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Participatory rainfall monitoring: strengthening hydrometeorological risk management and community resilience in Peru

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Heavy rainfall, floods and debris flow on the Rimac river watershed are recurring events that impact Peruvian people in vulnerable situations.There are few historical records, in terms of hydrometeorological variables, with sufficient temporal and spatial accuracy. As a result, Early Warning Systems (EWS) efficiency, dealing with these hazards, is critically limited.

In order to tackle this challenge, among other objectives, the Participatory Monitoring Network (Red de Monitoreo Participativo or Red MoP, in spanish) was formed: an alternative monitoring system supported by voluntary community collaboration of local population under a citizen science approach. This network collects and communicates data captured with standardized manual rain gauges (< 3USD). So far, it covers districts in the east metropolitan area of the capital city of Lima, on dense peri-urban areas, districts on the upper Rimac watershed on rural towns, and expanding to other upper watersheds as well.

Initially led by Practical Action as part of the Zurich Flood Resilience Alliance, it is now also supported by SENAMHI (National Meteorological and Hydrological Service) and INICTEL-UNI (National Telecommunications Research and Training Institute), as an activity of the National EWS Network (RNAT).

For the 2019-2022 rainfall seasons, the network has been gathering data and information from around 80 volunteers located throughout the Rimac and Chillon river watersheds (community members, local governments officers, among others): precipitation, other meteorological variables, and information regarding the occurrence of events such as floods and debris flow (locally known as huaycos). SENAMHI has provided a focalized 24h forecast for the area covered by the volunteers, experimentally combines official stations data with the network's for spatial analysis of rainfall, and, with researchers from the University of Bristol, analyses potential uses of events gathered through this network. In order to facilitate and automatize certain processes, INICTEL-UNI developed a web-platform and a mobile application that is being piloted.

We present an analysis of events and trends gathered through this initiative (such as a debris flow occurred in 2019). Specifically, hotspots and potential uses of this sort of refined spatialized rainfall information in the dry & tropical Andes. As well, we present a qualitative analysis of volunteers' expectations and perceptions. Finally, we also present a meteorological explanation of selected events, supporting the importance of measuring localized precipitation during the occurrence of extreme events in similar complex, physical and social contexts.

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