



## Saint Vincent REA Assessment

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La Soufriere Eruption Environmental Emergency Response

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### Introduction

This document is based on the [Rapid Environmental Impact Assessment in Disasters](#) (REA) process and summarizes top-level environment-related issues noted for the La Soufriere volcanic eruption on Saint Vincent island. The document is not an in-depth assessment. It is intended as a quick identification of issues that merit further review in developing a comprehensive plan to manage the environmental and humanitarian impacts of the recent volcanic activity. The REA components for relief aid and community inputs were not completed due to a lack of information. The results are provided “as is” and are subject to revision.

This report does not include the more in-depth work on waste and debris management done by the La Soufriere Eruption UNEP Environmental Emergency Response Team.

### Summary of Significant Issues Identified

#### Overall

- It is likely that a safe return of displaced people to their homes, particularly in the Red Zone, will not take place for months or longer. However, pressure to return will increase over time and needs to be incorporated into a relief-to-recovery transition.
- Sustainable management of volcanic ash<sup>2</sup> and flood-carried rock, sand, and sediment, as well as sand mining, require attention in near to medium response planning.
- “Sustainable” livelihoods, shelter, WASH (incl. waste and hygiene), and support for other basic needs will be required for displaced populations for the foreseeable future.
- A *phased, conditions-limited return process*<sup>3</sup> should incorporate Nature-based Adaptation and Nature-based Disaster Risk Reduction, local labor and livelihoods, and strong local engagement, including gender considerations.
- Planning for hurricane and seasonal weather, incorporating changes to the Saint Vincent environment due to volcanic eruptions, should be completed in the next few weeks.
- The environmental impacts of eruptions and of relief aid should be included in a formal damage and needs assessment.

#### Social and Economic Factors

- **Number of persons affected** (relative to total population in disaster area): Thousands<sup>4</sup>
- **Concentration** of the affected population: High
- **Self-sufficiency**: After the start of the disaster, the ability of survivors to meet needs without recourse to additional direct extraction from the environment or external assistance: Low

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<sup>2</sup> Note that volcanic ash can be used in concrete and mortar to reduce the quantity of cement required.

<sup>3</sup> “Phased, conditions-limited, return” would allow some people to return to some locations for specific periods of time under specific safety controls based on an on-going risk assessment process. For instance, adults may be allowed to return to homes in Sandy Bay to tend gardens and clear roofs during daylight hours, but with plans for immediate evacuation if volcano conditions change.

<sup>4</sup> Approximately 10% of Saint Vincent’s population is displaced, 5% in shelters.

- **Asset distribution:** The distribution of economic and other assets within disaster-affected populations after the start of the disaster: Partially equitable
- **Climate-related hazards:** Hazards that increase in intensity and frequency due to climate change, and which can produce adverse effects on natural and human systems: Many
- **Cultural homogeneity** (whether displaced and non-displaced people share a common culture) and **Gender** (men/boys or women/girls more affected by environmental conditions): Circumstances not clear

### **Hazards of Concern**

- Disease (COVID, living conditions, and hygiene-related issues).
- Volcano (explosion, ash, air quality, etcetera).
- Marine Pollution (surface and sub-surface).
- Floods & Mass Wasting.
- Coastal erosion (in the past due to sand mining).

### **Basic Needs**

- Fuel (while natural gas and electricity are widely used, reports also indicate that charcoal production is an issue).
- Personal Safety.
- Domestic Resources (such resources are limited in shelters and may be difficult to obtain).
- Waste Management (liquid and solid).
- Disease Vectors (reduction of health consequences from vectors, e.g., for Dengue).
- Environmental Conditions (associated with the volcanic eruption, pre-eruption environmental conditions and changing land use patterns).
- Water (including a preference for bottled water and availability of local public and commercial sources).
- Shelter (including the likelihood that current shelters will need to return to normal use and alternate sheltering options need to be developed).

### **Relief Assistance**

- Limited information on relief needs or plans.
- Limited near-term options for the displaced to return to their homes.
- Water importation and plastic containers (may diminish as an issue; commercial water production is available on Saint Vincent).
- Waste management (challenges may diminish over time).
- Management and sustainability of shelters/host family arrangements given potential requirement for months to years of shelter required.

<b>Form 1 – Factors Influencing Environmental Impacts</b>		
<b>Factor</b>	<b>Rating</b>	<b>Implication</b>
<b>Number of persons affected</b> relative to total population in disaster area.	<ul style="list-style-type: none"> <li>- Hundreds</li> <li>- <b>Thousands<sup>5</sup></b></li> <li>- Tens of thousands</li> </ul>	The greater number of people affected, the greater the potential impact on the environment.
<b>Duration:</b> Time from the onset of the disaster.	<ul style="list-style-type: none"> <li>- Days to weeks</li> <li>- <b>Weeks to months</b></li> <li>- Months to years</li> </ul>	The longer the disaster, the greater the potential impact on the environment.
<b>Concentration</b> of the affected population.	<ul style="list-style-type: none"> <li>- Low</li> <li>- Moderate</li> <li>- <b>High</b></li> </ul>	The more concentrated (or dense) the living conditions of the survivors are, the greater the potential impact on the environment.
<b>Distance</b> disaster survivors have moved since the beginning of the disaster.	<ul style="list-style-type: none"> <li>- <b>Close to point of origin</b></li> <li>- Not close or far</li> <li>- Far from point of origin</li> </ul>	The further survivors have to move, the greater the potential impact on the environment.
<b>Self-sufficiency:</b> After the start of the disaster, the ability of survivors to meet needs without recourse to additional direct extraction from the environment or external assistance.	<ul style="list-style-type: none"> <li>- High</li> <li>- Not high or low</li> <li>- <b>Low</b></li> </ul>	Low self-sufficiency after the disaster implies a greater risk of damage to the environment.
<b>Social solidarity:</b> Solidarity between disaster survivors and non-affected populations.	<ul style="list-style-type: none"> <li>- <b>Strong</b></li> <li>- Not strong or weak</li> <li>- Weak</li> </ul>	Weak solidarity may indicate the likelihood of conflict over resources and limits to the ability of survivors to meet needs.
<b>Cultural homogeneity:</b> The similarity of cultural beliefs and practices between disaster survivors and non-affected populations.	<ul style="list-style-type: none"> <li>- <b>High<sup>6</sup></b></li> <li>- Not high or low</li> <li>- Low</li> </ul>	A lack of common cultural structure may result in disagreement over resource use.
<b>Asset distribution:</b> The distribution	<ul style="list-style-type: none"> <li>- Equitable</li> </ul>	

<sup>6</sup> Needs to be confirmed, as the population from the most affected area may have some differences from those in less affected areas.

of economic and other assets within disaster-affected population after the start of the disaster.	<ul style="list-style-type: none"> <li>- <b>Partially equitable</b></li> <li>- Not Equitable</li> </ul>	The concentration of assets with one part of a population can lead to tensions with less well-endowed groups over the use of environmental assets.
<b>Livelihood options:</b> The number of options that disaster survivors have to assure their livelihoods after the start of the disaster.	<ul style="list-style-type: none"> <li>- Many</li> <li>- <b>Some</b><sup>7</sup></li> <li>- Few</li> </ul>	Fewer livelihood options indicates that disaster survivors may pose higher pressure upon limited resources of the environment.
<b>Expectations:</b> The level of assistance (local/external) which the disaster survivors expect to need to survive.	<ul style="list-style-type: none"> <li>- Low</li> <li>- <b>Moderate</b></li> <li>- High</li> </ul>	In the absence of adequate assistance, high expectations can lead to high demand on local resources.
<b>Availability of natural resources,</b> or whether the available natural resources meet the needs of the disaster survivors in a way that can continue without degradation to the environment or future availability of the resources.	<ul style="list-style-type: none"> <li>- High</li> <li>- <b>Moderate</b></li> <li>- Low</li> </ul>	Excessive use of natural resources leads to environmental damage. Relief can be used to reduce excessive resource demand or repair damage done to the environment. The resources in question are, for example, water (for human consumption and for other uses), forest resources (timber, firewood), and agricultural land (soil and water quality)
<b>Capacity to absorb waste:</b> The environmental, social, and physical structures available to handle waste produced by the survivors.	<ul style="list-style-type: none"> <li>- High</li> <li>- <b>Moderate</b></li> <li>- Low</li> </ul>	Low waste absorptive capacity will lead to environmental damage.
<b>Environmental Resilience:</b> Ability of ecosystem to rebound from the disaster itself and from relief and recovery activities that cause environmental damage.	<ul style="list-style-type: none"> <li>- <b>High</b></li> <li>- Moderate</li> <li>- Low</li> </ul>	Low resilience likely means high fragility and a greater possibility of long-term environmental damage.
<b>Climate-related hazards:</b> Hazards that increase in intensity and frequency due to climate change and which can produce adverse effects on natural and human systems.	<ul style="list-style-type: none"> <li>- Few</li> <li>- Some</li> <li>- <b>Many</b></li> </ul>	The greater the frequency and intensity of climate-related hazards, the greater the threat to a safe and productive life in the short- and/or long-term.
<b><sup>8</sup>Gender:</b> Are activities of men, women, girls, or boys linked to the environment, potentially subjecting them to physical harm?	<ul style="list-style-type: none"> <li>- No</li> <li>- Limited</li> <li>- Extensive</li> </ul>	Disasters often can place men, women, boys or girls in roles that can result in violence, such as collecting firewood or water, or harvesting natural resources. For all ratings, the group affected (women, men, girls, boys) and why they are affected should be noted and used in the prioritization process.

## Rating Form 2: Identification of Possible Immediate Environmental Impacts of Disaster Agents<sup>9</sup>

<sup>7</sup> Attention is also needed to remittances.

<sup>8</sup> No data.

<sup>9</sup> Note that Hurricane/Cyclone/Typhoon should be treated under each impact agent: flooding, sea surge, and wind.

Hazard and Threat	Guidance as to Significant Threat Threshold	Is the area affected: Large, Medium, or Small relative to the whole disaster-affected zone	Initial Response Options
<p><b>Flooding:</b> Transport of contaminated sediment. Sediment contains hazardous organic or inorganic chemicals (including high levels of salt). Secondary risk from sediment when dried after a flood.</p>	<p>Chemicals (including salt) present at levels exceeding acceptable standards.</p>	<p>Medium</p>	<ol style="list-style-type: none"> <li>1. Identify and assess the level of chemicals present.</li> <li>2. Limit the use of water sources with contaminated sediment and plants and animals collected from these sites.</li> <li>3. Specialized technical assistance is likely needed for assessment and planning.</li> </ol>
<p><b>Flooding:</b> Polluted Water. Water contains hazardous pathogens, or chemicals.</p>	<p>Pathogens or chemicals present at levels that exceed acceptable standards.</p>	<p>Medium</p>	<ol style="list-style-type: none"> <li>1. Identify and assess the level of pathogens or chemicals present.</li> <li>2. Limit the use of contaminated water and plants and animals collected from contaminated water.</li> <li>3. Consider water purification to meet immediate needs.</li> <li>4. Specialized technical assistance is likely needed for assessment and planning.</li> </ol>
<p><b>Flooding:</b> Transport of contaminated solids other than sediment. Floodwaters contain physical items which pose a threat, including but not limited to animal carcasses and hazardous materials containers.</p>	<ol style="list-style-type: none"> <li>1. Presence of dead animals.</li> <li>2. Presence of hazardous chemical containers.</li> <li>3. Presence of a significant level of floating debris in floodwaters.</li> </ol>	<p>Medium</p>	<ol style="list-style-type: none"> <li>1. Quantify the number and volume of solids by three threat types (animals, hazardous chemical containers, and other debris).</li> <li>2. Develop and publicize ways to deal with solids. Consider special collection and safety activities, and ensure safe disposal procedures and locations.</li> <li>3. Specialized technical assistance is likely needed for assessment and planning, and in handling disposal.</li> </ol>
<p><b>Flooding:</b> Erosion (water). Floodwaters remove usable soil and cover usable land with sediment.</p>	<ol style="list-style-type: none"> <li>1. Loss of critical infrastructure e.g. dikes, irrigation systems.</li> <li>2. Loss of immediately productive land e.g. land for cultivation or harvesting natural resources.</li> </ol>	<p>Medium</p>	<ol style="list-style-type: none"> <li>1. Remove or protect infrastructure under threat.</li> <li>2. Remove plants and other productive assets from flooded land before loss or coverage with sediment.</li> <li>3. Remove sediment after flooding.</li> <li>4. Specialized assistance is likely needed.</li> </ol>
<p><b>Flooding:</b> Damage to infrastructure (from</p>	<p>Damage which (1) seriously</p>	<p>Medium</p>	<ol style="list-style-type: none"> <li>1. Replace or remove infrastructure under threat.</li> </ol>

Hazard and Threat	Guidance as to Significant Threat Threshold	Is the area affected: Large, Medium, or Small relative to the whole disaster-affected zone	Initial Response Options
<p>erosion or force of floodwaters). Floodwaters damage or destroy the built environment, limiting the operation of critical functions (e.g., safe water delivery) or increasing the risk of pollution (e.g., damage to sewage treatment plant).</p>	<p>limits or stops the use of critical infrastructure, including roads, water treatment, power, emergency services, or (2) creates potential sources of pollution e.g. industrial or mining sites, oil and gas transmission systems, garbage dumps, and chemical waste sites.</p>		<p>2. Flood-proof and decommission sites at risk. 3. Identify the nature of potential or actual pollution due to flooding/flood damage and develop response plans (see above). 4. Specialized assistance is likely needed for any significant response.</p>
<p><b>Disease:</b> Human mortality and morbidity reduces social and economic activity and increase personal hardship.</p>	<p>Disease incidence significantly above normal. Note that specific criteria and methods exist to determine if an epidemic is occurring or a threat and should be used to assess threat significance.</p>	<p><b>Large</b></p>	<p>Disease control-related measures focusing on environmental factors such as water supply and quality, sanitation, pollution reduction, and living conditions (e. g. other hazards like flooding or crowded conditions). Many responses are likely to be common sense and relate to other threats to disaster victims.</p>
<p><b>Land Mass Movement</b>, including landslides, slumps, and other downslope movement. 1. Direct damage to infrastructure and natural resources. 2. Direct or indirect pollution of water sources.</p>	<p>1. Damage to infrastructure or other resources. 2. Significant increase in water-sediment load.</p>	<p>Medium</p>	<p>1. Remove infrastructure at risk. 2. Install containment structures and filtration systems for contaminated water. 3. Specialist assistance is likely to be required to plan the response.</p>
<p><b>Volcano:</b> Superheated ash, gas flows and large-scale explosions. Rapid destruction of the environment.</p>	<p>Volcano producing ash/gas clouds or evidence of large-scale explosions in the past.</p>	<p>Medium</p>	<p>1. Establish safety zones around the volcano and attempt to limit human and other access to high-risk areas. 2. Likely require specialized assistance to assess the nature of the volcano, high-risk areas, and effective safety precautions.</p>

Hazard and Threat	Guidance as to Significant Threat Threshold	Is the area affected: Large, Medium, or Small relative to the whole disaster-affected zone	Initial Response Options
<p><b>Volcano:</b> Ash falls (including materials deposited following a massive explosion) and lava flows. Covering and/or destruction of productive (natural) resources, damage or destruction of the built environment, pollution of water resources, and health impacts from air pollution.</p>	<ol style="list-style-type: none"> <li>1. Significant loss of productive assets or infrastructure.</li> <li>2. Air or water quality below standards.</li> <li>3. Threat of sedimentation, flooding, or erosion due to the presence of ash or lava.</li> </ol>	<p><b>Large</b></p>	<ol style="list-style-type: none"> <li>1. Identify areas at risk from ash falls and lava flows before eruption, and implement evacuation and resource management plans.</li> <li>2. Remove ash fall and lava.</li> <li>3. Remove or maintain productive resources or infrastructure under threat.</li> <li>4. Develop alternate uses for land covered with ash or lava e.g. use for construction material.</li> <li>5. Develop a water and air quality monitoring program and remedial measures as appropriate.</li> <li>6. Implement an erosion and surface water management plan to manage the sedimentation process and changes to water quality.</li> <li>7. Specialized technical assistance is likely needed to deal with water/air quality issues.</li> </ol>
<p><b>Technological:</b> Hazardous material release (fixed site and during transport, including road, water, rail, or air accidents). Release of chemicals or compounds that pose an immediate threat to life and well-being.</p>	<ol style="list-style-type: none"> <li>1. Level of release above the established norm (local or international, as appropriate).</li> <li>2. Rate of release (e.g., explosion) poses a significant threat to life or well-being.</li> </ol>	<p><b>Low</b></p>	<ol style="list-style-type: none"> <li>1. Limit additional damage by removing populations from affected areas and providing response teams with protective clothing and support.</li> <li>2. Treat exposure symptoms as per standard medical response, taking care not to pass on contamination during treatment.</li> <li>3. Dispose of contaminated items to limit additional land, water, or air pollution.</li> <li>4. Specialized assistance will likely be needed for all phases of the response.</li> </ol>
<p><b>Marine Pollution:</b> Surface and sub-surface contamination from soil, rocks, ash, or floating materials.</p>	<p>It may be difficult to measure and vary with winds and currents.</p>	<p><b>Large</b></p>	

**RATING FORM 3: UNMET BASIC NEED OF DISASTER VICTIMS**

Basic Needs and Indicators (* indicates Sphere Standard)	Are needs being met at present? Rate from 1 (not being met) to 10 (being met)	Is the use of resources to meet this need sustainable over the next 120 days? (Yes/No)
<b>Water*</b> 1. 15 liters of water per person per day. 2. Flow at water collection point is at least 0.125 liters per second. 3. 1 water point per 250 people. 4. Distance from shelter to water point is no more than 500 meters. 5. Water is palatable and of sufficient quality to be used without significant risk to health due to water-borne diseases or chemical or radiological contamination from short-term use. (Note: contaminants include human and industrial waste and pesticides.)	5	No
<b>Shelter*</b> Average of 3.5-4.5 square meters of covered space per person to provide protection from weather and sufficient warmth, fresh air, security, and privacy.	5	No
<b>Heating or cooling</b> <u>In hot climates</u> , shelter materials, construction, and ventilation adequate to keep in-shelter temperature 10 degrees centigrade below the outside temperature. <u>In cold climates</u> , shelter material, construction, and heating to ensure an internal temperature of no less than 15 degrees centigrade.	5	Yes
<b>Clothing*</b> Clothing is appropriate for climatic conditions, gender, age, safety, dignity, and well-being.	9	Yes
<b>Food*</b> 1. 2,100 kilo-calories per person per day. 2. 10-12% of total energy from protein. 3. 17% of total energy from fat. 4. Food distribution is equitable, fair, and covers basic needs (together with other food items available). 5. Adequate micro-nutrient intake.	7	Yes
<b>Fuel*</b> 1. Fuel availability meets immediate needs. 2. Fuel-economic and low smoke wood stoves, gas or kerosene stoves, and cooking pots with well-fitting lids are available.	?	?
<b>Lighting</b> Sufficient to meet security requirements and for normal economic and social activities.	10	Yes
<b>Domestic Resources*</b>	3	No



<b>Basic Needs and Indicators (* indicates Sphere Standard)</b>	<b>Are needs being met at present? Rate from 1 (not being met) to 10 (being met)</b>	<b>Is the use of resources to meet this need sustainable over the next 120 days? (Yes/No)</b>
Each household unit has access to adequate utensils, soap for personal hygiene, and tools. (Specific minimum needs identified in Sphere Handbook Chapter 4, Section 4).		
<b>Transport</b> 1. Adequate to deliver goods and services to displaced at a reasonable cost and convenience. 2. Adequate to permit disaster victims to reach goods and services at a reasonable cost and convenience.	9	Yes
<b>Personal Safety*</b> 1. Disaster victims have sufficient personal liberty and security at all times. 2. Camps, temporary shelter sites, or resettlement sites are safe and have adequate access to basic services. 3. Opportunities for violence are minimized to the extent possible. ( <u>Opportunities for violence should be noted and linked to environmental issues when appropriate.</u> For instance, fishing near a poorly defined cease-fire line.)	?	?
<b>Health Care*</b> 1. Disaster victims have adequate and timely access to care for injuries and health problems arising from the disaster. 2. Health management interventions are appropriate for chronic and acute health risks faced by disaster victims and consider the age and gender of victims. (See Sphere Standards for specifics.) 3. Adequate care is available for disaster victims with chronic diseases or disabilities.	7	Yes
<b>Disease Vectors (reduction of health consequences from vectors)*</b> 1. Disease vectors and nuisance pests are under control. 2. Disaster victims are located outside disease vector breeding or resting sites, or sites are modified or other interventions are used to keep the presence of pests at an acceptable level. 3. Chemicals used to control vectors are in accordance with local/national and international norms.	4	<b>No</b>
<b>Waste Management (liquid and solid)*</b> 1. Toilets are clean and safe, with a maximum of 20 people per toilet. 2. Use of toilets is arranged by household(s) and/or segregated by sex. 3. Toilets are no more than 50 metres from dwellings, or no more than a one minute walk. 4. Environment is acceptably free of solid waste contamination, including medical wastes. 5. Refuse is disposed of in a way to avoid creating health and environmental problems. 6. No dwelling is more than 15 meters from a refuse container or household refuse pit, or 100 meters from a communal refuse pit. 7. No contaminated or dangerous medical wastes are in living or public spaces.	4	<b>No</b>
<b>Environmental Conditions</b> 1. Location of disaster victims is not subject to immediate hazards, including flooding, pollution, landslides, fire, or	4	<b>No</b>

Basic Needs and Indicators (* indicates Sphere Standard)	Are needs being met at present? Rate from 1 (not being met) to 10 (being met)	Is the use of resources to meet this need sustainable over the next 120 days? (Yes/No)
<p>volcanic eruptions.</p> <p>2. Environment is free from risk of water erosion, from standing water, and has a slope of no more than 7%.*</p> <p>3. Smoke and fumes are below nuisance levels and pose no threat to human health.</p> <p>4. Animal management minimizes opportunities for disease transmission, solid and liquid waste, and environmental degradation.</p> <p>5. Uncontrolled extraction of natural resources by disaster victims is not taking place.</p> <p>6. 45 square meters of space is available per person in camp, temporary shelter area, or resettlement site, with provisions made for living, social and commercial activities.*</p> <p>7. Firebreaks are at least: 2 meters between dwellings, 6 meters between clusters of dwellings, and 15 meters between blocks of clusters.*</p> <p>8. Graveyard(s) are appropriately located and sized.</p>		