OFFICE OF U.S. FOREIGN DISASTER ASSISTANCE (USAID/OFDA)

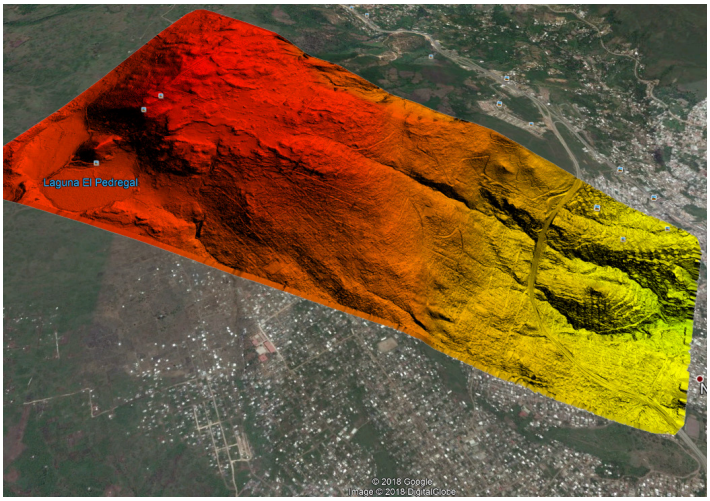
REGIONAL OFFICE FOR LATIN AMERICA AND THE CARIBBEAN, SAN JOSÉ, COSTA RICA

USAID/OFDA Supports Remote-Sensing Technology to Mitigate Disaster Risk in Honduras

Since 2013, USAID/OFDA, through implementing partner GOAL, has been helping transform landslide-and flood-prone urban neighborhoods in Honduras' capital city of Tegucigalpa into resilient communities. The program currently targets approximately 64,000 people in nine informal settlements in Duarte, Las Brisas, and Ulloa sectors of Tegucigalpa with activities to reduce risk and strengthen early warning and response systems. Through a neighborhood-approach process that features the active participation of the beneficiary communities and the collaboration of local public, private, and academic actors, the program is helping communities improve surface water drainage management, increase access to affordable, safe housing, and reinforce communal buildings and homes structures.

The program is also increasing micro and small enterprises' disaster risk reduction (DRR) and business management capacities and access to credit, aiming to ensure their continued operation in case of an emergency. Additionally, GOAL is engaging youth in activities to improve community risk management and early warning and response systems and transform public spaces in hazard-prone areas using street art and urban landscaping.

A key innovation recently incorporated by GOAL in this DRR project is the use of drones equipped with Light Detection and Ranging (LIDAR)—a remote-sensing system that uses light in the form of a pulsed laser to measure the Earth's contour—to carry out detailed topographical surveys of urban water catchments in high-risk areas of Tegucigalpa. LIDAR technology allows assessment teams to examine the land, even in heavily forested areas, with great accuracy and precision and to generate high-resolution 3D hydrological models. The models are a simulation of real-world events that aid in understanding and predicting water movement and its effects on landslide and flooding hazards and help in the design of strategic mitigation infrastructure, such as surface water drainage networks.



During the past two years, with USAID/OFDA support, GOAL has used LIDAR technology to study urban water catchments in Tegucigalpa and support the design of cost-effective mitigation works in hazard-prone neighborhoods. *Photo courtesy of GOAL*

Neighbors of Duarte sector work together on the construction of surface water drainage networks designed to mitigate hydrological hazards. *Photo courtesy of GOAL*

"With LIDAR technology we can generate high-resolution 3D topographic maps in a short time, which is difficult to achieve with conventional research methods that also require significantly higher levels of investment and do not offer the same resolution quality. This level of precision is crucial for the identification of potential hazards and houses at risk and the design and construction of drainage systems and other mitigation works," said GOAL Technician Jorge Tejeda.

GOAL Regional Director Bernard McCaul noted, "During the past two years, we have been using a combination of LIDAR technology and historical topographic data to study urban watersheds in Tegucigalpa and analyze their behavior and potential impact in hazard-prone neighborhoods under different severe weather scenarios. This information is helping us identify which factors would most likely trigger landslides or flooding and support the design of cost-effective mitigation interventions. For example, without these tools, the cost of mitigation works in a neighborhood in Ulloa was estimated at over $100 million, without considering the social impact of relocating thousands of families from their homes. With the use of LIDAR, we have been able to design viable mitigation solutions that can be done at a substantially lower cost—between $1 and 2 million—and can reduce up to 80 percent of flood and landslide risk."

The project also partnered with the Hydrological Research Center, a U.S. nonprofit research and technology transfer organization, to produce precise surface water modeling and train local actors—including scientists and representatives from the Central District Municipality, the Government

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of Honduras National Emergency Commission (COPECO), and Honduras National University (UNAH) Department of Spatial Sciences—on how to use the tools and methodologies developed in the survey and modeling processes, to ensure its replication in future DRR-related research in Honduras.

"It is very satisfying to see Honduran geologists and hydrologists using these tools," said Phil Gelman, Regional Advisor for USAID/OFDA. "Until relatively recently, in Honduras, these types of studies were carried out by foreign experts. Now the knowledge is being transferred, and methodologies are being replicated by local scientists."

This prototypical DRR project will be used by Tegucigalpa municipal authorities as a model to reduce disaster risk in densely populated hillside areas vulnerable to landslides and flooding.

The program is engaging youth in activities to improve community risk management and transform public spaces in hazard-prone areas using street art and urban landscaping. *Photos courtesy of GOAL*

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On February 23, VDAP and OVSICORI scientists met to discuss future collaborative work and strengthen their 30-year partnership *Photo by Irene Gago, USAID/OFDA*

VDAP Strengthens Partnership with OVSICORI

On February 23, scientists from the USAID/OFDA-funded Volcano Disaster Assistance Program (VDAP), implemented by the U.S. Geological Survey, met with colleagues from Costa Rica's Volcanological Seismological Observatory (OVSICORI) to discuss future cooperation and reinforce their 30-year partnership.

VDAP's new Chief, Dr. Jacob B. Lowenstern, said, "VDAP and OVSICORI are discussing a range of areas for potential future cooperation, including using new monitoring software, facilitating communication workshops, and collaborating on training programs for Central American volcanologists."

VDAP scientists have been providing technical assistance to Costa Rican geologists since the late 1980s. From 1988 to 2005, VDAP scientists conducted multiple infrastructure and scientific missions to help OVSICORI improve their monitoring networks and the analysis and archiving of volcano monitoring information. VDAP has also provided ongoing training and technical assistance in volcano monitoring, data analyses, and probabilistic forecasting.

VDAP Chief Lowenstern noted, "OVSICORI is now a highly capable and respected institution that exhibits considerable independence. VDAP continues to have intermittent contact with them to help with specific subjects of technical or scientific interest."

In the last decade, VDAP has assisted OVSICORI upon request, whenever volcanic activity merits increased scrutiny. For example, in 2016, in response to a request from the Government of Costa Rica, VDAP deployed two scientists to assist with probabilistic forecasting and provide advice on the development of a conceptual model to evaluate Turrialba volcano monitoring data. Additionally, VDAP replaced OVSICORI's damaged Multi-GAS, an instrument used to take real-time high-resolution measurements of volcanic gas emissions.

Dr. Geoffroy Avard, OVSICORI Geologist and Chief of the Volcanic Monitoring Program, said, "In recent years, due to increased activity at Poas and Turrialba volcanoes, we have requested VDAP's assistance. They helped us with seismic monitoring, eruption detection through infrasound monitoring, and crisis management. OVSICORI has also collaborated with VDAP providing support to other volcanic observatories in Central America. The VDAP scientists' visit to Costa Rica was an excellent opportunity to discuss future collaborative work."