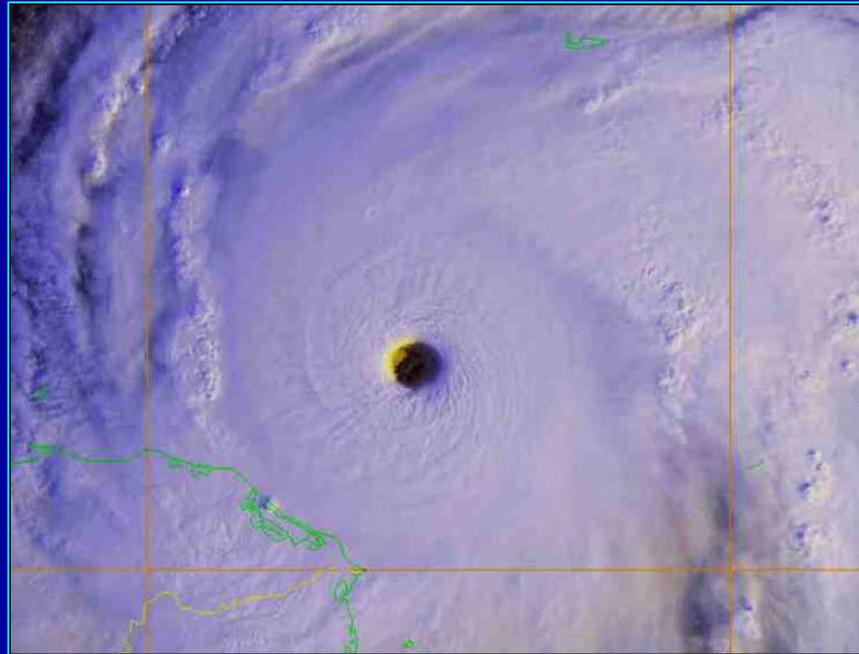


Evaluation of Housing and Infrastructure Reconstruction Following Hurricane Mitch January 11 - 30, 1999



*United States Geological Survey
United States Army Corps of Engineers
University of South Carolina*

Team Honduras:

Roger Burke, COE

Ed Harp, USGS

Bill Miller, USGS

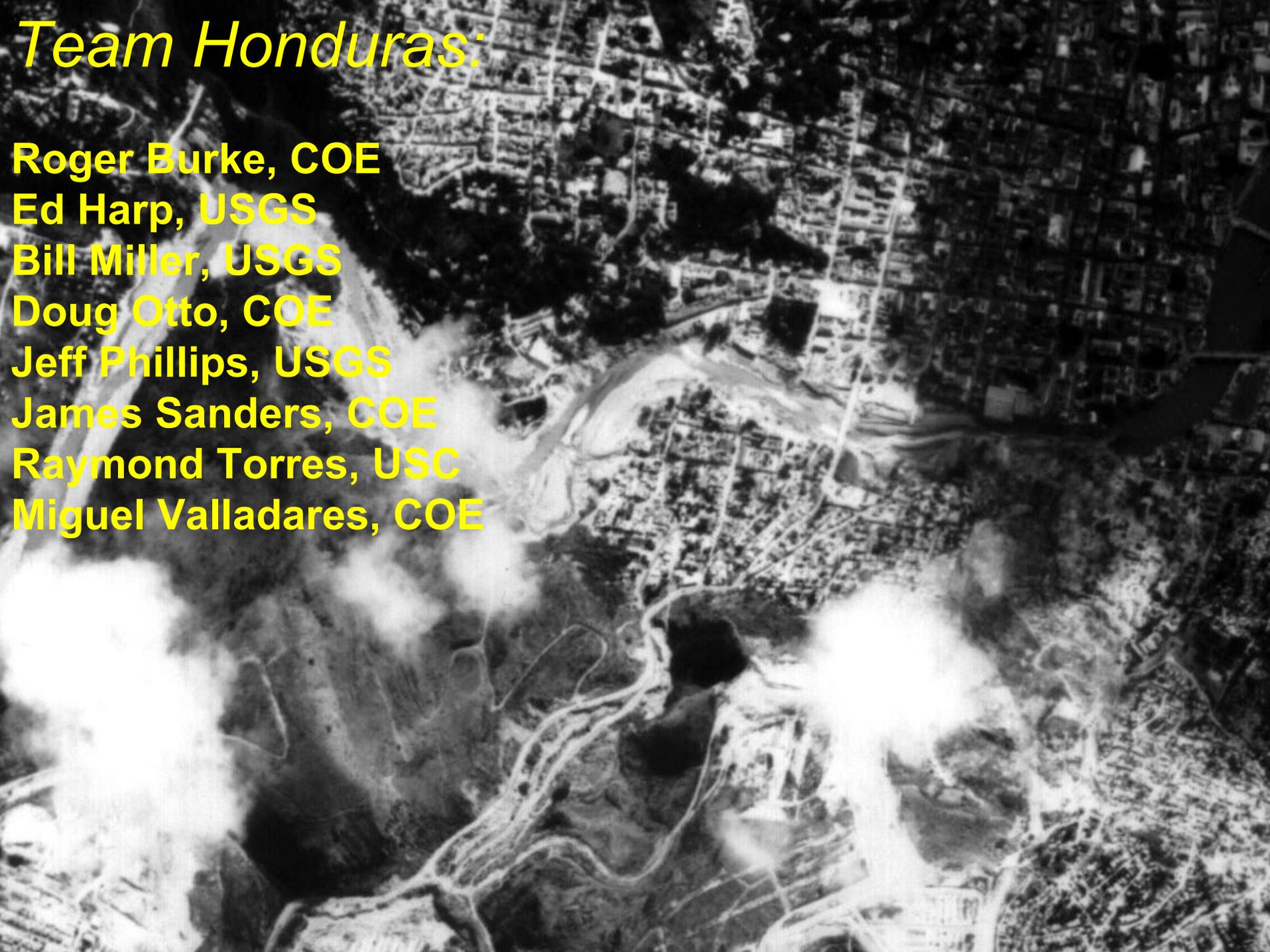
Doug Otto, COE

Jeff Phillips, USGS

James Sanders, COE

Raymond Torres, USC

Miguel Valladares, COE



Central America

Track of Hurricane Mitch



Mitch Impacts: Honduras

Flooding and Landslides

- 7,000 Fatalities
- 5,000 Missing
- 33,000 Homes Destroyed
- 50,000 Homes Heavily Damaged
- 95 Bridges Destroyed
- 75 Bridges Heavily Damaged
- 70% Road Network Damaged Nationwide



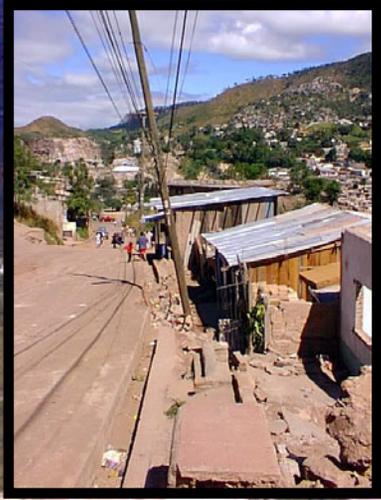
Sites Assessed



Tegucigalpa



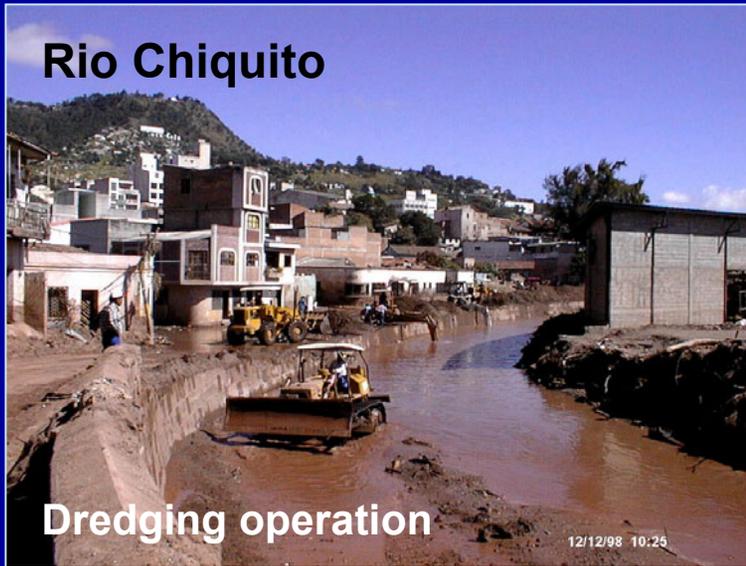
Landslides



El Berrinche
Landslide

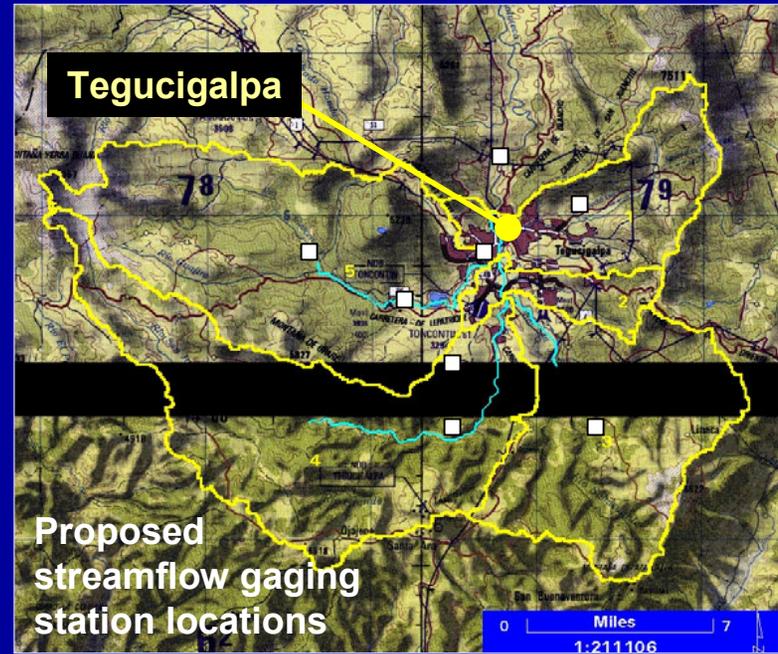


Flooding

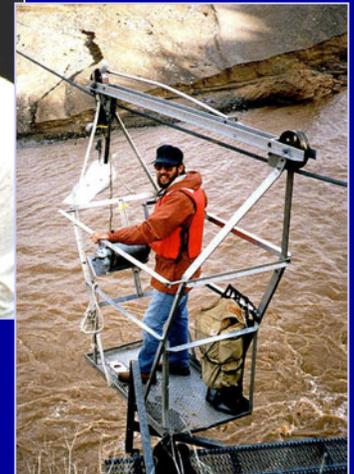


**Right bank
downstream of El Chile Bridge**

Streamflow Gaging Station - Floodwarning Network: Real-time Data Transfer Capabilities



Training: Operation & Maintenance of Network



Relocation of Mitch Victims: Tegucigalpa



SITE 1: Nueva Capital



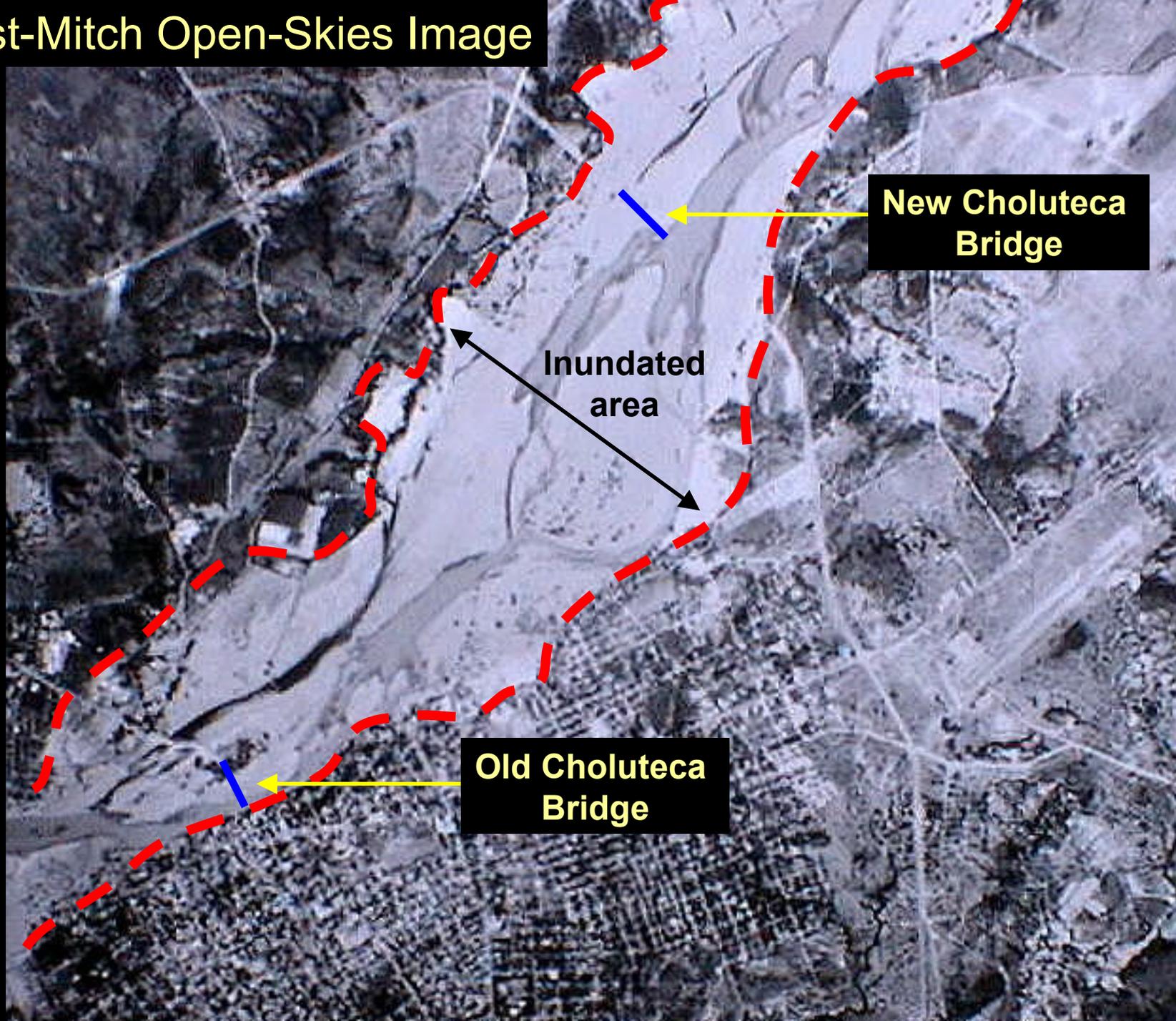
- Flooding
- Landslides
- Water Supply
- Site Access

SITE 2: El Ingles



- Flooding
- Landslides
- Water Supply
- Site Access

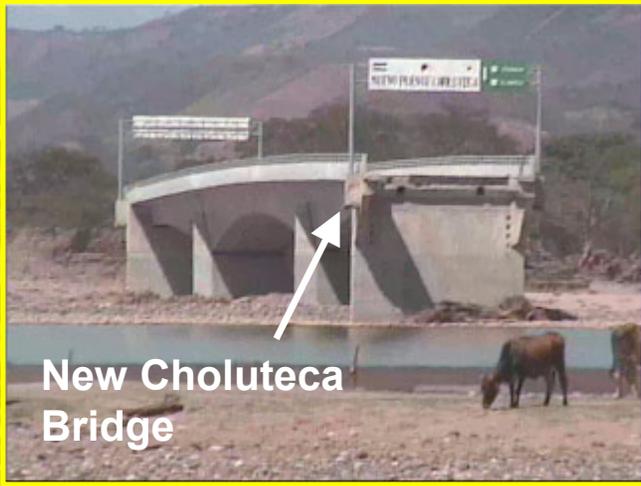
Post-Mitch Open-Skies Image



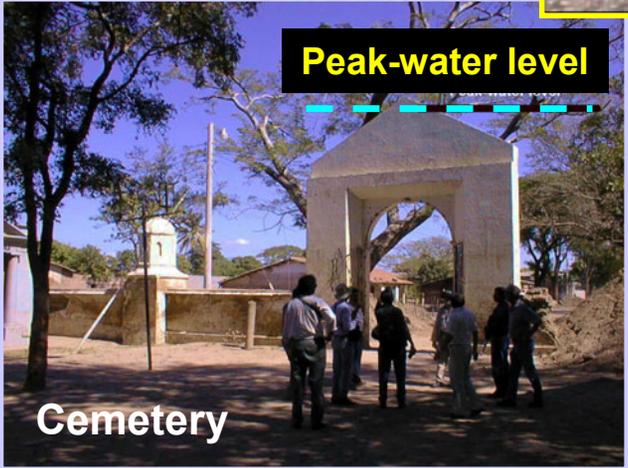
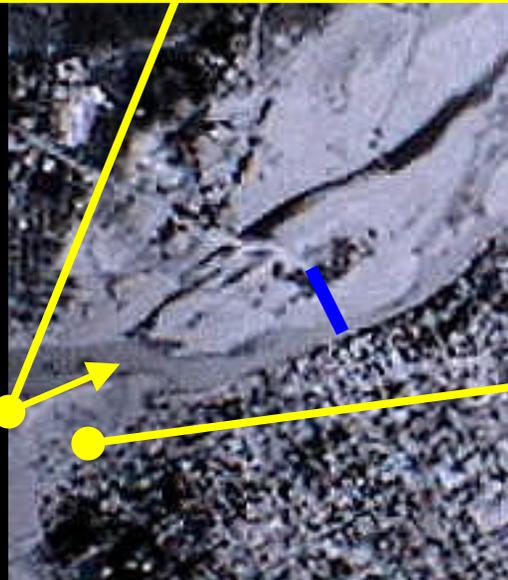
**New Choluteca
Bridge**

**Inundated
area**

**Old Choluteca
Bridge**



New Choluteca Bridge



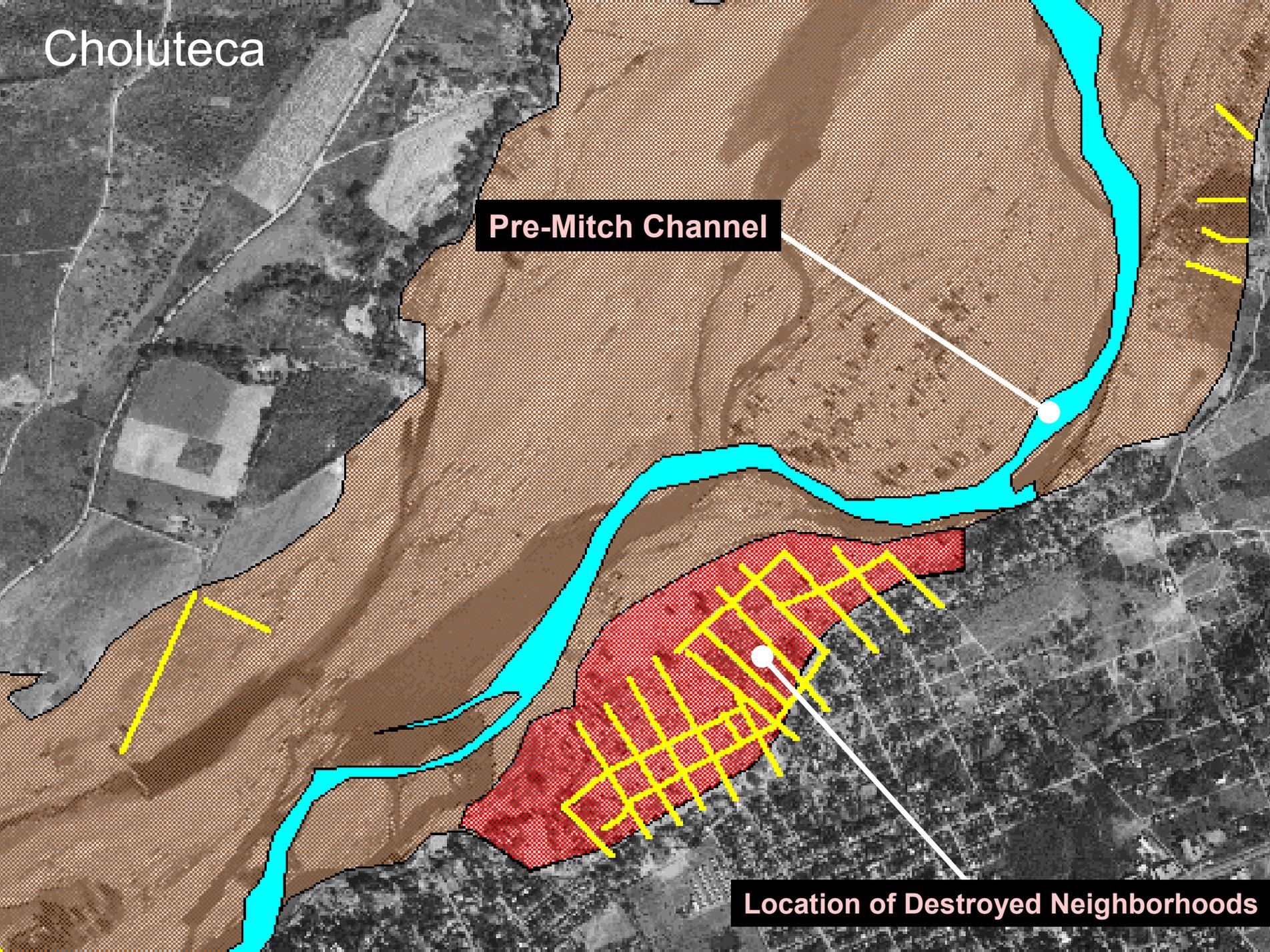
Peak-water level

Cemetery

Choluteca

Pre-Mitch Channel

Location of Destroyed Neighborhoods



Relocation of Mitch Victims

SITE 1: Nueva Choluteca



- Flooding
- Landslides
- Water Supply
- Site Access

SITE 2: Nueva Eden

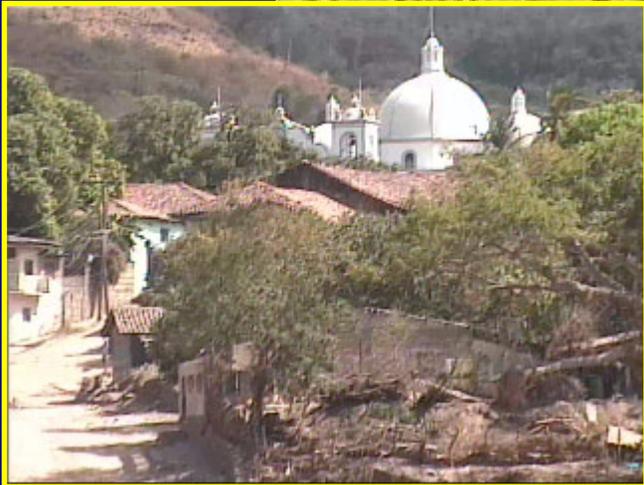


- Flooding
- Landslides
- Water Supply
- Site Access

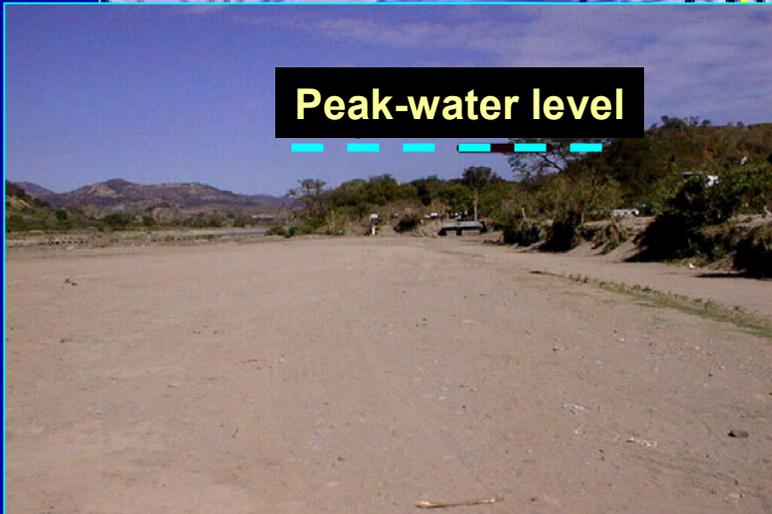
Pespire



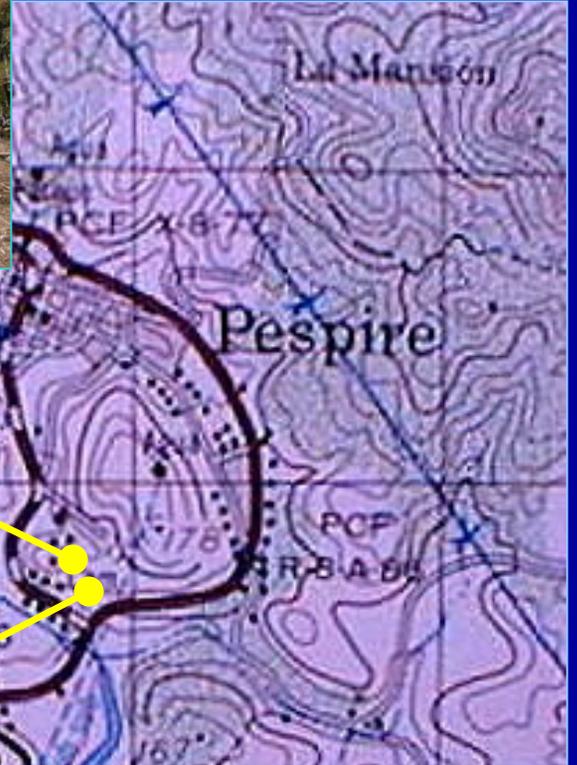
Rio Nacaome



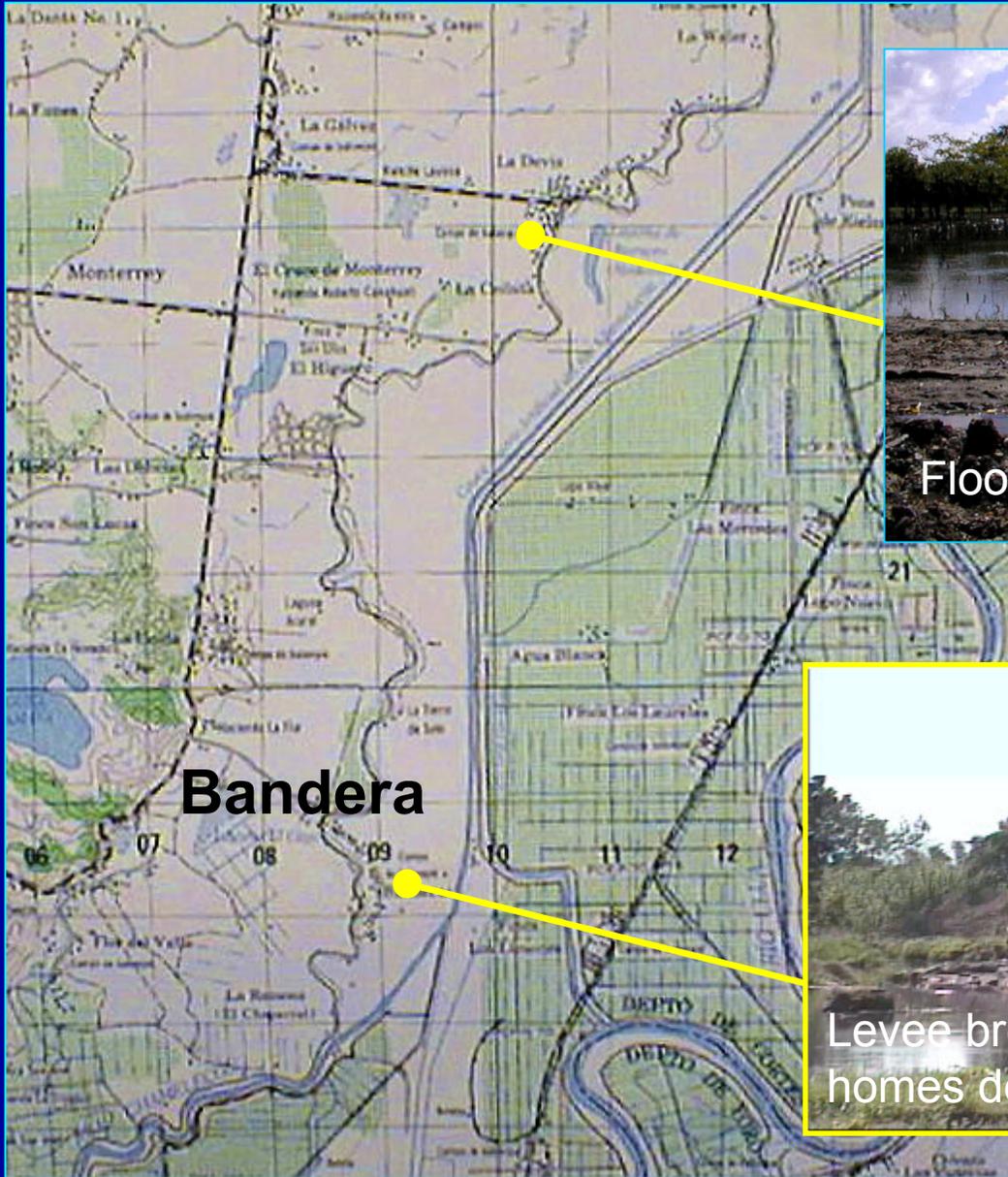
Peak-water level



Relocation of Mitch Victims: SITES 1 & 2



- Flooding
- Landslides
- Water Supply
- Site Access



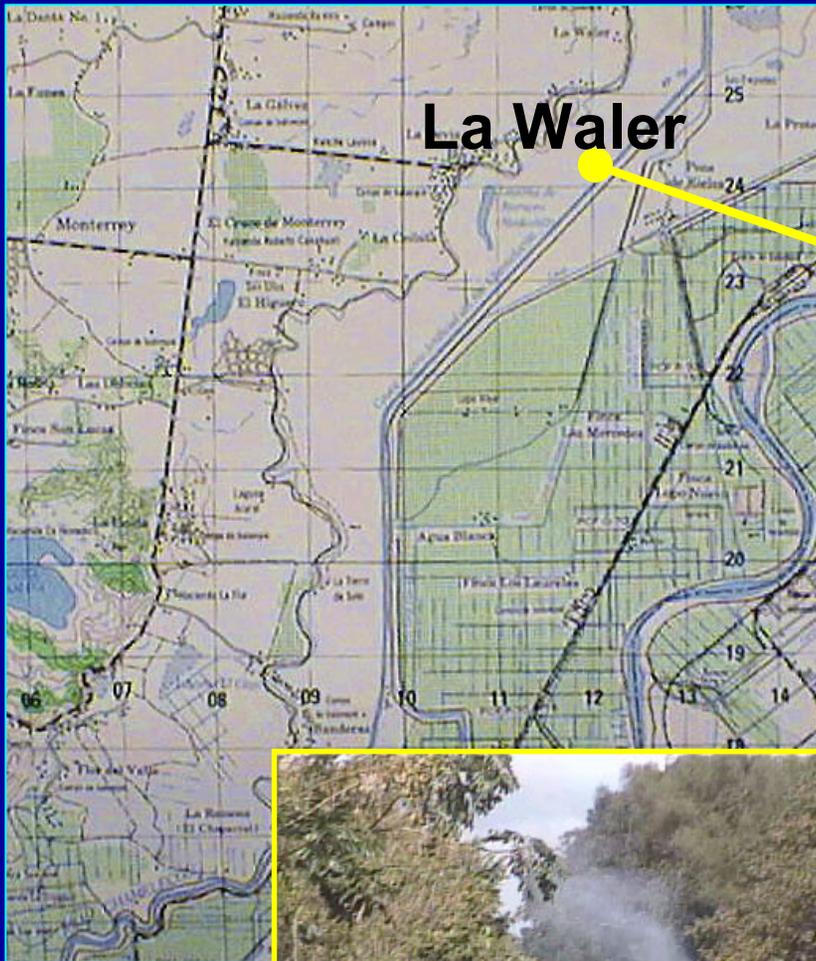
Bandera



Flooded crops



Levee break:
homes destroyed



La Waler



Levee break:
homes destroyed



People temporarily
dwell on the levee

- Flooding
- Landslides
- Water Supply
- Site Access

El Progreso



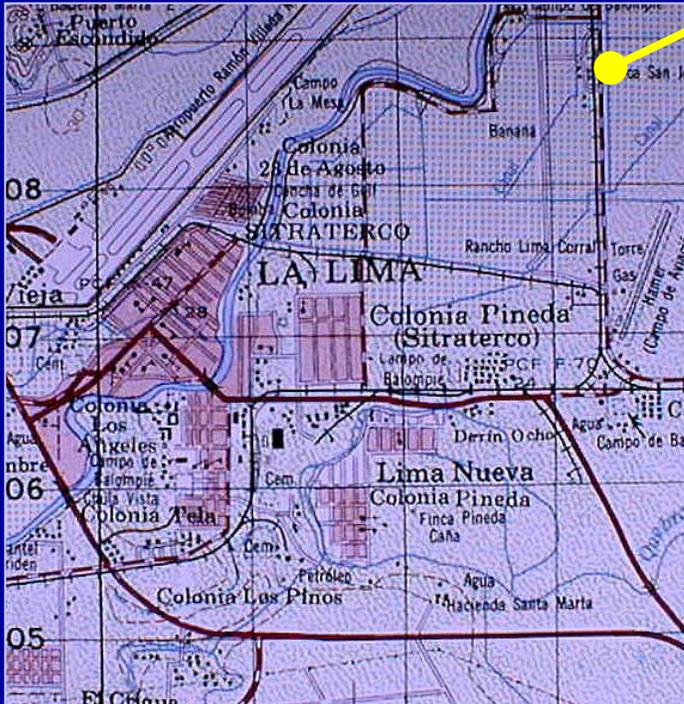


La Lima



Relocation of Mitch Victims

SITE: Via Lima



- Flooding
- Landslides
- Water Supply
- Site Access

Mission to Nicaragua



Team Nicaragua

Glynn Banks, COE

R.F. Moore, USGS

Eric Nelson, COE

Kevin Scott, USGS

Mark Smith, USGS

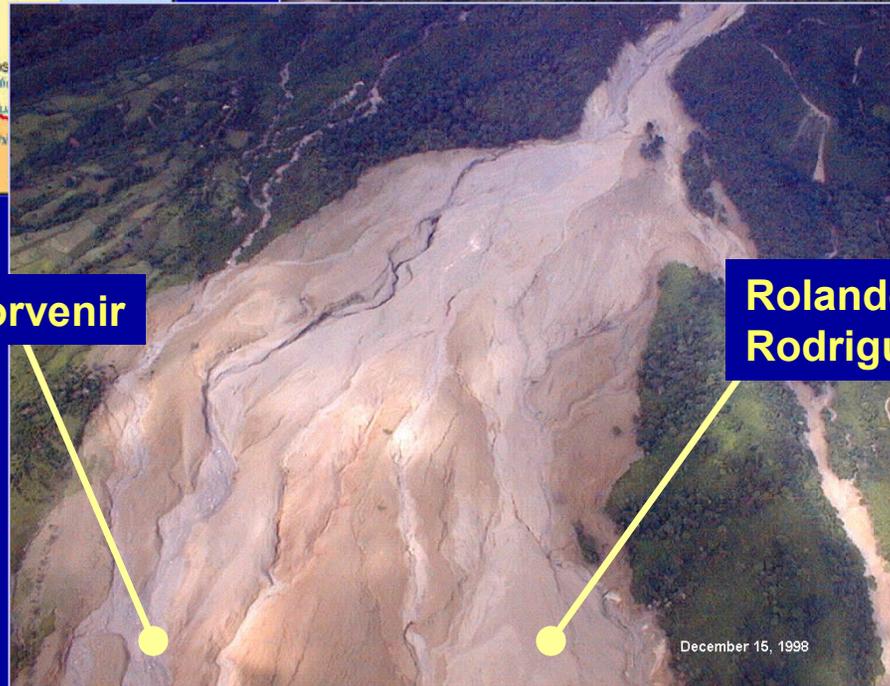
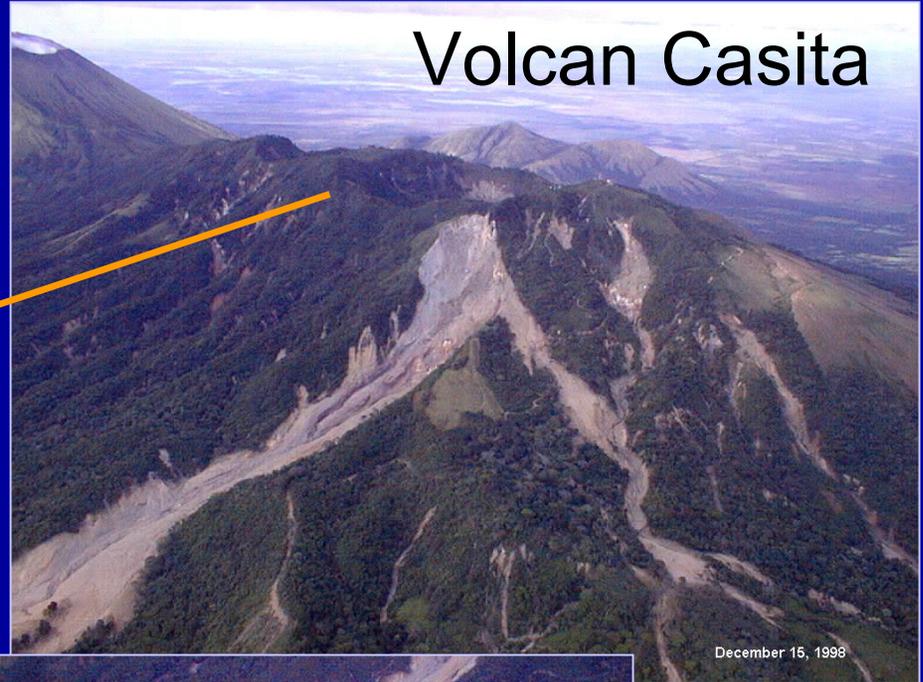
Mitch Impacts: Nicaragua

An aerial photograph of a large, dark-colored volcano with a prominent crater. The volcano's surface shows deep ridges and gullies. In the foreground, the underside of an aircraft is visible, with a red probe extending towards the volcano. The sky is filled with soft, white clouds, and the background shows a vast, hazy landscape.

- Displaced Population: 368,261
- Refugees: 65,271
- Refugee Centers: 304
- Deaths: 2,863
- Houses Damaged: 17,566
- Houses Destroyed: 23,854

Landslides

Volcan Casita



El Porvenir

Rolando Rodriguez

December 15, 1998

Volcan Casita



REPÚBLICA DE NICARAGUA

MAPA DE AMENAZA VOLCÁNICA

GOBIERNO DE LA REPÚBLICA DE NICARAGUA
 INSTITUTO NICARAGÜENSE DE ESTUDIOS TERRITORIALES

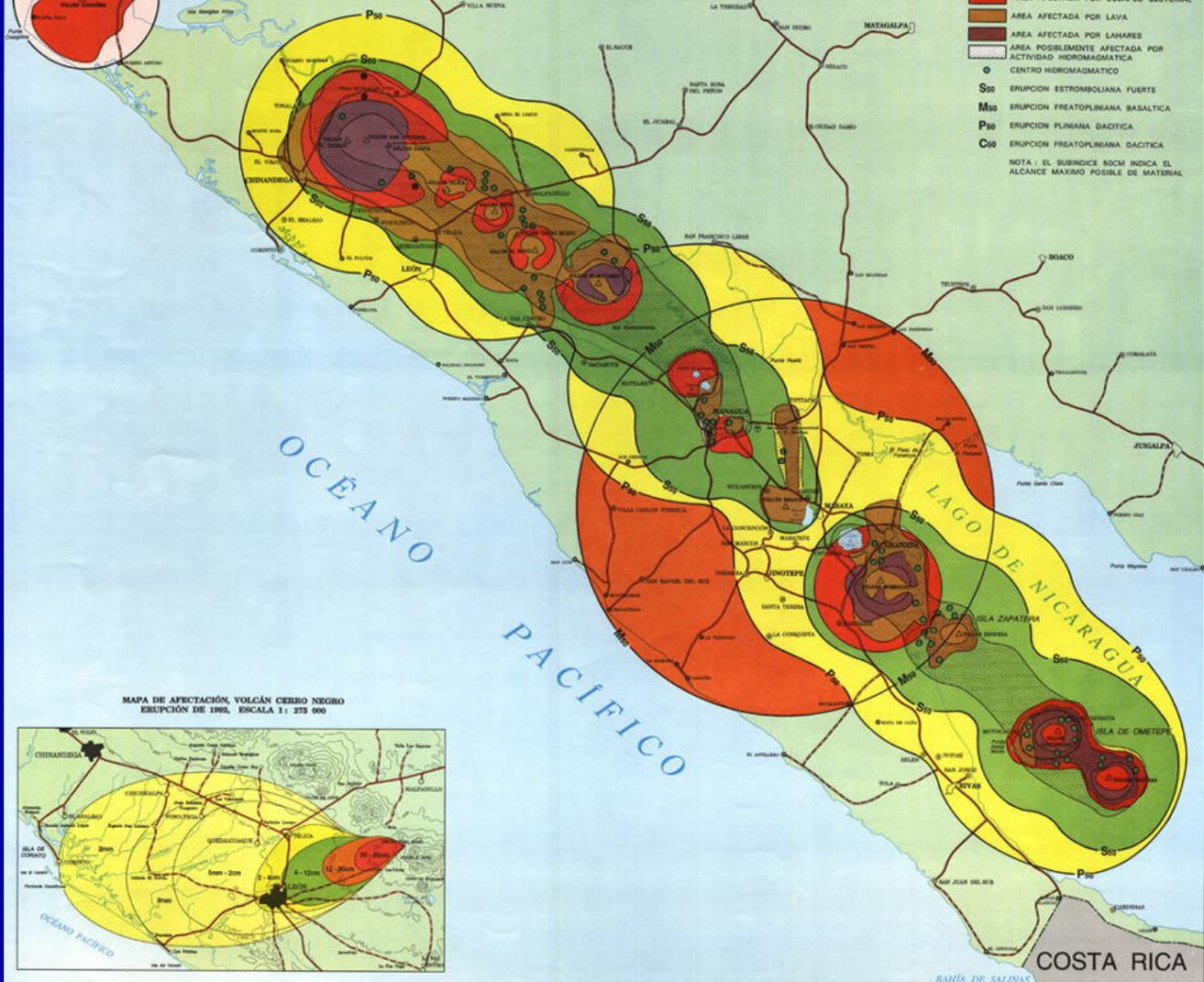
ESCALA 1 : 400 000

1 CM EQUIVALE 4,0 KM
 PUBLICADO EN 1995

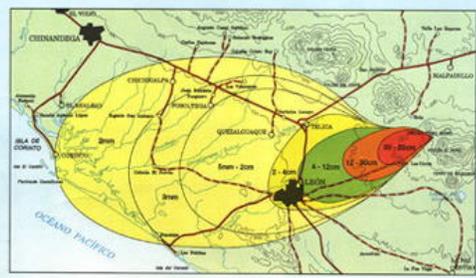
SIMBOLOGIA

- LINEA DE COSTA, RIOS
- CARRETERAS
- LIMITES INTERNACIONALES
- CAPITAL DE LA REPUBLICA
- CABECERAS DEPARTAMENTALES
- CABECERAS MUNICIPALES
- CIUDADES Y PUEBLOS
- AREA SIN ACTIVIDAD
- AREA AFECTADA POR COLAPSO SECTORIAL
- AREA AFECTADA POR LAVA
- AREA AFECTADA POR LAHARES
- AREA POSIBLEMENTE AFECTADA POR ACTIVIDAD HIDROMAGMATICA
- CENTRO HIDROMAGMATICO
- ERUPCION ESTROMBOLIANA FUERTE
- ERUPCION FREATOPLENARIA BASALTICA
- ERUPCION PLINIANA DACITICA
- ERUPCION FREATOPLENARIA DACITICA

NOTA : EL SUBINDEICE SOCM INDICA EL ALCANCE MAXIMO POSIBLE DE MATERIAL



MAPA DE AFECTACIÓN, VOLCÁN CERRO NEGRO
 ERUPCIÓN DE 1992, ESCALA 1: 275 000

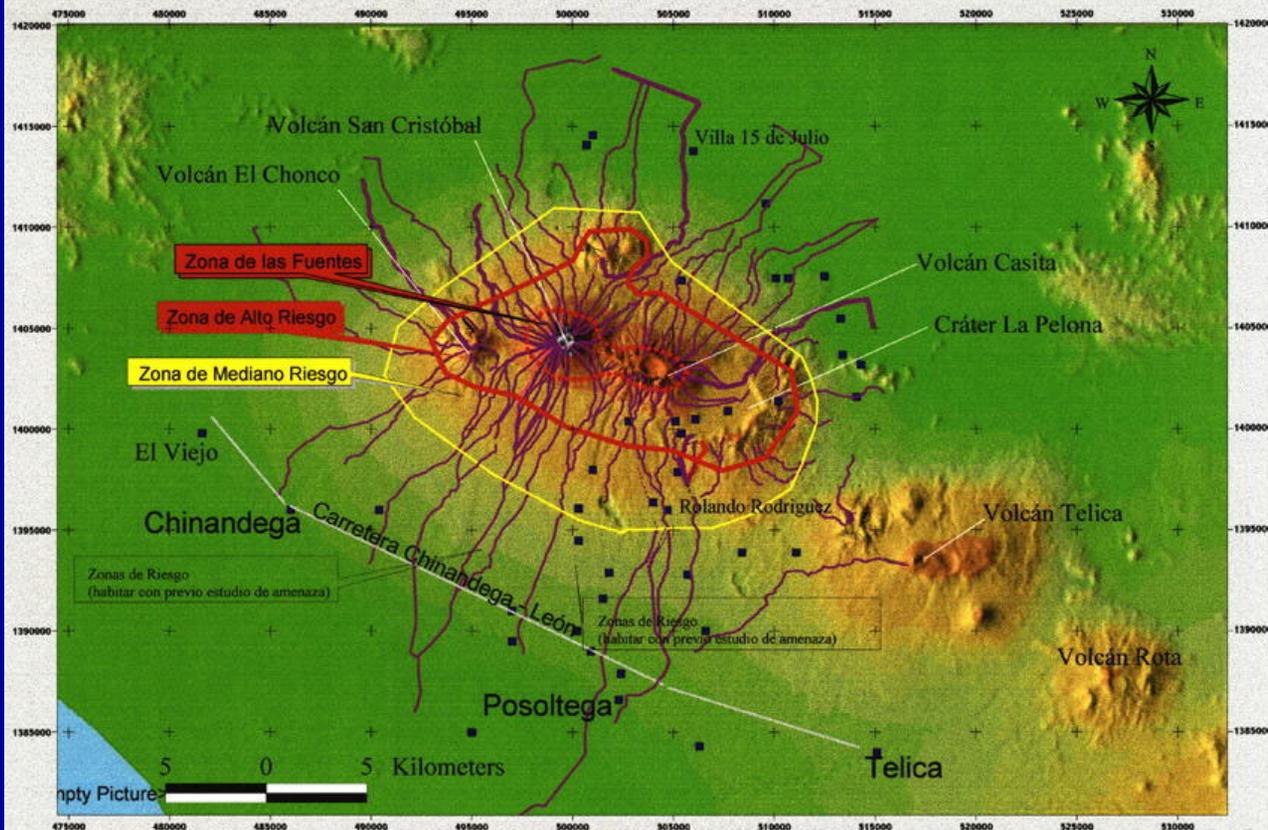


BAHÍA DE SALINAS

COSTA RICA



Mapa Preliminar de Amenaza por Avalanchas y Deslaves Complejo Volcánico San Cristóbal - Casita

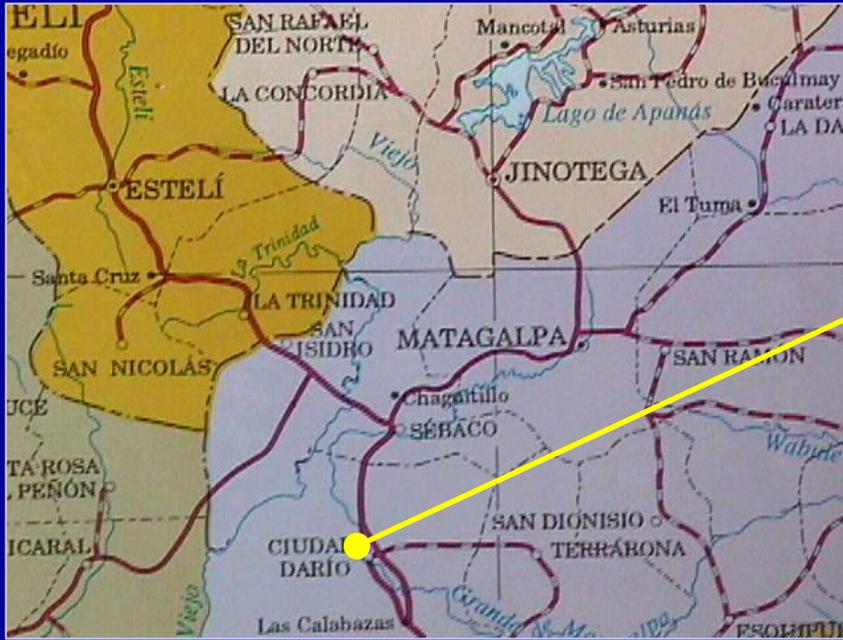


Flooding

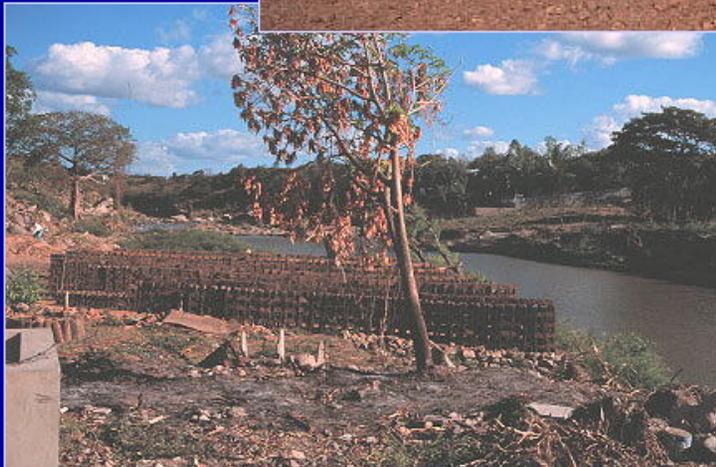


Managua

Dario

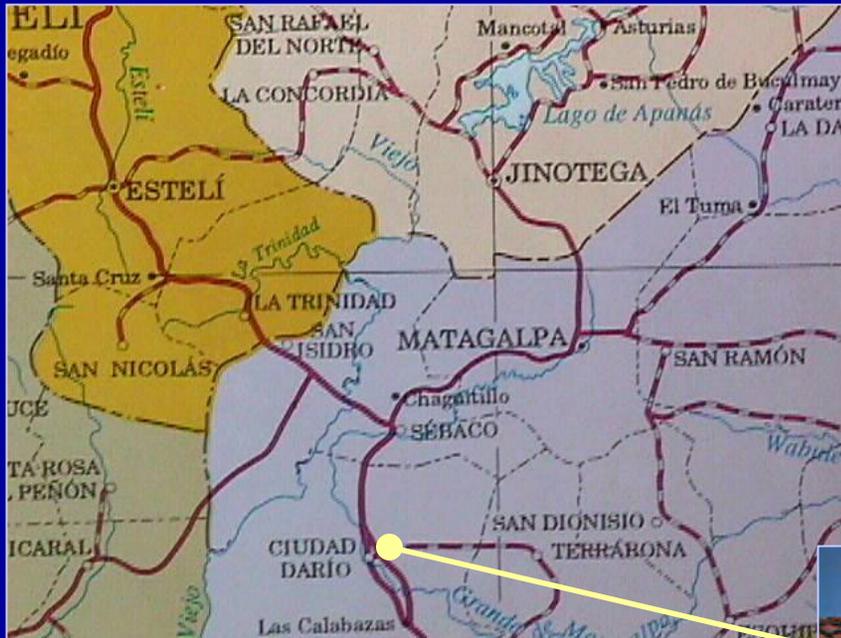


Dario



- Flooding
- Landslides
- Water Supply
- Site Access

Las Delicias

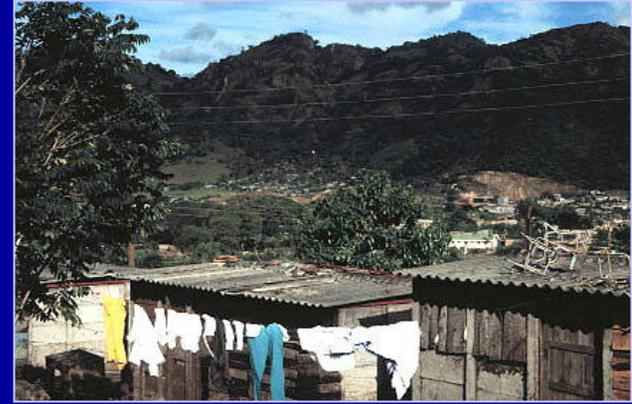
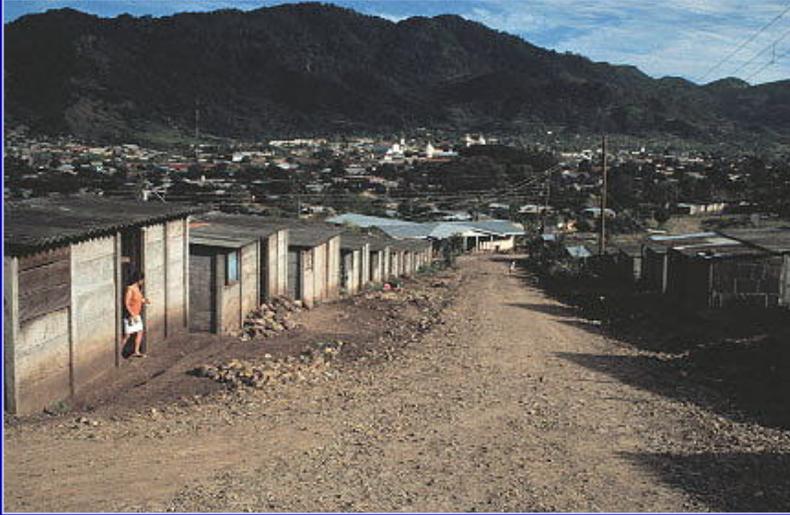


- Flooding
- Landslides
- Water Supply
- Site Access

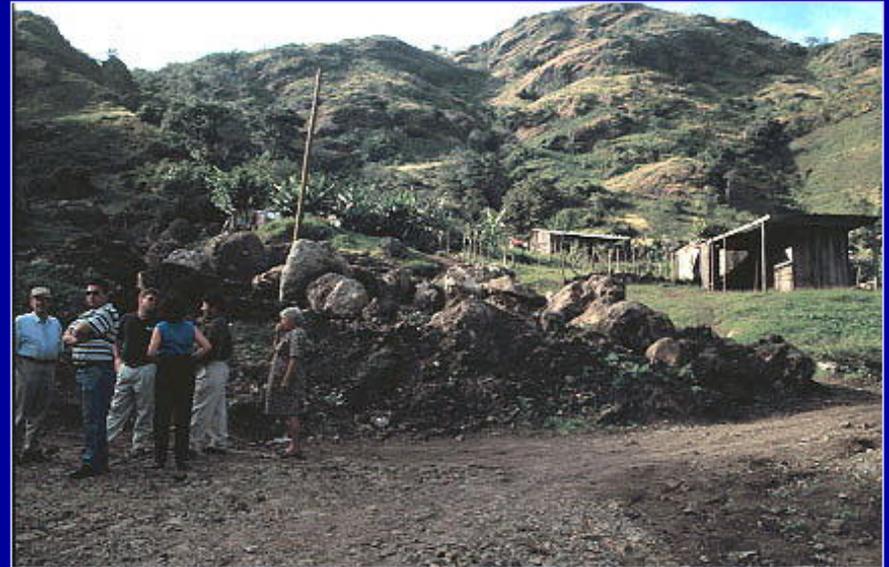
Jinotega



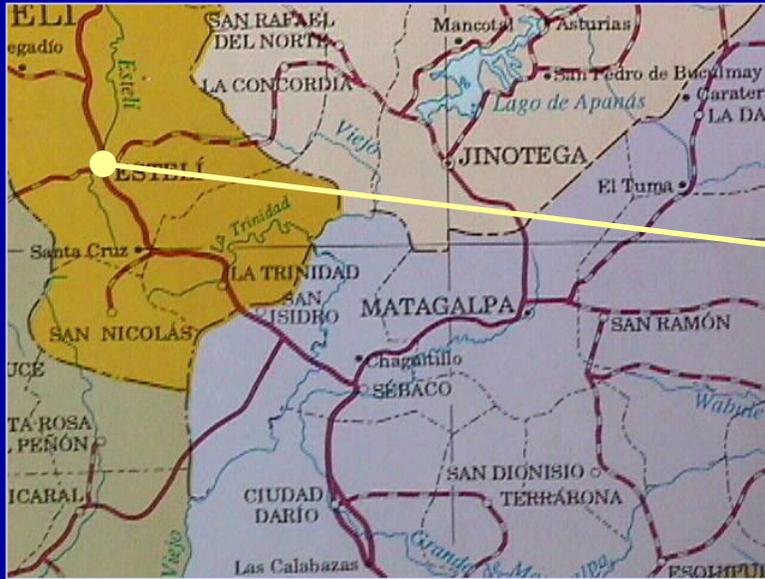
Jinotega



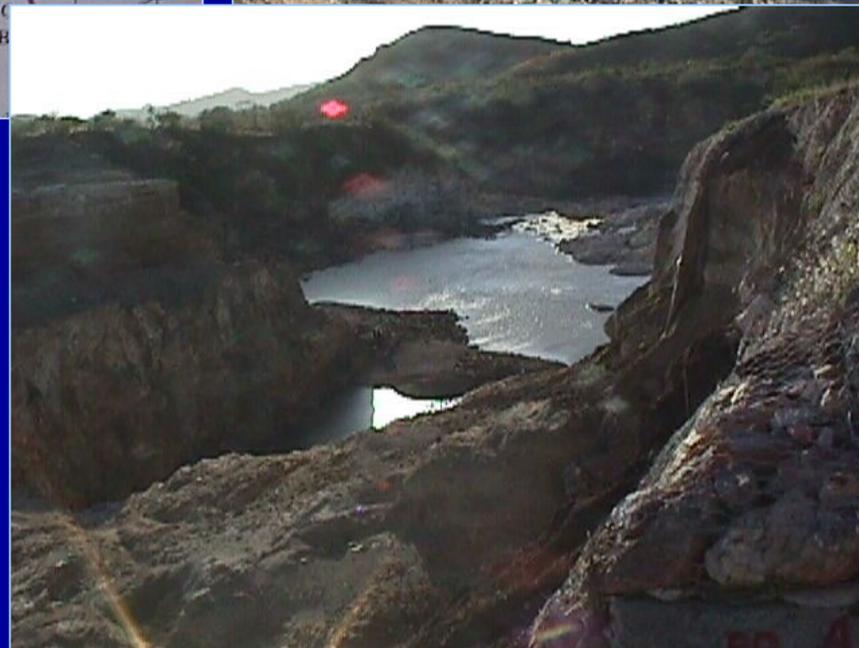
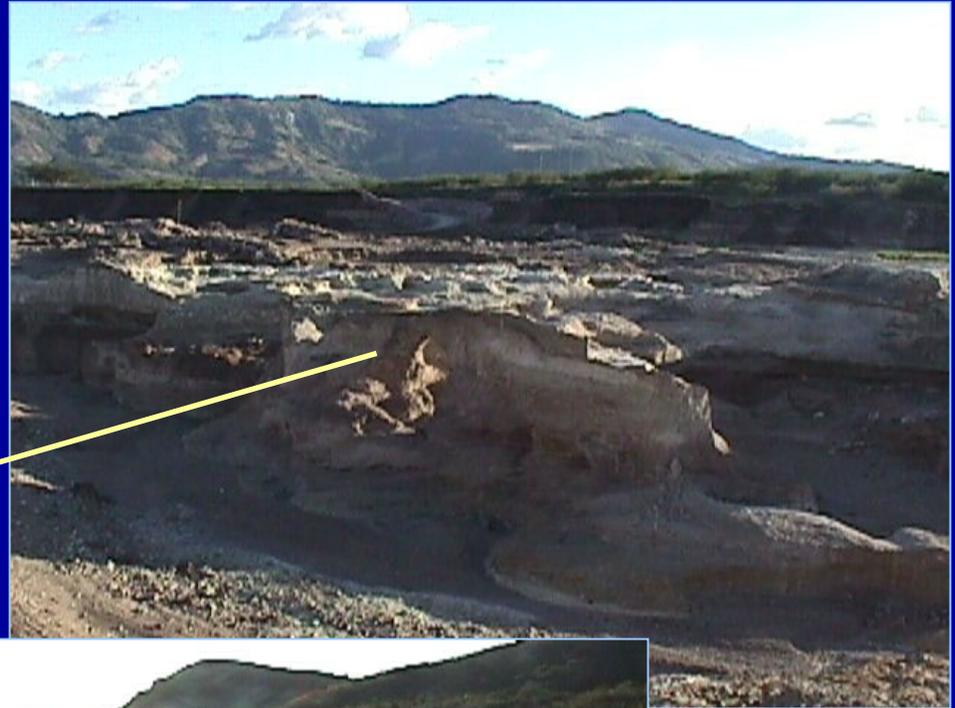
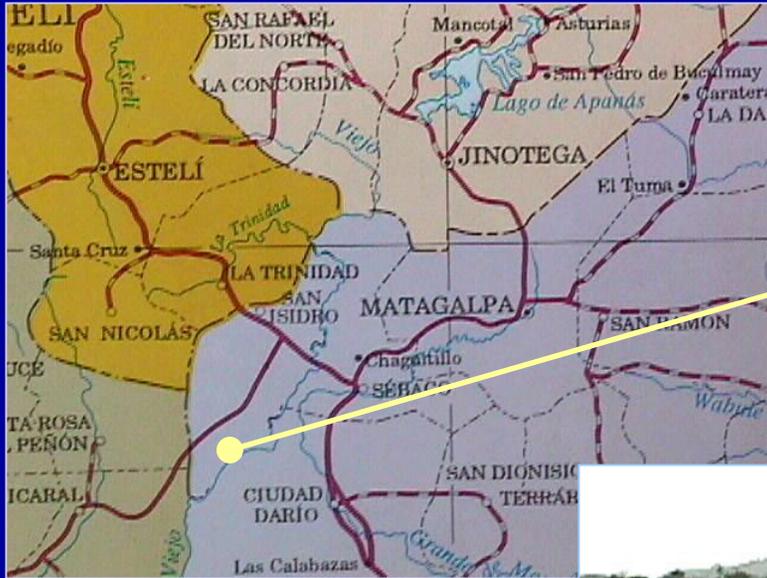
- Flooding
- Landslides
- Water Supply
- Site Access



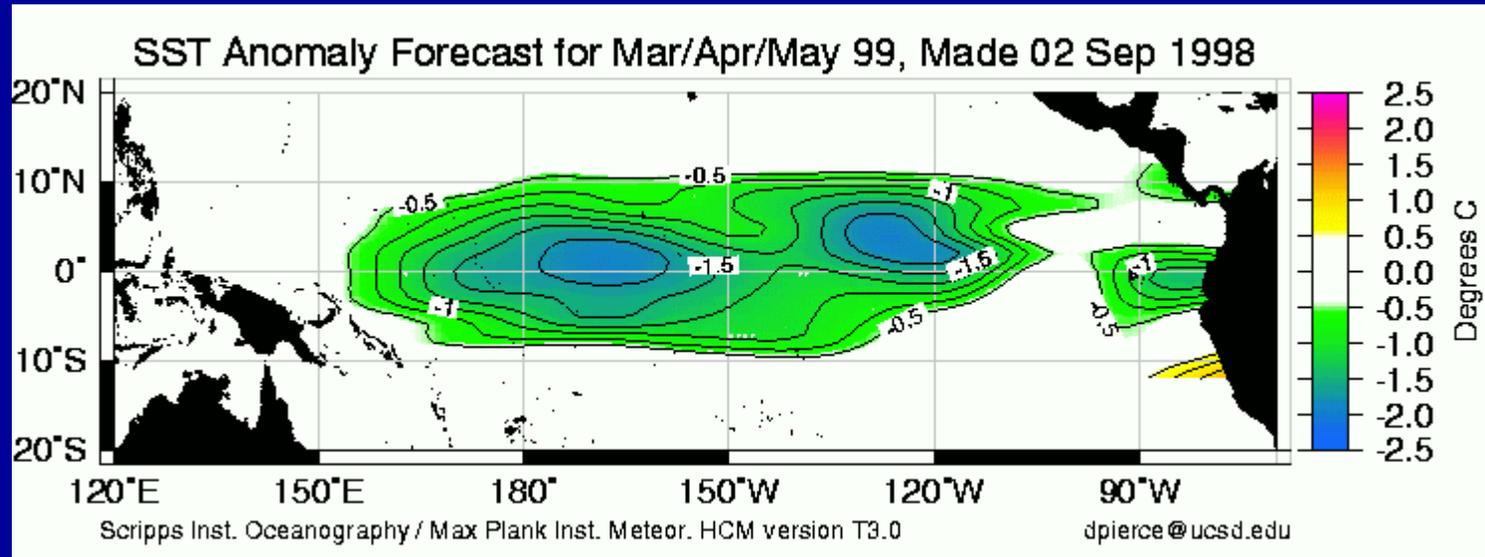
Esteli



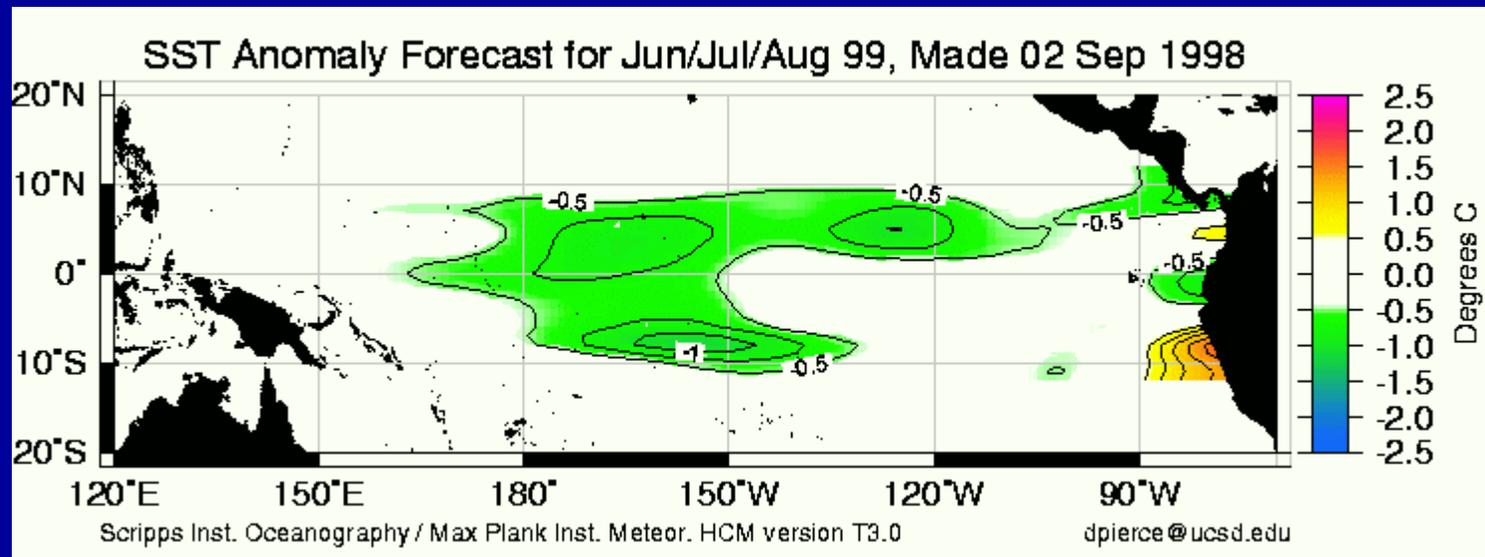
Santa Barbara



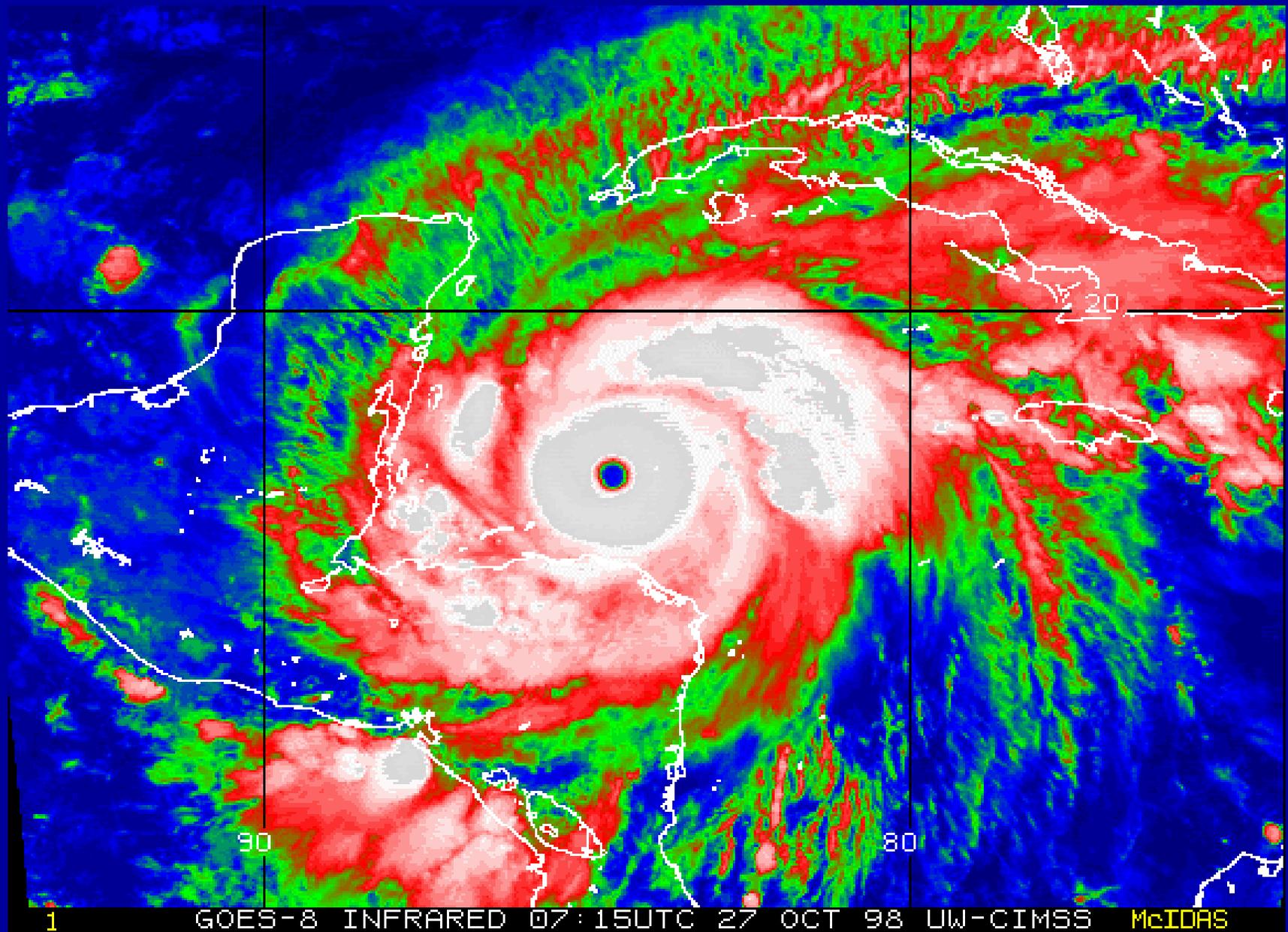
LA NINA FORECAST MAY 1999



LA NINA FORECAST AUGUST 1999



THE PHOENIX OF 1999?



Outline of Future Activities in Support of the Hurricane Mitch Reconstruction Effort

U.S. Geological Survey

U.S. Army Corps of Engineers

February 3, 1999

I – Providing basic information tools

USGS
science for a changing world

Center for Integration of Natural Disaster Information

USGS
Center for Integration of Natural Disaster Information
[CINDI home](#)

Current Event

Disaster in Central America

[USGS Science team in Honduras](#)
[Click here for daily updates](#)

[DOI Factsheet: DOI Science Helping Honduras Recover from Hurricane Mitch](#)
[Click here to make your own map of Central America and download data.](#)

Central America Interactive Atlas:
[Central America Disaster Overview](#)
[Central America Disaster Atlas](#)
[Central America Disaster Links](#)

Central America Disaster Atlas

Hurricane Mitch was the most destructive hurricane in the history of the western hemisphere. From Oct. 27 through Nov. 1, 1998, it battered the Caribbean coast and parts of Honduras, Nicaragua, El Salvador, and Guatemala, in Central America. This atlas describes aspects of Central America that were impacted by the hurricane's direct effects such as bridges destroyed and impact on electrical grids and water lines. Another atlas page tracks the path and intensity of the storm. Take a look!

Atlas Credits

New pages:

- [Honduras Landslide Susceptibility](#)
- [Map of Guatemala](#)
- [Map of Honduras and El Salvador](#)
- [Map of Honduras and Nicaragua](#)
- [Map of Nicaragua](#)
- [ANMIL Presentation](#)
- [Hurricane Mitch Task Presentation](#)

Location map showing track of Hurricane Mitch

USGS will continue its present role as a data gatherer, archiver, and integrator for the reconstruction effort. This will include providing and/or facilitating access to existing digital maps, aerial photography, satellite imagery and other data, and developing integrated databases from these sources.



U.S. Geological Survey

II – Acquisition of New Data



Assist in the acquisition of new aerial photography and satellite imagery; gather new hydrologic, geologic, and biologic field data for use in damage and risk assessments

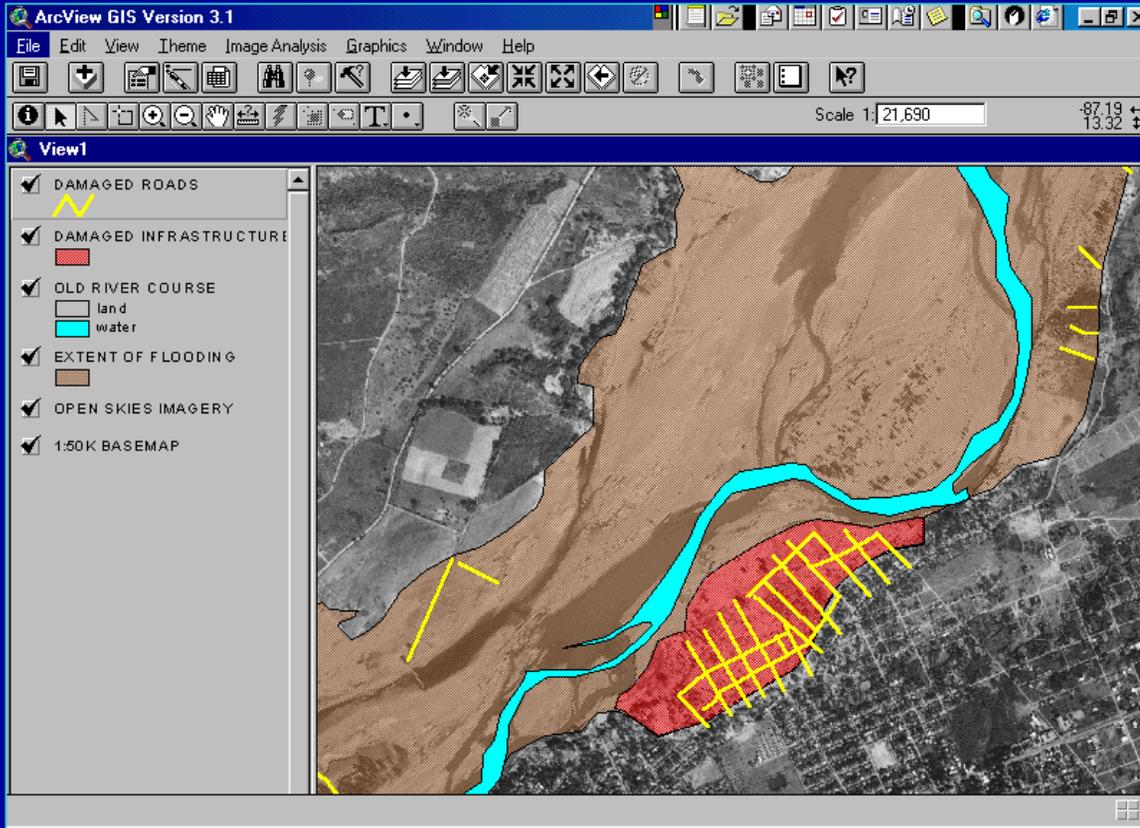
U.S. Geological Survey

III – *Damage/Risk Assessment & Mitigation*



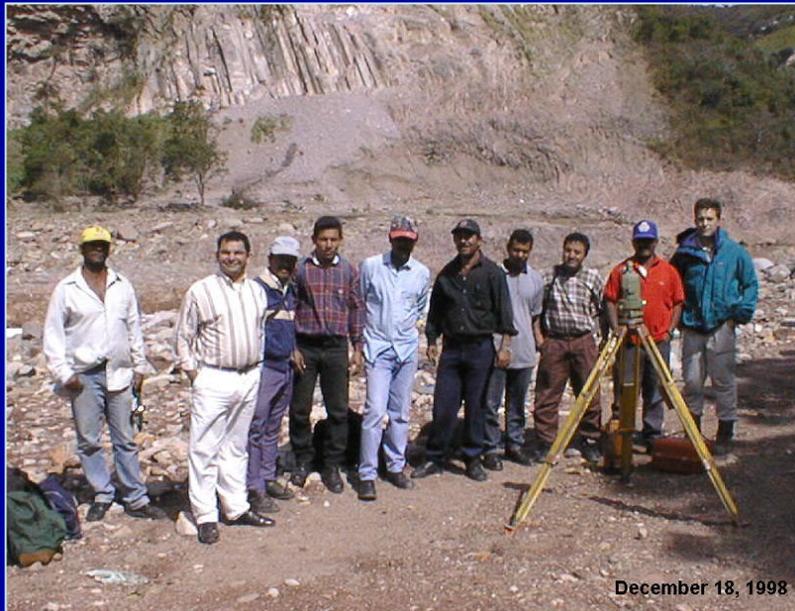
Further characterize the impact of Mitch-related flooding and landslides in priority areas; assess and monitor the potential threats from future events to population, infrastructure, and agriculture.

IV – Data Integration and Delivery



Integrate the results of damage and risk assessments with base maps, aerial photography, and satellite imagery in a GIS format; deliver these data sets as working tools to guide decision-making in the reconstruction effort

V – Capacity Building



All USGS/USACE activities will be conducted in close cooperation with counterpart agencies in Central America. Additional training and equipment/software will be provided to strengthen existing capacities and build new in-country capabilities to maintain these programs in the future.

U.S. Geological Survey/U.S. Army Corps of Engineers

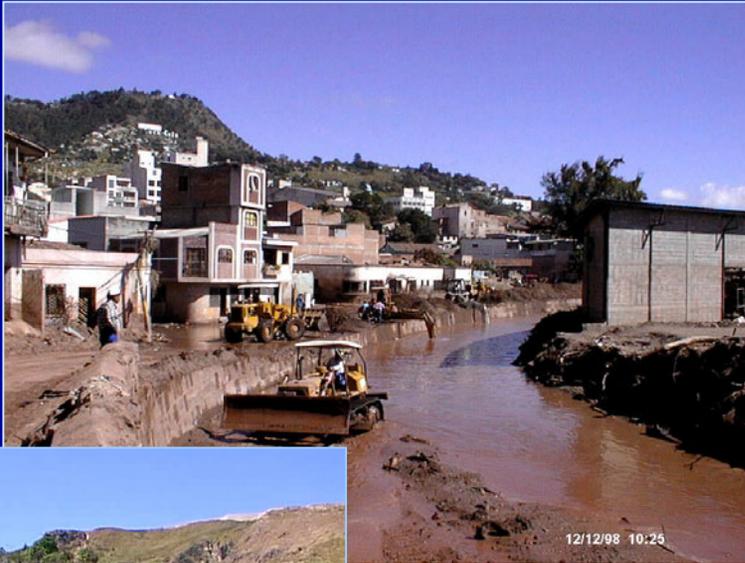
Planning, Engineering, and Design Services

- Damage assessments
- Planning and engineering of water and related land resource problems
- Environmental protection and restoration
- Master planning for transportation, utilities, and other infrastructure
- Floodplain planning and design of flood control projects
- Natural disaster preparation and planning
- Dam Safety and dam break analysis
- Mapping of flooded areas



U.S. Army Corps of Engineers

Construction Management



- Preparation of bid packages
- Award of contracts
- Supervision and inspection

U.S. Army Corps of Engineers