Geophysical Research Abstracts
Vol. 12, EGU2010-11924, 2010
EGU General Assembly 2010

Developing an Early Warning System for Machu Picchu Pueblo, Peru.

Mark Bulmer (1) and Tony Farquhar (2)

(1) Geophysical Flow Observatory, JCET, University of Maryland Baltimore County, United States (mbulmer@umbc.edu), (2) Flexible Structures Laboratory, Department of Mechanical Engineering, University of Maryland Baltimore County, United States (farquhar@umbc.edu)

The town of Machu Picchu, Peru, is linked to Ollantaytambo and Cusco by rail and serves as the main station for the 400,000+ tourists visiting Machu Picchu. Due to the tourist industry the town grown threefold in population in the past two decades. Today, due to the limited availability of low-lying ground, construction is occurring higher up on the unstable valley slopes. The town is located at 2000 m asl while the surrounding peaks rise to over 4000 m asl. Slopes range from $< 10^{\circ}$ on the valley floor to $> 70^{\circ}$ in the surrounding granite mountains. The town has grown on the downstream right bank of the Vilcanota River, at the confluence of the Alcamayo and the Aguas Calientes Rivers. Broadly, a dry winter season runs from May to August with a rainy summer season running from October to March. The rainy months provide around 80% of the annual rainfall average, which ranges from 1,600 to 2,300 mm. Seasonal temperature variations are considered modest.

An assessment of the geohazards in and around the town has been undertaken. Those of particular concern to the town are 1) large rocks falling onto the town and/or the rail line, 2) flash flooding by any one of its three rivers, and 3) mudflows and landslides. To improve the existing municipal warning system a prototype early warning system incorporating suitable technologies that could monitor weather, river flow and slope satability was installed along the Aguas Calientes River in 2009. This has a distributed modular construction allowing most components to be installed, maintained, swapped, salvaged, repaired and/or replaced by local technicians. A diverse set of candidate power, communication and sensor technologies was deployed and evaluated. Most of the candidate technologies had never been deployed in similar terrain, altitude or weather. The successful deployment of the prototype proved that it is technically feasible to develop early warning capacity in the town.