Vulnerability to Volcanic Risk and Multiple Hazards in the Island of St. Vincent

Maria Teresa Armijos
Roger Few
DEV Reports and Policy Papers

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I. INTRODUCTION

This report presents the findings from Work Package 3 (WP3, Vulnerability) of the STREVA (Strengthening Resilience in Volcanic Areas) project’s research conducted in the communities surrounding La Soufriere Volcano in the island of St. Vincent, West Indies, Caribbean. WP3 research examines the long-term implications of volcanic activity on people’s life trajectories, wellbeing and livelihoods. In this light, WP3’s work in St. Vincent focused on understanding three aspects of vulnerability related to La Soufriere Volcano: (1) the impact of the 1979 eruption on the population; (2) the recovery process after that eruption and; (3) the population’s current vulnerability to possible future volcanic eruptions.

In order to understand vulnerability to volcanic activity in the island of St. Vincent, this research was framed within the context of multiple hazards occurring in the West Indies, where St. Vincent is located. In particular, it focused on extreme weather conditions, especially hurricanes and high rainfall leading to hazards such as flooding. Risk to volcanic hazards is therefore understood as a condition set within wider risks and framed as part of vulnerability to multiple hazards to which local residents are recurrently exposed.

This report is based on data gathered during fieldwork conducted in the island of St. Vincent between May and August 2014 and shorter visits to the country in January 2014 and March 2015. It is based on data gathered at the household level through 46 semi structured interviews, 5 group interviews (41 attendees) and a 400 household survey across the Windward and Leeward sides of the north of the island. This data has been complemented with observations during the 3-month period of field research spent in the area.

The report is divided in five sections. The first section includes the introduction, the conceptual background of the research, the methodology used for data gathering and information about the case study. The second part of the report presents WP3’ findings for the research conducted in the areas close to La Soufriere Volcano in St. Vincent. It examines the 1979 eruption and its impacts on
the population. The third part examines livelihoods in St. Vincent today. The next section looks at the current situation in terms of vulnerability to possible impacts of the volcano in the context of people’s livelihoods, knowledge about the volcano, preparedness plans and other hazards that affect these communities. The last section includes the conclusion and summary of findings.

Conceptual background

Vulnerability is commonly understood as a combination of exposure to hazard and susceptibility to its impacts. Social science research on disaster risk emphasizes that both exposure and susceptibility are to large extent socially-generated conditions, and that people have varying degrees of underlying vulnerability that tend to shape how severely they are affected when a hazard occurs.

In STREVA, the term ‘vulnerability’ is defined as a condition of human subjects – of people, households, communities – as opposed to sectors, infrastructure and/or systems. This is because, ultimately, it is people who experience the consequences of hazards on their lives, wellbeing and livelihoods. Moreover, a people-centred approach to analysing vulnerability enables a focus on how different social groups experience and manage risk in different ways. Risk, in this sense, is defined as the interaction of hazard and vulnerability. We also use the term ‘adaptation’ to describe processes of response and learning that aim to reduce vulnerability; and we use the term building ‘resilience’ to denote a process through which people’s lives, wellbeing and livelihoods become less susceptible to the impacts of hazards (or multiple hazards/stresses).

Vulnerability can sometimes be analysed or ‘read off’ as revealed by the effects of actual disaster events and how this varies for different social groups; but we can also analyse it as an inherent social condition in which we can assess the potential for exposure and susceptibility to harm.

Volcanic hazards may be brief and episodic in their violent phases, but the long duration of high-risk periods that characterize many eruptions (eg. Soufrière Hills, Merapi, Tungurahua) have complex and chronic patterns of social, economic and political impact. Like many hazards they also have long-term implications for recovery – and the ability to recover (or not) is another key facet
of people’s overall vulnerability to their impacts (and to the risks of their impacts – e.g. psychosocial effects, economic implications, etc.). This research aims at going beyond a focus purely on volcanic hazard events to seeing volcanic risk as an ongoing risk process with ongoing social impacts for the vulnerable (including implications for recovery), punctuated (and reproduced) by actual volcanic events.

WP3’s research in St. Vincent aimed at understanding, impact, recovery and current vulnerability to volcanic hazards by also looking at other hazards that repeatedly impact this island. Put in a different way, our research analyses people’s ability to recover (and potentially develop resilience) to volcanic hazards in the light of response to other events. Questions around, the degree of impact, preparedness plans, access to assistance and information could be compared between these different events and used to understand vulnerability and recovery to volcanic hazards. These other events, which directly affect people’s wellbeing and livelihoods, together with fragile social conditions, also can have a direct effect on vulnerability to volcanic activity in the long run.

Framing our research in St. Vincent within these other events was also important given that for instance, hurricanes and flooding occur with more frequency than volcanic eruptions, and could therefore also be used as an indicator of risk to volcanic activity. Various researchers have also highlighted the importance of considering multiple hazards when analysing vulnerability in the Caribbean Islands and elsewhere (Bankoff 2009; Boruff and Cutter 2007; CCRIF 2012; Ferdinand, et al. 2012; WorldBank 2010). Thus this research incorporates other events as both factors and indicators of risk to volcanic events.

**Background to the case study**

La Soufriere Volcano is located in the north of the island of St. Vincent in the West Indies. Since 1700 or the European settlement at the island, there have been 4 explosive eruptions of varying magnitude in 1718, 1812, 1902, 1979 (Robertson 1995). Although the latest eruption (1979) did not result in any casualties, the 1812 and 1902 eruptions killed 56 and 1565 persons respectively (Robertson 1995; Smith 2011). Various studies have concluded that future volcanic eruptions could
cause important impacts on the island population and infrastructure (CCRIF 2012; Robertson 1995). Although the entire island and possibly other islands in the region could be affected by ash, it is the northern areas of St. Vincent that are most exposed to different volcanic hazards such as pyroclastic flows, mud flows, ballistics and ash (Robertson 1995; Smith 2011). Thus this study focuses in the populated areas of St. Vincent north of the town of Troumaka in the Leeward and north of Georgetown in the Windward side (see map below).

Figure 1. Hazard Map of St. Vincent
In addition to the physical proximity to the volcano and in comparison to the southern areas of the island where the capital of the country, Kingstown lies, the socioeconomic condition of the north of the island of St. Vincent is more disadvantaged. The population of the three census districts of the north where WP3 work focused (Chateaubelair, Georgetown and Sandy Bay) are amongst the poorest in the island, all above the national average of poverty levels of 30%. The prevalence of poverty in these districts is between 43% and 56% of the total population. Moreover, according to the Poverty Assessment Report 2007/2008 for St. Vincent, the poor population at Sandy Bay present the most severe levels of poverty in the country (KAIRA 2008).

Research Methods

Data collection for this report was conducted using a range of qualitative and quantitative methods that included, semi-structured interviews, group interviews, a household survey, and other or casual conversations with local residents.

Interviews

A total of 46 people were interviewed using semi-structured questionnaires across 12 villages in the northern Windward and Leeward sides of the island. The sampling methodology for the household interviews was principally based on geographical proximity to La Soufriere Volcano and potential exposure to volcanic hazards from it. All interviews were conducted in the north of St. Vincent. The specific locations were chosen based on the volcanic hazard map (potential exposure to volcanic hazards) (see figure 1.) as well as population numbers for the total area in order to maintain a balanced sample size. Exposure to other natural hazards such as hurricanes and floods in addition to volcanic hazards and evacuation experienced during the 1979 eruption of La Soufriere were also considered at the moment of choosing villages.

The specific households in each village were chosen based on purposive (people who were known to have been affected by the volcano in 1979) and random (people who we visited randomly in their households) sampling methodologies. Following WP3 research aims, which try to understand long-term social vulnerability to volcanic hazard, a mix of households from different economic and social
status were chosen. Gender balance was also considered at the moment of choosing households, however most of the people that we were able to reach during the day were women (See table 1).

The work at the community level was done in coordination with the district Community Development Officers for Northern Windward and Northern Leeward and or local Disaster Group Volunteers who have a deep knowledge of all households in the area. To prevent bias in the sample, some interviews were organised privately, through contacts developed during the time spent in the villages and without the aid of the Community Development Officers or Disaster Group Volunteers.

On the Windward side the interviews were conducted in villages west and north of Georgetown. Although Georgetown is included in the red zone of the Hazard Map, it was only included in the survey, and not in the interviews. The focus was on villages that are more exposed to volcanic hazards and where less research has been conducted, comprising: Dickson Village, Langley Park, Orange Hill, Overland and Sandy Bay. The most northern communities on the Windward side, Fancy and Owia, are now also located in the red zone of the hazard map which was updated in 2015. These were included in the original research plans due to possible isolation and difficulties in case of a volcanic eruption and evacuation orders, and today they are part of the red zone areas. Other factors considered to include Owia and Fancy into the sampling design were the presence of mixed indigenous (Carib) and Black population, Garifuna and their unique social and economic history (Kirby and Martín 2004).

In total 32 persons were interviewed in the Windward side of the island. Three or more interviews were conducted in each location except for Owia (1) and Langley Park (1). However, at Owia we run a group interview with 12 people.
In the Leeward side of the island, interviews were conducted in villages North of Cumberland Bay lying on the Orange Zone of the Hazard map including Troumaka, Rose Bank, Petit Bordel, Chateaubelair and Fitz Hughes. The areas located on the Red Zone of the Hazard map for the Leeward side of the island were not included because they are sparsely populated and difficult to access both as a result of lack of infrastructure and illegal marihuana farming activities. In total, 14 people were interviewed. Three or more interviews were conducted at the household level in each location except for Petit Bordel where 2 interviews were conducted. However, we did have a group interview in this location to which 11 people attended.

Permission to do the interviews was sought from each respondent. This included a short summary of the STREVA project, an explanation of what the information would be used for, and request to tape the interview. All interviewees were given a leaflet with information about STREVA, contact information of the interviewer and explanation on the option to withdraw their responses within a month of the interview (See Appendix). Interviews were carried out in English at people’s homes, businesses or fields. Unless otherwise noted, all of the interviewee’s names mentioned in this report have been anonymised. Reference to places and a number has been given to each quoted interview.

Group interviews
In addition to the semi-structured interviews, 3 group interviews were conducted in the Windward side at Orange Hill, Owia and Fancy with an attendance of 24 persons in total. In the Leeward side of the island 2 group interviews were conducted, one at Rose Bank (6) and one at Petit Bordel (11) with a total attendance of 17 persons.
These group interviews were organised with the help of the Community Development Officers for Northern Windward and Northern Leeward and were conducted at community centres or schools at the locations mentioned above. As with the semi-structured interviews, in all of these meetings permission to record the data was sought from all attendees. Information about the project and ethical procedures was also explained.

Household Survey
In addition to the semi-structured interviews and the group interviews a survey was carried in a total of 400 households (Windward 256, Leeward 144) located in areas adjacent to la Soufriere Volcano. This survey was conducted by a team of four Field Research Assistants: Caywama Edwards, Leighton Adams, Debson Cruickshank and Osneth Cato, supervised by Allanson Cruikshank from the St. Vincent and the Grenadines Community College. The questionnaire for the survey was designed by WP3 and WP4 of the STREVA project with assistance from the local survey team (See appendix).

The survey covered a continuous area in the north of the island, comprising most of the settled areas in the red hazard zone (i.e. the settled coastal areas north of Georgetown in the Windward side). It also included communities in the Leeward side from Rose Bank to Richmond. The southern boundary of the full sampling area, and the internal division of the sampling frame, is based on census enumeration districts obtained from the Mapping Unit, Statistical Office, Central Planning Division at the Ministry of Finance & Economic Planning. The total household population of 2617
across the selected enumeration districts formed the sampling frame. The sampling area forms a continuous zone north of a line from Rosebank in the west across the interior to the northern part of Georgetown (around the Langley Park River) in the east.

The survey was applied using a random sample selection of households in each location. Prior to all the interviews, the team members explained the purpose of the survey, introduced the STREVA project and sought permission from each individual. A leaflet containing information was handed out to all of the respondents (See appendix).
II. IMPACT AND RECOVERY FROM THE 1979 ERUPTION OF LA SOUFRIERE VOLCANO

The 1979 Eruption

In April 1979 a new period of volcanic activity was initiated at la Soufriere Volcano in St. Vincent. The strongest explosions took place between the 13th and 26th of April and produced large ash plumes and small pyroclastic flows and mud flows that travelled down the valleys of the volcano slopes (Fiske 1984). This section of the report will examine how people today understand, remember and perceive what happened in 1979. Interview and survey data will be complemented by official government documents published at the time of the eruption. Focusing on all these information, it will analyse the eruption’s impact and the following recovery process.

Specifically, this section will look at five aspects of the 1979 eruption: (1) Experience of the hazard - What did people do when the volcanic activity started? How do they describe the hazards they saw and felt? (2) Evacuation - How did people evacuate? Where did they evacuate to? What kind of assistance they got from the state and other entities while they were outside their homes? (3) Impacts - what were the short term and long term impacts on people’s livelihoods and assets? (4) Recovery - What did people do to recover? (5) Lessons - What can be learned from this experience for possible future eruptions?

What did people experience in 1979?

In the morning of April 13th 1979 people living in the northern areas of St. Vincent woke up to the alarm that La Soufriere Volcano had erupted. At first many had confused the ash with rain but as the word spread and those who had experienced or heard about other eruptions particularly that of 1902, confirmed what it was the volcano. From the interviews it is clear that those living further north in the island, at Fancy, Owia and Sandy Bay in the Windward and Chateaubelair in the Leeward felt and saw the eruption first. Most people were conducting their daily morning routines, and in this particular day, which was the Friday of Easter week, baking and preparing for the celebrations.
It happened early in the morning, after 5:00 am. Most persons were asleep. It was when people smelt the sulphur that they realised it was not rain and that something was wrong. Persons started to run all over the village, calling one another, informing each other and things like that. There was a truck in the area and it was the only main transport in the area. Everybody ran inside the truck and it went to Georgetown. Up this side, persons started to see the signs from early. In Georgetown, people were ok. When persons from up here went down to Georgetown they started to wonder if persons up here were crazy. Then it was afterwards that they started to see the place getting dark in Georgetown. So they also had to evacuate further down. I remember that the truck left us in Georgetown. The truck came back to the area to take more persons. We walked from Georgetown to North Union. Then the government started to send out trucks to evacuate persons.

Woman from Overland (7)

The Good Friday [my mother] was going to the river to wash our clothes. So she woke very early at about 5:00 am. On her way going to the river, she looked up into the mountain and she saw something looking like fire. She saw how the place was looking and when she looked, she heard something like thunder again. But when the thunder rolled, she saw the fire. She came and woke us up and told us to get water. She was telling us that that is what her mother told her. Her mother saw what happened in 1902. So she now told us to gather water. So we filled a piece of barrel with water. After we had our breakfast and tea, my mother went all the way down ringing a bell and telling people to wake up and come and see your danger, the Soufriere is exploding.

Woman from Fancy (12)

It was Good Friday. It is a morning that everybody go to church. On that day we usually do cross buns. I can remember I got up and I baked the cross buns on the Friday instead of the Thursday because I like my cross buns hot. I did not have enough pans to bake the buns so I went by my aunt to get pans. When I was coming down I saw my next door neighbour and I said to her it looks like we getting some rain. She said no it is not rain, it is Soufriere. She said they told her Soufriere. We did not have many phones, so I went by my grandmother and I called a nurse by Chateaubelair, because I thought if it was Soufriere then somebody in Chateaubelair would know. And she said it is Soufriere. By the time I came out I heard vehicles coming up. People had started leaving. Everybody seemed confused.

Woman from Troumaka (35)

That morning, the Premier at the time, Milton Cato, informed over the radio that the volcano had erupted and that the government would send trucks to evacuate people. As part of these messages, pleas to keep calm were also sent. People began to leave their homes towards the south of the island as soon as they could, many walked, and others waited for or were met in their journeys by government trucks. In the Leeward side of the island, boats were also used as transport. These were both private fishing boats and larger boats sent by the government to Chateaubelair to collect people. As the following passages show, people were very afraid and there was a lot of commotion in the villages during the evacuation. Many families were separated and only found one another later in the evening or even days after.
It was very rough that morning. There was a lot of people on the road. The government sent trucks and they speed down the road. People were frightened. When we looked into the sky, the fire was pitching all about.

   Woman from Sandy Bay (18)

They sent buses and the boat was the last thing that came. The boat stayed a while until the older people, my grandfather included, he was blind, were taken [...] It did not leave until about 2pm the Friday evening. The police was still here. And then they left. The Friday night the Soufriere really started.

   Man from Fitz Hughes (24)

Well on the day when the Soufriere erupted, it was such a sad day. If you saw the children, the parents with children, mothers with young babies, and running and crying. I walked from Chateaubelair to Baroullie and I was 6 months pregnant. I had to walk, because all the buses were full.

   Woman from Chateaubelair (23)

Some people were so scared they jumped out of their night gown and whatever they had on. People just began to run. So you can imagine the chaos on the road…. It was very scary. People did not know what to do, some could not believe it was the Soufriere.

   Woman from Petit Bordel (38)

In addition to the confusion, evacuation became more difficult given the large amounts of ash that fell in the first few hours after the eruption. From people’s accounts it is possible to gather that large quantities of ash fell during the morning of the 13th of April. Some referred to ash on the ground and difficulties in cars moving in the roads, especially up steep hills. Additionally, some also have mentioned that rivers had hot water/mud, which complicated river crossings and water collection for many.

Then the government put it over the radio and said they were sending vehicles to take out people and that we should not panic. But before we left we loosed our animals that were tied, so that if anything they could go and hide. Everybody from this side went over to the other side of the village and waited until the vehicles came to take us. After a time it was like no other trucks could come in again, because the ash had already gotten high, so in Sandy Bay on the steep hill coming up, no trucks could come up, only 4 wheeled drive vehicles

   Woman from Fancy (13)

When you went into your vehicles, the wind screen was filled with ash. Some people had to take stones and knock out the windscreen because they can’t see through the wind screen.

   Man from Owia (28)

And we were there until more trucks started to come and move people out. When you looked down at the river, you could just see the animals moving, because they were white, the ashes covered them. So you could have only told what type of animal it was based on how they were moving, because they were all covered with ash. The stones in the river,
the river was flat, you could not see any water. The water was covered with ash, and our faces were white. We had to keep wiping in order to see. Maybe if we had stayed there for long we would have been covered over.

Woman from Fancy (14)

Shelters

59 Shelters were set up at schools in towns south of Barrouallie in the Leeward side of the island and south of North Union in the Windward were around 20000 people stayed for up to 4 months. About two thirds of the evacuees stayed in these shelters and the remaining one third at family or friend’s homes (Gueri, et al. 1982). Although most people interviewed have mentioned that the condition at the shelters was acceptable and that they had enough provisions to sustain their families most of the time, they also noted on some of the difficulties they encountered during their stay at the camps. As the passages below note, the most common problems people had during the months they spent at the shelters were: limited space, little privacy, children illnesses, difficulties with logistical organisation, limited cooking facilities, and dependency on the government aid.

They started to give out like 2lbs rice, ½ peas, 2lbs chicken. If not chicken you got salt fish, or sardines. The government used to support us […] it was very difficult because we had to make fires outside. There were not many stoves there. We had to get wood and stones to make the fire […] Some persons had like 10 or 11 children, and it was really rough for some people. I had to help out with the children sometimes.

Woman from Sandy Bay (18)

Well, just sit around and waited until they brought rice and flour and saltfish and other food. We had to wait on the government to get something to eat. If you had money and you had coals and a coal pot, you could cook for yourself. It was difficult

Woman from Overland (8)

Well you have to expect that you are not in your private home, so you have to understand, so we had to make use and satisfy. But in terms of things to eat we did not have any problems. We got meat, whole chicken it was ok. I don’t have any complaints. But it was just a little room for you and your children and your husband. You are settled, you are not out in the rain, but you were sheltered.

Woman from Fancy (14)

I think because it was the first experience I don’t think the camps were well organized. There was a lot of chaos. The priority should have been on the people who evacuated from outside the area. But even people from the area were competing with people in the camps, maybe asking for food. Some camps were well run others were not depending on the individuals. I do not think at Baroullie it was well organized. In fact it took us some time. I worked along with some other guys in the distribution of ration. They gave me a list with how much food to be distributed, say ¼ of meat and ¼ of rice. We spent about 2 months there.

Man from Petit Bordel (38)
From the interviews, it was possible to gather that during the stay at the camps people would take day trips to look after their houses, animals or what was left of their crops. During these visits they were able to see the damage and losses to their crops, animals and possessions as a result of ash fall. People also reported theft.

On the 8th of June, after almost 2 months in the camps Premier Cato announced that some residents were allowed to permanently return to their homes. Those living north of Rabacca Dry River, in the Windward and north of Chateaubelair in the Leeward were only allowed to return later, around August (Cato 1979a).

Impacts
The impact of the volcanic eruption in 1979 on people’s well-being has to be understood in the light of both the impact of the volcanic hazards and the time people spent in the shelters. While people’s livelihoods and assets, especially houses, animals and crops, were directly impacted by volcanic ash, the time spent in shelters outside villages (between 2 and 4 months) also had a direct effect on people, most of all on their income, personal relations and general well-being.

Infrastructure
Damages to infrastructure were for the most part caused by volcanic ash fall. When people returned to their villages they spent a long time cleaning the ash, changing roofs and replanting their crops. The mix of ash and rain affected buildings and roads. Additionally some water systems, in particular pipes were destroyed by mud and ash. In the following passages people explain how their houses were affected. As noted by many, the main impact was on the galvanised roofs. Ash fall and rain resulted in corrosion and holes on the roofs. In addition, some old houses, made out of wood boards collapsed due to the weight of the ash.

When we came back it was looking bare. You had come back to a new life. The houses were looking ugly because ash covered a lot of them still. My house was covered with a lot of ash. Some of my relatives came and help me clean the galvanised and they pushed it onto the concrete. We had a lot of rain while we are at the camp, so the weight of the ash burst the concrete. After we came back we had to break it down and re-cast the area.

Woman from Sandy Bay (16)
[...] there was a lot of leaks and the galvanised started to rot really fast a lot of people changed their galvanised. There was no immediate damage, but it was still caused by the ash [...] When we washed of the ash, the roofs began to rotten. I think there was something in the ash that caused the galvanised to rot so quickly…

Man from Rose Bank (21)

The houses were filled with ashes. When you stepped on to your porch, ashes was their built up, also on your roof. In the mountains, it was like a fire passed through. All the trees were burnt. [...] some of the houses fell because of the material. Even some galvanised, the softer type, those were damaged [...] The metal itself had started eroding because of the ashes

Woman from Owia (26)

Some people’s houses dropped in because the ash and sand was heavy on their roof. The houses were built differently, because people had grass and board houses. At that time most houses were board houses. But now the houses are different. The houses now are mostly wall houses.

Man from Owia (28)

Overall, 77% of all households included in the survey said that they had experienced the eruption.

![Figure 2. Experience of the eruption](image)

Out of those impacted by the volcano, 16% were affected by house damages. Results from the interviews and survey show that a slightly higher rate of households experienced damages to houses, and particularly roofs, in the Windward side of the island. While 12% of households in the Leeward side noted that their houses had been affected, 19% in the Windward areas reported impact
in their house infrastructure.¹ This also coincides with the remarks made by Premier Cato in his June 8th address to the nation, where he highlighted that amongst the most affected villages were, Fancy, Owia, Sandy Bay, Overland, Langley Park and others (Cato 1979a).

Water systems were also affected. In some towns such as Orange Hill people only got their water service back approximately 4-5 months after they had returned, once the pipes were fixed and the catchment had been cleaned. Until then, they had to get water from springs or from outside the village (Group interview Orange Hill).

Roads, were badly affected too. In his address to the nation on the 9th of June, Premier Cato highlighted the impact of ash on the roads, particularly in the Windward side. Most damage seemed to have been caused by ash blocking drainages and provoking erosion to all roads, paved and not paved. Additionally, ash on steep hills made the road very slippery (Cato 1979a).

Collateral damage on school buildings used as shelters should also be considered as an impact on the country’s infrastructure. In the same address to the nation, Premier Cato noted that “the use of school buildings as evacuation centres has left us with smashed furniture, defective toilets, and insecure buildings in dire need of repair”(1979a:6). This would have had a direct impact on education infrastructure throughout St. Vincent in the long term.

Animals and crops

From the interviews conducted in the north of the island, it is possible to conclude that animals and crops were also impacted. This means that people’s main source of livelihood in that part of the island was severely affected by the eruption. The day local residents evacuated from their villages, as instructed by the authorities, animals were let loose so that they could roam around and feed. Although during the months people stayed at the camps, they made regular visits to their villages

¹ It is important to note that although 77% of households interviewed for the survey noted that someone in their household had experienced the 1979 eruption, a high percentage, or about 38% were not able to respond what the impact had been. This means that the numbers obtained for each category of impact could be higher. This trend reflects the fact that the survey was conducted retrospectively and many were unable to remember or answer the question.
to tend to their animals and their properties, they still lost many animals due to illnesses, lack of water, food and theft. As noted in the passages below, letting the animals roam freely in addition to the ash and theft resulted in a huge loss of livestock.

A lot of people let go their animals because they could not carry the animals with them. People came and steal some of the animals. Even people from St. Lucia came over with boats and stole the animals. Remember St. Lucia’s boundary is not far from us. At nights you can see the lights in St. Lucia.

*Man from Owia (28)*

There was no water to feed them but I feed them with breadfruit, mango, banana, whatever I could find. I had cattle, and the cattle went to the banana field where they could get something to eat. But there was no water to give them until a certain time. Same thing happened to us. Because water had to be trucked.

*Man from Overland (5)*

The animals got away and mixed with other animals. I could not concern about the animals at that time though. The animals also destroyed the crops because all the animals had to be loosed. So after the volcano we had to start things afresh.

*Man from Dixons (29)*

Well people lost crops, and many people lost their animals from death and from stealing. Most people had let go their animals and people used the opportunity to steal. People from St. Lucia came over in boats and took animals away with them. That is what people said. But I think other people just killed animals and eat them as well.

*Woman from Troumaka (35)*

The passages above coincide with the results of the survey where about 13% of households that reported impacts on their assets said that their livestock had been affected. This trend was also reflected by Premier Cato during his address to the nation on the 8th of June, 1979 where he summarised impact on animals as follows: “Direct losses of livestock as a result of the eruptions have been minimal, though it is understood that there was large scale larceny during the period of the crisis. Several farmers slaughtered their animals rather than risk losing them outright.” (Cato 1979a:10). Although theft is mentioned by Cato as well as by most people interviews for this research as major issue affecting their animals after the eruption, it should be noted that there is no official confirmation that people from St. Lucia were crossing by boats and stealing livestock.

The other heavily impacted aspect of people’s livelihoods was crops. On the one hand, large amount of ash either buried the crops that were planted and/or burned the leaves and fruits of many plants
and trees. On the other hand, animals that had been let lose during the evacuation caused a lot of damage to crops. In the following passages people describe what happened to their crops.

Well no plants were here because all those things were buried with the ash. All over the place where you had plants, the animals would eat them, even in the mountain. They would eat up the arrowroot and the potatoes.

*Man from Owia (26)*

The ash covered the plants and all the crops were destroyed. [...] We had to try all over again.

*Man from Fancy (85)*

We noticed that the coconuts and the palms were not the same. It seemed as if the ash went down into the heart and all the coconuts grew with some kind of defect after that. [...] The outer skin of the coconut seemed shrivelled with brown defects, looking like they were burnt by the ash.

*Woman from Troumakia (36)*

All the crops were almost burned, especially those that were in the higher parts of the mountain.

*Man from Dixon (31)*

As mentioned earlier, losses incurred in terms of livestock and crops could be related to volcanic hazards, particularly ash, as well as the time people spent in the shelters. This is most clear when looking at the impact of the eruption on the banana and arrow root crops, which at the time of the eruption were the main, export products in St. Vincent. While bananas were mostly affected by ash and animals grazing on these plantations, large arrow root production was lost to rotting of already harvested or close to harvest produce. It was estimated that between 50-60% of the banana production in the country was lost and that 48000 baskets of harvested rhizomes (arrow root) plus 285 acres of produce ready to harvest were lost due to the evacuation and subsequent halt in factories processing of the root to obtain starch (Cato 1979a:8).

Although at first ash was the main reason for crop damage and loss, months after it began to have a positive effect on the plants. It functioned as a fertilizer. The positive effect of ash on crops will be further discussed in the section on recovery.

*Lost or stolen property*

As a result of the evacuation process and in addition to livestock and crop loses, some people lost property as a result of theft. Interviewees mentioned that many houses in the villages that had been
evacuated had been broken into during the months people spent in shelters. Additionally, property was also lost during the actual evacuation process or in the shelters. In the passage below a man from Rose Bank explains what happened.

*Well stealing was rampant. While people were away and even after people returned, people were still stealing. People who were outside the village would go to your house once the house is closed and steal away your things [...] No not every house. But those who stayed away their houses were broken into*

*Man from Rose Bank (21)*

Theft in areas that had to be evacuated during the time of the crisis was also reported in official documents. Shop-breaking and general misconduct were mentioned as some of the problems the police had to deal with at the time (Cato 1979b).

*Other impacts*

In addition to the direct impacts of the volcanic eruption and subsequent evacuation mentioned above, the eruption in 1979 also had a severe impact on small and large business across the country, particularly those that depended on customers purchasing goods and services. Large Agricultural enterprises were also affected. As noted by Premier Cato in his 8th of June address to the nation, “merchants and shopkeepers in the evacuated areas suffered the greatest losses” (Cato 1979a).

It should also be mentioned that the school system was severely affected by the evacuation of over 20,000 people. Not only were the facilities in the schools affected but also over the duration of the official evacuation, which lasted up to 4 months for some, many children could not attend school. This was either because they had evacuated themselves or because the schools were they attended were being used as shelters. 12 secondary schools and 32 primary schools alone were used as evacuation centres in the south of the country. Another 29 primary schools located in the evacuated zone were closed. In total 30000 children were not able to attend school for several weeks (Cato 1979a).
Conclusion

The impact of the volcanic eruption in 1979 could be summarised as a combination of direct impact from volcanic hazards, mostly ash, and the time people spent in the shelters or what translates as the time not spent conducting productive activities. The following section looks at the recovery process, which is also directly related to the types of impacts, and general disruption that different families had to cope with during and after the eruption in 1979.

Recovery from the 1979 eruption

The previous section looked at the immediate impacts of the volcanic eruption in 1979. This section turns to the long-term effects and process of livelihood recovery after the eruption, including people’s perceptions of recovery in the wider community. In other words, what did residents do when they returned to their villages? What happened to people’s livelihoods? How did people cope, particularly the first months after the return? Who returned and who did not? Recovery from the volcanic eruption also needs to be understood in the context of other important events taking place at the time in St. Vincent. The country became independent, there were elections and there was a very strong hurricane in 1980, the year after the eruption.

Livelihoods

As noted above, both the volcanic eruption and the time people spent in the temporary shelters severely affected peoples livelihoods in the island of St. Vincent, particularly in the north of the country. This section will focus mainly on agriculture, which was and still remains the single most important source of income in the north of the island. It will examine people’s accounts of what they did when they returned to their homes in order to recover their animals and crops after the eruption. When people returned, they spent considerable amounts of their time cleaning up their houses and their fields. Mixing the ash that had fallen with the soil and preparing the fields for the crops became a priority. The return also coincided with the rainy season, which helped the clearing and ‘mixing’ of ash with soil.
When we came back from the camp people were trying to catch back themselves. We had some animals up here. You
could not plant back any food. It took us about 3 months before we started planting back any food.

Man from Owia (26)

It did not take long [to start again]. We still had our donkey, and I had a piece of land so we cleaned up the land and the
ash was like it gave the provisions more energy. So we started to work all over again. The ash was in the house so we
had to do a lot of cleaning. The ash did a lot of damage

Woman from Chateaubelair (23)

In some areas it was about 6 inches of ash. One of the things that happened was that people were unable to cultivate at
the same time, because all of the ash on the ground we had to dig through in order to cultivate the land […] Well people
kept removing the ash. I can’t say exactly how long it took people. […] But what someone told me was that it took them
some time to relocate, and trying to get their animals that went astray. They found a lot of them dead, so they had to
buy them. The animals had nothing to eat because the grass was covered with ash. And then to start over again their
livelihoods they had to depend on aid coming in after the evacuation. Aid came from government, relatives overseas.
Because we weren’t able to cultivate immediately after they returned. Houses had to be cleaned.

Man from Rose Bank (21)

From the passages above, it becomes clear that it took a substantial effort to clean up and restart the
planting process. This meant that not all households were able to recover at the same time. It took
several months before people were able to get crops and therefore income. The time between people
had returned and the first harvest meant that families had to find other ways to cope. The state had
provided some food when people left the shelters, but this was not enough so, as some explain
below, while the crops came back, they had to rely on friends, family, and their own savings or
simply conduct other activities.

Well it took a long time because we got no help, so it was like you were just starting for the first time. We started all
over again. It took a while before the village could get back together. It was a difficult time for everyone. […] I remember
my brother was working and my stepfather was a farmer, so little things were squeezed until we were able to cope.

Woman from Dixon (31)

Some people got back to normal more quickly than others. Sometimes by the time you work your income, and you have
a larger family than others, you had situation where some families could save and other families couldn’t save so some
people were able to help themselves before others.

Woman from Orange Hill (20)

We got back some of our animals but not all. We had to start life all over again. We planted food and so on. No we didn’t
get any help from the government. […] we didn’t borrow any money. I make cakes, tarts and pudding and sell those.

Woman from Fancy (14)

All the big logs were burnt, and the rains came and washed the coals down by the beach and cool the logs. So lots of
people were picking up coals down in Richmond. One lady had many bags of coals stacked up in her yard which she got
from the volcano. They sold the coal. Some people made good of the volcano, while others lost their animals and crops. But it was an experience, one I would not to like to go through again, but it was an experience.

Woman from Troumaka (36)

Despite the difficulties encountered when going back to the villages, and as noted by many farmers, the first harvest after they returned was described by many as excellent. This meant that some farmers were able to get cash after the first harvest and continue with their activities. In the following passages, people from different villages explain what happened with the first harvest.

Well we got good crop when we started planting again. It seemed like manure was in the soil. So it was good for the crops. After a whole year a lot of things plant up and they grow well. There were also some mosquitoes in the mountain. But after the eruption, there was no mosquito. Lizard and all animals, they died. You could sleep in the mountain after the eruption and nothing would happen to you. Everything got back green and nice after a while.

Man from Owia (28)

I remember that when some people returned and they started to farm, the crops that they reaped was more fruitful so they were saying that the ash was like manure. It was one of the most fruitful times for farmers after the eruption.

Woman from Troumaka (34)

Then we came back home from there we just moved on, everything went back to normal, sometimes we don’t even remember that an active volcano is there. We continued planting. Afterwards, the food bare plenty. It was like the ash was a manure for the land. Just afterwards it was very good.

Woman from Fancy (14)

Other livelihoods were also affected by the eruption in different ways and therefore were re-established at different times. For instance fishermen were able to restart their activities faster, almost immediately after they returned to their villages. Yet, as explained by a seamstress in Chateaubelair below, people providing services or those who owned shops had to wait until others in the villages had enough money to start buying products and services again.

I do not think it took us quite a while to get back going because this area was mainly a fishing village. We are a resilient people so we did what we normally do so we did not wait on government for help.

Man from Petit Bordel (38)

It was not easy to start, because people had no money, they could not work, and they had no money to buy fabric or to pay me. So it was very difficult at that time. [It took] about 2 or 3 months [and] we did not get any help from anywhere. No one helped us.

Woman from Chateaubelair (22)
In addition to the problems and changes posed by the eruption, people also had to deal with other hazards, particularly hurricanes which destroyed crops not long after the eruption and important political changes that took place at the time in St. Vincent including independence from the United Kingdom. Overall recovery was therefore influenced and made more difficult by a hurricane in late 1979 and an even stronger hurricane in 1980, Allen which damaged large areas of banana plantation in the island, the most important crop at the time.

*We had the volcano in that year, election and independence. And then we had a very bad hurricane pass through, Hurricane David. We got the tail end of that hurricane. It also devastated Dominica. In 1980, Hurricane Allen came.*

*Man from Fitz Hughes (24)*

**Assistance**

Assistance from the different sources including the state, family and friends seemed to have been available at different degrees during the recovery process. Data from the survey shows that about 15% of households got assistance from the government and 24% from family and friends.\(^2\) As the passages below show, some farmers seemed to have gotten plants, seed and expert assistance from the state to restart working their plots of land. There was also help for people to replace the roof, many of which had rusted due to the ash and rain. Family and friends, especially those that lived abroad also helped people during the recovery process. Lack of assistance or an unequal distribution of the assistance across villages was mentioned by many.

*It took a lot of time to clean, because the whole place was in ashes. The crops took a long to grow back. The government had to send plants from Kingstown for us. Kingstown did not get any damage from the volcano. But places like here to Fancy, Sandy Bay all those places were scorched. There was a lot of ash.*

*Man from Owia (28)*

*[It was difficult] but the government was giving assistance too. Some got seeds, manure, and cash to help them start up their crops.*

*Man from Fitz Hughes (24)*

*We got galvanise and lumber. The galvanised that rust were replaced. Other organizations came in and assisted farmers with planting materials such as potato vines, peanuts, vegetable seeds, short crops so that you could restart quickly.*

*Woman from Sandy Bay (16)*

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\(^2\) Given that the survey was conducted retrospectively and many were unable to remember or answer the question this numbers could be higher and therefore only show what people today can remember of what happened in the past.
Well we didn’t get any food from government because of the kind of people who were in the position. [...] So some people get and some didn’t. [...] The government used to bring things in but sometimes the things didn’t get to you.

Woman from Dixons (31)

What I observed was that after the Soufriere period, material was given to people, but the decision was made more of a political nature. I know there was galvanise, and I know that some of my friends got galvanise who did not need it, while other people should have gotten it. What happened was that when you left the area and go to the camps, the distribution was ok but when they returned and the material fell in the hands of political activists, the distribution was not fair. It was done mostly after a political nature, rather than one of need, and that is what created some problems with some people.

Man from Petit Bordel (38)

Other long-term effects

In addition to the impacts of the eruption and the difficulties people experienced when re-establishing their everyday lives and livelihoods, the eruption catalysed other significant transformations in St. Vincent, which were also important for the recovery process. It was clear from the interviews that the extent of the evacuation, and the mere fact that people had to move, travel, meet others, see other villages and people that they had never seen before, had an important effect when they returned. As well as those who returned with new views and ideas, those who did not return also had an effect in the villages. Changes in the types of housing and the value of land were also mentioned in the interviews.

They came back with a new outlook. Most people got more aggressive with housing, the way they dressed, and so on a lot of things changed. At that time people from Chateaubelair got a bit more exposure to different ways of life. When they left Chateaubelair, a lot of persons were probably going to town for the first or second time... Some never returned. They lived around town. Some got jobs there built better families. Some did better. Some did worse

Man from Fitz Hughes (24)

But people left and never returned. People have been migrating from this area since 1902. The majority of people in Clear Valley are from Fancy, and that is from 1902. Then in 1972 and again in 1979 people moved from the area and did not come back.

Man from Orange Hill (Group interview 20)

Everybody did not return at the same time. There were few people in the village. People were scared to come back to their homes. The atmosphere was still dark, the place was still very cloudy. Sometimes you would have nightmares. Any thunder you heard you would think it was Soufriere. If the place got dark and set up to rain, people would think it is the Soufriere.

Woman from Rose Bank (Group Interview 21)
As explained in the following quote, the volcano might have also influenced the closing down and selling of the Orange Hill Estate, a large agricultural property belonging to one family/owner where people lived and worked. 

*Well after the 1979 eruption, the estate owners started getting reluctant in continuing. As a matter of fact, 5 years after the eruption, the estate was sold, in 1984. It may not necessarily have been because of the eruption…They were the owners of the estates in SVG so they started slowing down. So this was going to happen anyway, whether or not there was the volcano but the volcano made the Orange Hill estate close down faster. After the 1979 eruption, they started scaling down on the operation. People had to wait until they sold some cattle, wait until they got copper money; so there was some sign that they had started scaling down.*

*Woman from Orange Hill (Group Interview 20)*

Long term transformation associated with hazard impact is not uncommon and is a topic that has been discussed by other researchers (Collins 2009; Pelling and Dill 2010). In the case of St. Vincent and the 1979 eruption, increased exposure to other communities, the experience of evacuation for an extended period of time, newer housing styles and general development aspirations seems to have been an important trigger for the changes brought about by the eruption. Although, changes in the social and political arena were also taking place at the time, most notably, independence from the British Colonial State, the volcanic eruption was undoubtedly a crucial factor in the history of the island.

*Conclusion*

What can we learn from this experience for possible future eruptions? Two topics have been discusses in this section, impacts and recovery. In terms of impacts it is clear that hazard impact on livelihoods and infrastructure as well as the impact of disruption due to evacuation are factors that need to be considered if another eruption were to occur. Livelihoods are particularly affected in the long term as they take time to recover, particularly given the fact that other hazards are also present. After the eruption in 1979 a series of hurricanes impacted the island making it more difficult to recover. In this light, equal access to assistance both to repair infrastructure and to be able to recover livelihoods is important.
III. LIVELIHOODS TODAY

The previous section focused on the impacts and recovery process of the 1979 eruption. It was clear from the analysis that due to the eruption and subsequent evacuation, livelihoods were severely impacted and took time to recover in the long term. In this light, this section turns to livelihoods in the island today, as it recognises that livelihoods are a key issue which requires further research and analysis in order to understand long terms impacts of volcanic eruptions in St. Vincent.

Data from the survey shows that for about 32.3% of households agriculture is the main source of income. As table 2 illustrates, compared to other sources of income, agriculture remains the most important one for a high percentage of households in the areas in the north of the island considered being at high volcanic risk (where WP3 conducted its research activities). This coincides with data from different studies which highlight the importance of agriculture to the Vincentian Economy (FAO 2011; Greene 2006).

<table>
<thead>
<tr>
<th>Main Source of Income</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Agriculture</td>
<td>32.3%</td>
</tr>
<tr>
<td>Fishing</td>
<td>2.0%</td>
</tr>
<tr>
<td>Selling Goods</td>
<td>3.9%</td>
</tr>
<tr>
<td>Own Business</td>
<td>5.0%</td>
</tr>
<tr>
<td>Private Sector Job</td>
<td>14.6%</td>
</tr>
<tr>
<td>Public Sector Job</td>
<td>12.2%</td>
</tr>
<tr>
<td>Teacher</td>
<td>6.1%</td>
</tr>
<tr>
<td>Paid housework</td>
<td>1.8%</td>
</tr>
<tr>
<td>Retired Pension</td>
<td>4.4%</td>
</tr>
<tr>
<td>Construction</td>
<td>4.8%</td>
</tr>
<tr>
<td>Does not Work</td>
<td>.9%</td>
</tr>
<tr>
<td>Other</td>
<td>10.6%</td>
</tr>
<tr>
<td>Does not Know</td>
<td>1.3%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
</tr>
</tbody>
</table>

Most agricultural production in St. Vincent focuses on crops sold for the local market (including the Grenadines) and for export to nearby countries such as Trinidad and Tobago (FAO 2011; Greene 2006).
2006). Farmers also keep livestock although it is mainly for household consumption or the local market. As the quotes below show, there are a variety of crops farmed in St. Vincent, which are either sold directly by the farmers at the markets or sold to merchants or ‘traffickers’, middle men who resell the produce locally and abroad.

My occupation is farming. I do vegetables, tomatoes, cabbage, pepper, cucumbers, corn, white yams, tanias and eddoes. Those are my main crops.

Man from Overland (8)

Well I sold to Traffickers to go to Trinidad and Barbados, them come on the farm and take your produce, carry them to Barbados and Trinidad, don’t give we no money, when they come back they say, “Oh, I don’t make no money, I buss”.

Man from Orange Hill (1)

Problems with agriculture

As mentioned in the last quote, one of the main problems that farmers have is access to secure markets and fair prices (Greene 2006). Those problems are reflected in the quotes below. Considering that agriculture is the main source of income for many households the level of uncertainty and problems related to agriculture are noticeably high.

Well the traffickers help us out, but right now things are low. Things are low with the traffickers. We are producing but we not getting any price. And the Government is not coming in to help us, so that we could get markets and support. Nothing…. So even if you plant you do not know what is going to happen. We don’t know who to depend on. Even if the Trafficker buys from you every week, you still can’t depend on them because the last time they sent our produce to Trinidad and they sent them back, because of the Black Sigatoka disease, they sent them back. And they did that twice. So everything falling on us, because when we sell the Traffickers the produce, they come back with something else, and we know that because we are hearing that the Traffickers things rejecting in Trinidad, so that is the down fall on us the farmers. It’s rough here in St. Vincent.

Man from Overland (5)

Sometimes the traffickers come and they credit, and sometimes we end up without being paid… They will sometimes take three or two months, or sometimes every other week. They will take the crops on Saturday/Sunday, and then most likely they pay next week Friday. But some people have to end up with a longer time. Sometimes some people don’t get paid at all. If a trafficker takes from you today, you may not see them again

Man from Fancy (10)

Another serious problem that many of those whose livelihoods are based on agricultural activities mentioned is theft. The fact that agricultural land tends to be located away from people’s homes
makes it more difficult to look after the land and the crops. As the quote below explains, a lot of effort is put into planning and caring for crops yet farmers are prone to losing all their production to theft.

_We plant potato, tainia cabbage, watermelon, plantain, banana and other greens. And sometimes when you plant them people just go in and reap your things. You can’t get anything sometimes… Some people are lazy, they don’t want to go to the mountain. As you plant your things they go in and steal._

_Woman from Sandy Bay (18)_

Data from the survey also reflected similar issues mentioned in the interviews. Most notably, crops pests and diseases, theft and natural hazards were listed as the most important problems farmers have to deal with (see table 3 below). The table shows that families whose main source of income is agriculture are vulnerable to different types of shocks. These shocks take place at different points in time or simultaneously making it more complicated to control.

<table>
<thead>
<tr>
<th>Land Tenure Arrangements</th>
<th>1.2%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Crop Pests/Diseases</strong></td>
<td>23.7%</td>
</tr>
<tr>
<td>Animal Diseases</td>
<td>2.0%</td>
</tr>
<tr>
<td>No access to Irrigation</td>
<td>0.4%</td>
</tr>
<tr>
<td>Difficulties accessing markets/fair price of products</td>
<td>5.6%</td>
</tr>
<tr>
<td>No access to credit</td>
<td>0.4%</td>
</tr>
<tr>
<td>Unable to buy/access farm input products</td>
<td>7.2%</td>
</tr>
<tr>
<td>Labour force</td>
<td>2.0%</td>
</tr>
<tr>
<td>Lack of tools/machinery</td>
<td>0.4%</td>
</tr>
<tr>
<td><strong>Theft</strong></td>
<td>31.3%</td>
</tr>
<tr>
<td>Natural hazards (storms, flooding, draught)</td>
<td>23.7%</td>
</tr>
<tr>
<td>Other</td>
<td>2.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

Access to land is central to viable livelihoods in agriculture. In this sense it is important to note that 52% of households interviewed for the survey have access to agricultural land. Note that 32% of households said their main income is agriculture. Out of those who have access to land, around 30%
have less than one acre and 50% have between 1-5 acres. This coincides with official records which state that the majority of farms in the country range between 0.5 and 5 acres in size (FAO 2011). In terms of land tenure, about 50% of households own the land with papers, while 18% are leasing from the state and about 14% access family land. These numbers shows that although most people conducting agricultural activities have secure access to land, these are small plots making it difficult to generate large profits. In other words, difficulties accessing markets, shocks related to extreme weather and theft should be seen in the context of limited access to land (FAO 2011; Greene 2006).

Other livelihoods

In addition to agriculture private sector jobs, own business and public sector jobs are also important sources of income for households. As table 2 above shows, about 25 per cent of households depend on these sources of income. In terms of the public sector, people are employed as teachers, nurses and other community outreach activities. Private sector jobs and own business include amongst others, work in shops, trading of goods and food processing.

Although table 2 above depicts main sources of income, it is important to note that one person might conduct more than one activity at the same time. As the quotes below note, people tend to complement their incomes by conducting different activities.

I used to do farming, when the banana was more active. I am farming still. I plant tarias and eddoes. Right now, I am employed by the school where I cook for the children

Woman from Overland (9)

I am a farmer. I farm a little around my home in my yard. I had a piece of land but circumstances caused me to give it up. So I only have the land that I am living on, so I plant kitchen items around in my yard. But I am really a farmer and a craft maker

Woman from Orange Hill (4)

I am a farmer and a businessman. I operate a bar.

Man from Fitz Hughes (24)

Some of the issues mentioned in relation to conducting other livelihoods, particularly those in the private sector or own business were: difficulties accessing markets, no access to credit and inability to buy materials or inputs for the business.

Unemployment
In addition to the problems people mentioned in relation to sustaining their livelihoods, a very high level of unemployment was recorded in the survey.

**Table 4. Employment Status**

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Time worker</td>
<td>45.6%</td>
</tr>
<tr>
<td>Part Time Worker</td>
<td>4.5%</td>
</tr>
<tr>
<td>Unemployed</td>
<td>36.3%</td>
</tr>
<tr>
<td>Retired</td>
<td>12.3%</td>
</tr>
<tr>
<td>Other</td>
<td>1.3%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

While about 46% per cent of the individuals who were interviewed for the survey were employed, 36% were unemployed. The high percentage of unemployed coupled with the difficulties people mentioned in sustaining their livelihoods shows that there are a high percentage of economically vulnerable households in the north of the island. This data coincides with the results from the Poverty Assessment Report 2008/9 where poverty was reported to be most prevalent in the census districts in the north of the island (KAIRA 2008:58). As the statement below describes there are various social, historical and economic reasons that explain the prevalence of poverty in this part of the country:

Settlement patterns that have evolved from pre-Columbian times up to the present are reflected in the geography of poverty, and wealth in the society at the beginning of the 21st century. The Sandy Bay census division is home to some of the Carib communities, the descendants of the Caribs who were defeated by the British in the 18th century, and who because of physical isolation and social exclusion, have remained at some social distance from the rest of the society for many years. Georgetown Census Division, while having a Carib presence as well, is an area that was previously heavily reliant on sugar production in the first half of the 20th century and then to some extent on banana production. The decline in competitiveness of the sector has hurt this area of the country, and the poverty level is indicative of the impact of the fall-out in the banana industry, and the difficulty experienced in the transfer of farmers into other types of agriculture.

**Access to resources and state services**

Despite the high poverty rate access to basic services in the north of the island has improved substantially since the 1980’s. As Figure 3 below shows access to drinking water, electricity, healthcare, primary education, secondary education and state benefits have increased. Yet as discussed in the previous section, sustaining viable livelihoods over time especially in agriculture
remains a big challenge in St. Vincent, rendering local residents more vulnerable to natural hazards particularly in terms of their capacity to recover from different events.

**Figure 3. Access to services over time**

**Conclusion**

In summary it is possible to say that the most important livelihood in the north of St. Vincent remains agriculture, though those who depend on it are in a vulnerable position and face a range of difficulties to maintain it. Other livelihoods are also under pressure while unemployment is a widespread problem in these areas.

Despite a general improvement in access to basic services, households are still vulnerable in terms of securing livelihoods and incomes in the long term. Poverty, lack of employment, access to assets, political affiliation and access to services from the state underline volcanic risk in the long term. These findings also coincide with the Poverty Assessment carried in 2008/2009 which stated that the poorer areas (census divisions) in the country were Georgetown, Sandy Bay and Chateaubelair (KAIRA 2008:58; PAHO 2012:579).

This section discussed the types of livelihoods that people conduct in the areas considered to be at high volcanic risk in St. Vincent. The aim of this discussion was to provide a general introduction to
the livelihoods of the people who inhabit the north of St. Vincent and the different issues they have to face in their daily lives. Creating a general context around the lives of the residents of the north of the island allows to better understand how and why people are vulnerable to natural hazards a topic to which we turn in the next section.
IV. VULNERABILITY TO MULTIPLE HAZARDS IN ST. VINCENT

As a result of its geography, location and socioeconomic characteristics the Caribbean region is known to be prone to various types of natural hazards (Boruff and Cutter 2007). The most recurrent events are hurricanes and tropical storms. Given the island’s topography, the types of construction and the places where these have been built, frequently in unstable hill areas, rain and wind often cause severe damages to buildings, infrastructure and agriculture. Landslides, sea surges and flooding also affect many areas in the island. La Soufriere Volcano is an additional potential hazard that can have a direct impact on the entire island of St. Vincent as well as in the neighbouring islands particularly as a result of ash fall (CCRIF 2012; WorldBank 2010). This section will discuss how people are affected by different hazards and how, in the context of complex socioeconomic characteristics, they are able (or not) to cope with these impacts in the long term. The aim of this discussion is to understand volcanic risk in the light of other hazards that are more common in St. Vincent to which people have to respond and cope with as part of their daily lives.

Impacts from multiple hazards

Hurricanes and tropical storms are the most common hazard affecting St. Vincent, with storms being the most damaging of them. Since 1980, 94% of the total population has been affected by a storm/hurricane in the island (WorldBank 2010). This was also reflected in the interviews conducted for WP3 of the STREVA project where most of those interviewed noted that storms and floods had affected them in several occasions. Since the interviews were conducted in 2014 the most common topic of conversation in this respect was the flood that occurred in December 2013 (see image below), which had a huge impact in the island especially in the northern areas where WP3 research took place.
The following passages summarize some of the experiences people shared in terms of how they have been impacted by different hazards. Despite the fact that the 2013 flood was the latest of a string of storms that had affected local residents, references to earlier hurricanes were also raised and are quoted below.

In December 2013 we had water shortage and the electricity went away for a short while. That was the main problem. Access to roads was gone as well because the river came down and blocked the areas. Some trees had fallen, so persons could not go to the mountain because the roads were blocked. Persons’ crops were washed away as well. There were landslides also.

Woman from Overland (7)

With the floods [2013], none of us were prepared. We did not get any warning. I don’t even believe that the authorities even knew about it either. What they would have predicted was that we would have had rain, but maybe not so much. It was terrible. The night I was alone at home and I saw the rain coming. I later heard a loud shower on the galvanise as if it was to burst the galvanise. I sat down and I said wow this is a big shower of rain. Little after I was there I saw the place getting very dark. So I went into my bedroom, but I noticed I saw a light flashing outside. When I moved the curtain I looked out, I saw that it was lightening, but I never saw lightening flash like that. I went to sleep and slept right through the night until the next morning. Someone came and called me in the morning and said Chateaubelair is destroyed. The person said her daughter was almost washed away in the river. She said there is a place up the road called Coco, and she said it is destroyed, and we can’t even go to Fitz Hughes. I went out and realized that we could not move through the community because the roads were blocked. I had to walk down by the beach to get to the other side. I could see the broken bridges, the garbage blocking people’s houses. It was really terrible. It was the first time I was seeing a flood so terrible.

Woman from Chateaubelair (23)
During Tomas, I was living in a board house and the roof blew off. I had to leave and go by my sister-in-law to live. Wind and rain was blowing and you could see galvanise in the air. It was really bad. Heavy rains and the rivers were flooded. It was bad. I thought I was going to die. My bed, it was a king bed, the mattress got wet, my chairs, everything. It was really bad.

Woman from Sandy Bay (18)

Tomas was the worse thing to ever happen to St. Vincent. For me it was very bad. It was the only time since we were producing bananas in St. Vincent. We have never exported before. Tomas completely devastated this place. The morning when I went up on my farm the first that came to my mind was that if a thief had come on the farm I would have still gotten something. Everything was flattened: plantains, bananas, orange, avocado, everything was flat. Tomas was a lot of wind. It might not have been as big as other winds in other hurricanes, but the wind was consistent. I saw several house roofs fly off. When I was at my house I was frightened for my shop. I thought the roof would have been blown off too. My house roof was on as well. But a few houses here were devastated. But the fields were the worse. Tomas was the worst thing that ever happened

Man from Fitz Hughes (24)

As these quotes show, the most affected assets during storms and related floods and winds are people’s homes and crops. Houses and specially roofs, which are galvanised and can be old, are prone to damage from winds while buildings and property inside them can be affected by rain/flood water. These findings correspond with data collected for the survey, which focused on the two most recent events, the floods in 2013 and Hurricane Tomas in 2010. While 20% of the households reported damages to their houses during the floods of 2013, a higher number or about 39% of households reported damages to houses due to Hurricane Tomas in 2010. As figure 4 below shows, other important impacts include loss of electricity and water and impact to crops and animals. ³

³ Water and electricity services are suspended during hurricanes/storms for prevention and therefore it might have been included as part of the impacts that people experienced. However, it is also known that for the 2013 and 2010 events many households in St. Vincent did not have water and electricity for many days and even weeks after the events. Thus the high percentage of affected households as shown in figure 1.
In all five group interviews and in most of the individual semi structured interviews conducted for WP3 research, we asked people how they would compare the impacts from the eruption in 1979 and other hazards specifically hurricanes and floods which they have experienced since then. Having an open question, rendered a mix of answers, but it also allowed us to get an overview of how different impacts are considered and weighed by different people. The distribution of impact, graveness of the impact and access to resources and services were some of the factors that people used to compare different hazards. Most pointed out that the latest floods during which people had been killed had been the most devastating event. Aside from that, some mentioned that the impact from Hurricane Tomas had also been particularly bad. However, many also reflected on the fact that as a result of the eruption in 1979, the impact was more widespread particularly given the length of the evacuation by the majority of the population in the north of the island. Below are some of the reflections gathered during the interviews.

*I think the floods. The December floods. We had more deaths. Much more than hurricanes. The volcano did not have much. It was more like the cleaning and loss of crops. But people themselves did not really get affected.*

*Woman from Troumaka (35)*
Man: All are serious. The flooding was a dangerous thing. People were killed and people lost their houses. The whole place was flooded. There was water in the roads so nothing could pass.

Woman: But when you look at the volcano, I would say the volcano was more serious than the flood, because the volcano affected everybody, every single household in Owia. On the other hand, the flood only affected a small percentage. So I would say the volcano was more dangerous. [...] Because even a hurricane does not affect everybody. But when there is the volcano everybody had to evacuate and prepare themselves one way or the other. In the hurricane, some people have 2-storey house, and you can go into the downstairs and ride out the storm. But with the volcano, you can’t go downstairs or anything, because this is fire and ashes and lava and poisonous gas. No matter where you are it will find you.

Group Interview Owia (26)

In the eruption of Soufriere, we had over 13,000 people in camps. No other disaster ever caused that to happen. It is the most devastating thing that has ever happened to St. Vincent. It is not easy to leave your comfort zone to go into a camp with multiple families with different social backgrounds. Sanitation was not at its very best. No disaster has ever struck us as hard as Soufriere. The evacuation process did not work for some people because they left their residence and area where they were living and it may have taken them to. But the other disasters affected under 250 people. If that happened you have more people in the community that would look out for you. So I would say the volcano.

Man from Petit Bordel (Group Interview 38)

Coping and responding to impacts

The ability of people to cope with the impacts generated by natural hazards depends on various factors: how vulnerable or susceptible to impact they are before the event (socio-economic status, access to resources and information, how prepared they are for different hazards, knowledge about hazards, location,) how badly affected they are by the event and access to assistance and resources which allow to recover after the event (Ferdinand, et al. 2012; Wisner, et al. 2004). In other words, both the effects of the actual disaster events and the ability the household has (or not) to recover from them reveals household vulnerability. In this light, this section analyses how people cope with the different events they are faced with and the type of assistance and other resources they access to respond to the impacts brought by the events.

What people do to recover?

To be able gather information about recovery to different hazards in St. Vincent, our research used a series of questions, which aimed at analysing this aspect of vulnerability. Both during the interviews and the survey we asked people how they had coped with specific impacts from the volcano in 1979, the hurricane in 2010 and the flood of 2013. Additionally, we asked if they had received assistance and from whom. Yet, despite the fact that there were multiple options in the
survey to choose from in terms of recovery (see appendix 1, question K6), when asking people what they have done to recover after the floods in 2013 and hurricane Tomas in 2010, many answered ‘nothing’ and many answered ‘other’ (see figure 5). Although there could have been more options to choose from (reduce percentage of ‘other’), the fact remains that a high percentage chose nothing as an answer even if there were other options available.

![Coping with impacts](image)

*Figure 5. Coping with impacts*

This does not necessarily mean that they have not taken any action to get out of the situation in which they found themselves after an extreme event, but most probably, that they have continued with their routines as much as the situation has allowed them to do so. The passages below, which refer to the aftermath of the floods in 2013, show this point in a clear manner and help contextualise the data gathered in the survey.

*Interviewer:* What did you do to recover from the loss?

*Man:* I simply continued. If you sit back, you won’t bounce back.

*Interviewer:* Did you replant anything?

*Man:* Yes I had to replant. Even this dry weather we just went through, I had put in a lot of eddoes, which would have been ready for harvest this same month. But because of the weather, everything is delayed. Peppers and other crops went down. Up to that time I did not see any field officer come around to find out how things are going.

*Man from Overland (8)*

44
I have just started to build back. I bought a sheep from a friend, and that sheep has now given me two young sheep [...] The crops were destroyed. So I have just started planting again, on part of the land that was not damaged. One part was flooded and the other part was safe.

*Man From Fancy (10)*

Well we just start again and plant things. Sometimes you get things from the government. But only sometimes not every time.

*Man From Dixon (34)*

In addition to continuing with their activities, it is noteworthy that between 24% and 28% of households reported that they used their savings to recover (see figure 5). This means for example using savings to buy a sheep from a friend and replant the crops as the Man from Fancy above reports. Others however, as the woman from Fancy below explains (89), need to borrow money to be able to recover.

*As time goes by, I would borrow money and get something to fix up my house. Right now things are very expensive. Money is hard to come by. We just have to try our best and see when the time comes…*  

Community cooperation was also mentioned in some of the interviews. A woman from Chateaubelair (96) noted that after the floods in 2013 “people began to help each other to clean their house and yards and things like that until the government sent the assistance”.

**Access to assistance**

Assistance is an important aspect of recovery and might play a significant role in the ability of a household to recover from a disaster (Wisner, et al. 2004). It has an important effect in how different households recover and on future livelihood performance. Survey data shows that about half of the households affected by the 2013 flood received support. The numbers are considerable lower for 2010 (see figure 6).
In addition, the survey also asked who had given the support, and as noted in figure 7 below, the government has provided a high percentage of that support, especially if NEMO is counted as a state institution that had provided assistance.\(^4\) In the case of St. Vincent, assistance from the state is crucial for people to be able to recover after an event, especially because, as discussed in the section on livelihoods above, many are already vulnerable and poor households.

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\(^4\) It is important to note here that these numbers are only the answers from those who received support, which as shown in the figure above are 51% after the floods and 18.3% after the hurricane in 2010.
The type of support that people received has mostly been to rebuild or fix houses and some for agriculture. After the floods of 2013 houses were built in small resettlements sites or adjacent to the homes that had been destroyed. Moreover, agricultural help comes mostly as fertilizer, plantlets or seeds.

Data from the survey and the interviews shows that many of those who received assistance after the events in 2013 and 2010 (figure 7) got it from the government. However, there was also a group of people who did not receive any support and pointed out that access to assistance was differentiated across the population. While the survey shows that about 48% of households after the floods and 78% of households after hurricane Tomas did not get support (figure 6) the interviews helped capture some of the detail around this topic. Many reported that the deciding factor behind who has access to assistance from the state and who does not is based on political allegiance. From a research perspective, it is interesting to note, that even if it difficult to verify each individual case, the fact remains that many believe that unequal access to assistance is a problem and as such it is a finding in itself. The passages below show some of the testimonies given by different interviewees who referred to unequal access to state assistance.

Yes we were affected badly [2013] The house roof was damaged and we don’t get anything. The water came all over into the house, and all the tiles down here raised up and we had to buy a piece of carpet. And we didn’t get any assistance

Woman from Sandy Bay (17)

In the hurricane in 2010 my roof was damaged but I repaired it. Also the flood took some animals from me. They promised they would give me back some animals but I haven’t gotten any as yet. I am still asking about them and they promise they will refund me. I lost a cow. The freak storm washed away the cow and washed it into the sea, it was tied somewhere so it could not move

Man from Dixon (29)

No I did not get any help. This country is divided. My sister’s house roof blew off. She lived near to somebody who got their entire house roof fixed, and nothing was wrong with their house. But she got nothing. They promised that they were going to come back to help but nothing.

Woman from Fancy (14)

My crops were damaged. Everything I had to plant over. Plantains, everything gone. And we didn’t get anything. No manure, nor money, no help from the government. Some people got help. Those who are supporting the government. And everybody knows that.

Man from Overland (5)
What helps people recover? What does not?

The recovery process, or what people do after a hazardous event has impacted their household, seems to be based on a combination of factors: continuing with daily routines and activities, accessing assistance from the state, and using their savings or relying in their families and friends. Despite all these measures, the situation is still difficult and many are not able to recover. The fact that the island is prone to the impact of multiple hazards means that recovering is made more difficult by the possibility that another hazard might impact soon after. For example, after the eruption in 1979 Hurricane Allan in 1980 struck the island and caused a lot of damage in crops that had been recently planted. Other problems, such as plant disease also impact farmers. This is clearly explained in the passage below.

*Well the assistance I got didn’t even worth the while [...] I only got two sacks of manure. The week before Tomas I sold 1800lbs of plantain. I have a big plantain field. And every single thing was flat. The only thing I could do was to cut everything and try to get everything to grow again. But after Tomas the Black Sigatoka Disease came in. So it was one after the other. Until now I am still in a bad spot with farming.*

*Man from Fitz Hughes (24)*

Data from the survey corroborates this point, and shows that people have to respond to multiple shocks at the same time. When asked which had been the most severe shocks that the household had experienced in the last 15 years, the most common responses were as follows: 25% of households ranked food price, 15% ranked lower crop yield due to drought/disease/heavy rains, 7.7% ranked loss of employment and 5.7% ranked property theft first or as the most significant shock they have had to deal with (figure 8).
Rather than attaining full recovery, households become more vulnerable in the long term and as noted in the introduction to this section, are more prone to be impacted by another shock or hazard in the future. The following passages exemplify it clearly.

*I got my son and my grandson to nail back the galvanize and rest something on it. But it is not plastered down. And now the weather time is on, it is very threatening, because some winds blow last night and I thought the roof was going to blow off and go somewhere else. But when I wake, it was still on. […] But when the weather is hot you can go about and do things. When you are living in that condition and the rain is coming, you can’t function properly because you are thinking that I am going to sleep tonight and wonder if rain is going to come. You have to pray that the rain does not come.*

*Woman from Orange Hill (4)*

*Well if any strong wind is to blow my house roof will blow off, because it may lift up in the air and drop. But because we don’t have the finance we can’t really do anything. We had to run out of our house during Tomas. People were telling us to run fast because the river was coming down around by the spring that comes down really heavy. As soon as we cross we saw the water coming down behind us. We went by our daughter down the road. The old galvanize on the roof would lift up and fall back. Nobody came to our assistance.*

*Woman from Fancy (14)*
Knowledge and multiple hazards preparedness

Preparedness remains a key component of disaster risk reduction and has been included in all efforts to decrease the impacts of natural hazards on human beings and infrastructure in the region (Crosweller 2009). In St. Vincent, like in most of the Caribbean, there has been an important effort led by the local government and projects funded by international organisations like the Red Cross to improve knowledge and prepare the population for disaster risk reduction. Most of the effort however has focused on dealing with hurricane emergency situations, and to a lesser extent tsunamis, earthquakes and volcanic eruptions. This became clear in most of the interviews conducted for WP3 of the project, where most people said they had received some kind of training around basic actions that are to be taken before, during and after a hurricane or a storm impacts their area.

NEMO goes around and educate persons. They have emergency groups in Fancy, in Sandy Bay and in Owia.

Man from Fancy (11)

Right here in Sandy Bay NEMO does training, Red Cross, and other different organizations have come in time and time again and they give training and even just before the disaster time they would come and distribute leaflets to people to remind them of what should be done.

Woman from Sandy Bay (16)

During the year, you would have advertisement coming over the radio informing persons about what would happen during a hurricane, and what they should do, and where they should go and seek shelter. They usually inform persons who live in the low lying areas like close by the sea, to evacuate at an early time before the actual hurricane starts. So if you see the rain starting to fall heavy, they would put the advertisement over the radio. The seas would become rough and so they tell people to evacuate.

Woman from Overland (7)

Data from the survey also shows that almost 93% or the majority of households know where to go in case of an emergency (see figure 9).
Out of those who responded that they know where to go, 97% said they would go to a shelter. However, despite the fact that people are aware of the shelters that exist in their communities, some did point out to the fact that not all shelters are in a good condition, are too far, or simply do not exist in their village. For some people therefore, going or trying to go to these shelters during an emergency might be more dangerous than staying at home.

In Orange Hill, we have no emergency shelter whatsoever […] Yes there is a school at Overland, but you cannot run from here to Overland. […] Sometimes when you are going down you don’t know what you will meet down there. You may leave to go there and you see you are in very serious trouble. December 24 flood it cut us off in Orange Hill from Sandy Bay and Georgetown. Because nothing could pass to come down. When you reach Rabacca, nothing could pass there to go down. So we were caught in the middle. So if we have a serious disaster, we don’t know where to go.

Woman from Orange Hill (4)

Yes, if anything we go by the school around there. Well, the school is not really a shelter. It has some louvers from by the seaside. When rain and wind blows, the school is not safe. The rain blows in and wet down the whole school. They promised to come and fix it but I haven’t seen anybody come. In Fancy, they need to build a shelter just for emergency.
But the school, even the clinic, does not have good shelter. These are situated in the place that is most likely to have a disaster.

Woman from Fancy (14)

I would not go there (shelter). It’s better to stay home, I would not go there because it is bad. The bank that sponsored it, Bank of SVG, are not finished with it. They have not brought all the material so that is why it is like that. So they need to finish it. So they are building now with screws instead of nails. So when you put it down there are bolts underneath, so that the wind does not blow up the roof. The walls now, the use lots of steel and mesh to do the walls, and mix the sand with the rough and fine sand, so it is stronger. They use more cement so it is stronger. So in the even of a disaster it would be safe.

Woman from Langley Park (33)

Another important finding from the survey was that although people know what to do when a hurricane/storm strikes their area, very few households have an emergency plan of their own (see figure 10).

![Figure 10. Do you have a household emergency plan?](image)

Out of the total 401 households interviewed only 8% of households said they have an emergency plan. That in contrast to more than 92% of households who said they did not have an emergency plan. Although people are aware of the general measures to take in case of a hurricane, there are still some factors that might prevent them from doing that successfully. Limited access to
appropriate shelters and individual household plans seems to be the most pressing issues, which require further action. Also, as pointed out by Ferdinand et al (2012), despite the fact that several Disaster Risk Reduction groups exist at the community level, they are not always successful at getting people to work together which in some instances can exacerbate vulnerability. Additionally, it became clear that most of the knowledge people have in terms of natural hazards relates to hurricanes, storms and tsunamis and that there is significantly less knowledge about geohazards, specifically earthquakes and volcanoes. This was also found by Ferdinand et al (2012:89) who note that although people in St. Vincent are prepared for hurricanes “other hazards are a different story”. Knowledge and preparedness around volcanic eruptions will be discussed next.

Knowledge about the volcano
An important part of the research conducted by WP3 in St. Vincent included getting to understand how much and what people know about the volcano. The aim was to go beyond perception of volcanic risk and try to find out details about their knowledge related to the volcano and how they would use that knowledge in case of a volcanic eruption. In combination with the socioeconomic data gathered around livelihoods and information about other hazards’ impacts and recovery, information on knowledge about the volcano helps understand vulnerability to multiple hazards. As the following passages show, it is possible to conclude that the majority of people in the north of the island of St. Vincent are aware that the volcano is active and that they live in high-risk areas.

I think today we are more aware of the devastating effects, not only our volcano here but we see places like Montserrat, even in USA. So that consciousness is being developed among the younger people, you know. This is what a volcano could do and in case of a volcanic eruption these are the things you can do, you move out of the zone but even in 1979 there were people who did not move out of the area, probably the older folks and so on, and those of us with families had to try and get our families out of the areas because we did not know exactly what was happening.

*Man from Petit Bordel Group Interview (38)*

Danger zone they say, but you look at it we are better equipped today, we have not reached that system today. Scientists cannot tell you what is going to happen. Today between 20.000 people would have to evacuate. It might be worse because there are more people. People from the hospital in Georgetown, prison from Leeward side, would have to be moved, you can’t just leave them there.

*Man from Sandy Bay (15)*
As the last passage above notes, most are aware that a volcanic eruption might have significant impacts and that it would require evacuating large amounts of people. It was also possible to note that many know about the monitoring activities scientist carry around the volcano and are aware that instruments are placed around the volcano for this purpose. Additionally, people are also aware that there is uncertainty in what the scientists are able to say about when and how eruptions will take place. This corroborates with the results of the study conducted by Crosweller (2009) in St. Vincent.

Even by the river at Orange Hill, when you go to certain areas, you can see where they have placed things looking like a meter, or thermometer looking thing. If you go up a little higher, you will meet another. Any little earthquake they will feel it. But people go up there and vandalise them.

Woman from Orange Hill (4)

Yes they have the instruments and the scientists are in Trinidad. And so if anything is happening to the volcano, they would pick it up. They have it at St. Augustine in Trinidad by the University.

Woman from Overland (7)

Since that time, on and off we have been having updates on it. I can’t say we have not had anything on it. They always come and look at it. They had equipment put up there to monitor it. So we are aware that they are monitoring it. Sometimes we hear that persons have vandalized the equipment and that they should desist from doing those things. So everybody should be aware, unless they just don’t care. At least we are aware.

Woman from Troumaka (36)

**Evacuation**

People’s willingness to evacuate in case of a volcanic eruption was a topic discussed in most of the interviews as well as in the group interviews. While some people seem to believe that most would evacuate others thought that given that today families have more property they might be reluctant to leave everything behind. In general though, the majority said that they would be willing to evacuate. A few however, said that they would simply not evacuate as they did not see the need to do it or felt that living in camps/shelters would be difficult.

If I have to move I would move. It’s for my safety.

Woman from Troumaka (36)
I think a lot of people would go. Especially the older persons. Some of the older persons can be stubborn, but a lot would go. From the experience of the 1979 eruption, a lot of people would not want to risk it.  

Man from Overland (8)

If you hear what happened and you didn’t see what happened, but if you heard about the 1902 eruption, and you lived to see the 1979 eruption, there is no use for you to sit and say you are not going anywhere. You have to move.  

Woman from Orange Hill (4)

Well if it happens I have to evacuate. I am not going to be stubborn and say I am not going to move. Once it happens and there is a way for me to evacuate I will evacuate. I know the seriousness. I knew before because my guardian that I grew up with lived during the time of the 1902 eruption. She told me all about it.  

Woman from Orange Hill (4)

I would not go anywhere. I definitely would not go anywhere. When the scientists came in 1979, there was only 1 rum shop left open in the entire Leeward. And that is where the scientists used to go. The only thing the guys were saying to us was that if it erupts, go inside. Do not let the ash get into your lungs. And I proved it. We had a serious eruption on the Saturday. People ran leaving everything at that eruption. People were very scared.  

Man from Fitz Hughes (24)

I do not think people would be willing to leave because they want to protect their property.  

Woman from Rose Bank Group Interview (21)

There were also mixed results and opinions in terms of evacuation routes and facilities to evacuate. While some people thought that it would be easier to evacuate today because there are better roads and more vehicles, others believed that more vehicles would obstruct the road and complicate the process. There was no mention of ash as a significant problem for vehicle circulation and visibility.

I say easier because there is more transportation now than then. More vehicles now. In 1979 there was not much transportation and people had to walk from here to Central Leeward like Baroullie. Transportation had to come from Kingstown to get people before some people could get a ride. But now we have a lot of transportation in the area. Well if it happens now like in 1979, there would be a lot more transportation that can come in and get people out. There are more people with engine boats as well  

Woman from Rose Bank Group Interview (21)

I would say it would be more difficult and more congested. There are a lot of vehicles now, and you have to have a plan in place and execute that plan very well. People would not listen. People are panicking and people want to get out at the same time. There would be a lot of road blockage. So then it would be more difficult to get people out. And people these days would not listen. We have to be really good at the planning and plan carefully. Have groups in the areas, educate people and tell them what to do  

Man from Rose Bank Group Interview (21)
Yes and they would move fast. More people have their own vehicles now. But at that time nobody had any vehicles in 1979. Everybody had to wait on the bus. The roads were bad so there was no van on the roads.

*Man from Owia Group Interview (26)*

The previous passages show that although people are aware that they are living in high risk areas which would require evacuation in case of an eruption, information that is not clear, contradictory and possibly even damaging if an eruption were to occur circulates amongst the population. Moreover, as Crosweller points out, because risk communication has focused on preparedness and risk awareness around volcanoes it has not always been effective at communicating information about hazards (2009). For example, as it is mentioned in two separate quotes below, it is commonly thought that the bridge over the Rabacca River, also known as the Dry River, would make it easier to evacuate from areas north of it. This might be true for smaller eruptions, if there is a larger eruption with lahars and pyroclastic flows, the entire area, including the bridge might be impacted.

*I think I will be so scared that I might not remember what to do. Once there is a ride, get out of the danger zone. In the case of hurricanes and those things, you can be well prepared. But volcanoes don’t give you much warning. You might have some earthquakes, but when the actual eruption starts we may not know. We are a little better off now because we have the Rabacca River where the hot water comes down so we have a bridge to cross over. So the hot water would not affect you. If hot water comes down that river you can’t pass. So that is a plus.*

*Woman from Orange Hill (2)*

*Well I heard that we are in the danger zone for right now […] We don’t have the dry river anymore to pass, as that would be dangerous since the water would be very hot. The lava coming down would be hotter and larger. That is what I heard.*

*Woman from Fancy (12)*

In short, even if there is a high perception of risk, and many are even willing to evacuate, or know they have to evacuate, it is not clear whether the majority know what are the specific measures that should be taken in case of an eruption and which are the types of hazards that each community could be affected by. Similar findings are reported by Crosweller (2009). It was clear from the research conducted in St. Vincent that most people would wait for instructions and for the government or organisations like the Red Cross to reach and help them during an emergency.
Volcanic Hazard Map and position of each community in relation to the volcano

In terms of the hazard map and the position of each community in relation to the volcano, there also seems to be mixed knowledge amongst the population. Some people have seen the map, know about it and were able to explain the different colour zones on it. This was the case with young adults at the school in Owia in the Windward side of the island. However, most people that were interviewed for WP3 research had not seen it or known about it. Despite this, most were well aware that their communities were located in areas of high risk. The terms used to describe them were ‘red’, ‘volcano zone’, ‘fire zone’ and ‘danger zone’. This information reiterates the point made earlier, which is that many know that they are in areas with direct influence from the volcano, yet the details of how each community could be impacted and by which hazards, are not always clear.

Interviewer: Have you ever seen the volcanic hazard zonation map? It is a map of St. Vincent with the different hazard zones in different colours?
Woman: Yes I have seen it
Interviewer: Where is Owia on that map?
Woman: It is in red. We are in the fire zone

Woman from Owia Group Interview (26)

Yes at school. We discuss the volcano hazards and where the safe zones are.

Yong man from Owia Group Interview (26)

No we have not seen that map, but NEMO would have those things, but we didn’t get them […] Well we know that Sandy Bay is near to the volcano. We know that. We know we are in the volcano zone

Man from Sandy Bay (27)

Access to information about the volcano

The mixed results in terms of knowledge about the volcano might be explained by the fact that training and access to information is also differentiated across communities. It seems that those that have strong community groups, specially led by the Red Cross, such as Fancy, Sandy Bay, Troumaka and Chateaubelair, have more access to information. Schools and radio stations also
featured as important sources of information dissemination. During the interviews, some mentioned that training work has been done by NEMO, the Red Cross, and during Volcano Week. Others, however had not received information about the volcano.

Well because of Red Cross we do some training on how to assist people. So what we would do is that we would hear it on the radio or tv that we should expect the volcano to erupt so we should evacuate. Well I am the head of the team here, so I would go to people and tell them they have to pack up some clothes and leave Chateaubelair. People who have their vehicles would just come to assist and we would search for the older people and those people who cannot move, so we would walk around and tell them.

Woman from Chateaubelair (22)

There have been times when persons came on the other side of the village, so I went. They said if the volcano erupts and you can get out, you should try to leave. But if you can’t get out, you should stay where you are. They also explained what the volcano is like when it erupts.

Woman from Fancy (13)

Well I do not know for everybody but during the period that the volcano erupts, they usually keep that day as a special day. On that day they usually have radio programmes that talk about the volcano and give updates on what is happening.

Woman from Owia Group Interview (26)

Well if you get the volcano erupt in the night, it’s gonna be a real big problem because everybody would be going here and there, the light might cut off, electricity might cut off. If current goes now, everybody searching for candle, candle, candle, nobody is prepared.

Man from Orange Hill (1)

Only if the volcano is in action, you would listen and hear it on the air. But nobody came. Not even a workshop, I would say. Nobody has ever come to give a workshop on the volcano to get information on the volcano and how to prepare in case the volcano was to erupt.

Woman from Orange Hill (4)

I think the schools are now integrating those areas in their curriculum. When the students are doing Geography or Social Studies, La Soufriere is mentioned, and students can easily identify with it. We also hear some jingles on the radio. Sometime ago they had a training session, and it had something to do with the volcano. People said after the workshop that Soufriere is going to erupt. So it is more through the schools and information from the radio, and sometimes the training sessions. The Red Cross did some training two months ago for those persons in Troumaka. I think they are doing some training so people become more aware of what is happening.

Woman from Troumaka (34)

Moreover, as Crosweller (2009) points out, the fact that there is uneven knowledge about the volcano across and within different communities in St. Vincent, could also be explained by the way
in which volcanic risk is communicated, generally following a model that prioritises “what the experts believe the public needs to know” (Crosweller 2009).

**Trust in information during emergencies**

Some of the questions in interviews and the survey focused on trust in information and information dissemination during emergencies with a general focus on Disaster Risk Reduction. The findings from both inquiries show that the majority of people trust information that is coming from NEMO and also expect them to disseminate information during emergencies. When asked whom they trust the most to give information during an emergency in the survey questionnaire, 53% households responded that they trust in NEMO, 14% in family and friends and 17% in the Media (radio, tv, internet).

![Figure 11. Trust in Information](image)

Similar results were found through the interviews. However, some people did express lack of trust in official information as the quote below notes.

> Getting information like that has to come from NEMO. Once you get it from there, you will do whatever they say you are to do because they are the source of the information.

-Man from Overland (8)
The only problem is that with our disaster system here, a fair amount of the time, we get the wrong information. It all boils down to trust. Who do you trust? Whether the person is right or wrong. The question is who do you trust? And if we do not have that trust, it will be difficult

Man from Petit Bordel Group Interview (38)

A significant finding from the survey is that most people would expect NEMO to reach them first in case of an emergency (see figure 12). There were also high percentage of homes that expected the Red Cross and other state authorities (not NEMO) to reach to them during an emergency.

Figure 12. Reach first during emergencies

**Help during emergencies**

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorities (other than Nemo)</td>
<td>18.5</td>
</tr>
<tr>
<td>NEMO</td>
<td>40.6</td>
</tr>
<tr>
<td>Red Cross</td>
<td>19.0</td>
</tr>
</tbody>
</table>

**Improving disaster risk reduction**

Two questions were included in the survey, which referred to improvements that could be done to reduce the impact from storms/rain and the volcano. These questions reflect peoples’ opinions around these two topics and should be interpreted as their suggestions for enhancement of the risk reduction system. Each respondent could chose three out of 12 options. In terms of changes or improvements that could be done to reduce impacts from rain/storms, there was a range of different responses (see appendix). Housing relocation, better warnings and better housing were amongst the most common choices. Other and don’t know answers were also high, and are kept in the figure below to show that there is still a relatively high number of households that either have different ideas (other) or did not know or did not want to share their options (don’t know) (see figure 13).
Reducing impact from Storms

<table>
<thead>
<tr>
<th>Option</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t Know</td>
<td>11.6</td>
</tr>
<tr>
<td>Other</td>
<td>12.6</td>
</tr>
<tr>
<td>Sea walls/defences built</td>
<td>10.2</td>
</tr>
<tr>
<td>Housing relocation</td>
<td>18.6</td>
</tr>
<tr>
<td>More/Better Shelters</td>
<td>6.0</td>
</tr>
<tr>
<td>Better housing</td>
<td>8.3</td>
</tr>
<tr>
<td>Help with preparedness</td>
<td>11.6</td>
</tr>
<tr>
<td>Better warnings</td>
<td>12.5</td>
</tr>
</tbody>
</table>

Figure 13. What can be done to reduce impact from storms?

For reducing potential impacts from the volcano, different options were chosen yet there was a focus on better warnings, better preparedness and better evacuations and (see figure 14).

Reducing impact from Volcano

<table>
<thead>
<tr>
<th>Option</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>4.0</td>
</tr>
<tr>
<td>Housing relocation</td>
<td>7.0</td>
</tr>
<tr>
<td>Better organised evacuations</td>
<td>13.0</td>
</tr>
<tr>
<td>Help with preparedness</td>
<td>11.0</td>
</tr>
<tr>
<td>Better warning</td>
<td>16.0</td>
</tr>
</tbody>
</table>

Figure 14. Reducing impact from volcano
V. SUMMARY OF FINDINGS

This report aimed at examining vulnerability to volcanic hazards in St. Vincent by focusing on understanding three aspects of vulnerability related to La Soufriere Volcano: (1) the impact of the 1979 eruption on the population; (2) the recovery process after that eruption and; (3) the population’s current vulnerability to possible future volcanic eruptions.

It is well known that small island states such as St. Vincent share a range of vulnerabilities that include size, remoteness and proneness to impacts from natural hazards. Physical vulnerabilities (location and geography) are combined with socio-economic factors that include access to resources, impacts from other shocks, education attainment, employment status, amongst others (Ferdinand, et al. 2012:85). This report emphasises the socio-economic factors that underline vulnerability to volcanic hazards in the future which are summarised below:

Direct and indirect impacts: The 1979 eruption had a combination of direct (ash and other hazards) and indirect impacts (time spent in shelters, school disruption, theft, dislocation, loss of income etc). These impacts were felt in different ways and different lengths of time across infrastructure, houses, crops, livestock, and services.

Recovery trajectory: The trajectory of recovery after 1979 was uneven in time (as well as across social groups), with boosts (e.g. bumper harvests) and setbacks (e.g. hurricanes). The 1979 eruption also triggered interacting social transformations – it contributed to changes in lifestyles and livelihoods within the risk zones, led to relocations of people outside high-risk areas, and contributed to closure of the last remaining agricultural estates.

Vulnerability to hazards today: The volcanic high-risk zone corresponds with a geographical area in which a proportionately high number of households have underlying livelihood difficulties (e.g. in securing livelihoods, difficulties with accessing markets and theft). This makes them prone to impact from multiple hazards and other shocks/stresses. In other words, both the effects of the
actual disaster events and the ability the household has (or not) to recover from them reveals that household vulnerability in this part of St. Vincent is high. Their ability to recover and move forward from shocks (what is commonly understood as resilience) is relatively constrained for most of the population.

**Recovery mechanisms:** Recovery processes, or what people do after a hazardous event has impacted their household, is based on a combination of activities including: continuing with daily routines, accessing assistance from the state, and using their savings or relying in their family and friends. Despite the efforts made, many are not able to recover. Access to state assistance and social capital, for example, are not the same for every household – and these differences come into play in post-disaster just as much as in normal times. The fact that the island is prone to the impact of multiple hazards means that recovering is made more difficult by the possibility that another hazard might impact soon after. Moreover, impact of recurrent hazards can possibly cause a downward spiral in livelihood trajectories.

**Hazard Risk Preparedness and vulnerability:** Although there is a high perception of risk that manifests itself particularly in terms of knowledge about storms and hurricanes, there is less understanding in terms of volcanic hazards. Knowledge of evacuation routes and shelters is high yet household preparedness plans are very limited. Shelters are not in a good condition. There may be a need for different types of shelters for different types of hazards.

**Reducing impacts from volcanic hazards:** To reduce the possible impact from volcanic hazards there is a need to improve preparedness plans but also to reduce vulnerable livelihood patterns existing at the moment in St. Vincent. This is particularly the case for agriculture, which is one of the most important sources of income from households in high volcanic risk areas. Problems such as poor access to markets that limit income security at all times, and thereby undermine resilience in the face of hazards. Unemployment and constrained livelihood opportunities in the north of the island are therefore accentuating underlying vulnerability to natural hazards.
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Appendix

1) Survey Questionnaire for St. Vincent

2) Information Sheets WP3
SURVEY INFORMATION

ENUMERATION

1. INTERVIEWER ............................ CODE........................
   (Name)
   (Day, Month & Year in two digits)

2. LOCATION
   Community....................... Household ID. ...................

3. INFORMED CONSENT
   Agreed to respond to questionnaire

4. RESULT OF INTERVIEW
   1 = Completed   2 = Refused   3 = Household locked
   4 = Household not found/located  5 = Incomplete

VERIFICATION

5. SUPERVISOR. ............. CODE  DATE
   (Name)
   (Day, Month & Year in two digits)

SIGNATURE: ..............................................................

Remarks of Supervisor/ Enumerator /Data Entry Operator (If any):--

........................................................................................................
........................................................................................................
........................................................................................................
........................................................................................................
........................................................................................................
........................................................................................................
........................................................................................................
........................................................................................................
# A. BASIC HOUSEHOLD INFORMATION

*Please complete this table for all household members (people that live in the same household).*

<table>
<thead>
<tr>
<th>PID No</th>
<th>A.2 What is ....’s relationship to the respondent?</th>
<th>A.3 What is ....’s gender?</th>
<th>A.4 What is ....’s age in years?</th>
<th>A.5 What is ....’s level of education?</th>
<th>A.6 What is ....’s ethnicity?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Spouse 1</td>
<td>Male- 1</td>
<td>Put 00 if &lt; 1 year</td>
<td>Primary 1</td>
<td>Afro-Caribbean 1</td>
</tr>
<tr>
<td>2</td>
<td>Son/Daughter 2</td>
<td>Female- 2</td>
<td></td>
<td>Secondary 2</td>
<td>Amerindian (Carib) 2</td>
</tr>
<tr>
<td>3</td>
<td>Spouse of son/daughter 3</td>
<td></td>
<td></td>
<td>College 3</td>
<td>East Indian 3</td>
</tr>
<tr>
<td>4</td>
<td>Grandchild 4</td>
<td></td>
<td></td>
<td>Undergraduate Degree 4</td>
<td>European 4</td>
</tr>
<tr>
<td>5</td>
<td>Father/ mother 5</td>
<td></td>
<td></td>
<td>Postgraduate Degree 5</td>
<td>Mixed 5</td>
</tr>
<tr>
<td>6</td>
<td>Brother/sister 6</td>
<td></td>
<td></td>
<td>No formal education 6</td>
<td>Other 6 (specify)</td>
</tr>
<tr>
<td>7</td>
<td>Nephew/niece 7</td>
<td></td>
<td></td>
<td>Children under education age 7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Father/ mother-in-law 8</td>
<td></td>
<td></td>
<td>I don’t Know 0</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Brother/ sister-in-law 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Grandfather/ Grandmother 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Other relative 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Non relative 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### B. House type, utilities and items

<table>
<thead>
<tr>
<th>B1. What house type does the household occupy? (one response possible)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1= Concrete house</td>
<td></td>
</tr>
<tr>
<td>2= Wooden house</td>
<td></td>
</tr>
<tr>
<td>3 = Mixed material</td>
<td></td>
</tr>
<tr>
<td>4 = Other (specify)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B2. What type of roof does this house have? (one response possible)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1= wall roof (concrete)</td>
<td></td>
</tr>
<tr>
<td>2= asphalt shingles</td>
<td></td>
</tr>
<tr>
<td>3 = clay roof</td>
<td></td>
</tr>
<tr>
<td>4 = zinc sheeting</td>
<td></td>
</tr>
<tr>
<td>5 = thatched roof</td>
<td></td>
</tr>
<tr>
<td>6= Other (specify)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B3. What is the ownership status of this house?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1= Own</td>
<td></td>
</tr>
<tr>
<td>2= Renting</td>
<td></td>
</tr>
<tr>
<td>3 = Living without paying (offered by relatives, landlord, other)</td>
<td></td>
</tr>
<tr>
<td>4= Squatting</td>
<td></td>
</tr>
<tr>
<td>0= Don’t Know</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B4 What is the household’s main source of drinking and cooking water?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Piped water</td>
<td></td>
</tr>
<tr>
<td>2= Supply outside of house (e.g. tank, private well)</td>
<td></td>
</tr>
<tr>
<td>3 = Public/Communal (e.g. standpipe)</td>
<td></td>
</tr>
<tr>
<td>4 = Natural water source (e.g. river, stream, spring)</td>
<td></td>
</tr>
<tr>
<td>5 = Bottled water</td>
<td></td>
</tr>
<tr>
<td>6 = Other</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What kind of sanitation facilities does this household have access to? (Yes 1, No 2, Don’t Know 0)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B5.1 Latrine</td>
<td></td>
</tr>
<tr>
<td>B5.2 Flushing toilet/septic tank</td>
<td></td>
</tr>
<tr>
<td>B5.3 Shower</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Does your household own any of the following household items? (Yes 1, No 2, Don’t Know 0)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B6.1 TV</td>
<td></td>
</tr>
<tr>
<td>B6.2 Radio</td>
<td></td>
</tr>
<tr>
<td>B6.3 Mobile phone</td>
<td></td>
</tr>
<tr>
<td>B6.4 Computer</td>
<td></td>
</tr>
<tr>
<td>B6.5 Refrigerator</td>
<td></td>
</tr>
<tr>
<td>B6.6 Internet access</td>
<td></td>
</tr>
</tbody>
</table>
## C. LAND

<table>
<thead>
<tr>
<th>C1. Does this household have access to agricultural land?</th>
<th>C2. If yes, how much?</th>
<th>C3. What is the land tenure arrangement for the agricultural land? READ OPTIONS</th>
<th>What do you use it for? Please choose up to 2 answers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>C4.1</td>
<td>C4.2</td>
</tr>
<tr>
<td>Access to land</td>
<td>Quantity of land</td>
<td>Land tenure</td>
<td>Use of land</td>
</tr>
<tr>
<td>1 = Yes</td>
<td>1 = &lt;1 acres</td>
<td>1 = Own with papers</td>
<td>1 = Planting crops only (Go to D.)</td>
</tr>
<tr>
<td>2 = No (Go to E)</td>
<td>2 = 1-5 acres</td>
<td>2 = Own without papers</td>
<td>2 = Planting crops and livestock (Go to D.)</td>
</tr>
<tr>
<td>0 = Don’t know</td>
<td>3 = 6-10 acres</td>
<td>3 = Leasing from state</td>
<td>3 = Livestock (Go to E.)</td>
</tr>
<tr>
<td></td>
<td>4 = 11-20 acres</td>
<td>4 = Renting from someone else /sharecropping</td>
<td>4 = Not in use (Go to E.)</td>
</tr>
<tr>
<td></td>
<td>5 = 21+ acres</td>
<td>5 = Family land</td>
<td>5 = Renting (Go to E.)</td>
</tr>
<tr>
<td></td>
<td>0 = don’t know</td>
<td>6 = Other (specify)</td>
<td>6 = Other (Go to E.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 = don’t know</td>
<td>0 = don’t know (Go to E.)</td>
</tr>
</tbody>
</table>

## D. CROPS

*Question for households that have access to land and use it for planting crops. If no access to land or not used for farming enter n/a.*

<table>
<thead>
<tr>
<th>D1. What type of crops do you plant? Please list 4 main crops</th>
<th>D2. What do you do with these crops?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td></td>
</tr>
</tbody>
</table>

### Types of crops

<table>
<thead>
<tr>
<th>1= Ground Provision</th>
<th>2= Arrow root</th>
<th>3= Vegetables</th>
<th>4= Plantain</th>
<th>5= Banana</th>
<th>6= Fruits</th>
<th>7= Coconut</th>
<th>8= Cocoa</th>
<th>9= Groundnuts</th>
<th>10= Other (specify)</th>
</tr>
</thead>
</table>

### Use of crops

<table>
<thead>
<tr>
<th>1 = Own consumption only</th>
<th>2 = Own consumption and for sale</th>
<th>3 = For sale only</th>
<th>4 = Other (specify)</th>
</tr>
</thead>
</table>
### E. LIVESTOCK

<table>
<thead>
<tr>
<th>E.1 Does this household own any livestock?</th>
<th>If yes, what type of livestock does your household own? (Choose up to three options)</th>
<th>What do you use them for?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own livestock</td>
<td>Types of livestock</td>
<td>Use of livestock</td>
</tr>
<tr>
<td>1 = Yes (go to E.2)</td>
<td>1 = Small livestock (chickens, fowl)</td>
<td>1 = Own consumption only</td>
</tr>
<tr>
<td>2 = No (go to F)</td>
<td>2 = Medium sized livestock (goats, sheep, pigs)</td>
<td>2 = Own consumption and for sale</td>
</tr>
<tr>
<td>0 = Don’t know</td>
<td>3 = Large size livestock (cows, mules, horse, donkeys)</td>
<td>3 = For sale only</td>
</tr>
<tr>
<td></td>
<td>0= Don’t Know</td>
<td>4 = Other</td>
</tr>
</tbody>
</table>

### F. TRANSPORT

<table>
<thead>
<tr>
<th>F1. Do you own any means of transport?</th>
<th>List in order of importance (if none insert n/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F2.1</td>
</tr>
<tr>
<td></td>
<td>F2.2</td>
</tr>
<tr>
<td></td>
<td>F2.3</td>
</tr>
<tr>
<td></td>
<td>F2.4</td>
</tr>
</tbody>
</table>

| Type of transport                      | 6 = boat                                         |
|                                       | 7 = mule/horse/donkey                           |
| 1= motorbike                          | 8 = Bicycle                                     |
| 2= car/jeep                           | 9 = Other                                        |
| 3= pickup-truck                       | 4= minivan                                       |
| 5= truck                              | 5= truck                                         |
### G. MIGRATION

<table>
<thead>
<tr>
<th><strong>G1.</strong> Do you have members of this household overseas?</th>
<th><strong>G2.</strong> Does this household receive any remittances from household members, relatives or friends who are overseas?</th>
<th><strong>G3.</strong> How important is the contribution of remittances to this household’s total income?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 =Yes (go to G2)</td>
<td>1 =Yes (go to G4)</td>
<td><strong>Contribution of Remittances</strong> 1= <strong>Very high contribution</strong> (most of the household’s income comes from remittances)&lt;br&gt;2= <strong>High contribution</strong> (about half of the household’s income comes from remittances)&lt;br&gt;3= <strong>Some contribution</strong> (about a third or less of the household’s income comes from remittances)&lt;br&gt;4= <strong>Very small contribution</strong> (not significant)&lt;br&gt;5 = Other</td>
</tr>
<tr>
<td>2 = No (go to G2)</td>
<td>2 = No (go to H)</td>
<td></td>
</tr>
<tr>
<td>0= I don’t know (go to G2)</td>
<td>0= I don’t know (go to H)</td>
<td></td>
</tr>
</tbody>
</table>
H. MAIN ACTIVITIES/OCCUPATIONS OF HOUSEHOLDS MEMBERS

Can you please tell us the main activities/occupation of the household members who are in an economically active age 15-65?

| H1. Person ID Code | Occupation (Choose up to three) | H3. Employment Status READ OPTIONS | Most of the income for this household comes from which activity/occupation? Please list up to three in order of importance
(Go to I if most income comes from farming. Go to J if most income comes from business. Go to K if most income comes from a public sector job or non-farming or business-related) |
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**H2 and H4. Occupation**

1= Farming (Cultivation of own land)
2= Casual/hired labour (agriculture)
3= Fishing
4= Selling goods (e.g. Trading agricultural produce, petty trade, food)
5= Own business (e.g. hairdresser, workshop, food processing)
6= Private sector job
7= Public sector job
8= Teacher
8= Paid housework and childcare
9= Disabled, does not work
10=Retired (Pensioner) 11= Retired (non-pensioner) 12= Construction Worker
13= Does not work 14 = Other 0 = Don’t know

**H3. Employment status**

1. Full time worker/ one job
2. Full time worker/multiple jobs
3. Part time work/multiple jobs
4. Part time work/one job
5. Unemployed
6. Retired

---

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### I. Livelihoods difficulties (FARMING)

Questions for households whose main occupation is farming. (If farming is not a main occupation enter n/a and go to J.)

<table>
<thead>
<tr>
<th>I1. Have you or anyone else in your household ever experienced difficulties when farming?</th>
<th>What kinds of difficulties have you encountered? (Allow three most significant problems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I2.1</td>
<td>I2.2</td>
</tr>
</tbody>
</table>

1 = Yes (go to next column)  
2 = No  
0 = Don't know

1 = Land tenure arrangements  
2 = Crop Pests /Diseases  
3 = Animal disease  
4 = No access to irrigation  
5 = Difficulties accessing markets /Fair price of products  
6 = no access to credit  
7 = Unable to access/buy farming inputs (seeds, pesticides, fertilizer, food and medicine for animals)  
8 = Labour force  
9 = Lack of tools machinery  
10 = Theft  
11 = Natural Hazards (storms, landslides, erosion, flooding, draught)  
12 = Other

### J. Livelihoods difficulties (BUSINESSES/PRIVATE)

Questions for households whose main occupation is business /trade activity (if occupation is not business enter n/a and move to K).

<table>
<thead>
<tr>
<th>J1. Did you or anyone else in your household experience difficulties in pursuing your main occupation?</th>
<th>What kinds of difficulties did you encounter? (Allow three most significant problems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J2.1</td>
<td>J2.2</td>
</tr>
</tbody>
</table>

1 = Yes (go to next column)  
2 = No (Go to K)  
0 = Don't know ( Go to K)

1 = taxes/ fees  
2 = difficulties getting permit  
3 = lack of transportation for products  
4 = theft  
5 = Difficulties accessing markets /Fair price of products  
6 = no access to credit  
7 = Unable to access/buy materials/inputs/machinery  
8 = Labour force  
9 = Natural Hazards (storms, landslides, erosion, flooding, draught)  
10 = Other
K. EMERGENCY MANAGEMENT

These questions are about the disaster events that you (or a member of your family) have been affected by.

<table>
<thead>
<tr>
<th>K1. Was your household affected by this event?</th>
<th>K2. Did you get a warning before the event struck your area?</th>
<th>How did you receive this warning? (choose up to two answers) READ OPTIONS</th>
<th>Who was the source of this information? (choose up to two answers) READ OPTIONS</th>
<th>How was your household affected? (For everyone that answered “yes” in K1) (choose up to 3 answers)</th>
<th>How did your household cope with this? (Please choose up to 3 answers)</th>
<th>K7. What were the most difficult assets to replace?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floods in 2013</td>
<td>1 = Yes (go through all questions.) 2 = No (go to K8-10) 0 = Don’t know (go to K2-K4 and then K8-10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hurricane Tomas 2010</td>
<td>1 = Yes 2 = No (go to K5) 0 = Don’t know</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

K3 Warning
1 = TV 2 = Radio 3 = SMS/Phone 4 = Social media 5 = Person 6 = Other

K4 Source
1 = NEMO 2 = Red Cross 3 = Local emergency committee 4 = Church/Religious group 5 = TV/Radio journalists 6 = Friends or Family 7 = Other 0 = I don’t know

K5 Impact
1 = Illness or injury 2 = Loss of life 3 = House damaged or destroyed 4 = Livestock affected or died 5 = Crops affected 6 = Loss of equipment/tools 7 = No road access 8 = Loss of electricity 9 = Loss of water supply 10 = Loss of irrigation supply 11 = Other 0 = Don’t know

K6 Household coping
1 = Sell assets 2 = Use savings 3 = Borrowing money/loan 4 = Seek other type of work 5 = Eat less/less preferred food 6 = Did nothing 7 = Relocated permanently 8 = Relocated temporarily 9 = Other 0 = Don’t know

K7 Assets
1 = House/repair house 2 = Land 3 = Livestock 4 = Access to water 5 = Access to electricity 6 = Crops 7 = Equipment 8 = Household items 9 = Other (specify)
<table>
<thead>
<tr>
<th>K8. Did you receive any support after the event?</th>
<th>What type of support did you receive?</th>
<th>From whom? (Please choose up to 3 answers)</th>
<th>K11. How would you rate the quality of this support overall? READ OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ] Floods in 2013</td>
<td>[ ] K9 Type of support</td>
<td>[ ] K10 Provider of support</td>
<td>[ ] K11 Quality of support</td>
</tr>
</tbody>
</table>
| 1 = Yes 
2 = No 
0 = Don’t know | [ ] K9.2 | [ ] K10.2 | [ ] K11.2 |
| [ ] K9.3 | [ ] K10.3 | [ ] K11.3 | [ ] Don’t know |

**K9 Type of support**
1 = Cash/ other non-food provisions (appliances)
2 = Food and water (rations)
3 = Equipment /training for productive activity (for business, farming, etc.)
4 = Loan
5 = Housing repair
6 = New house/ same location
7 = New house/ different location
8 = Remittances from abroad
9 = Other
0 = Don’t know

**K10 Provider of support**
1 = A community org
2 = Government
3 = NEMO
4 = International NGO/Charity groups
5 = Private company
6 = Members of the community
7 = Family/friends
8 = Religious group
9 = Family abroad
10 = Other
0 = Don’t know

**K11 Quality of support**
1 = Very good
2 = Good
3 = Fair
4 = Poor
5 = Very poor
0 = Don’t know
### L. DISASTER RISK COMMUNICATION AND PREPAREDNESS

<table>
<thead>
<tr>
<th>Who do you trust to give you information during an emergency? (allow for two responses)</th>
<th>Which authority/organisation do you expect to reach your first in case of an emergency? (allow for two responses)</th>
<th>L3. Does this household have an agreed emergency plan? (what to do when an emergency occurs?)</th>
<th>L4. Do you know where to go if a natural hazard strikes your area?</th>
<th>L5. Where would you go to?</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1.1</td>
<td>L1.2</td>
<td>L2.1</td>
<td>L2.2</td>
<td></td>
</tr>
</tbody>
</table>

1= NEMO  
2= Friends or Family  
3= Authorities (other than NEMO)  
4= Scientists  
5= Red Cross  
6= Local emergency committee  
7 =Church/Religious group  
8 = Media  
9= Nobody  
10 = Other

1= Authorities (other than NEMO)  
2= NEMO  
3= Red Cross  
4= Local emergency committee  
5= Church/Religious group  
6= Other organisations  
7= Nobody  
9 = Other

1 = Yes  
2 = No  
0 = Don’t know

1 = Yes (go to L5)  
2 = No (go to M)  
0= Don’t know (go to M)

1= Shelter (school or other building)  
2= Relative’s/neighbour’s/friend’s home  
3= other (specify)
### VOLCANIC HAZARDS

#### M. 1979 ERUPTION

<table>
<thead>
<tr>
<th>Question</th>
<th>Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M1.</strong> Have you or anyone in your household experienced the 1979 eruption?</td>
<td>1= Yes (go to M2) 2= No (go to O) 0= Don’t know (go to O)</td>
</tr>
<tr>
<td><strong>M2.</strong> How did you or anyone in your household first know about the eruption?</td>
<td>1= I saw it 2= Family or friends 3= People running from the volcano 4= authorities 5= media 6= other 0= don’t know</td>
</tr>
<tr>
<td><strong>M3.</strong> Did you or anyone in your household evacuate?</td>
<td>1= Yes (go to M4) 2= No (go to M5) 0= Don’t know</td>
</tr>
<tr>
<td><strong>M4.</strong> Did you or any of your household members return to the same place after the evacuation?</td>
<td>1= Yes 2= No 0 =I don’t know</td>
</tr>
<tr>
<td><strong>M5.</strong> How were you mostly affected. (choose up to 3 answers)</td>
<td><strong>Coping/Recovery</strong> How did your family deal with the impacts? (three responses possible?) To whom did you turn? (three response possible)</td>
</tr>
<tr>
<td><strong>M5.1</strong></td>
<td><strong>M5.2</strong></td>
</tr>
<tr>
<td>Way in which affected</td>
<td>Coping</td>
</tr>
<tr>
<td>1= Illness or injury 2= Loss of life 3= House damaged or destroyed 4= Livestock affected 5= Crops affected 6 = Loss of equipment/tools 7= No road access 8= Loss of electricity 9= Loss of water supply 10 = Loss of irrigation supply 11 = Other 0 = Don’t know</td>
<td>1= Sell assets 2 = Use savings 3 = Borrowing money/loan 4 = Seek other type of work 5 = Eat less/ less preferred food 6= Did nothing 7 = Relocated permanently 8 = Relocated temporarily 9 = Other 0 = Don’t know</td>
</tr>
</tbody>
</table>
## N. Risk Management in Development

These questions are about how you think disaster risk management has changed and what more could be done to reduce risk.

<table>
<thead>
<tr>
<th></th>
<th>N1. What improvements have there been in your lifetime that makes people less vulnerable to hazards?</th>
<th>N2. Have there been improvements since the December 2013 floods to housing and infrastructure?</th>
<th>N3. Do you think that the devastation caused by the December 2013 floods could happen again?</th>
<th>N4. What more needs to be done to reduce the impact of storms and heavy rain?</th>
<th>N5. What could be done to reduce the impact of a volcanic eruption in the future?</th>
<th>N6. How would you rate the work of NEMO in risk reduction before an event occurs?</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1.1</td>
<td>N1.2</td>
<td>N1.3</td>
<td></td>
<td>N4.1</td>
<td>N4.2</td>
<td>N4.3</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

1. Better warnings
2. Help with preparedness
3. Better organised evacuations
4. Better housing
5. Better roads
6. Higher incomes
7. More/better shelters
8. Greater tenure security
9. Housing relocated to safer areas
10. Sea walls/defences built

11. Other
12. None
0. Don’t know

1. Very good
2. Good
3. Fair
4. Poor
5. Very poor
0. Don’t know
<table>
<thead>
<tr>
<th>O1. Has your household been affected by any of the following shocks within the last 15 years? (Go through the list before moving to next question)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Yes (go to O2)</td>
</tr>
<tr>
<td>2 = No (If “no” in all go to section P)</td>
</tr>
</tbody>
</table>

READ ALL OF THE CATEGORIES BEFORE MOVING TO NEXT QUESTION

<table>
<thead>
<tr>
<th>O2. Please Rank the three most significant shocks your household experienced.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Most severe</td>
</tr>
<tr>
<td>2 = Second most severe</td>
</tr>
<tr>
<td>3 = Third most severe</td>
</tr>
</tbody>
</table>

Coping
How did your family deal with this? (three responses possible?)

| 1 = Sell assets |
| 2 = Use savings |
| 3 = Borrowing money/loan |
| 4 = Seek other type of work |
| 5 = Eat less/ less preferred food |
| 6 = Did nothing |
| 7 = Resettled permanently |
| 8 = Other (specify) |
| 0 = Don’t know |

To whom did you turn? (three response possible)

| 1 = A community org |
| 2 = Government |
| 3 = NEMO |
| 4 = Other state entity |
| 5 = International NGO |
| 6 = Private company |
| 7 = Members of the community |
| 8 = Family/friends |
| 9 = Religious group |
| 10 = Family abroad |
| 11 = Other |
| 0 = Don’t know |

<table>
<thead>
<tr>
<th>O3.1</th>
<th>O3.2</th>
<th>O3.3</th>
<th>O4.1</th>
<th>O4.2</th>
<th>O4.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lower crop yield due to drought/disease/heavy rains</td>
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<tr>
<td>2. Large fall in price of crops</td>
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</tr>
<tr>
<td>3. Sharp rise in food prices</td>
<td></td>
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</tr>
<tr>
<td>4. Livestock died/stolen</td>
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</tr>
<tr>
<td>5. Household business failure</td>
<td></td>
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<tr>
<td>6. Loss of salaried employment</td>
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<tr>
<td>7. Illness or accident of households’ main earning member</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>8. Death of main earning member of household</td>
<td></td>
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</tr>
<tr>
<td>9. Property Theft</td>
<td></td>
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<tr>
<td>10. Reduction of regular assistance, aid or remittance from outside household</td>
<td></td>
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</tr>
<tr>
<td>11. Other (Specify)</td>
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</tbody>
</table>
**P. PARTICIPATION IN DECISION-MAKING**

*These questions are about how you participate in decision-making and planning activities.*

<table>
<thead>
<tr>
<th></th>
<th>P1. Have you heard about this meeting?</th>
<th>P2. Have you ever participated in this meeting?</th>
<th>P3. If yes, how often do you participate?</th>
<th>P4. If no, why not? What prevented you from participating?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town hall meetings on neighbourhood/social issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public consultation about development policies, services and/or environmental issues</td>
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</tr>
<tr>
<td>Protest/ strike</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Group activity for study on disasters or vulnerability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**P1 and P2. Heard about / ever participated in meeting or group activity**

1 = Yes  
2 = No  
0 = Don’t know

For P1, if 2 or 0, do not ask P2, P3 or P4.  
For P2, if 2 or 0, go to P4.

**P3. Regularity of participation**

1 = Every week  
2 = Every month  
3 = A couple of times a year  
4 = Only a few times in my life  
5 = Only once  
6 = Other  
0 = Don’t know

**P4. Reasons for not participating**

1 = This event hasn’t taken place  
2 = Didn’t know about it  
3 = Not invited  
4 = Not interested  
5 = Wasn’t able to get to the venue  
6 = Working/busy  
6 = Other  
0 = Don’t know

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READ OUT. These questions are about services or support that you and your family have received and how these have changed over time. We will be asking you to compare how things were in the 1980s, 1990s and today.

<table>
<thead>
<tr>
<th>In the 1980s</th>
<th>In the 1990s</th>
<th>Today</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q1.</strong> Did you or anyone in your household receive/benefit from this service?</td>
<td><strong>Q4.</strong> Did you or anyone in your household receive/benefit from this service?</td>
<td><strong>Q7.</strong> Do you or anyone in your household receive/benefit from this service?</td>
</tr>
<tr>
<td><strong>Q2.</strong> Who provided the service/support?</td>
<td><strong>Q5.</strong> Who provided the service/support?</td>
<td><strong>Q8.</strong> Who provides the service/support?</td>
</tr>
<tr>
<td><strong>Q3.</strong> What was the service like then?</td>
<td><strong>Q6.</strong> What was the service like then?</td>
<td><strong>Q9.</strong> What is the service like now?</td>
</tr>
</tbody>
</table>

- Drinking water
- Electricity
- Healthcare
- Primary education
- Secondary education
- Training/Support for business/farming
- Loans/credit
- Housing project
- NIS benefits
- Land provision

**Q1, Q4 and Q7. Receive service/support?**
- 1 = Yes
- 2 = No
- 3 = Didn’t need it
- 0 = Don’t know
- NA = Not applicable

**Q2, Q5 and Q8. Provider**
- 1 = A community-based organisation
- 2 = Government ministry
- 3 = NEMO
- 4 = Other state entity
- 5 = NGO
- 6 = Private company
- 7 = Members of the community
- 8 = Volunteers
- 9 = Religious group
- 10 = International organisation (EU/UN)
- 11 = Other
- 0 = Don’t know

**Q3, Q6 and Q9. Quality of service/support**
- 1 = Very good
- 2 = Good
- 3 = Fair
- 4 = Poor
- 5 = Very poor
- 0 = Don’t know

READ OPTIONS
Strengthening Resilience in Volcanic Areas (STREVA)

RESEARCH PROJECT INFORMATION SHEET

The project ‘Strengthening Resilience in Volcanic Areas’ (STREVA) is an international project working in Ecuador, Colombia and the Caribbean, funded by the UK Research Councils.

The aim of the project is to understand more about the risks and consequences of volcanic eruptions for local populations and how best to strengthen the ability of vulnerable people to cope with and recover from the impacts.

The research is independent from government and is led by the University of East Anglia, UK, in partnership with universities and research institutes from the UK and the partner countries. In St. Vincent the partner institution is the University of the West Indies (UWI).

The project work involves speaking to people who live and work alongside volcanoes, to understand better how they are affected by eruptions or by the risk of eruptions, how they cope with the impacts and what makes it easier or harder for them to recover. We are working at a total of six volcanoes in South America and the Caribbean.

Findings and learning will be used to produce recommendations on better risk management both by organizations and by the affected populations.
As part of this research we are working with the communities that live around La Soufrière volcano, undertaking interviews and questionnaire surveys. Involvement in this research is voluntary and any person that participates in this research will remain anonymous. All the information will be treated as private, and we will not show that person’s name in any of the written outputs of this project. People will also have the right to withdraw any information they give within 30 days.

The findings of the research will be written up and published and these documents will be available to you. Please contact the researchers involved.

Contact information for this project:

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