

“Early warning, early action”

Monitoring and minimising landslides and floods

Summary

In a region prone to landslides and floods, the Centro de Protección para Desastres (Centre for Protection Against Disasters) works with local communities and municipal authorities to reduce the likelihood and potential impact of these events, and thus to protect people’s lives.

The project focuses on monitoring both rainfall and surface movements of earth in order to predict flash floods and landslides, as elements in community-managed early warning systems. Community risk mapping, and the planting of grass and trees to stabilise slopes, reduce water run-off and enhance soil retention, are among the activities. As part of its work supporting community-led development and disaster risk reduction in Latin America, Lutheran World Relief has been collaborating with CEPRODE since 2003 to enhance the resilience of vulnerable rural and peri-urban communities in El Salvador.

Implementing partner: Centro de Protección para Desastres (CEPRODE)

ACT funding member: Lutheran World Relief

Location: municipalities of Berlín and Alegría in Usulután province

Coverage: Berlin (population of 15,205) and Alegría (population of 14,000)

Vulnerable to landslides & earthquakes

Situated in a mountainous, coffee-growing region of eastern El Salvador, the municipalities of Berlín and Alegría are vulnerable to frequent flash floods and landslides, in particular as a result of heavy rains and tropical storms. In the aftermath of prolonged rainfall, the steep slopes surrounding the city of Berlín are susceptible to mud flows, rock falls, and other sudden displacements of land. Seismic activity,

though not climate-related, accentuates the risk as tremors can help dislodge already unstable land.

Landslides are capable of moving long distances down steep slopes into the centre of Berlín. In 1998, for example, following Hurricane Mitch the north slope of the Cerro Las Palmas mountain was dislodged and produced mud that flowed over five kilometres into the centre of the city. Early warning systems are thus essential so that people in high-risk areas can be alerted of possible floods or landslides in time to evacuate themselves to safer ground.



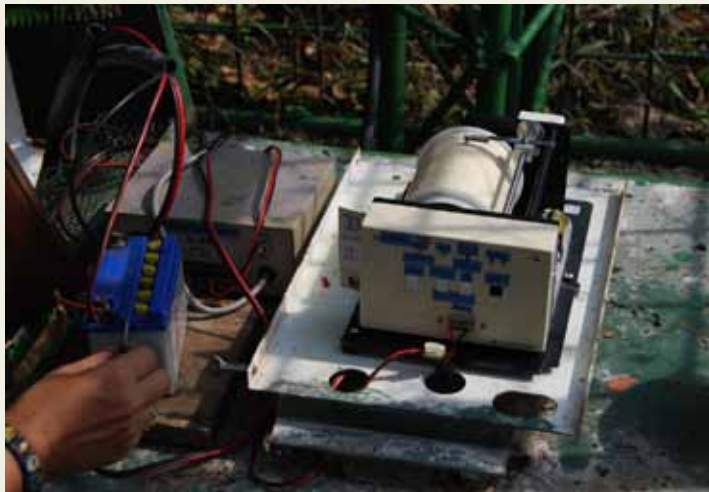
Devastation caused by floods and landslides in Berlín municipality, May 2007

Early Warning Systems

Modern technology and low-cost systems are both used to monitor geological and meteorological risks. On a hillside above the city of Berlin, a piece of equipment called an extensometer records ground movement on steep slopes and rocky areas. The extensometer uses a tensioned wire cable extending between a supply spool and an anchor to measure movement of the cable and the anchor, which in turn indicates shifts



Using a simple beaker as a pluviometer



Extensometer recording ground movement



Vetiver grass planted along contour lines control erosion

in the surface of the ground. The movements are recorded by a solar- and battery-powered digital recording device, which is monitored by community members.

This modern technology is complemented by a low-cost monitoring tool that consists of simple metal bars inserted into the ground in a grid, and connected by nylon string. By comparing the extent of ground movements, fractures, and geological faults within the plotted area over time, engineers are able to determine if landslides or mud flows are imminent.

At the same time, the project also focuses on monitoring the risk of flash floods from heavy rains. A network of community members has been trained as early warning system flood monitors. These monitors measure how much rain falls in a given period of time using simple beakers as 'pluviometers'. These measurements, together with analysis of extensometer readings, predict the likelihood of floods, landslides, and mud flows, and communities can be alerted in high-risk zones in time for them to prepare or evacuate to safer ground.

Risk mapping and slope stabilisation

CEPRODE trains municipal authorities and community members to map their communities, identifying existing infrastructure and assets as well as areas at risk of floods, landslides, or other disasters. It advocates for municipal authorities to relocate inhabitants in high-risk areas to safer ones, and to prevent the construction of new structures in vulnerable zones. It also undertakes activities to stabilise slopes in high-risk areas identified as a result of the mapping exercises.

The project has built retaining walls behind elementary schools to reduce the risk of hillside collapse, and it has further stabilised slopes by planting live barriers of grass and trees along contour lines, which also serve to control erosion and conserve moisture. Vetiver grass has proven to be an excellent crop to this end, as its dense and spongy root network can reach three metres in depth. In addition to the

benefits that vetiver grass has in terms of slope stabilisation, it carries an economic benefit as well: a group of local women entrepreneurs, supported by CEPRODE, is using the grass to produce handcrafts for sale in the local market.



Woman using vetiver grass for basket work

The project is also promoting the planting of acacia, annatto, and cashew trees, in protective strips or in windbreak rows, along with the construction of stone soil-retention barriers and run-off channels.

Cooperation with centres of learning

CEPRODE is a member of a Central American network of organisations dedicated to “Social Studies in the Prevention of Disasters” and has been instrumental in coordinating the exchange of disaster monitoring and prevention information at the regional level.

The project cooperates with the University of El Salvador on technical support for the geological monitoring component. This includes maintaining and comparing the data collected from both systems and has led to advances in standardisation and improvement of disaster mitigation and response mechanisms throughout the region. One example of such collaboration is the sharing of information gathered from the extensometer readings with the municipal government to inform action planning with government committees and community groups. The information gathered to date has also validated the reliability of lower cost monitoring devices as opposed to more expensive modern versions.

In addition to its linkages with the university, the project also works with local schools to introduce education on risk reduction and environmental issues into local classrooms.



Roadside retention wall in Berlín



El Salvador: Project locations highlighted in red

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