

Landslides

El Progreso has been the site of tremendous sediment influx from the Rio Pelo. Part of this sediment has been derived from the preexisting river channel; however, numerous landslides are present in the Montana Mico de Quemada. If these landslides were responsible for a significant portion of the sediment load supplied to the Rio Pelo from Hurricane Mitch, airphoto mapping and analysis can assess the volume and distribution of the sources. This knowledge will allow estimation of how much sediment remains in the watershed and is likely to be remobilized in future storms as well where to emplace any diversion or retaining structures that might be used to modify future flow of the Rio Pelo. Airphoto mapping and analysis will cost \$200,000. Data and information transfer will cost \$50,000.

Flooding

At the confluence with the Rio Ulua, 3 meters of fine sand was deposited on nearby homes. Two kilometers upstream, 117 homes were damaged or destroyed by fast moving floodwaters and sedimentation. The sedimentation here caused the channel bed rise 1.5 meters. The flow in the channel is confined by a hastily built levee, hence the present river surface is higher than the present living areas of homes along the channel. At 4 km upstream the channel widened by more than 200 meters, and the concurrent lateral erosion undermined roads and about 90 homes; another 260 were damaged or destroyed. At 7 km upstream, the Mitch flood destroyed most of the municipal aqueduct.

Mitigation Measures

- *(Short Term)* Dredge the channel and transport the sediment to upland sites or use it for reconstruction. Reintroducing the sediment into the river system downstream may cause local aggradation and increase the likelihood of downstream flooding.



Sediment deposition along the Rio Pelo in El Progreso is so severe that the channel is now elevated approximately 1.5 meters above the floodplain.

- *(Intermediate Term)* The construction of a low wall or berm on the mountainward side of El Progreso would help divert and channel floodwaters into the established channels to the Rio Ulua. Currently, flow coming off of the mountain flows down city streets and through neighborhoods outside of established channels.

- *(Intermediate Term)* Those areas of the floodplain where active flow destroyed homes should be evacuated. This is particularly true in areas along the Rio Pelo where the channel is perched above the surrounding flood plain.

- *(Intermediate Term)* Install channel bank protection in some areas to arrest the recent and present lateral riverbank erosion.

- (Long Term) Evaluate the potential for large landslides in the head water areas of the Rio Pelo.

La Lima

General

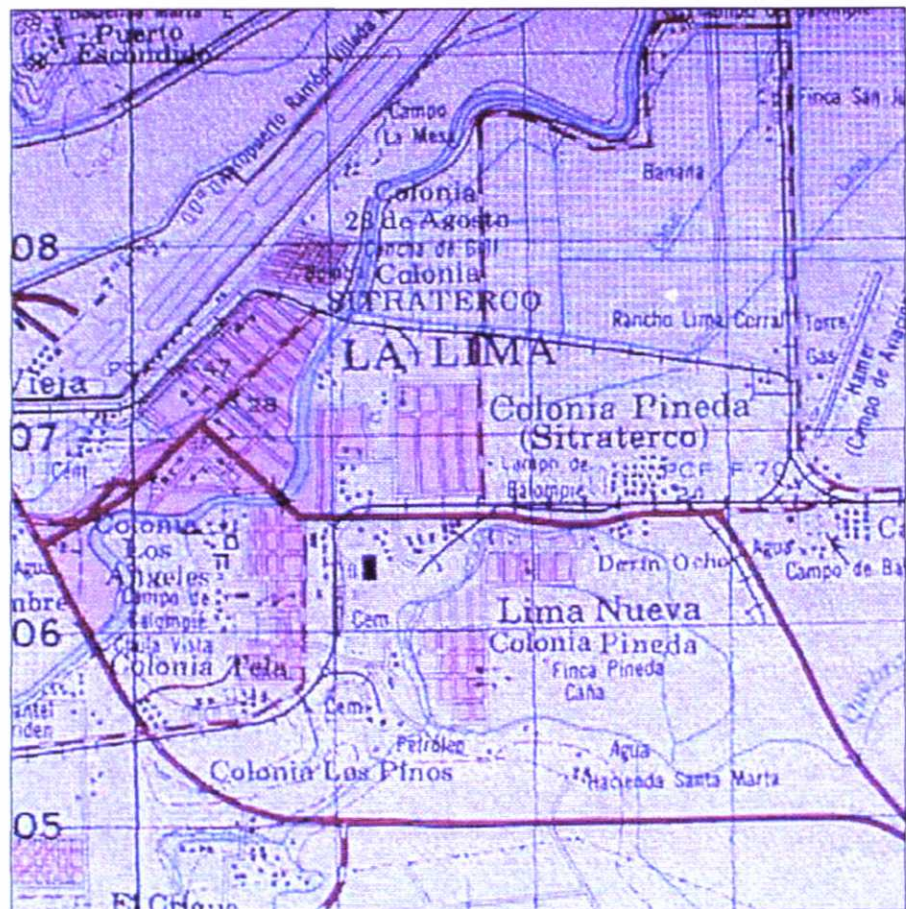
La Lima lies in the Cortes Department. La Lima is situated on the Rio Chamelecon between San Pedro Sula and El Progreso. Within this department Hurricane Mitch destroyed 3,300 residences and damaged 4,550.

The Sula Valley is a major contributor to the Honduras economy.

Agricultural and industrial production in the Sula Valley represents 50 percent of the Honduran Gross Domestic Product and 40 percent of the total agricultural production. The major crops grown in the valley are bananas, plantains, pineapple, sugar cane, citrus, corn and

Description of Problem

Hurricane Mitch flooded the entire town of La Lima. The most severely flooded homes were located adjacent to the Rio Chamelecon. Accordingly about 1,500 residences will be relocated to a site named Via Lima about 4 kilometers northeast of the center of town. The town is also susceptible to flooding to some degree on almost an annual basis.



Mitigation Measures

- *(Short Term)* Do not allow any reconstruction in the area from which the 1,500 homes are being relocated.
- *(Intermediate Term)* Require new structures have no habitable quarters on the ground floor.
- *(Long Term)* Any long-term solution to flooding problems must be considered in the context of a comprehensive solution for the entire Sula Valley. Data collection regarding stream flows can be initiated. Technical studies to evaluate alternative flood control measures can then be conducted.

Evaluation of Proposed Housing Sites

General: The town of La Lima has identified a site, Via Lima, northeast of the town for relocating about 1,500 residences.

Flooding: The proposed relocation site has a risk of flood, but it is less than the current location of the residences. The town flooded to about a 1-meter depth during Hurricane Mitch, while Via Lima only flooded to about a 1/3-meter depth.

Landslides: There is no risk of damages or loss of life from landslides.

Water Supply: Water for this site can be provided by wells producing from the highly productive alluvial aquifer. Well yields are up to 750 gpm in the La Lima area, however, there is evidence that several wells within the town are polluted. Two wells should be required at this site, at a cost of approximately \$50,000.

Sanitary: With the very high water table, a lift station with oxidation pond is considered to be the best alternative.

Environmental: The existing land use in the proposed relocation site is crop land, which at the present time is idle. Changing this land use for housing will have some adverse effects normally associated with urban areas. Adequate waste treatment will prevent further degradation of water quality in the receiving stream.

Site Access: The relocation site is about 4 kilometers from La Lima by way of dirt roads. These have been continually been graded so that their elevation is below that of the surrounding land. Accordingly, they do not drain well. Some improvement will be necessary to improve drainage.