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*'Understanding volcanoes and society: the key for risk mitigation'*



## **Adapting to changes in volcanic behaviour: formal and informal interactions for disaster risk management at Tungurahua Volcano, Ecuador**

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This paper analyses the interactions between scientists, communities and risk managers and examines the interpretation and communication of uncertain scientific information during a long-lived volcanic eruption. Our study shows how formal and informal institutions evolve and interact, shaping individual behaviour and collective action in response to volcanic risk in Tungurahua, Ecuador. We describe the evolution of a 'shadow system' that has developed outside of, but in interaction with, the formal institutions for risk management in Ecuador. This is complemented with a detailed study of the eruptions of 2006 and 2014, which exemplifies the interactions between formal and informal institutions and actors during periods of heightened volcanic activity. The findings suggest that the informal interactions have facilitated important adaptations in the scientific advisory response during eruptions (near-real-time interpretation of the volcanic hazards), in hazard communication, and in evacuation processes. Improved communications between stakeholders and the establishment of thresholds for evacuations have created an effective voluntary evacuation system unique to Tungurahua, allowing people to continue to maintain their livelihoods during heightened volcanic activity and associated periods of uncertainty. This paper highlights the kinds of interactions between formal and informal institutions that enhance DRM systems in general, and produce more desirable outcomes leading to improved social resilience to volcanic risk and other types of recurring, high intensity hazards. This work is based on information gathered during field research as part of the STREVA project in collaboration with the IG-EPN between 2013 and 2016.



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