STREVA Project: Strengthening Resilience in Volcanic Areas

Image: Luke Su

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Simple measures to help reduce impacts during and after an eruption – lessons from international contexts

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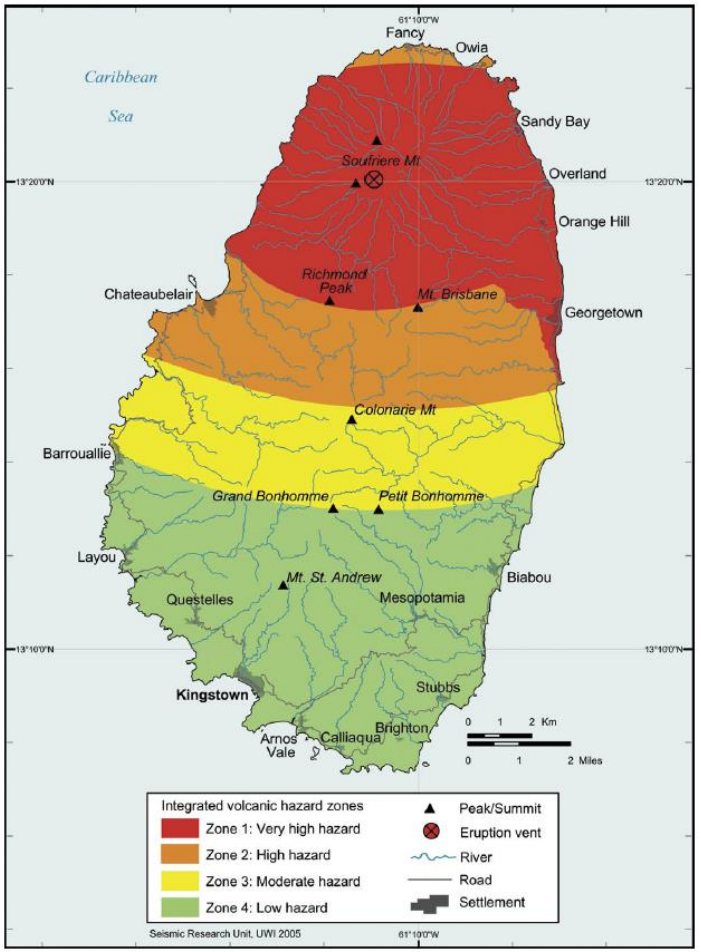
Structure

Reducing effects of ash on:

- Visibility, road and driving conditions
- Public health effects
- Vegetation and agriculture
- Water supply
- Infrastructure

Quick and easy measures to help

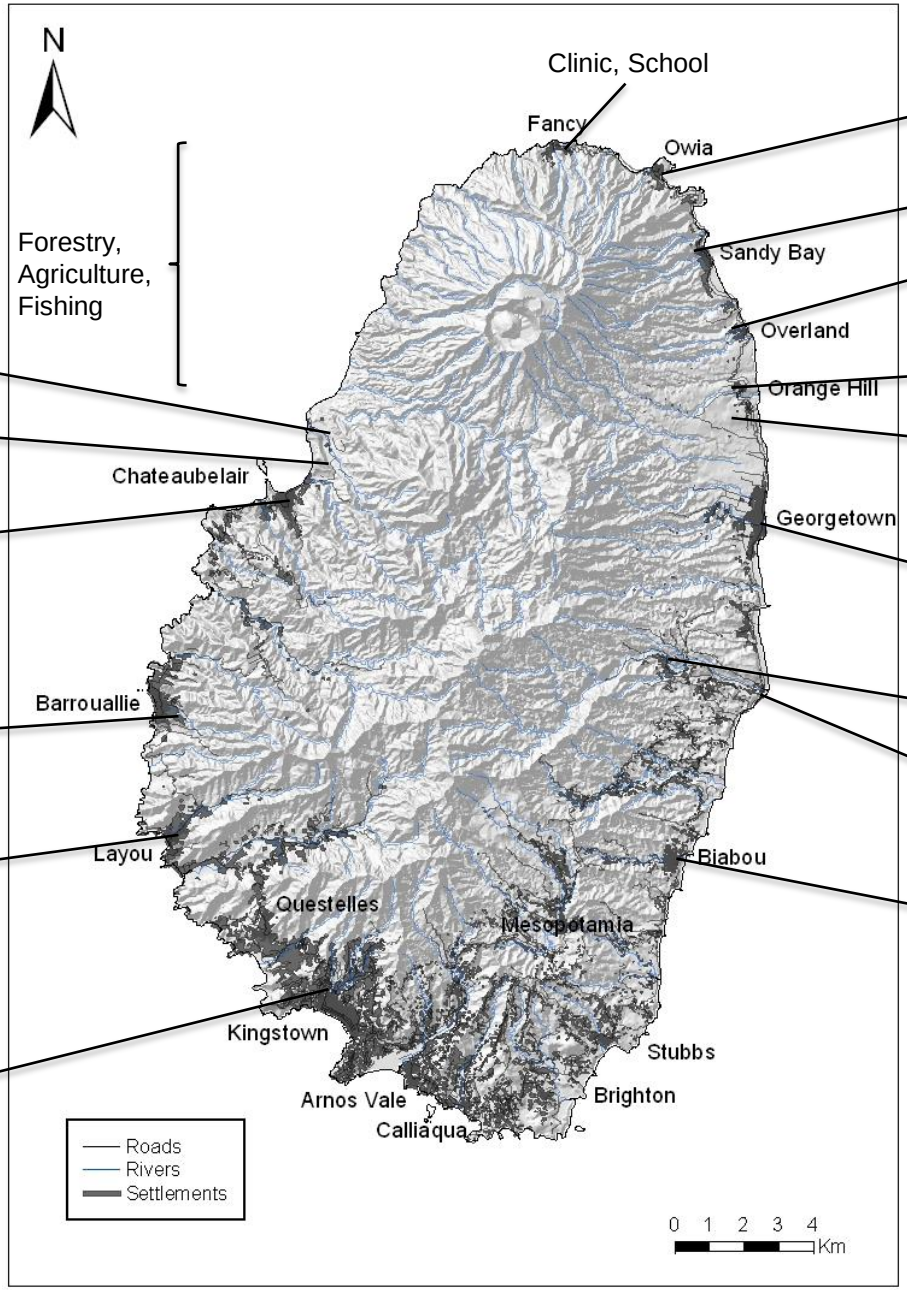
- Structural/physical changes
- Maintenance and supplies
- Contingency plans



St Vincent integrated volcanic hazard map

Source: Robertson (2005)

Infrastructure in St Vincent



Fishing Complex, Clinic, Primary School, Salt Pond Development

Clinic, Primary & Secondary School
Primary School

Banana Boxing Plant

Copra Factory, domestic water supply, Horticulture R&D Complex
Banana Boxing Plant

Hydroelectric Power Station, School

Hospital, Clinic, Methodist School

Hospital, St Benedict's Children's Home, Factory, Secondary School, special needs school, water pipelines, Georgetown Technical Institute

Hydroelectric Power Station, Clinic, School

Clinic, School

Arrowroot Factory, Coconut packing plant, Clinic, School

Petrol Station, School

New Airport (planned)

Airport, Hospital, Port, Schools, Botanic Gardens, Factory
Power Station (Lowman's Bay, Arnos Vale)

SRC Map, 2015

Reducing the effects of ash

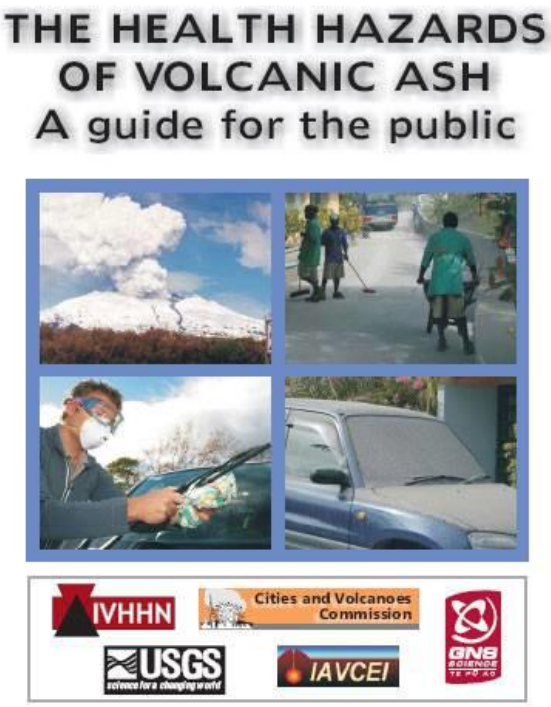
Eyjafjallajokull 17th April 2010

Visibility, roads and driving conditions

- Communication about where ash falls are observed (e.g. via radio stations)
- Traffic information and coordination system
- Advisory messages to reduce non-essential travel, and drive slowly
- Clean-up quickly to reduce remobilisation – prioritise roads for clean-up

Public Health Effects

- Stay indoors when possible
- Close windows and doors
- Wear ash masks or cover nose and throat when outside during ashfalls
- Support community members who may need more help
- More counselling may be required
- Increased demand for nebulisers



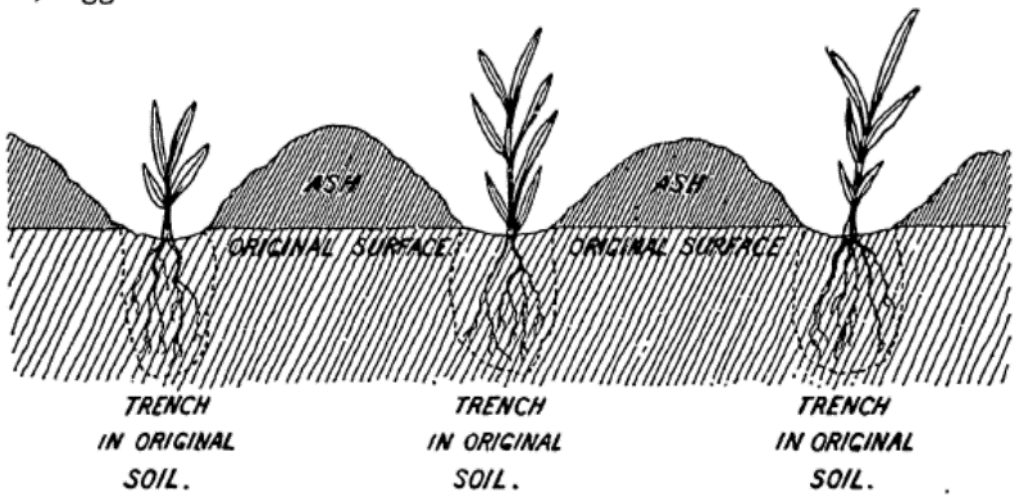
Vegetation and agriculture

- Covered planting prevents impacts (but can be expensive)
- Washing plants after ashfalls when possible can reduce effects
- Roots crops appear to be less affected
- Crop diversification e.g. chives, sweet potato, green onions are found to be more resistant in Montserrat; onions and potatoes in Ecuador
- Plan for evacuating animals and providing emergency feed for animals – where/ when?

Experiments from 1902

Tilling into soil is an effective mitigation (can increase fertility)

20. My proposals in regard to starting cultivation on the estates in the Carib country, the details of which I have already discussed with some of the leading planters, suggest the treatment of the ash now on the land as follows :—



Sketch showing volcanic ash piled in ridges allowing of the planting of canes, arrowroot, &c., in trenches dug in the original soil.

Contemporary Experiments demonstrated that ash alone was not as fertile as a that where ash was mixed in the soil, Imperial Commissioner Report, 1903

Water supply, treatment and waste water

- Cover water supplies where possible to prevent ash ingress
- Shut down non-essential equipment
- Monitoring torque on motor equipment
- Limiting ash ingress into storm water drains

- Anticipate increased water demand during and after ashfalls

- Ensure access to back-up power
- Monitor water quality
  - Fluoride minimum acceptable value 1.5mg/L
  - pH guideline value 7.0-8.5
  - Turbidity guideline value 2.5 NTU

Montserrat

Structures

- Identify points to reduce ash ingress into buildings
- Building codes?
  - Difficult to design residential buildings to withstand more than about 7kN/m^2 load
- Increasing cross-sectional area of trusses and reducing truss span appear to improve performance
- Slight roof pitch (~15°) may encourage self-cleaning
- Swift clean-up – after ash has stopped falling - to reduce loading
- Clean-up of galvanised roofs can reduce damage caused by corrosion

Power plant and electrical distribution networks

- Plan for downtime to clean sites and components
- Develop clear communication plans for outages
- Develop safe clean-up procedures (live-line and de-energised plans)
- Monitor suspended solid load in water intakes (hydroelectric)
- Mechanisms for fault isolation (protection switches)

Hospitals and Clinics

- Ensure access to back-up power and covered water tanks
- Develop communication protocols
- Keep stocks of medical supplies in case supply lines are affected
- Plan for clinic closures, relocation of – and access to – client records
- Plans and responsibilities for shelters and emergency medical care and to care for vulnerable clients
- Cover equipment to prevent ash ingress and close windows and doors
- Develop plans to reduce ash ingress and transport through buildings
  - E.g. doormats/cardboard in entrances and changing clothes and gurneys to enter sensitive areas of hospitals
- Expect high demand for nebulisers and increased need for psychological support

Quick and easy measures to help

Eyjafjallajokull 17th April 2010

Simple solutions to help #1

- Back up generators and water tanks
  - If back-up power is not available, ice packs can keep vaccines cool at hospitals/clinics
- Air conditioning
  - Raising air conditioning units off the ground to prevent blockages and overheating
  - Shading air conditioning units (where possible)
- Cover water supplies where possible, and if possible pipe water to reduce exposure to ashfalls
  - Pipes in PVC rather than metal, if possible, to reduce corrosion
- Shingled or concrete roofing are more resistant to ash
  - For concrete roofs, these can increase earthquake risk if building codes are not enforced/followed
- Mechanisms to reduce ash ingress
  - E.g. by sealing windows (e.g. Plexiglas and A/C used in Montserrat), double door systems and hung windows where possible

Simple solutions to help #1

- Oiling equipment and components
- Oil-based paint speeds clean-up of ash, and anti-rust paint reduces corrosion
- Regular cleaning and maintenance
- Covering small equipment to protect it from ash
- Keep stocks of ash masks
- Keep stocks of spare antennas for communication (corrosion)

Simple solutions to help #3

- Contingency plans e.g. schools and clinics
- Advisory messages for broadcasting over the Radio
  - E.g. to limit driving and drive slowly (to reduce ash remobilisation)

- Quick and efficient clean-up – coordination and communication plans
  - Prioritisation, coordination and collaboration adds capacity to networks of interdependent systems
  - Define roles and responsibilities in ash clean-up
  - Develop ash clean-up protocols, priority locations for clean-up
  - Define equipment needs, clean-up responsibilities and allocate funds
  - Identify preventative methods for damage limitation – e.g. avoid ash ingress into storm water networks
  - Identify potential ash disposal sites

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