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Editorial: Climatic hazards and disaster risk reduction in South-Central America and the Caribbean

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Editorial on the Research Topic

Climatic hazards and disaster risk reduction in South-Central America and the Caribbean

In this Research Topic collection, our objective is to show the state-of-the-art on disaster risk reduction initiatives in Central-South America and Caribbean regions. Countries in those regions are regularly affected by disasters of hydrometeorological origin. The year 2021 showed a record number of hurricanes that affected Central America and the Caribbean. It evidenced the increasing vulnerability of those areas to extreme events. At the same time, the Pantanal, Amazon, Central Chile, and the Parana-Plata basin are regions in South America that exhibited persistent drought conditions that increased the number of wildfires and affected natural and human systems (WMO, 2022). This WMO report shows that anticipatory actions are still limited in those regions and, in some countries, are almost non-existent, focusing more on disaster management (post-disaster). Discussions such as monitoring and early warning for hydrometeorological hazards, vulnerability assessment, and mapping are critical to addressing Target G of the Sendai Framework and SDG 13 related to climate action. Relevant disaster impact assessments are some subjects to be covered in this collection.

This collection includes five articles related to hazard and risk assessments in some countries in the region. [Salgado and Nájera](#) assess flood Early Warning Systems (EWS) for flash floods in Manizales, Colombia. The authors propose a duration-independent rainfall threshold for flash floods in the El Guamo stream basin in Manizales, Colombia. This basin with abrupt topography and small areas where floods are rapid and energy filled. This paper presents a systematic literature review of 19 case studies from 2016 to 2021 to compare and highlight complexities and differences in the methods used in rainfall threshold estimation in the El Guamo stream. While hydrodynamic models are solid in rainfall threshold estimation, probabilistic methods, including uncertainty analysis with utility functions, are valuable in improving decision-making in early warning systems.

[Camilloni et al.](#) investigate the *La Plata basin hydroclimate response to solar radiation modification with stratospheric aerosol injection*. This study assesses changes in mean and extreme temperature, rainfall, and river flow simulations for the RCP8.5 emission with

and without sulfur injection in the tropical stratosphere. The response of such an intervention is compared to a historical period (1980–2010), and projections under the RCP8.5 scenario for two-time slices: 2021–2050 and 2051–2080. The analysis of changes in extreme temperature and precipitation shows robust impacts on the water cycle of the LPB due to Solar Radiation Modification (SRM) implementation. These variations would lead to regional-dependent responses in the river flows, mostly related to reductions in the severity of the extremely low flow conditions.

Pérez Tello et al. discuss *Coping strategies and tactics to deal with social vulnerability in the flood disaster of March 25, 2015, in Chañaral and Diego de Almagro, Chile*. On March 25, 2015, the inhabitants of the towns of Chañaral and Diego de Almagro, in the Atacama Region of Chile, faced a flood that produced a crisis of great magnitude. This qualitative research describes the actions the inhabitants used to reduce social vulnerability before, during, and after the emergency. These were done to describe the extent of planning, meanings, resources, and structures of opportunities present in the actions. The study concludes that learning actions include family and cultural habits, daily learning and previous experiences, and imitation, among others. Finally, it provides recommendations for reducing risks of socio-natural disasters, with policies that include educational strategies based on the ways of acting shown by the communities.

Zambrano Nájera and Rey prepare an *Assessment of storm floods in a small tropical Andean Basin*. In the city of Manizales, Colombia, the increase in urbanization processes has considerably changed urban flows, as basin impermeabilization generates increased surface runoff volumes. It induces storm floods that simultaneously generate mobility problems, infrastructure damage, and in extreme conditions, pedestrian deaths. This problem has been widely studied. However, there is little literature on small basins with steep watersheds. In these basins, the problem is even more complex, as flows are faster and more energized, given the surface slopes, which generates further problems, including drainage infrastructure damage, landslides, and fallen trees. This study found that rain barrels and green roofs were viable solutions independently, although the application of additional techniques, such as cisterns and bioretention cells, is also indispensable. The present study also concludes that, although the techniques studied are implemented on a small scale, these should be planned and implemented by municipal authorities.

Bazo et al. discuss the *Anticipation mechanism for cold wave: forecast based financing a case study in the Peruvian Andes*. In June 2018, the Peruvian provinces of Arequipa and Puno in

the southern Andean region were affected by heavy snowfall, which caused severe damage to people and livelihoods in several communities. Using the Forecast-based Financing approach, the Peruvian Red Cross implemented its pre-defined early action protocol before this event after receiving an extreme snowfall warning from the Peruvian meteorological service. This article presents the results of a household survey following the impact of the extreme snowfall and documents the early actions these communities took to protect their livelihoods, health, and assets. While most households took action to protect their assets, fewer extreme losses of alpaca herds were reported in the communities that received the early support, and these communities also reported fewer adults suffering from respiratory illnesses. This case study can inform government, civil society, and humanitarian actors of how early action is happening before disasters occur and provide a direction for further investment in research and practice to make use of hydro-meteorological forecasts for the benefit of the most vulnerable.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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