research, Indonesia

Smit, B., Pilifosova O., (2002) Adaptation to climate change in the context of sustainable development and equity. *Sustainable Development*, 8 (9), pp.9-28

Smit, B., Wandel, J. (2006) Adaptation, adaptive capacity and vulnerability. *Global Environmental Change*, 16(3), pp.282-92.

Sookram S., (2009) *Impact of Climate Change on the Tourism sector in selected Caribbean countries, Caribbean Development Report Volume II, CEPAL, ECLAC – Project Documents collection Caribbean Development Report, Volume 2, LC/CAR/L.245, United Nations, December 2009. Printed in Santiago, Chile – United Nations*

St. Vincent and the Grenadine Tourism Authority (2009) *Tourism and Travel Award, Discover St. Vincent and the Grenadines* . SVG Tourism Authority, Kingstown, St. Vincent and the Grenadines

St. Vincent and the Grenadines (2013) National Economic and Social Development Plan: 2013-2025. Available at:

<https://sustainabledevelopment.un.org/content/documents/1466vincentgrenadines.pdf>

Stake, R. E. (1995) *The art of case study research.* Thousand Oaks, CA: Sage.

Stochowiak, S., Robles, L., Habtermanion, E., Maltry, M. (2016) *Beyond Win: Pathway for Policy implementation*, ORS Impact/The Atlas Learning Project.

Stocks, P. (2014) *Island Innovations: UNDP and GEF: Leveraging the Environment for sustainable development of Small Island Developing States.* UNDP.

Suggett, D (2011) *The implementation challenge: strategy is only as good as execution.* State Services Authority Occupational paper No. 15.

Sumberg J., Anyidoho N.A., Leavy J., te Lintelo D.J.H., Wellard K. (2012) Introduction: The young people and agriculture problem in Africa. *IDS Bulletin: Young People and Agriculture in Africa*, 43 (6) pp.1-8.

Takewira I., Simmons, A (2004) *Youth development at the centre of the Commonwealth agenda. Commonwealth Youth Programme (CYP).* Forum 21, European Journal on Youth Policy, No 2 12/2004 pp.82-91

Taylor M.A., Chen, A.A., Bailey, W. (2009) *Review of health effects of climate variability and climate change in the Caribbean*. Technical Report. Belmopan, Belize: Caribbean Community Climate Change Centre (CCCCC).

Taylor, C. (2012) *The Black Carib War: Freedom, Survival and the Making of the Garifuna*, Signal Books, Oxford, UK pg.161

Temple, B., & Young, A. (2004) Qualitative research and translation dilemmas. *Journal of Qualitative Research*, 4(2), pp.161-78.

The Economist (2017) *Paradise lost How Hurricane Irma will change the Caribbean: The region must adapt to climate change, not simply rebuild*. Print edition | The Americas, Sep 14th 2017

Tobago Cays Marine Park, (TCMP) (2007) *Strategic Plan 2007-2009: Tobago Cays Marine Park, Clifton, Union Island, St. Vincent and the Grenadines* .

Tobago Cays Marine Park, (TCMP) (2010): *Personal communication: Tobago Cays Marine Park, Clifton, Union Island, St. Vincent and the Grenadines* . January 2010.

Tompkins (2007) *Planning for climate change in small islands: Insights from national hurricane preparedness in the Cayman Islands*. Tyndall Centre for Climate Change Research, School of Environmental Sciences, University of East Anglia, Norwich NR4 7TJ, UK. Tel.: +44 1603 593910, +44 1603 593910; fax: +44 1603 593901

Tracy, S.J. (2007) *Qualitative research method, collecting evidence, crafting analysis, communicating impact*. Willey-Blackwell inquiry.

Trading Economics (n.d.) St. Vincent and the Grenadines GDP per Capita PPP. Available at: <https://tradingeconomics.com/st-vincent-and-the-grenadines/gdp-per-capita-ppp> [Accessed on 16/11/2017]

Tuli, F. (2011) The basis of distinction between qualitative and quantitative research in social science: reflection on ontological, epistemological and methodological perspectives. *Ethiopian Journal of Education and Sciences*, 6(1) pp.97-108.

UNDP (2015) Human Development Report; Work for Human Development, United National Development Programme (UNDP) New York, USA.

UNDP (n.d.) Promoting Community Education and Environmental Action JEMS Environmental Management Services. Small Island Developing States. Sharing Innovative Experiences Series pp.5060. Available at:



[http://tcddc2.undp.org/GSSDAcademy/SIE/Docs/Vol2/Promoting\\_Community1.pdf](http://tcddc2.undp.org/GSSDAcademy/SIE/Docs/Vol2/Promoting_Community1.pdf) [Accessed on 26/12/2017]

UNESCO (2014) *Shaping the future we want: UN Decade of Education for Sustainable Development (2004-2014)*, DESD Monitoring and Evaluation, Paris, France.

UNESCO, (2015) *Not just hot air: putting Climate Change education in to practice*, Education sector, Paris, France.

UNFCCC, (2011): *Fact sheet: Climate change science - the status of climate change science today*, United Nations Framework Convention on Climate Change, pg.1. Available at: [https://unfccc.int/files/press/backgrounders/application/pdf/press\\_factsh\\_science.pdf](https://unfccc.int/files/press/backgrounders/application/pdf/press_factsh_science.pdf)

UNICEF (2015). *Climate change and Children*, United Nations Children Fund (UNICEF), New York, USA, pg.4.

United Nations (2003): *World Youth Report 2003: The global situation of young people*. Department of Economic and Social Affairs, United Nations, October 2005.

United Nations (2005): *World Youth Report 2005, Young people today and in 2015*. Department of Economic and Social Affairs, United Nations, October 2005.

United Nations (2010): *Local Governance and Climate change: A discussion note*. UNDP, UNCDF & UNEP, December 2010.

United Nations (2014) *Emerging issues for small island developing states*. Result of UNEP Foresight process. UNEP, Nairobi.

United Nations Development Programme (UNDP) (2015): *Human Development Report 2007/08*. New York.

United Nations Environment Programmes (2013) *Identifying emerging issues from the perspective of Small Island Developing States (SIDS)*. Expert Group Meeting Co-hosted by United Nations

Environment Program (UNEP) and the United Nations Department of Economic and Social Affairs (DESA), 14-16 May 2013, Cambridge, United Kingdom.

United Nations Environment Programmes, (2008) *Water and Climate Changes*. In: Diop, B., Bekacewicz, P (Eds.) *Vital Water Graphics - An overview of the state of the Worlds Fresh Water and Marine water*. (2<sup>nd</sup> ed.) Nairobi, Kenya, UNEP, ISBN 92-870-2236-2236-0

United Nations Secretary-General (2017) Secretary-General's remarks to High-Level Event on

Hurricane Irma [as delivered]. Available at:

<https://www.un.org/sg/en/content/sg/statement/201709-18/secretary-generals-remarks-high-level-event-hurricane-irma-delivered> [Accessed on 18/11/2017]

UN-OHRLS, (2007) *The Impact of Climate Change on the Development of the Prospect of The Lest*

*Developed Countries and Small Island Developing States, the High Representative for the Least Developed Countries, Land lock Developing countries and Small island Developing Countries.* The United Nations Office of the High Representative for the Least Developed Countries, 2007.

USAID (2013): *Eastern and Southern Caribbean Youth Assessment (ESCYA) Final Report*, United States Agency for International Development, Washington, USA.

Uyarra, M.C. Cote, L.M., Gill J.A., Viner D., Watkinson A.R., (2005) Island Specific preference of Tourism for environmental features: implementation of climate change for tourism-dependant states. *Environmental Conservation*, 32 pp.11-9.

Voccia, A (2012) Climate change: what future for small, vulnerable states: *International Journal on Sustainable Development & World Ecology*, 19 (2) pp.101-15.

Walker, L.R., Billingham, P. (2011) *Island Environment in a changing world*, Cambridge University Press. Cambridge.

Weber, P. (1990) *Basic content analysis*, Sage publication, California, USA

West P., (2006): *Conservation is our government now: The politics of ecology in Papua New Guinea*, Burham, NC: Duke University Press.

White, B. (2012) Agriculture and the generation problem: Rural youth, employment and future farming. *Young people and Agriculture in Africa; Institute for Development Studies; IDS Bulletin*, 42(6).

Wider Caribbean Pavilion (2015) *Wider Caribbean Pavilion*, November 30<sup>th</sup> to December 11<sup>th</sup> 2015, European Union via the Intereg IV Caribbean Space Fund.

Williams, S.E., Shoo, L.P., Isaac, J.L., Hoffmann, A.A., Langham, G. (2008) Towards an integrated framework for assessing the vulnerability of species to climate change. *PLoS biology*, 6(12), e325.

Wise, R.M. Fazey, I., Stafford Smith, M., Park, S.E., Eakin, H.C., Acher Van Garderen, E.R.M., Campbell, B. (2014) Reconceptualising adaptation to climate change as part of pathways of change and response. *Global Environmental Change*, 28, pp.325-36.

Wittmayer, J., Schapke, M., van Steenberger, F., Omann, I. (2010) Making sense sustainability transitions locally: How action research contributes to addressing societal challenges. *Critical Policy Studies* 8 pp.465-85.

World Bank (2013) *Quality education count for skills and growth*. Caribbean Knowledge Forum Series: Caribbean Growth Forum, World Bank LAC, June 2013.

World Bank Group (n.d.) CO2 emissions (metric tons per capita) by country and globally.

Available at: [http://data.worldbank.org/indicator/EN.ATM.CO2E.PC?year\\_high\\_desc=true](http://data.worldbank.org/indicator/EN.ATM.CO2E.PC?year_high_desc=true)

[Accessed on 29/07/2017]

World Bank Group (n.d.) St. Vincent and the Grenadines: Climate Change Knowledge Portal

Available at: <http://data.worldbank.org/country/st-vincent-and-the-grenadines> [Accessed on 01/10/2017]

World Bank, (2005) *Children and Youth: A Framework for Action*, World Bank, Washington DC, USA pp.7-21.

World Bank, (2007) *World Development Reports 2007: Development and the next Generation*, World Bank, Washington DC, USA.

Yin, R. K. (2003) *Case study research: Design and methods* (3rd Ed.). Thousand Oaks, CA: Sage.

Yohe, G.W., Lasco, R.D., Ahmad, Q.K., Arnell, N.W., Cohen, S.J., Hope, C., Janetos, A.C., Perez, R.T. (2007) Perspectives on climate change and sustainability. In: M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden, C.E. Hanson, (Eds.) *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University

# 10. Appendices

## *10.1 Appendix I: Analysis of the TCMP by utilising the Cultural web (Top-down approach)*

TCMP would have to change its current way of doing business by instituting strategies to change its culture if it intends to impact on the livelihoods of stakeholders in the Southern Grenadines. The concept of the cultural web is useful to present an analysis of the TCMP as a way to analyse how an organisation actually behaves (Johnson and Scholes, 2002, David, 2005). It is interesting to note that although TCMP has a flatter organisational structure and a simple way of doing business it still contains elements of a role culture (Handy, 1986). There are strong elements of the organisation being bureaucratic, conservative, mechanistic, and hierarchical, and adherence to authority is emphasised. The main problem facing the TCMP is that the staff works within the narrow tasks outlined in their job description rather than taking the initiative to address any issue that appears to be challenging or outside of their scope of work. The culture of the TCMP presents the following features:

### **10.1.1 Stories**

The stories in the TCMP emphasise the failure and negative experiences of persons who survive the organisation. The emphasis is on individualism and not teamwork. Like other public entities, some stories promote messages that discourage persons from doing an honest job for honest pay.

### **10.1.2 Routine and Rituals**

Employees are concerned with performing their day-to-day chores. Although a flatter organisation exists when compared to other public entities there is still incidents of a blame culture existing in TCMP. Recruitment of persons in the TCMP is mainly as a result of their qualification and competencies. However, there is a tendency for political affiliation to have some weight. Although staff has seen the value of sharing information, there is still the tendency to hoard information by some staff members.

### **10.1.3 Symbols**

Symbols are not a major area of focus for staff at TCMP. Although employees view the TCMP as an institution where jobs are provided for life, they are, to some extent, hesitant and uncertain of this notion, specifically due to its heavy dependence on tourism which is currently negatively affected due to the uncertainty of the global financial system and the impact of climate change.

### **10.1.4 Power structure**

Power is mainly concentrated in the hands of the policymakers from Kingstown, Chair of the Board of Directors and the manager of the organisation. It is also concentrated in the hands of those officials who possess special expertise.

### **10.1.5 Organisational structure**

Although TCMP is much flatter when compared to other public entities staff are of the opinion that it still possesses aspects of being rigid, conservative and hierarchical. Information and power flow mainly from top to bottom.

### **10.1.6 Control**

The Auditor's and financial reports are the main systems of control in the TCMP. The exertion of control by Senior Managers over staff is a key feature of the culture. Recruitment, selection, orientation and appointment procedures/processes are structured to maintain a cycle of dependency, which gives rise to practices of laziness and low levels of performance.

### **10.1.7 Paradigm**

The TCMP is viewed by staff as an 'important government body' which possesses the potential to enhance the livelihoods of persons living in the Southern Grenadines. However, the staff is quite committed to making the organisation a positive change for good. The organisation lacks the capacity and resources to create such changes thus enabling it to achieve its full potential.

For such changes to be successful, they must be implemented as part of a continuous process (Johnson and Scholes, 2002, David, 2005) and owned by the employees (stakeholders) themselves (Bernick, 2001).

## 10.2 Appendix II: Questions used during the Focus Group discussion with Youth

|   |  |
|---|--|
| 1.1.1.1.1 ID                                      |  |
| TVET Centre,<br>Secondary Schools<br>Youth Groups |  |

Research on the impact of Climate Change on youth in small island communities

Focus Group Discussion: Youth

1. Do you consider Climate Change to be a threat/risk to your community/island? If yes, why do you consider it a threat/risk?

Probe: Deduce from youth whether they think Climate Change is a threat. Determine the reasons for their consideration and the extent of threats to their existence on the island states?

2. What were the specific impacts of Climate Change risks on your community/island over the past 5 years?

Probe: Extract information on the impact of Climate Change caused by the following: a) weather systems, e.g. increases in wind speed (hurricanes on housing, livelihoods, health etc.), b) sea level rise (increases in sea surges and high tides etc. on coastal communities.), c) temperature changes (its influence on rainfall, drought, livelihoods etc.) and d) Invasive species and diseases (their impact on health, agriculture, tourism etc.). Find out how these changes are impacting on their overall health, housing and livelihoods etc. specifically in areas such as agriculture, tourism and fisheries over the past 5 years.

How has Climate Change impacted the:

- a) Natural environment
- b) Social and community life

c) Employment and livelihoods (tourism, agriculture, Fisheries

d) Infrastructure including roads, housing, water supplies, electricity etc.

3. In light of the impact of Climate Change on the island identified above, how has it impacted on the lives of youth?

Probe: Deduce information from youth on the impact of Climate Change on the various aspects of their lives (as listed above – health, housing, livelihoods). Information on how Climate Change is impacting on their lives and the extent of such impact.

4. What was the level of response of the members of the community (key stakeholders) to address the Climate risks challenge?

Probe: Find out how the various stakeholder groups ((a) Members of your family, b) Governmental agencies, c) Community groups and networks) responded to resolve the Climate risk problems encountered? What did they do to resolve the risks and the effectiveness of the actions taken?

5. Did youth participate in making decisions on the type of programmes/activities implemented to resolve climate threats/risks? If yes, state how they participated in making decisions to address the climate risks issue?

Probe: Identify the decision making roles played by youth during the Climate risk period. What decisions were made? What were the actions were taken and the outcomes of these actions? Did they contribute to saving lives and made life on the island more comfortable in the time of disaster?

6. During the period of Climate risks, did your community receive assistance from organisations outside the community to deal with the Climate threats/risks? If yes, what role did youth play in facilitating these contacts?

Probe: Assess information on whether support to communities was received, the extent of the support provided and who was responsible for providing such support. What was the role of youth in facilitating contacts with agencies providing such support and whether assistance was provided to where it was most needed?

7. What knowledge did you use to address the Climate risks and vulnerability affecting your community?

Probe: Identify the specific knowledge used by youth to address the Climate risks and vulnerability problem faced by the community, e.g. hurricanes, sea surges, drought, heavy rains, diseases and invasive species affecting health, tourism and agriculture? How did they use the knowledge to resolve the problem? Whether youth possess such knowledge before the Climate risk disaster? Where and how this knowledge was acquired?

8. What skills did you use to address the Climate risk and vulnerability affecting your community?

Probe: Identify the specific skills used by youth to address the Climate risk and vulnerability problem faced by the community, e.g. hurricanes, sea surges, drought, heavy rains, diseases and invasive species affecting health, tourism and agriculture? How did you use the knowledge to resolve the problem? Whether youth possess such skills before the Climate risk disaster? Where and how such skills were acquired?

9. How do you see the effects of Climate Change changing over the next 20/30 years?

Probe: Deduce information from youth how they view the impact of Climate Change in the next 20/30 years? How are they preparing to deal with Climate Change in the future, and what new skills and knowledge will be required for them to effectively build capacity to address Climate Change risks in the future?

10. What skills and knowledge should be provided to enable youth to create sustainable employment and livelihoods in the future, specifically in areas of agriculture, tourism and fisheries to enable them to build their capacity to address Climate Change risks in the next 20/30 years?

Probe: Identify the specific skills and knowledge needs required by youth to acquire sustainable employment and livelihoods in the next 20/30 years.

11. What has been done to prepare youth to develop appropriate employment/livelihoods to adapt to Climate Change threats/risks for the next 20 years?

Probe: The country already has high unemployment among youth estimated at over 50% - access youth views on the employment and livelihoods needs in the future to adapt to Climate Change. Assess their views on whether they are being provided with adequate



training (skills and knowledge) to meet future employment needs. What is being done to provide these needs and what support would be necessary to enable youth to meet their employment needs in the future?

12. Are you satisfied with the level of skills and knowledge provided to youth in schools, colleges and other training programmes to enable them to build the capacity to address Climate Change risks?

Probe: Request youth to express their views on whether they are satisfied with the skills and knowledge on Climate Change provided in schools, colleges, Adult and Continuing Education programmes, and via mass media (radio, TV and internet). Deduce their views pertaining to the quality of content, methodology, resources (human and material) and curriculum of the programmes provided.

13. What are the current Climate skills and knowledge provided in schools, colleges etc. that should be preserved for future use to enable youth to build resilience to respond to Climate Change threats/risks?

Probe: Find out what are the knowledge, skills and practice currently provided in schools and other institutions that should be preserved, those that need to be thrown out and new knowledge and practice that should be introduced.

14. What are the gaps/barriers in knowledge, skills, practices (methodologies) and resources which are provided in relationship to those which need to be offered in schools, colleges and other training programmes to enable youth to develop sustainable employment/livelihoods to adequately prepare them and build their capacity to create decent jobs in the next 20/30 years?

Probe: Identify the gaps/barriers in overall training provision namely in the area of skills and knowledge to enable youth to develop sustainable employment/livelihoods to adequately prepare them to create decent jobs/employment in the future?

15. What can be done to improve how these skills and knowledge are imparted to youth?

Probe: Further explore the strategies, resources (human and financial) and methodologies used to prepare/train youth; effectiveness of these strategies and methodologies; what can be done to enhance the skills and competencies of the

trainers/officials who are responsible for providing the training, and identify the other aspects of the training provided that can be enhanced/improved e.g. content of training - knowledge and skills.

16. What role should Community/youth organisations and social networks play in making youth more responsive to build their own capacity to address Climate Change risks and vulnerability?

Probe: The effectiveness and roles of the organisations and networks within the communities to enable youth to build capacity to address Climate Change risks. The focus is on getting youth to share their own/specific experiences/cases in the past, indicating/highlighting areas of successful outcomes and identify how these successes can be used to build resilience in 20/30 years.

17. What do you think can be done to improve the overall development of Climate Change education and training to make them more effective to prepare youth to build the capacity to adapt to Climate Change in the future?

Probe: Make recommendations to enhance the capacity of youth to adapt to Climate Change.

*10.3 Appendix III: Questions used during interviews with Policymakers and Senior Officials*

| 1.1.1.2.1 ID                                      |  |  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|--|
| TVET Centre,<br>Secondary Schools<br>Youth Groups | <table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> |  |  |  |  |  |  |  |
|   |  |  |  |  |  |  |  |  |

Research on the impact of Climate Change on youth in small island communities

Interviews with Policymakers and Senior Officials

1. Is Climate Change an important issue for your country?
2. How is it likely to affect your country?
3. How is it likely to affect youth now and in the future?
4. How are its effects likely to change in the future?
5. What knowledge would be required to enable youth to deal with these changes?
6. What skills would be required to enable youth to deal with these changes?
7. How are youth being prepared to deal with risks and challenges associated with climate change in the future (20/30 years)?
8. Are you satisfied with the level of skills and knowledge provided to youth in schools and colleges to enable them to build their capacity to address climate change in the future?
9. What needs to be done to improve how knowledge and skills are delivered in education and training to enhance youth capacity to adapt to climate change?

10. What are the gaps/barriers in education and training that will limit youth to develop sustainable livelihoods which will prepare them and build their capacity to create decent green jobs in the next 20/30years?
11. What roles should community/youth organisations and social networks play in making youth more responsive to build their capacity to adapt to climate change in the future?
12. What policies and practices relating to education and training exist on the island to enable youth to build resilience to adapt to climate change?
13. What can be done to improve the overall development of climate change education and training to make the education system more effective to prepare youth to be more resilience to adapt to climate change in the future?

**10.4 Appendix IV: Colleges, TVET Centre and Groups participating in the Focus Group Discussion (FGD)**

| Code | Name of Institutions   | Description of institutions   |
|------|--|---|
| X1   | Campden Park Technical Vocation Centre                       | A technical vocation Training Centre located on the leeward side of the island about 2 miles from Kingstown, the Capital  |
| X2   | Barrouallie Technical Vocation Training Centre               | A technical vocation training centre located in the rural town of Barrouallie in the Central Leeward constituency   |
| X3   | The St. Vincent and the Grenadines Teachers Training College | A college responsible for the training of teachers is located in the Glen on the windward side of the island, approximately 4 miles from Kingstown, the Capital. It is affiliated to the School of Education of the University of the West Indies and is a member of the network of colleges of St. Vincent and the Grenadines Community College. |
| X4   | The St. Vincent and the Grenadines School of Nursing         | A college responsible for the training of nurses is located in Kingstown, the capital. It is affiliated to the University of the West Indies and is a member of the network of colleges of the St. Vincent and the Grenadines Community College.  |
| X5   | North Leeward Climate Change Group                           | A youth organisation located in the rural town of Chateaubelair dedicated to raising awareness and taking actions on CCA.   |
| X6   | Georgetown Technical Vocational Training Centre              | A technical vocation training centre located in the rural town of Georgetown in the Central Windward Constituency. It is 20 miles from Kingstown the Capital.   |

| Code | Name of Institutions  | Description of institutions  |
|------|---|--|
| X7   | Unattached Youth from North<br>Windward community of<br>Georgetown. | A group of unemployed and marginalised youth brought together solely to participate in the research.   |
| X8   | Kingstown Technical Vocation<br>Training Centre                     | A technical vocation training centre located in Kingstown the capital, providing livelihoods training for youth from Kingstown and its environs.   |
| X9   | St. Vincent and the Grenadines<br>Technical College                 | A college for the training of young people in technical areas which lead to livelihoods in the technical fields. It is located in Arnos Vale, a mile and a half from Kingstown the Capital. It is a member of the network of colleges of the St. Vincent and the Grenadines Community College. |

**10.5 Appendix V: Code for Policymakers and Senior Officials participating in the Interview**

| Code | Description of Interviewee  |
|------|---|
| Y1   | Senior Public Servant with 15 years in Policy formulation and implementation on environment, forestry and conservation issues. An ecologist by training.  |
| Y2   | Senior Public Servant with 35 years' experience in developing and implementing policies on agriculture  |
| Y3   | Retired Senior Public Servant with over 35 years' experience in developing and implementing development policies. He had responsibility for managing the Office of the Prime Minister. Presently Chair of a major civil society agency. |
| Y4   | Public Servant with responsibility for the national school safe programme and the integration of CC into the school curriculum.   |
| Y5   | A Senior Public Servant with over 25 years' experience in the development and implementation of policies on forestry and conservation of biodiversity.  |
| Y6   | Former Senior Minister of Government with over 15 years of experiences in the development and formulation of policy for the tourism sector CEO of the National Tourism Authority.   |
| Y7   | A Senior Minister of Government with responsibility for the formulation and implementation of government's education policy. A retired Senior Public Servant with over 30 years' experiences in policy development.                     |

| Code | Description of Interviewee  |
|------|---|
| Y8   | A Senior Minister of Government with over 10 years' experiences in developing and implementing policies for social development.   |
| Y9   | Senior Public Servant with over 25 years' of experiences in policy development and implementation in Climate Risk and Disaster preparedness. Now working as a foreign diplomatic. |
| Y10  | Senior Public Servant with over 25 years in developing and implementing Education policies and strategies. Has responsibilities for curriculum development.                       |
| Y11  | Senior Public Servant with over 10 years of experiences in formulating and implementing policies in education. Has responsibility for Adult and Continuing Education Division     |
| Y12  | Senior Public Servant for over 12 years working on Disaster Preparedness programme with responsibility for the development and implementation of climate risk, disaster policies. |
| Y13  | CEO of the main private sector organisation who possesses over 10 years of experiences in policy formulation for businesses development and the economic sector.                  |
| Y14  | Junior Minister of Government with responsibility for Education. She has worked on the formulation of the education policy.   |
| Y15  | Senior Public Servant with over 10 years of experiences developing programmes for the Climate Change Unit.  |
| Y16  | Senior Public Servant with responsibility for the formulation and implementation of policies on youth development.  |



**10.6 Appendix VI: Strengths Weaknesses Opportunities and Threats on JEMS capacity building for youth to adapt to climate change**

| Strengths  | Weaknesses  |
|--|---|
| Civil society organisation with a rich history of utilising the bottom-up participatory approach to address climate change and environmental issues                          | The organisation operates a 100% voluntary basis. It does not have any full-time staff, nor sustainable financial resources to sustain its work. It operates mainly on project funds.   |
| A cadre of youth volunteers and community leaders who are skilled and committed to working with communities to build their capacity to adapt to climate change.              | It has mobilised financial resources to support its work in the community, but these resources are restricted to the projects they were raised for.   |
| Possess skills in project development and resources mobilisation which enable them to access financial resources from international donors to implement CCA projects         | The organisation may experience difficulties in delivering more complex and longer timeframe CCA projects due to the lack of technical and financial support within these communities.  |
| The organisation has established an excellent relationship with Policymakers and government agencies involved in CCA and sustainable livelihoods.                            | The absence of financial resources to cover transportation and other costs for youth to conduct voluntary work in communities may affect how long these youth would be available to implement CCA projects in communities.        |
| Utilised popular theatre and various cultural art forms to mobilise the members of the community to participate in climate actions and enhancing awareness building          | The absence of a designated bottom-up monitoring and evaluation framework at the community level to assess the impact of performance of the project would hinder the community from seeing the wider picture of the CCA projects. |
| Utilized its networks to access experts from within and outside of the island to assist with the implementation of its Climate Change Adaptation work at the community level | Due to lack of capacity of CBO, if these organisations are left on their own, they may experience difficulties when implementing CCA programmes at community level.   |

| Opportunities   | Threats   |
|---|---|
| <p>Develop and implement innovative Trust Fund to ensure the availability of sustainable financial resources to fund CCA projects.</p> <p>Employing full-time staff with expertise to implement sustainable CCA projects.</p> <p>Advocate on behalf of community and lobby government to develop appropriate CCA policies, mainstreaming of Climate Change policy across sectors and the integration of Climate Change Education in the education curriculum.</p> <p>Continuous strengthening of the institutional capacity of JEMS through enhancing its planning, strategic programme, and monitoring evaluation systems</p> <p>Provides opportunities for youth and community leaders to strengthen their national, regional and international networks through working collectively to build their capacity to adapt to climate change.</p> | <p>The reluctance of the residents and community leaders to utilise their limited time to participate in CCA actions rather than dealing with more pressing issues.</p> <p>Government lacks the political will, technical and financial resources to implement CCA projects at community level.</p> <p>The absence of a national CCA policy to provide guidance on the scope and strategies to develop CCA actions.</p> <p>The absence of a legally binding climate change agreement which limits the emission of greenhouse gases and provides penalties for countries to comply with the Climate Change agreement.</p> <p>Difficulties of mobilising financial and technical resources from international donor organisations to support CCA projects</p> |

**10.7 Appendix VII: Climate change vulnerability codes and youth development merged:  
Analysis of climate change NVivo codes and youth development theme**

Theme: Climate Change: CC; Community: Com; Youth Preparedness: YP; Change Enabler: CE

| <b>NVivo Nodes/Codes</b>                  | <b>Theme/s that apply to codes</b> | <b>Description &amp; definition of codes from the stakeholders perspective</b>  |
|---|------------------------------------|---|
| Actions to be taken                       | CE                                 | Activities to reduce the impact of climate change on youth and community  |
| Adaptation                                | CE                                 | Adjustments to the impact of climate change   |
| Adaptation practices                      | CE                                 | Actions to reduce the impact of climate pressures on community  |
| Advocating of sustainable practice        | CE                                 | Promotion of activities that conserve the environment   |
| Balanced development                      | CE                                 | Reflects awareness of wholeness, sustainable development  |
| Basic CC knowledge                        | CC, CE, YP                         | Acquisition of information and skills to survive related CC situations  |
| Beach erosion                             | CC, Com                            | Removal of sand from the beach and coastal areas  |
| Building youth and community organisation | CE, YP, Com                        | Development of groups at the community level to assist young people to develop into responsible citizens              |
| Capacity building                         | CE                                 | Providing opportunities for young to enhance skills and skills in leadership and their overall development            |
| CC at all levels of the education system  | CE, YP                             | Integration of climate change in the education system and curriculum  |
| Change Enablers                           | CE                                 | Strategies to enable and facilitate positive change at community and national levels                                  |
| Changes in weather patterns               | CC                                 | Seasonality changes (climate, temperature etc.) can hinder gestation, fruiting and harvesting periods in agriculture. |

|                              |             |   |
|------------------------------|-------------|---|
| Climate Change               | CC          | Changes in the climate or weather patterns of a region of a country   |
| Coastal regions              | CC, Com     | Areas that are located on the coast or found on coastal areas   |
| Community                    | Com         | An area where a specific set of people lived; multiple populations occupying the same spacial and temporal area   |
| Exclusion of culture         | Com         | The way of life and customs of a set of people from a specific area not taken into consideration in actions   |
| Community as classroom       | Com, CE     | Various aspects of the village and overall life in the community should be used to training youth on various aspects of sustainable development         |
| Community organisation       | Com, CE     | Groups, collective and other entities which are form by members of a community for the purpose of working collectively to develop that community        |
| Community pressures          | Com         | Anything that causes problems/negative impact on a community, calamities within a community   |
| Confusion in fruiting season | CC          | Anything that caused disruption to the fruiting season of plants, i.e. causing plants not to produce fruits during the designated fruiting season       |
| Conservational practices     | CE, CC      | Activities and actions are taken to preserve aspects of the environment   |
| Coral bleaching              | CC, Com, YP | Disease infesting corals causing the death of coral   |
| Coral reefs                  | CC, YP      | An expanse of an area in the sea with a sing or a variety of coral. Home to rich searches of marine life that is attractive to local and tourist alike. |
| Crop damage                  | CC, Com     | The negative impact of drought and diseases on crops and how it is affecting food security  |

|                                    |             |  |
|------------------------------------|-------------|--|
| Deforestation                      | CC, Com     | Awareness of how humans are destroying the rainforest and its negative impact on water supplies  |
| Delivery of content and skills     | CE          | Utilising various innovative strategies to provide access to knowledge and skills to youth in the classroom  |
| Destruction in societal integrity  | Com         | Forces and factors which prevents a society and/or community to live together  |
| Destruction of the banana industry | CC, YP, Com | Refers to climate stressors/pressures which devastated the banana industry   |
| Destruction of infrastructure      | CC          | Refers to the negative impact of climate change on bridges, roads, electric power grids/facilities, water systems etc.   |
| Destruction of natural resources   | CC          | The indiscriminate clearing of forests, mangrove swamps and other natural resources to construct hotels, grow crops or plant marijuana and other cash crops. Also involves dynamiting of coral reef and the clearing of mangrove and other coastal defences to construct tourism facilities. The dumping of garbage into rivers and sea. |
| Development of CCE in communities  | Com, CE     | Implementing community training as part of climate change literacy/ education  |
| Disaster preparedness plans        | CE          | Building the capacity of community through provision with skills and knowledge on natural and climatic disasters.  |
| Disconnect                         | Com, YP     | Separation or absence of links between Climate Change challenges and how youth are being prepared to deal with such issues.  |
| Diversification                    | CE          | The state of developing and implementing a range of strategies/practices and models to enhance/sustain progress.   |
| Drought                            | CC          | Sustained dryness of the soil, lack of precipitation (rain, snow, dew) for a period of time.   |

|  |         |   |
|--|---------|---|
| Drought and disease resilient crops                        | CE      | Creation of crops able to withstand extreme droughts and diseases; new forms of crop engineering to produce new crops or to enhance existing ones |
| Early warning technologies                                 | CE      | Use of technology to warn communities of approaching climatic and natural disasters   |
| Energy efficiency  | CE      | Utilisation of energy for sustainability means  |
| Engage in community self-help                              | Com, YP | Volunteering at community levels to develop and implement projects which benefits the whole community or sections of the community                |
| Enhance effectiveness / responsiveness of Education System | CE      | Development of strategies in the education system to make it more efficient and relevant to the development needs of the country                  |
| Enhance teaching methodologies                             | CE      | Improvement in how teachers deliver knowledge and skills to learners  |
| Enhanced food production                                   | CE      | Systems and strategies to improve how crops are grown and harvested.  |
| Enhanced green architecture and design                     | CE      | Development and implementation of environmentally friendly building, energy efficient design.   |
| Enhanced rights of citizens                                | CE      | Protection and practice to uphold basic human rights.   |
| Enjoyed voluntary service                                  | Com, YP | Pleasure engaging in volunteering work with less privileged and marginalised people   |
| Facilitate youth training                                  | YP, CE  | The act of training young people in various aspects of development for the creation of active and autonomous leaders                              |
| Flooding and landslides                                    | CC      | Overflowing of rivers causing communities to wash away and slippage of land due to heavy rains and storms.  |
| Food efficiency  | Com, CE | Producing enough food locally to feed the population  |

|                                      |             |   |
|--------------------------------------|-------------|---|
| Food security                        | CC, CE      | Ability to produce enough food over a sustained period of time  |
| Gap in knowledge                     | Com, YP     | Not enough or a lack of basic knowledge and skills on a specific subject or area of interest/work.  |
| GIS mapping                          | CE          | Utilising geographic information system (technology) to develop risk mapping of a particular area as a means of predictive assessment   |
| Governmental control                 | Com, CC, YP | Utilising laws and regulation as a way of controlling people  |
| Harmony                              | Com, CE     | Art of getting people to work together and cooperate  |
| Hotter air on earth                  | CC          | Increase in warmer surface air due to rise in temperature   |
| Human Interference                   | CC          | Destruction of the environment and increase in the impact of climate change due to illicit human actions  |
| Identifying areas prone to disasters | CC, Com     | Utilising participation in mapping exercises and other popular strategies to identify areas that are susceptible to natural disasters and climatic risk   |
| Illegal crop trades                  | CC, YP, Com | The action of growing and selling of marijuana is illegal in SVG; those that do also destroy surrounding areas of natural forest for land to grow the plant.  |
| Implementation of national CC policy | CE          | Developing of implementing climate change policy across the island.   |
| Inclusive education                  | CE          | Developing a comprehensive, wide-ranging and all-inclusive education process that involved all stakeholder whether disabled, the poor and marginalised sectors of the society.                                      |
| Increase in aerosols - dust          | CC          | Increases in dust, insecticide particles etc. in the atmosphere resulting from stronger winds and misuse which increases surrounding atmospheric temperatures as well as harming human and environmental wellbeing. |

|                                 |             |  |
|---------------------------------|-------------|--|
| Increase in storm frequency     | CC          | More ferocious storms sustaining wind at 150-300 miles per hour  |
| Increase in storm intensity     | CC          | A larger body of storms travelling over multi islands states across the Caribbean region   |
| Increase in unemployment        | CC, YP      | Persons losing jobs or out of paid work are in the increase as the impacts of CC have either disestablished their livelihoods or their reduced fitness from the effects of new diseases.   |
| Increase in weather sporadicity | CC          | Drastic weather changes are occurring at any time during the years rather than during the hurricane season with little predictive power.   |
| Increased hardships             | Com, YP, CC | Poverty and hardship will increase among the poor and marginalise sectors  |
| Increased mosquitoes            | CC, Com     | More people will be affected with increased mosquito-related diseases such as Zika, Malaria and haemorrhagic fevers  |
| Increased poverty               | CC, Com, YP | Climate change resulted in increased in poverty; the rise in temperature and drought would reduce the productivity of crops  |
| Increased rainfall              |             | Changes in weather patterns resulted in heavier rainfalls for a short period; rain falls outside of rainy season more often.   |
| Increase in waterborne diseases | CC, YP      | Due to an increase in flooding due to heavier rainfalls coming for a shorter period, increases in rats, mosquitoes and other vectors have enhanced the infectivity of related diseases. Affects the health and well-being of youth and compromised persons, e.g. elderly and disabled. |
| Infrastructure exposure         | CC          | Climate change impacts negatively on infrastructure, destroying bridges, roads, water systems and electrical grid facilities. Extremely difficult for SIDS to replace due to the   |



|   |             |  |
|---|-------------|--|
|   |             | costs.   |
| Innovation in sustainable livelihoods           | CE          | Strategies for enhancing existing and emerging livelihoods specifically in areas of agriculture, fisheries and tourism and other areas. Use of technologies to create livelihoods for the future.      |
| Integration of local knowledge and technologies | CE          | Recognising, valuing and utilising knowledge, skills and technologies at the community level and use them to develop sustainable models in livelihoods, food production and enterprises in the future. |
| Integration into sectoral policies              | CE          | Development of climate change policies and practices and its incorporation into other policies and programmes  |
| Integration of CC in Education                  | CE          | Creating the enabling conditions for climate change knowledge and content to be incorporated in the school curriculum and the broader community: a Climate Change literate society.                    |
| Integrations in livestock production            | CE          | Developing new and sustainable practices in livestock production as a means of improving food production and security  |
| Invasive species and diseases                   | CC, Com, YP | Disease caused by climate change. The emergence of new diseases new to the area and the increased severity of existing diseases due to the worsening impact of climate change.                         |
| Investment in human development                 | CE          | Investing in training and capacity development by providing skills and knowledge to youth to enable them to adapt to climate change  |
| Irrelevant Education                            | YP          | Education and skills that do not meet the needs of the people, nor prepare them to deal with the future impact of  |

|  |             |   |
|--|-------------|---|
|  |             | climate change  |
| Irrelevant skills and knowledge        | YP          | Skills and knowledge that are not appropriate to prepare youth for life and living in SIDS  |
| Knowledge management                   | CE          | Effective handling of information and knowledge and use them to benefit development within the community society  |
| Lack of trained leaders or experts     | YP          | Community leaders do not have the appropriate skills and knowledge to enable them to motivate and mobilize people to deal with the impact of climate change |
| Lack of insurance                      | CC, Com     | No insurance available to cover small business against climate pressures such as hurricanes, drought, etc.  |
| Lack of investment                     | Com, YP     | Reduction of funding in areas relevant to youth development, e.g. in education and training, employment etc.  |
| Lack of preparation for youth          | YP          | Limited funding and technical resources available to adequately prepare youth to adapt to the impact of climate change                                      |
| Limited dialogue and action            | Com, YP     | Inadequate opportunities exist for consultation, exchanges of views and actions on climate change within a community  |
| Local knowledge/ indigenous technology | CC, Com     | Appropriate machinery handed down through the generations which are still in use within a particular community.   |
| Loss of income                         | CC, Com, YP | Youth and community lose their livelihoods due to the severe impact of climate change on agriculture, fisheries, tourism and other economic activities      |
| Low community capacity                 | Com         | Community lacks basic knowledge and skills to enable it to effectively adapt to climate change.   |

|  |             |   |
|--|-------------|---|
| Mainstreaming of policy                    | CE          | The realisation of climate change perspectives into preparation, design, implementation, monitoring and evaluation of policies, spending etc. programmes with a view to promoting adaption and sustainable development. |
| Mangrove destruction                       | CC          | The clearing of mangrove swamps to build tourism residencies and other development projects.  |
| Mangrove swamps                            | CC          | Wetland locate on coastal areas which act as a filter for affluence entering the sea, provision of food for fishes and as a barrier for preventing the sea from eroding the coast                                       |
| Minimal organisation; dysfunctional groups | Com, YC     | The youth groups and community organisation that exist in communities are not functioning to influence positive changes within communities  |
| Minimal understanding of CC                | Com, YP, CC | Persons are not climate change literate. Youth and the general public possess too limited information on climate change to enable them to take effective action   |
| Movement directed by and for youth         | CE          | Youth creating institutions which empowers them to take control of their future development   |
| Negative impacts                           | CC          | Stunted growth and development. Scared all areas of the physical environment  |
| Negative impacts to the economy            | CC, Com, YP | Climate change damages on all aspect of the economy of SIDS   |
| New CC policy                              | CE          | Development of a national policy on climate change  |
| No choice                                  | CC, YP      | Governmental control of all decision. Youth voices are not being heard nor respected  |
| No inclusion of CCE                        | YP          | Climate change education is not included in the school curriculum. Youth are not taught about climate change in schools   |

|  |         |   |
|--|---------|---|
| No mechanism to build resilience             | Com, YP | No measures in place to enhance the capacity of youth and their communities to adapt to the impact of climate change                              |
| No satisfaction                              | YP      | Citizens are not happy with authority (central and or local government authority) and how they dealt with issues such as climate change education |
| Opportunity for decision making              | CE      | Creation of enabling an environment for youth to participate in making a decision on community and national issues                                |
| Organic farming practices                    | CE      | Agriculture farming practices which do not use chemicals such as pesticides and herbicides and non-organic manures.                               |
| Organisation of group                        | CE      | The setting of youth and community groups   |
| Participation in decision making             | CE      | Collective decision-making process involving all stakeholders. Working together in partnership  |
| Partnership                                  | CE      | Working in collaboration with other stakeholders  |
| Perspectives on the impact of Climate Change | CC      | Diversification and variations in views, perceptions and outlook on the impact of climate change  |
| Physical effects of CC                       | CC      | Observable scale of climate change pressures on community   |
| Political influence                          | Com, YP | Ability to effect governmental decision and shaping policies and programmes.  |
| Poor equipment                               | Com, YP | Irrelevant tools, poor quality tools and equipment. Non-functioning items   |
| Power to take action                         | CE      | The motivation and confidence to take action to resolve any issues/risk/challenge   |
| Preparedness of youth                        | CE, YP  | Strategies or actions to prepare youth to respond positively to a threat or risk. Activities to get youth ready                                   |

|                                 |         |  |
|---------------------------------|---------|--|
| Proactive and responsive action | CE      | Pre-emptive, practical response by youth in response to a problem, risk and vulnerability  |
| Provision of assistance         | CE      | Aid, relief and other forms of support provided to youth and communities to build capacity and empower them to shape their own development. This can be in the forms of skills training, financial support, equipment, technical assistance, internship etc. |
| Rainforest                      | CC, Com | Strands of tropical woodland that attracts rain clouds and contain high levels of biodiversity.  |
| Raising awareness               | CE      | Strategies/activities to raise the knowledge of youth on climate change and other development issues that affect the community   |
| Redesigning career programmes   | CE      | Development of new education and training development programmes which focus on sustainable livelihoods  |
| Reduced fitness                 | YP      | Destruction of recreational facilities on coastal areas due to sea level rise and flooding reduces the area for youth to exercise. The emergence of lifestyle diseases such as diabetes  |
| Reduced food supplies           | CC, Com | Drought, poor farming practices, poor soil quality and prevalence invasive species, and disease contribute to a reduction in food supplies   |
| Reduction in water resource     | CC, Com | Deforestation of rainforest due to farming contributed to the reduction of the fresh water source. Illegal farming of marijuana is the main contributor  |
| Reduction of fisheries          | CC      | Coral bleaching, overfishing and warming of ocean waters, caused fish to contribute to the reduction of fish stock. Fishes travel further out of the sea in search of food   |
| Reduction of water quality      | CC, Com | Due to the illegal dumping of garbage in the water catchment area, deforestation and over the use of   |

|  |         |   |
|--|---------|---|
|  |         | pesticides there is a reduction in the availability of fresh water on the island  |
| Relationship with MDGs and CCA+M         | CE      | Ensuring that Climate change adaptation is linked to the achievement of millennium development goals as a way to ensuring future sustainability             |
| Retention of innovative growth practices | CE      | Strategy to ensure that SIDS continue to put measures in place to utilise technologies and knowledge to sustain economic growth and wellbeing in the future |
| Rights-based education                   | CE      | A type of Education which is inclusive and considers the right of the child.  |
| Rise in temperature                      | CC      | Rise in temperature due to excess greenhouse gases going into the atmosphere. GHG contribute to the disruption of weather patterns.                         |
| Rough Seas                               | CC, Com | Rough seas caused by storms and high tides resulted in the erosion of coastal communities as well as a reduction in the opportunities of fishing            |
| Sea Level Rise                           | CC      | The rise of sea level due to the melting of snow in the Arctic and Antarctic areas due to rise in temperature. This is severely impacting on SIDS           |
| Self-centred / selfish motives           | Com, YP | Members only think of oneself and not of projects to benefit the overall community in regards to adaptive strategies.                                       |
| Skills and knowledge of renewable energy | CE      | Skills and knowledge in build and maintaining solar electric grids, wind turbines and other forms renewable energy  |
| Soil quality                             | CC, Com | The process to sustain rich soil to produce foods. Use of mulching, contouring and organic manure helps to sustain soil quality.                            |

|                           |              |   |
|---------------------------|--------------|---|
| Strengthen cooperation    | CE           | Increase partnership and friendship among government, youth, members of the community and other stakeholders to tackle climate change and other development issues  |
| Teacher training          | CE           | Investment in teachers training in climate change literacy, methodologies and use of technology to deliver knowledge and skills to youth and the wider community  |
| Technological Innovation  | CE           | Facilitate changes in product and processes via the use of technology. E.g. creation of drought and disease resistant crops   |
| Technologies in classroom | CE           | Use of technology and other innovations in the classroom to deliver knowledge and skills in the classroom   |
| Temperature rise          | CC sub theme | The increase in Earth's average surface temperature due to rising levels of greenhouse gases long term has resulted in longer dry seasons and in turn droughts/ destroyed crop production. The effects have run off implications such as changing weather patterns, sea level rising and many others. |
| Threat                    | CC, Com, YP  | Climate change inflicts severe harms and damages to communities, i.e. threats to livelihoods, fresh water supplies and food security  |
| Tourism breakdown         | Com          | Climate change severely impacts the tourism industry reducing national revenues due to a reduction in visitors to Caribbean shores.   |
| Traditional Practices     | Com, CE      | Knowledge and skills handed down through communities through the generation. Such knowledge and skills contribute to the development and survival of their communities  |
| Uncertainty               | CC, Com      | Lack of information and knowledge on how and when climate change will impact on youth and community in SIDS   |

|                           |               |  |
|---------------------------|---------------|--|
| Unsustainable livelihoods | Com sub theme | Livelihoods that are affected by climate change pressures can no longer consistently maintain the wellbeing and quality of life of families.   |
| Use of social media       | CE            | Use of the internet and other forms of social media to enhance skills, knowledge and social development  |
| Violation of rights       | YP            | Inability to up-keep and protect basic human rights, e.g. right to proper education and sustainable livelihoods.   |
| Water flow and streams    | CC, Com       | Freshwater streams and rivers for human and industrial use   |
| Water supply              | CC, Com       | Availability of fresh water in the community   |
| Youth Empowerment         | CE            | Creating the enabling conditions for youth to develop self-esteem, self-worth, confidence, ownership and make choices in the development at community and national level.                            |
| Youth involvement         | CE            | Participation of youth in development activities within their respective communities   |
| Youth Preparedness        | YP theme      | Providing youth with knowledge and skills to enable them to deal with climate change and other development problems  |
| Youth unemployment        | YP, Com, CC   | Young people who are unable to find work because of lack of appropriate skills and knowledge or availability of a limited number of jobs.  |
| Youth vulnerability       | YP, CC        | Exposure of youth to risk resulting from being young and or through their process of transition, vulnerability due to unemployment, violence and drugs. Climate change worsens such vulnerabilities. |



**10.8 Appendix VIII: Reflection on positionality, which highlights the choices made by the researcher at different stages of the research process.**

| <b>Factors</b>                              | <b>Environmental Activist</b>  | <b>Research Outsider/Insider implication</b>  |
|---|--|---|
| Citizen of a Small Island Developing States | I am a citizen of St Vincent and the Grenadines and have experienced the first-hand impact of climate change. I am very passionate and motivated to use my activism to influence changes to policies, governance and practices. I actively participated in activities to build the resilience of small island states communities to adapt to the impact of climate change. | As a citizen of an island state, I am motivated to explore strategies to adapt to the impact of climate change on SIDS. Along with my PhD journey, I acquired skills and knowledge which informed the way I respond to climate change and other calamities.                                       |
| Age - An older person doing a PhD           | I started the PhD thinking that I will have the opportunity to research more innovative strategies to enhance my environmental activism. During the research process, as an older person, I realised that I possess a body of knowledge and experience that I can  | I started the PhD at the age of 56. I was very cognizant of my age, and the limited time I have available to work after completing the PhD. This motivated me to focus my energies on completing the research in the quickest time. Being a researcher and practitioner created a lot of tensions |

|                   |   |   |
|-------------------|---|---|
|                   | <p>tap into to enhance the quality of my research rather than focusing my energies on enhancing my skills as an activist.</p>   | <p>within me and influenced the way I respond to environmental issues.</p> <p>Before pursuing the PhD, I used to respond to issues based on my passion. However, during the research process, I had to recognize my role as a researcher and tried to exercise as much restraint and tack.</p>  |
| Professional life | <p>Over the years a thin line existed between my life as a professional and that of an activist. I struggled between my professional life and my activist life over the past 45 years. As early as 1975 as a teacher (16 years old) I participated in the longest teachers' strike (one month) in the history of St Vincent and the Grenadines for better working conditions. In 1990 one month after taking up a senior position as Director of Community Service with the Government of St Vincent and the Grenadines, I organised a series of marches and picketed the Office of the Prime Minister to protest the government poor environmental policies.</p> | <p>My experience of working at local, national, regional and international levels on youth, education, community and sustainable development issues in UK, Africa, Asia and the Caribbean meant I was able to draw on that body of knowledge to prepare case studies and utilize innovative data collection methodologies such as participatory mapping exercises to add value to the quality of my qualitative research work in the field.</p> |
| Practitioner      | <p>I have been involved as a youth development practitioner and environmental activist in St Vincent and the Grenadines and across the Caribbean for over 40 years. The organisation I started as a teenager - JEMS was 40 years in September</p>   | <p>Since starting the PhD in 2015, I had to exercise restraint to curb my activism tendencies. Being so close to the centre of the research process there was the possibility of increasing my own bias which could negatively influence the outcomes of the research.</p>  |

|   |   |   |
|---|---|---|
|   | <p>2018. The Caribbean Environmental Network which was established with colleagues in the 1990s was 25 years in November 2018.</p> <p>As a practitioner and activist I was I won numerous prestigious awards and recognition including the UN Global 500 Award in 1990; Goldman Environmental Prize in 1994; Partners of America award for youth/community development across the Caribbean, 1996; my Biography was included in The Marquis Who's Who in Science and Engineering in 2000 for my contribution to the protection of the environment; recognition from UN for my contribution to the development of Small Island Developing States at UN SIDS +10 meeting in Mauritius in 2004. As an Environmental Activist, I will respond to issues based on my emotions.</p> | <p>In 2015, I participated as a member of the national delegation of St Vincent and the Grenadines at the UNFCCC COP 21 in Paris, France. Having access to over 40,000 delegates and the internal chambers of the meeting was an excellent opportunity for me as an environmental activist to meet with policymaker. However, I found myself searching for empirical evidence to support my strategies when advising negotiators from CARICOM, OASIS, LDCs and G77. My colleagues who knew me as an activist thought that I was getting "soft in my older years".</p> |
| <p>The attitude of Senior officials: Verbally abused and attacked by high powered politicians</p> | <p>During my 40 years as an environment and development activist, I would always respond to every moment when I felt that my colleagues and I are being attacked and or threatened, whether by governmental officials and or officials of institutions. However, since starting the PhD, I have changed the way I responded to</p>  | <p>In 2016 when I was collecting data for the research in St Vincent, I was verbally abused by the Hon Minister of Planning and Sustainable Development on a live radio phone-in programmes discussing my research.</p> <p>As an environmental activist, I would have responded to him very brazenly (in an attacking mood), but I did not. I tried to engage him in a civil conversation on</p>  |

|  |         |  |
|--|---------|--|
|  | issues. | <p>the environmental issues facing the island and the importance of his office in creating the enabling environment to build the resilience of the people to adapt to the impact of climate change. However, the feedback from the public on the way I managed the situation was very positive</p> |
|--|---------|--|