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Beyond the Surface
GeoWB's Insight into La Paz's Slopes

ILAM Winners 2025

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GeoWB Mission to La Paz Addresses Slope Stability in the Face of Climate Change and Urban Growth

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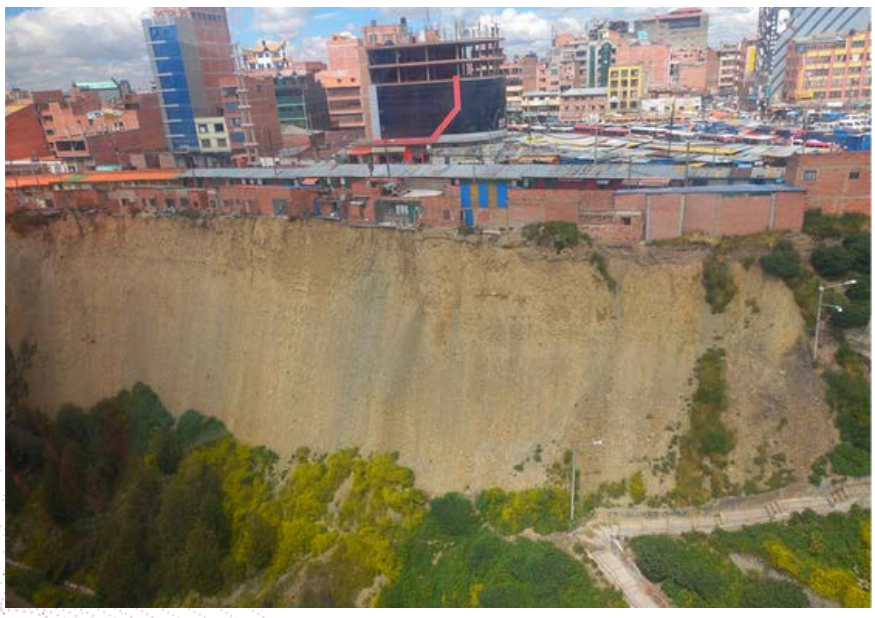
The GeoWB technical visit to La Paz focused on evaluating slope stability conditions and assessing the effectiveness of local mitigation strategies. The city's complex topography and widespread hillside occupation, often in geologically unstable zones, pose significant geotechnical challenges. Among the numerous slope stability problems that occur in the city of La Paz, two of them are the most evident:

·Slopes in partially saturated soils that can remain stable with almost vertical gradients as long as the suction pressure remains sufficiently high.

·Colluvial deposits that, due to precipitation conditions, increase their interstitial pressure and induce large-scale movements.

For the second type of movement, deep piles, occasionally combined with drainage tunnels, have been employed to intercept known failure planes, as revealed by inclinometer data. While numerous drainage tunnels have been constructed across the city, their long-term effectiveness remains uncertain, and the associated high costs raise concerns about financial sustainability. The visit also underscored the lack of regulation and enforcement in hillside development, where informal construction continues to expand into high-risk areas. Social and economic pressures frequently outweigh technical considerations, increasing the population's exposure to landslide hazards.



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A growing concern is the impact of climate change, particularly the projected increase in precipitation intensity and frequency. Such changes are likely to result in higher infiltration rates, progressively reducing matric suction on currently unsaturated slopes. As pore-water pressures rise, these slopes, once stable under unsaturated conditions, may reach critical thresholds, leading to failure and placing densely populated communities at elevated risk. This highlights the need to integrate climate projections into slope stability assessments and mitigation planning.

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The La Paz Formation offers considerable potential for further geological and geotechnical research, particularly in evaluating the performance of current stabilization techniques and exploring cost-effective, scalable alternatives. Although existing mitigation strategies demonstrate technical merit, their success is constrained by rapid, unregulated urban expansion, economic limitations, and the increasing influence of climate-driven hydrological stressors.

Importantly, the visit was carried out at the invitation of the Gobierno Autónomo Municipal de La Paz (GAMLP), in close collaboration with the Secretaría Municipal de Resiliencia y Gestión de Vulnerabilidades, whose ongoing efforts in risk reduction and slope stabilization provide a valuable institutional framework. During the visit, the GeoWB delegation engineers were able to verify that the studies and stabilization works being carried out in the city of La Paz are being carried out using state-of-the-art geotechnical engineering techniques. Nevertheless, the delegation engineers recommend considering the following:

·While the city has reportedly implemented deep drainage tunnels as part of its slope stabilization program, no detailed georeferenced information on their location or monitoring results was found in the available documentation, highlighting a need for improved transparency and post-construction evaluation.

·It may be useful to emphasize the role that local institutions, such as universities and professional associations, can play in strengthening technical capacity, promoting applied research, and supporting the long-term sustainability of mitigation efforts.

·Adopting a monitoring system based on satellite interferometry can be very useful for accurately measuring changes in the Earth's surface, such as ground movements. This would be an initial phase for detecting unstable areas, which can then be monitored more precisely with the inclinometer technology already used in the city.

Finally, it is important to remark that effectively addressing slope instability in La Paz will require a multidisciplinary, integrated approach that combines geotechnical engineering, hydrological analysis, climate resilience strategies, and a deep understanding of local socio-economic dynamics.

GeoWB Panel Highlights the Role of Geoengineers in Disaster Response at PanAmGeo Chile 2024

Report by Natalia Garrido

The Geoengineers Without Borders (GeoWB) committee of ISSMGE hosted a compelling opening panel at PanAmGeo Chile 2024, titled "International Perspectives on the Crucial Role of Geoengineers in Socionatural Disasters Response." The session emphasized the essential contributions of geotechnical professionals in addressing the impacts of natural disasters, particularly in seismically active regions like Latin America.

Chaired by PhD. Dimitrios Zekkos, the panel brought together experts from across the globe. PhD. Ellen Rathje (GEER, USA) stressed the importance of standardized data collection during post-disaster investigations and the need for public data dissemination. PhD. Fernando Marinho shared lessons from Brazil's recent flooding and landslide disasters, reinforcing the value of systematic post-event documentation.

Natalia Garrido, a Chilean geologist, reflected on the seismic identity of Chile and the regional challenges in disaster risk management. She underscored the cultural and scientific importance of addressing geological hazards and referenced the emotional legacy of disasters, illustrated by the poem "Puerto Montt está temblando" by Violeta Parra.

PhD. Pierre Delage, Chair of GeoWB, presented the committee's global outreach efforts in recent geodisaster response cases, including the Derna dam failure in Libya, the landslide in Papua New Guinea, and events in Brazil's Rio Grande do Sul.

The session concluded with a vibrant Q&A segment, reinforcing the importance of cross-disciplinary collaboration in disaster risk reduction. With over 700 professionals in attendance, the session served as a call to action for deeper engagement between researchers, practitioners, and organizations. GeoWB encourages future conference organizers to integrate panels or dedicated sessions on geodisaster topics, fostering continued global dialogue and knowledge-sharing.