

Farmers' perceptions of options for pasture remediation and recovery following major tephra fall in New Zealand

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Many regions around the world have farms surrounding potentially active volcanoes that have been dormant for decades to centuries. Without any recent experience, a new major eruption and tephra fall would present an unfamiliar soil and pasture remediation challenge. We interviewed 23 farmers from the volcanic North Island of New Zealand in order to gain insight into the current understanding of tephra fall risk and associated production recovery strategies needed for the pastoral agricultural sector. Of the interviewees, 26% had experienced past minor tephra falls on their farms while 70% believed they were at risk of experiencing future tephra fall. Around half of all interviewed farmers (48%), including one who had previously experienced tephra fall, provided suggestions for possible remediation techniques. The remaining half (52%) did not know what to do if tephra were to fall on their farm. The farmer-suggested remediation strategies are: 1) waiting for rainfall to wash away the tephra (for thin falls), 2) cultivation, 3) re-grassing, 4) ploughing, 5) using fertilizers, 6) flipping the upper 0.5 metres of tephra and soil, and 7) physical removal. A key barrier to effective recovery is lack of rapid access to appropriate knowledge during and following a tephra fall. These findings provide potentially useful treatment strategies for heavy tephra fall on pasture and a key reference amongst the farming community when considering farm system preparedness for (and recovery from) tephra fall.

Our home is a volcano? Responding to volcanic unrest and building community awareness in American Samoa

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American Samoa comprises the easternmost islands of the volcanic archipelago formed by the Samoan hotspot in the South Pacific Ocean. However, volcanoes are not prominent in the local consciousness: tsunamis, hurricanes, and daily life are of greater concern. The only documented eruption occurred ~3 km off the coast of Olosega Island in 1866 CE. Archeological studies indicate that communities existed on Tutuila during the last known eruption about 1,500 years ago, but there are no existing stories that recount volcanic events. Ta'ū volcano last erupted in the early Holocene or late Pleistocene. There was no volcano or earthquake monitoring in American Samoa until mid-2022.

Between late July and early October 2022, Ta'ū volcano was in a state of unrest – and it took a few weeks to identify this volcano as the source of felt seismicity. Fortunately, no eruption occurred, but the episode was stressful and challenging for the local population, territorial authorities, and responding agencies.

We share our journey as members of responding federal government scientific agencies both during the 2022 unrest, and in subsequent quiescence.

During unrest, we built and strengthened partnerships across different levels of government, engaged affected communities in a culturally sensitive manner, rapidly established a monitoring network, and communicated understandable information during uncertain times to a population unfamiliar with volcanoes.

In the later quiescent time, we have focused on maintaining and growing trust and partnerships, building awareness without alarm, future-proofing the newly established monitoring network, and updating the decades-old geologic maps of American Samoa.

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Community Resilience is improved by increasing mental health awareness and providing tools and training for scientists and first responders

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Occupational exposure to stressors increases the risk of developing mental health conditions, especially in first responder roles. Communities, government agencies, and organizations invest large amounts of time and money protecting scientists and first responders from physical harm, including requiring personal protective equipment, developing safety procedures, and requiring safety-related trainings, but invest relatively little to address their mental well-being and protection.

There are three key steps to addressing mental health needs in volcano scientists, first responders, and at-risk communities: 1) recognizing the stressors; 2) identifying what protective measures can be put in place to provide support; and 3) reducing stigma around mental health challenges. Unsupported or unrecognized mental health conditions may lead to poor job performance, low quality of life and can result in devastating outcomes like substance abuse and suicide. To address these key steps, the U.S. Federal Highway Administration, invested in an agency wide Mental Health Awareness initiative beginning in 2020. After implementation, staff reported positive impacts on their mental health and work satisfaction, which improved performance, retention, and resilience.

Empowering resilient individuals who know and understand their own mental health needs, and the needs of others and how to support them, is critical to building a resilient eruption response and a more resilient community. When mental health is not prioritized, people may suffer in silence. The volcano preparedness community should prioritize a unified message that those who are struggling are not alone and consider education and support for mental health as a critical part of disaster preparedness.

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IG-EPN's efforts to help prepare Ecuadorian society for volcanic events

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Throughout its 40 years of existence, one of the main goals of the Instituto Geofísico de la Escuela Politécnica Nacional (IG-EPN) has been to help Ecuadorian society prepare for volcanic events using different strategies and tools. IG-EPN members worked on four main themes to achieve this goal: (1) volcanological studies and hazard assessment; (2) multiparameter volcanic observatories on Ecuador's most dangerous volcanoes; (3) communication protocols with authorities and the general public; (4) awareness programs to help prepare decision-makers and communities at risk. In this work, we present the main aspects of awareness programs that have been developed to ensure timely, relevant, understandable and effective communication. Working at multiple scales, from small communities to megacities, is a challenge with limited human and financial resources, but new technologies and partnerships have helped IG-EPN increase its reach in different parts of Ecuadorian society. The inclusive approach (gender, age, language, disability) when preparing training and communication products requires additional efforts to prepare the most vulnerable populations, but plays a crucial role in early warning and crisis response. Probably the most effective strategy developed by IG-EPN has been to include communities in the monitoring effort, securing a direct link and good relations between all risk management stakeholders. Using volcanic threats as a rationale to support livelihood improvement projects in hazard-prone areas is also one of the best ways to ensure community involvement and lasting effects.

Forecast-based Early Actions (FbEA) on Volcanic Hazards: Systematic Review on Related Research at Merapi Volcano, Indonesia

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The innovation of Forecast-based Early Action (FbEA) approach is mainly applied by NGOs around the world to anticipate disaster impacts by providing clear guidance and automatic activation of protocols based on forecasted conditions commonly related to climate-hydrometeorological hazards. However, despite technological developments, structural application and programmatic feasibility of the FbEA approach against volcanic hazards remain challenging. This study aims to review the existing literature relevant to implementing an FbEA approach for Merapi's volcanic hazards in Indonesia. To collate the scientific publications, this study utilizes CARI's portal to access several repositories, including Scopus, Directory of Open Access Journals and Portal Garuda, Indonesian research repository by Ministry of Education, Culture, Research, and Technology. The study employs well-defined keywords in English and Bahasa Indonesia on Merapi's specific volcanic hazards, location, and disaster management approaches to select the articles. Through this process, we collated 477 publications. After multi-stage selections and review process, our preliminary findings are 1) most publications are about volcanic hazards forecast that may have implications for decision-making, planning, and timely potential early-actions; 2) pyroclastic flows are the most studied volcanic hazard type followed by lahars; and 3) only around a third of total compiled publications has clear direct implication to specific areas (e.g., villages, cities or regencies). Therefore, initially, we concluded that FbEA initiatives and implementation by national and local actors against volcanic hazards for communities in Merapi is still in its formative stages, especially in the delivery and financing of FbEA, hazard diversity, and local context empirical application.

Raising long-term awareness of volcanic risk among the younger generation: an example of transdisciplinary initiatives in Goma (DR Congo)

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In regions developing under the threat of volcanic eruption, it is crucial to take advantage of the periods of quiescence between two volcanic crises to raise awareness among the population, in order to strengthen their risk culture.

Following the eruption of Nyiragongo in 2021 in eastern DR Congo, which had severe and long-term consequences for Goma and its population, the disaster risk reduction institutions and many stakeholders recognised the importance of raising awareness. While some of the new initiatives were short-lived, others became really relevant and valuable following the 2021 eruption.

Prior to the eruption, the Civil Protection was already using Hazagora, an awareness-raising board game for secondary school children, in about 50 schools in Goma and surroundings. Hazagora aims to foster a better understanding of, and appropriate responses to, the volcanic risks and disasters that young people may face in their daily lives. A recent evaluation of its impact on their risk culture showed that a deeper contextualisation of Hazagora and the implementation of complementary and diversified tools (such as a volcano museum or a card game for younger children) would not only have a greater impact on the resilience of the young people of Goma, but potentially also of their families.

Understanding the impact of gender norms to inform risk reduction efforts: Perspectives of women on evacuation at Fuego volcano, Guatemala

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Cultural norms influence not only a population's in-the-moment response to hazardous events but also planned strategies for anticipatory actions such as evacuation. At Fuego volcano, Guatemala, we applied qualitative methods to investigate women's experiences of the evacuation process after a paroxysmal eruption on 7–8 March 2022. While participants' experiences and decisions varied, we identified how gender norms influenced dynamics such as who evacuates and who makes evacuation decisions at the community and household levels. Communities prioritized women for evacuation with the children and elderly in their care, yet prioritized men in the evacuation decision-making; despite this hierarchy, a woman may override a male partner's decision to prioritize the safety and well-being of her children; and even if she overcomes social barriers to leaving, she may be unable to evacuate in a timely manner because of lack of transportation—a barrier impacting all residents, but especially women since they are the ones leading their households in evacuation. This gendered evacuation strategy disproportionately leaves men exposed to the threat, since most do not evacuate, and places the burden of evacuation on the women, who leave their homes and take responsibility for the dependent family members in their care. This presentation discusses these findings and how they can inform future disaster risk reduction efforts at Fuego and other volcanoes by ensuring women are included in risk reduction planning to advocate for their needs, ensuring information during crises reaches them directly, and focusing evacuation messaging on taking care of the wellbeing of family members.

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Use of residents' local language narratives of volcano eruption experiences for disaster risk communication

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The language of communication in volcano disaster risk reduction is crucial in raising public awareness, developing social preparedness, and managing actual crisis responsiveness. We recognize the challenges and opportunities related to ensuring efficient and effective communication brought about by geography and language diversity in volcanic areas. The PHIVOLCS embarked on a systematic documentation of volcano disaster experiences in the local languages focusing on the five most active volcanoes- Bulusan and Mayon (Bicolano), Pinatubo (Kapampangan, Tagalog), Kanlaon (Hiligaynon and Cebuano) and Taal (Tagalog). Residents' accounts of volcano eruption events in the different local languages are up-close and personal views of hazardous volcano processes as they unfold, giving direct observations of pyroclastic density currents, lava flows, lahars, and tephra falls. The compiled stories provide a better understanding of volcano eruptions from various perspectives and greatly contribute to developing localized, site-specific materials for science and risk communication. These compilations of descriptions in various local languages are valuable source materials for the awareness, preparedness, and response planning of various stakeholders. This study is a component of an ongoing project, DANAS: Earthquake, Tsunami, and Volcano Disaster Narratives for an Experiential Knowledge-based Science Communication (DANAS Project) which aims to establish a methodology of documenting experiences of people in the local languages and harnessing their narratives through qualitative analysis.

Congratulations! You've created a social media account. Now what?

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@USGSVolcanoes social media is approaching its 10th anniversary. Launched in 2015, the social media team shares timely, accurate, and authoritative information on research and volcanic activity to a wide and eager audience. In this presentation, we outline USGS Volcanoes social media strategies, provide examples of how the strategies have been implemented, and show how social media users have responded.

Developed by a group of creative and enthusiastic communicators, the USGS Volcanoes social media network has expanded and evolved to meet USGS mission objectives and fill the information needs of online audiences. Experience has shown that successful social media strategies include narrating major volcanic events and sharing informative posts with videos and photos that give users instant access to eruption sites and providing context for understanding current conditions. Routine updates of non-crisis volcanic activity show how scientists are continually working to understand volcanic behavior. Video updates help counter sources of misinformation and establish trust while humanizing observatory scientists and operations. Retrospectives delve into previous eruptions from a social science perspective to ensure lessons from the past are not repeated. Comments from users provide key insights into information gaps and products are developed to meet their needs.

These strategies have enhanced the USGS' role as a trusted source of information by publicly posting accurate, up-to-date content, improving situational awareness that can lead to appropriate responses and answering inquiries to educate and inform. This strong presence lays the groundwork to effectively communicate during future volcano crises to mitigate impacts on people and infrastructure.

Three years, two volcanoes, six eruptions: outreach and communication strategies in Hawaii

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The Island of Hawai'i comprises five volcanoes; four are active, and all have communities living on their flanks. Six eruptions have occurred within the past three years: five at the summit of Kīlauea and one at the summit and Northeast Rift Zone of Mauna Loa.

During times of quiescence, unrest, and eruption, the Hawaiian Volcano Observatory (HVO) works closely with USGS Volcano Science Center colleagues and partners at Hawai'i Volcanoes National Park, the University of Hawai'i at Hilo, and the County of Hawai'i to promote community awareness of Hawai'i's active volcanoes and their associated hazards.

Ongoing HVO website updates, social media posts, official notices, an annual "Volcano Awareness Month" initiative, and a weekly "Volcano Watch" column provide information on volcanic activity, research, and collaborations. During recent periods of unrest and eruption, communication strategies have differed in scale. Increased messaging, media interviews, and partner/public meetings prior to the eruption at Mauna Loa—the world's largest active volcano—helped to build trust and foster information sharing. Likewise, amplified communication to the public and media was coordinated on multiple platforms and between numerous agencies during that eruption.

Recent eruptions on the Island of Hawai'i have fortunately offered relatively safe viewing with minimal impact on the population and infrastructure. However, many communities are still impacted by volcanic air pollution and others will certainly be threatened by future lava flows. While recent eruptions have strengthened partner relationships and raised community awareness, they have also highlighted important paths for improving outreach and communication.

“Canary Islands: A volcanic window in the Atlantic Ocean” – 16 years spreading knowledge of volcanic phenomenon throughout the population of the Canary Islands

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The educational program “Canary Islands: A volcanic window in the Atlantic Ocean” began in 2008, born from the need to regularly inform and educate citizens living in the Canary Islands about different volcanic hazards, how to reduce and manage volcanic risk and the benefits of living in a volcanic territory. The implementation of regular outreach programs is key to forming a “volcano-ready” community, enabling and improving community knowledge. This creates a better informed society, organized against volcanic risk, and therefore less vulnerable than a community that is unaware of the volcanic threats surrounding it (which could only react to volcanic crisis as they unfold). The Canarian regional council document on volcanic risk management (PEVOLCA), together with island-specific documents (e.g. PAIV for Tenerife), state that those administrations involved in volcanic risk management must establish annual public educational programs. In Tenerife, INVOLCAN provides informative and educational sessions on volcanic phenomenon for a general audience. Since 2008 and the initiation of this program, 23,321 people have attended. The overarching goal of the program aims to use volcanic education as a key tool in reducing the volcanic risk level, and for this, education must be available and accessible to all members of society.