Needs and drivers for volcanic risk assessment worldwide

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1st IAVCEI-GVM Workshop
From Volcanic Hazard to Risk Assessment

Who needs or uses risk assessments?

- Civil protection, government departments, regional and local authorities, cities, insurers, private companies, public sector institutions, individuals…

‘Decision-makers’ – but do decision makers, whoever they are, have enough useable, useful information on which to base their decisions?

Knowledge and information about volcanic risk is not widely available. Our community is far behind flooding, cyclone, earthquake. We need to provide evidence on hazard and risk for effective decision making.

Personal experience

- Montserrat Volcano Observatory:

Individual risk assessments (MVO staff, official workers, community daily)

Societal risk assessments (time frames on request)

Scientific Advisory Committee, Expert elicitation

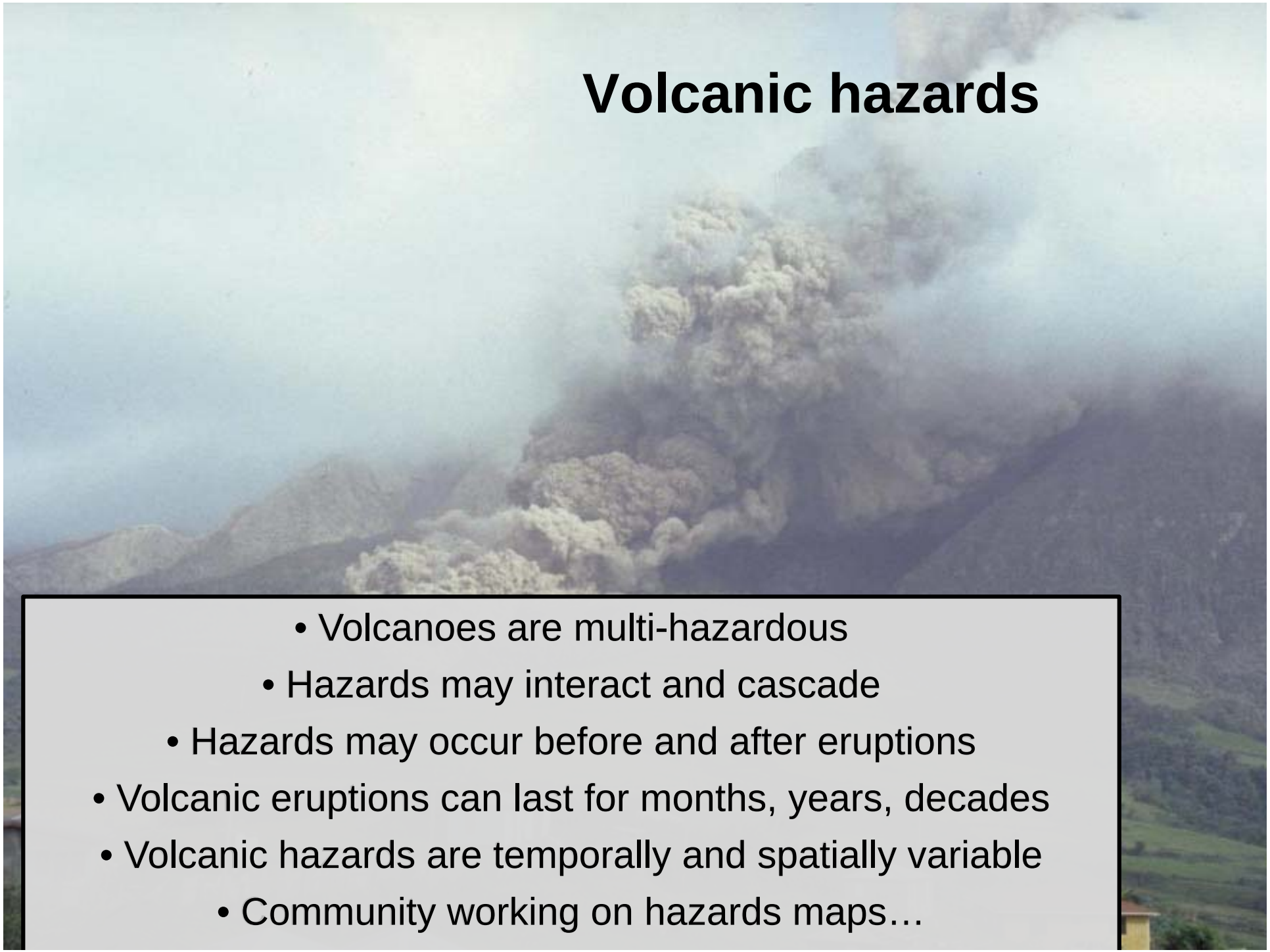
- UK civil protection (Cabinet Office)

Contributing hazards for National Risk Register (years)

Expert committee (SAGE)

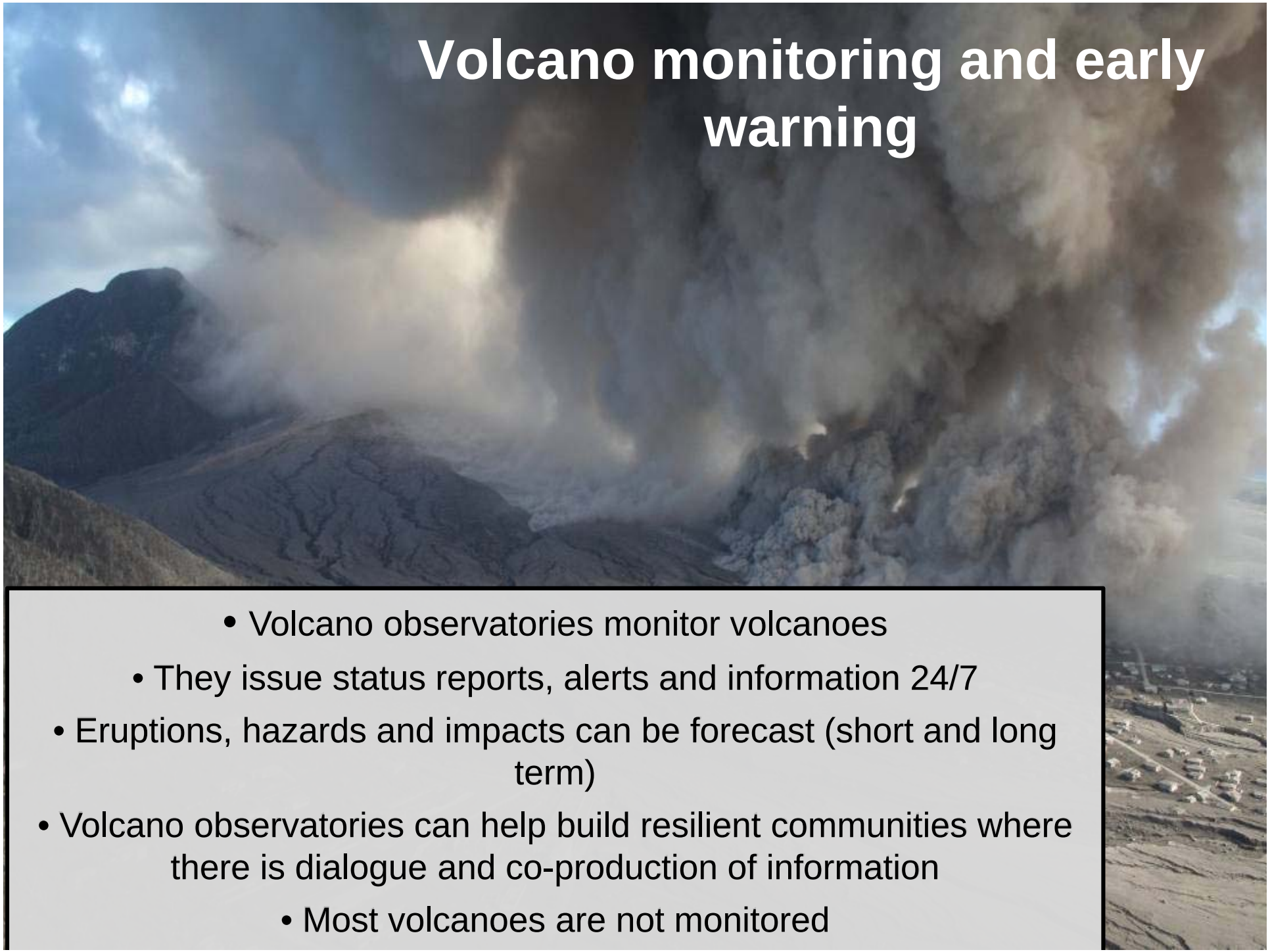
- World Bank calls: Sub-Saharan Africa, Challenge Fund

GVM ethics: local scientists, collaborative



Volcanic hazards

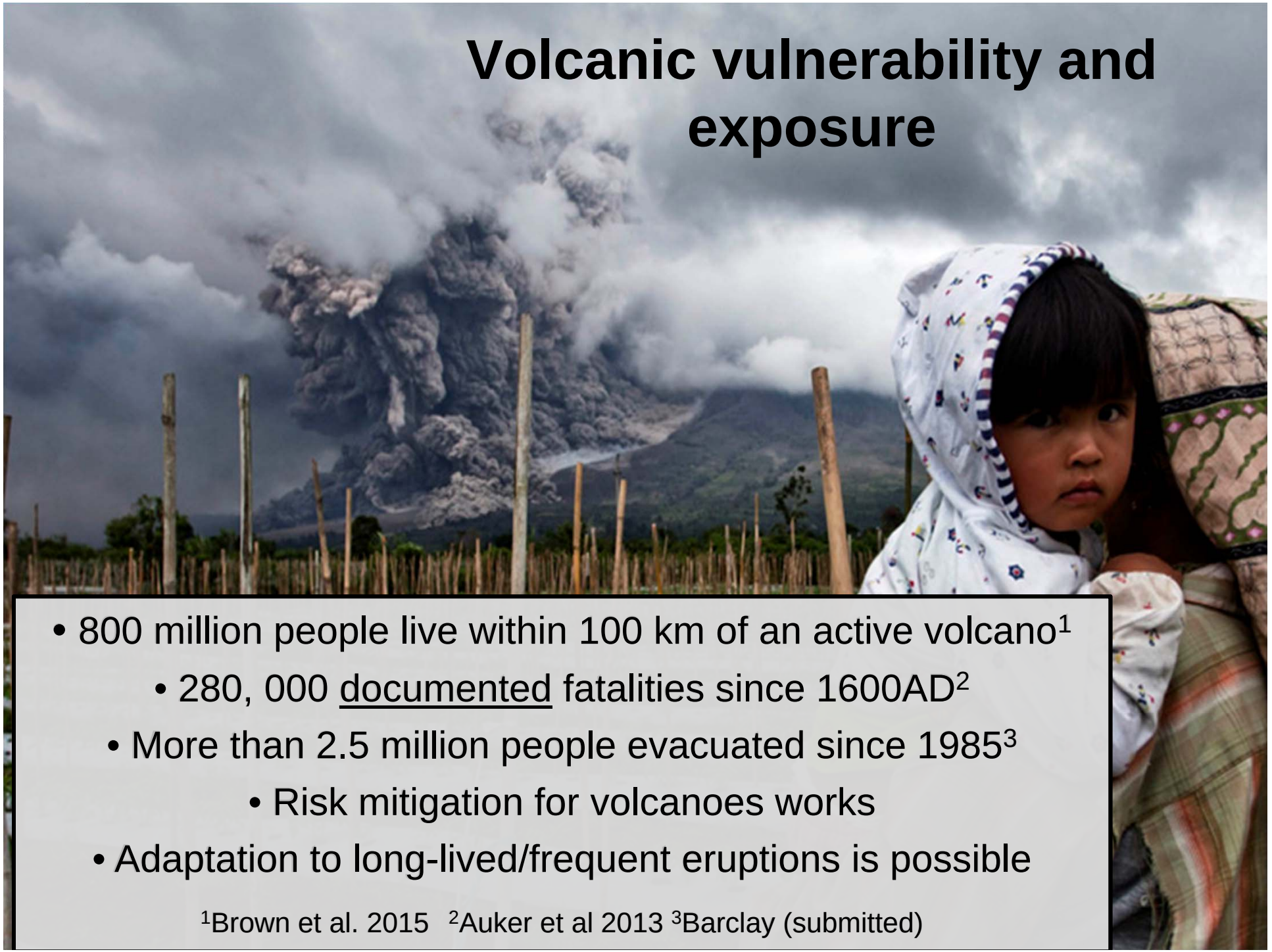
- Volcanoes are multi-hazardous
- Hazards may interact and cascade
- Hazards may occur before and after eruptions
- Volcanic eruptions can last for months, years, decades
- Volcanic hazards are temporally and spatially variable
- Community working on hazards maps…



Volcano monitoring and early warning

- Volcano observatories monitor volcanoes
- They issue status reports, alerts and information 24/7
- Eruptions, hazards and impacts can be forecast (short and long term)
- Volcano observatories can help build resilient communities where there is dialogue and co-production of information
- Most volcanoes are not monitored

Volcanic vulnerability and exposure



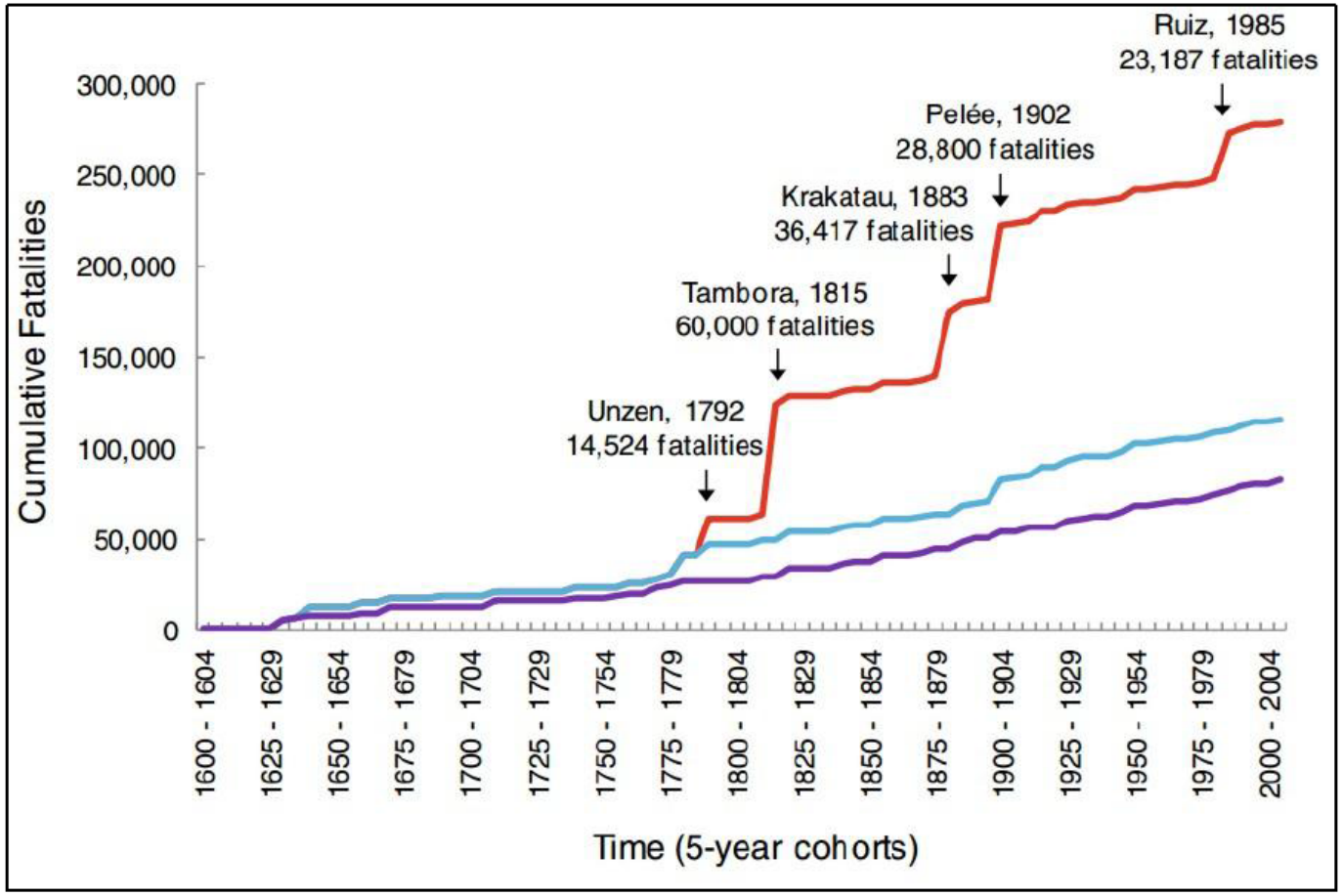
- 800 million people live within 100 km of an active volcano[1]
- 280, 000 documented fatalities since 1600AD[2]
- More than 2.5 million people evacuated since 1985[3]
- Risk mitigation for volcanoes works
- Adaptation to long-lived/frequent eruptions is possible

[1]Brown et al. 2015 [2]Auker et al 2013 [3]Barclay (submitted)

Volcanic risk - losses

- Many losses have not been quantified
- Losses sometimes wrongly attributed
- Economic losses are increasing
- Damage and losses are rarely documented
- Supply chains and business disruption
- Many damaged assets are uninsured
- Loss of livelihoods can affect generations

Volcanic fatalities



Auker et al. 2013 : Smithsonian Institution, Witham (2005), CRED EM-DAT and Munich RE.

What is a risk assessment?

- Identify hazards and risk factors that have the potential to cause harm (hazard identification).
- Analyze and evaluate the risk associated with that hazard (risk analysis, and risk evaluation).
- Determine appropriate ways to mitigate the hazard, or control the risk when the hazard cannot be eliminated (risk control).

Occupational Health

Individual risk assessment

There is a tendency for individuals to be less rational when risks and exposures concern themselves as opposed to others.* There is also a tendency to underestimate risks that are voluntary or where the individual sees themselves as being in control.

* Ragnar, 2018

What is a disaster risk assessment

‘A qualitative or quantitative approach to determine the nature and extent of disaster risk by analysing potential hazards and evaluating existing conditions of exposure and vulnerability that together could harm people, property, services, livelihoods and the environment on which they depend.’

UNISDR

UN Sendai Framework for Disaster Risk Reduction

‘There is a need for focused action within and across sectors by **States** at local, national, regional and global levels in the following four priority areas’:

Priority 1: **Understanding disaster risk**
Priority 2: Strengthening disaster risk governance to manage disaster risk.
Priority 3: Investing in disaster risk reduction for resilience.
Priority 4: **Enhancing disaster preparedness for effective response, and to ‘Build Back Better’** in recovery, rehabilitation and reconstruction.

Targets

Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030

Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020

Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030

Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030

Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015

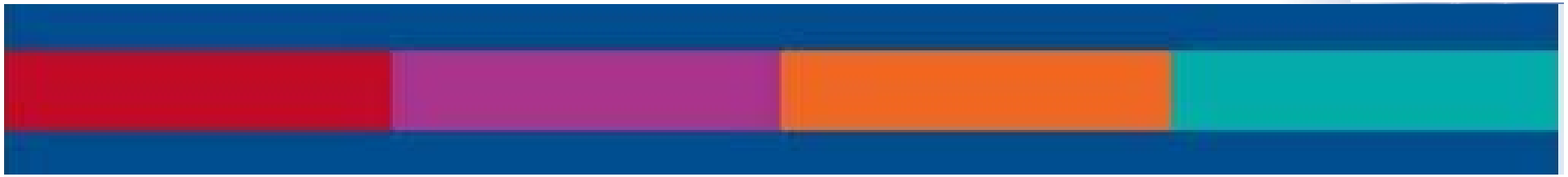
Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015

Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030

Role of scientists 2015-2030

"Academia, scientific and research entities and networks to:

- *focus on the disaster risk factors and scenarios, including emerging disaster risks, in the medium and long term;*
- *increase research for regional, national and local application;*
- *support action by local communities and authorities;*
- *support the interface between policy and science for decision-making*".



UN-Habitat

The mission is to promote socially and environmentally sustainable human settlements development and the achievement of adequate shelter for all.

- Urban legislation, land, and governance,
- **Urban planning and design**,
- Urban economy,
- Urban basic services,
- Housing and slum upgrading,
- **Risk reduction and rehabilitation**, and
- **Research and capacity development**.

100 Resilient Cities

‘Pioneered by the Rockefeller Foundation (100RC) is dedicated to helping cities around the world become more resilient to the physical, social and economic challenges that are a growing part of the 21st century’.

- **‘Urban resilience** is the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience’.

UN Sustainable Development Goals

What are barriers to volcanic risk assessment and application?

- Capacity
- Funding
- Lack of time/opportunity to build collaborative teams (across disciplines)
- Poor relationships between key institutions
- Hazards and risk information not co-developed with users
- Lack of damage and loss data
- Lack of forensic studies to investigate causes of losses
- Legal restrictions and liability

Opportunities

- Sustainable development relies on good risk understanding and DRR so many potential users with funding
- Increasing numbers of research calls in development that are cross-disciplinary
- Learning from other hazards communities (e.g. earthquakes, flooding , cyclones etc)
- To get better at forensic analysis
- To get better at documenting risk trends
- To get better at co-design and co-development with users of science

Towards a multi-risk approach

- **The natural hazards communities have common challenges, including:**

- Developing synergies and coordination within our own communities at local to global scales.
- Collaboration and identification of opportunities for harmonisation across natural hazards communities
- The scale and breadth of multi-risk assessments needs to be defined with users, which will constrain the relevant potential cascading/compounding hazards/impacts to consider
- Multi-risk assessments require multi-risk knowledge, demanding interdisciplinary perspectives, as well as those with discipline specific expertise.

Summary

- Volcanic risk needs to be better understood at local to global scales
- Volcanic risk assessment ideally requires a collaboration of specialists (e.g. volcanologists and civil protection)
- SFDRR and SDG in particular create a strong demand for excellent science applied in context
- Users of science should be involved in co-design and co-development of hazards and risk information
- Diverse needs depending on users
- Quantitative and qualitative approaches are needed to reduce risk.