

Volcanic risk perceptions of La Soufrière, St. Vincent, Lesser Antilles



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1. Introduction

Risk perceptions are an influential part in understanding what hazard education is needed (Njome *et al.*, 2010). The study includes an individual's own knowledge of the hazard(s), preparedness and confidence in decision makers and other stakeholders – which are knock-on effects to the individual's vulnerability (Gaillard, 2008) in the form of feeling powerless and making them more susceptible to threats. The choice of adjusting to volcanic eruptions depends on how people perceive these types of threats and associated risk to themselves (Gaillard, 2008).

This study investigates the risk perceptions of the La Soufrière volcano on St. Vincent from a lay-person perspective using a questionnaire.

2.1. St. Vincent

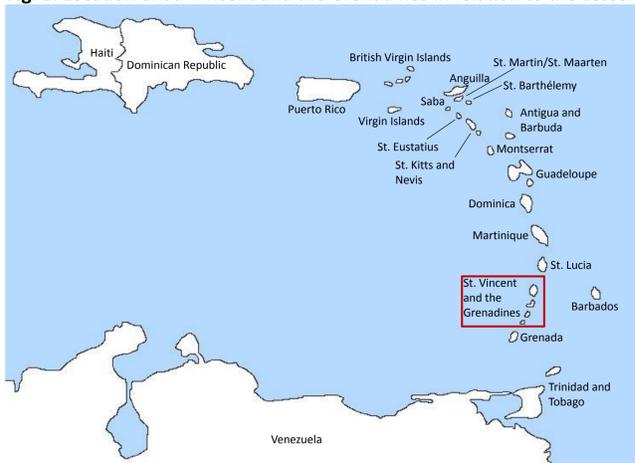
St. Vincent is a volcanic island located in the southern part of the Lesser Antilles (Fig. 1.). The estimated population of the island is 102,918 (CIA, 2014).

The population is made of 66% black, 19% mixed, 6% East Indian, 4% European and 2% Carib (CIA, 2014). The Central Planning Division (CPD) (2014) has calculated that 48.2% of the population is under the vulnerability line (based on the vulnerability index – a measurement of the exposure of a population to hazards), arising from a mixture of poverty and those that are at risk of entering poverty as a result of a disaster or an economic shock.

2.2. La Soufrière volcano

The La Soufrière volcano is part of the Lesser Antilles volcanic chain, which consists of 17 volcanoes across 11 islands. It is the youngest centre of volcanism (0.6ma to recent), located as the northern most mountain. Table 1 describes the eruptive history.

Fig. 1. Location of St. Vincent and the Grenadines in relation to the Lesser Antilles.



3.1. Methodology

The volcanic risk perception questionnaire consisted of 39 questions in 8 sections which covered:

- Hazard saliency: the natural hazards experienced on St. Vincent;
- Factual information of La Soufrière and knowledge of its associated hazards;
- Preparedness for a possible future eruption;
- Confidence in officials and receiving information;
- Self-efficacy: how much control one feels they have in protecting themselves and others;
- Perceived risk of hazards produced from La Soufrière and;
- Demographic information

The questionnaire was structured with a range of open (in the form of comment boxes) and closed questions (in the form of yes, no, don't know questions, 5-point Likert scale and 1-10 ranking question).

3.2. Distribution procedure

25 locations across the 4 hazard zones were surveyed (Fig. 2). The sample selection consisted of participants being selected through personal recommendations. This was a means to integrate into the community within a short time frame and was made easier because of the author's family connections and family name meant Vincentians were more inclined to help. This method would have been impractical if this connection was not the case. Overall, there was a 100% return rate from the 100 questionnaires distributed. 47 males and 53 females participated with an age range of 18 to 60 years and over.

Table 1. Historic eruptive history of the La Soufrière volcano.

Date	Type of eruption	Activity
26 th -29 th May 1718	Explosive	One month of earthquake activity preceded before an explosive eruption.
1780	Fumarole/effusive	Increased fumarole activity and possibly emission of lava.
27 th April-9 th June 1812	Explosive	Approximately 200 strong earthquakes in 1811 led to an explosive eruption. Pyroclastic density currents, lahars and ash fall affected areas in the west and east with 56 fatalities.
9 th January 1814	Explosive	Small eruption with ejecta being thrown 0.5km from the crater.
1880	Fumarole	Crater lake temperatures along with the water level increased with the possible development of a lava dome.
6 th May 1902-30 th March 1903	Explosive	Strong earthquakes in 1901 preceded an explosive eruption beginning on the 6 th May 1902, continuing to 30 th March 1903. Areas to the northeast, east and west were affected by lahars, ash fall and pyroclastic density currents. Approximately 1,500 people lost their lives and extensive damage was caused to agriculture surrounding the volcano.
1946-1954	Fumarole	Fumarolic activity contributed to a mean crater lake temperature increase of 4°C in 1946 and during 1948-1949 this increased by another 5°C and eventually returned to the 1946 value by 1954.
28 th September-10 th October 1971	Effusive	An aseismic effusive eruption with extrusion continuing until 1972. A voluntary evacuation in the surrounding areas began in November and an official evacuation was ordered in December.
4 th -17 th April 1979	Explosive	A preceding earthquake swarm in 1978 led to an explosive eruption on the 4 th to the 17 th April and development of the lava dome continued until 1983. No fatalities with over 14,000 people evacuated from areas in the northeast and northwest but with extensive loss to agriculture.

4.1. Results – Hazard saliency

The following section covers hazard saliency, factual knowledge and receiving information.

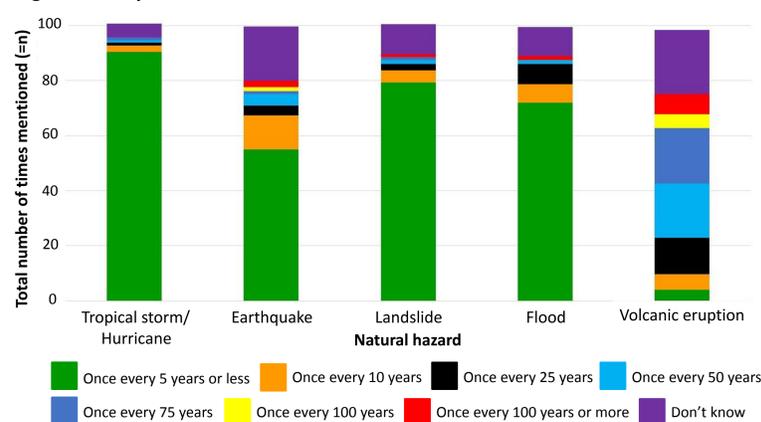
Questionnaires were completed over the course of one month and Fig. 2. represents how many questionnaires were completed in a given location with the approximate integrated hazard zones adapted from Robertson (2005a).

The more frequent natural hazards participants are exposed to are more on their minds than a volcanic eruption (Fig. 3). There is usually recognition of hazards within communities, which are prioritised in order of personal threat to the individual, along with all other personal daily issues a person must face (Cutter *et al.*, 2008). This ordering system can lead to risk and vulnerability reduction not becoming salient concerns until after the disaster occurs (Cutter *et al.*, 2008).



Fig. 2. Map of locations of questionnaires completed.

Fig. 3. Saliency towards St. Vincent's natural hazards.



4.2. Results – Factual knowledge and receiving information

Fig. 4. Is the volcano dormant or active?

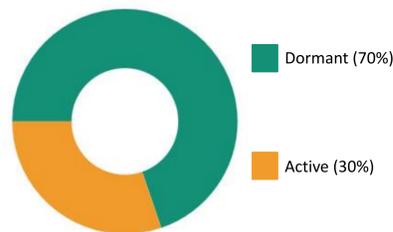


Fig. 5. Who or what controls the volcano's eruptions?

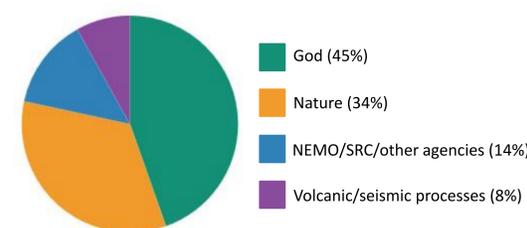
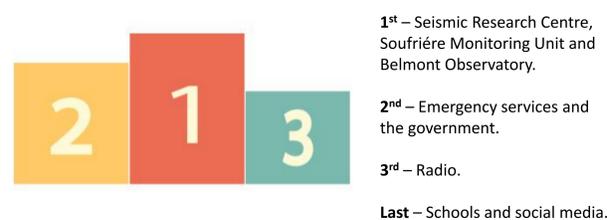


Fig. 6. Who should provide you with information about the volcano?



Present education on the volcano is directed more at students than adults. Although it is beneficial to raise awareness for the students that may be more likely to experience the next eruption, it may lead to a generation gap in knowledge, with the older generations feeling alienated about the knowledge shared with the students.

Out of the 100 who participated, 70% of those believe the volcano to be dormant (Fig. 4).

The participants' understanding of when the volcano is considered active or dormant may lead to misperceptions about its danger. This is perhaps owing to when the volcano erupted last, it will remain dormant until it erupts again. For example, Gregg *et al.* (2004) suggested the community living in the shadow of Kilauea believed it would not erupt again once the immediate eruption had stopped. La Soufrière is a noticeable feature in Vincentians' everyday lives that has acquired a personal aspect which makes it larger than reality (Robertson, 2005b).

Fig. 5 proved to be the most interesting response, with 45% attributing God to controlling the volcano and only 8% linking the volcano to volcanic and/or seismic processes. Christianity is the dominant religion on the island and divine action in response to volcanic eruptions in the Caribbean region has also been noted for Mont Pelée and Soufrière Hills (Chester and Duncan, 2010). Vincentians view the volcano in a small element of superstition (Robertson, 1995). However, Chester (2005) believed that superstitions towards geological hazards was part of a society's geoculture. The concept of geoculture influencing people's perceptions warrants further study.

Who should provide the participants with risk information regarding the volcano had 10 different options that needed to be ranked 1 to 10, 1 being the most desirable, is shown in Fig. 6. This order is possibly the result of believing who has the most knowledge of La Soufrière and also relates to participants' trust in receiving accurate information. Relating to Vesuvius for an example, Barberi *et al.* (2008) linked the lack of confidence and trust in authorities with a desire for the information to come from the Vesuvius Observatory.

5. Conclusion

- Lack of hazard saliency towards the volcano and misperceptions in what hazards could affect the participants.
- Participants wanted to know more about the volcano, its dangers and how to prepare.
- The majority would rather transfer their responsibilities in personal resilience and vulnerability reduction to those in authority.
- The need of a reduction in a gap of knowledge regarding La Soufrière in order to build community and household relevant information on preparedness measures.

6. Acknowledgements

Thanks to Hugh Tuffen (Lancaster University), Steven Corder (UWI), Richie Robertson (SRC-UWI), Jenni Barclay, Anna Hicks and Teresa Armijos-Burneo (UEA) acting as academic support. Lastly, a special thanks to Angela Griffiths for her hospitality and helping me getting to know the island and its people.

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