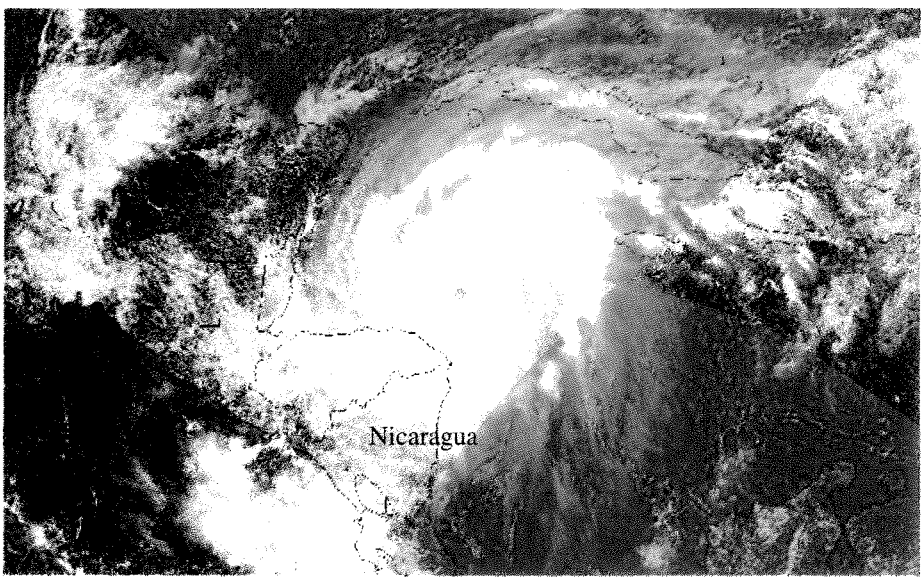
HURRICANE MITCH

The response of US Government Agencies
to the Disaster in Nicaragua
October 1998 to December 2001



USAID, NOAA, USDA, USGS, USACE, CDC
including FEMA, HUD, EPA and DOT

MESSAGE FROM THE U.S. AMBASSADOR TO NICARAGUA OLIVER P. GARZA

This publication has been produced to mark the completion of a US$ 115 million dollar program of US government disaster-related assistance to Nicaragua, and to highlight its principal achievements. Congress approved these funds on behalf of, and in the name of, the people and citizens of the United States. The funds come from the US taxpayer, from the pay checks of ordinary working Americans, and represent a generous act of solidarity from the people of the United States to the people of Nicaragua.

This US government humanitarian assistance program has been part of a broad international effort to help the Nicaraguan people get back on their feet after the cruel body blow dealt them by hurricane Mitch in October 1998. Our efforts have been coordinated with other international aid donors and multilateral institutions, the Nicaraguan government, and hundreds of NGOs and voluntary organizations. The Hurricane Mitch Reconstruction Program has reached out to all those affected in an effort to address their needs in the most efficient way possible.

US funds have been channeled through non-governmental organizations, to take advantage of these organizations' long-standing involvement with the affected communities. I wish to extend my thanks and appreciation to all our partners for their professionalism, skill, dedication and cooperation in delivering this aid to the hundreds of communities and hundreds of thousands of individuals that have been the direct and indirect beneficiaries of our aid package. I wish to thank them also for their cooperation with the representatives of our Congressional oversight teams, that have visited regularly over the past three years to ensure that the funds have been used efficiently and for the purposes for which they were intended.

The physical scars left by the hurricane have today been largely healed. Roads, bridges, schools, health clinics, houses, electricity transmission lines, water pipelines have been rebuilt or replaced – in many cases to far better standards than the infrastructure they replaced.

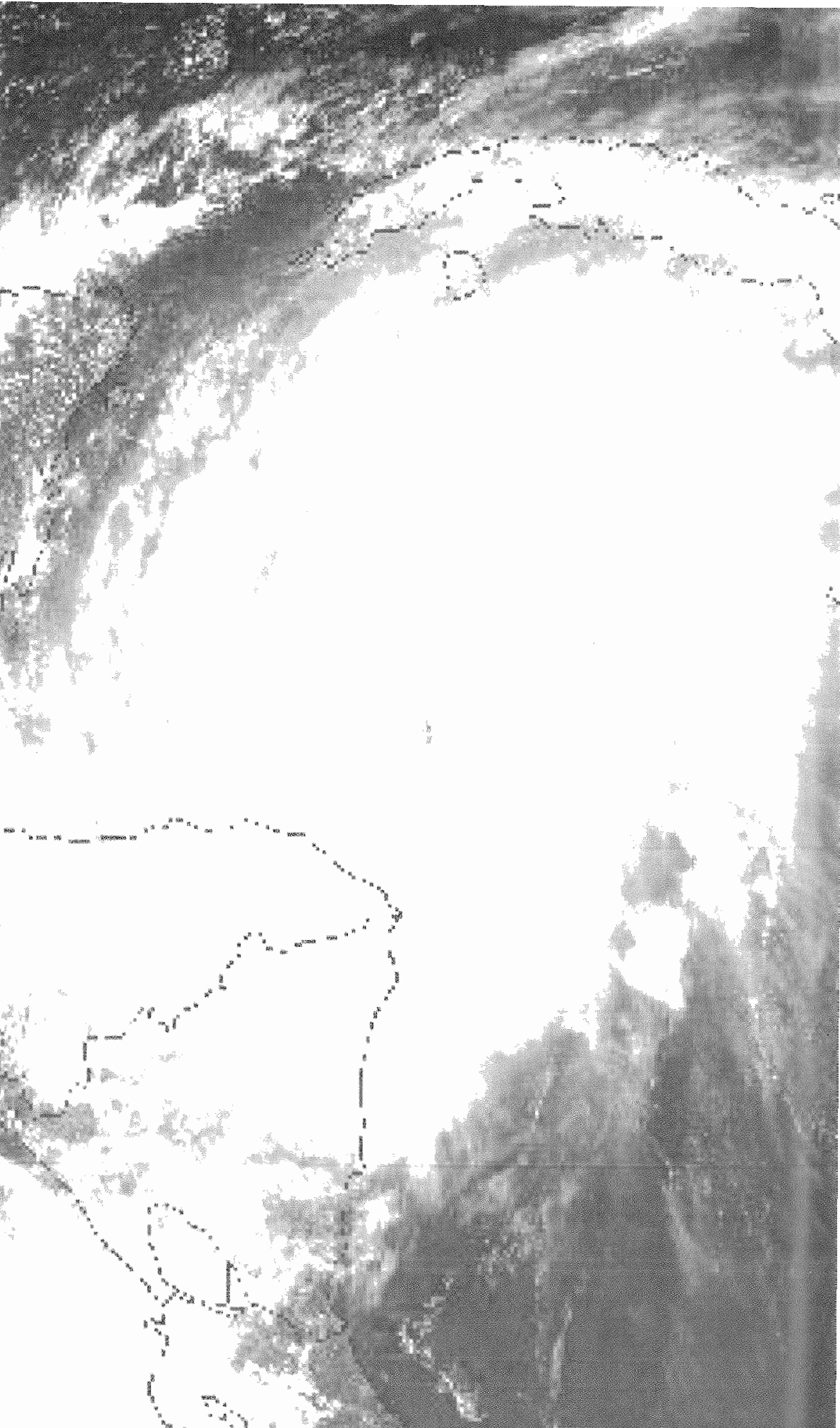
Less visible than roads or bridges, but of even greater importance, has been the training of tens of thousands of people in disaster preparedness, prevention and mitigation. This valuable human capital that the US aid has helped create, is a vital element in preparing the country to better face, and to cope with, future natural disasters.

On November 4, 2001, Nicaraguan citizens came out in record numbers to cast their ballots in their national elections. The peaceful and dignified manner in which the elections were conducted, has been a superb example of the growing political maturity of the Nicaraguan people, their leaders and their institutions, and has ensured the third orderly transfer of power in just over a decade.

This is the best of all messages that Nicaragua can send to the international community. The creation of a climate of peace and stability is the forerunner to the creation of prosperity. And in their efforts to create that prosperity, the Nicaraguan people can be assured of the ongoing support and solidarity of the government and people of the United States.

Oliver P. Garza

December 2001



HURRICANE MITCH – A ONCE IN 300-YEAR EVENT

Nicaragua lies south of the main hurricane paths that cross the Atlantic Ocean and Caribbean each year. However, once every decade on average, the track of a tropical storm or hurricane is pushed southwards by atypical weather systems further north. These conditions prevailed in October 1998, when hurricane Mitch headed for the northern Honduran coastline and stayed there for four days, sucking up billions of tons of moisture from the Caribbean and depositing it all over Central America. Meteorologists have described it as a once in 300-year event.

In Nicaragua, in the northern department of Chinandega, more rain fell in a week than normally falls over a period of two years. The catastrophic flooding that ensued caused widespread destruction.

One in every thousand of the country's 4.5m population was killed. One in every five persons had their lives severely disrupted by the hurricane. One in every twenty persons lost their homes and belongings and one in ten lost their immediate source of income and sustenance due to the destruction and flooding of crops. On a localized scale, the proportion was much higher in many municipalities. 80% of the municipalities in the country reported damages.

Overall, losses were estimated at some US$1,400 million – equivalent to 70% of the entire output of the Nicaraguan economy for one year.

The international community was quick to respond to the disaster. By December 1998, more than US$900m had been pledged in emergency and reconstruction assistance. Of this total, the US Congress approved a US$115m aid package for Nicaragua, most of which was to be administered through the US Agency for International Development (USAID). However, a series of US government agencies were also to become involved, setting up representation offices in Managua to bring their special expertise to bear in the reconstruction effort. These agencies were the US Department of Agriculture (USDA), the US Geological Service (USGS), the National Oceanic and Atmospheric Administration (NOAA), the US Army Corps of Engineers (USACE) and the Centers for Disease Control and Prevention (CDC). Four others, the Environmental Protection Agency (EPA), the Housing and Urban Development Department (HUD), the Federal Emergency Management Agency (FEMA) and the Department of Transportation (DOT) have also administered a series of projects related to the reconstruction effort.

In total, these agencies have invested some US$20m of the total US$115m aid package.

The Response - Disaster Mitigation and Prevention

An underlying theme of the US agencies' response to the disaster has been disaster mitigation and prevention.

Natural disasters – whether they be hurricanes, earthquakes, volcanic eruptions, tsunami, droughts or simply tropical storms accompanied by heavy flooding - occur in Nicaragua on average every seven to eight years. This has been the historical pattern, and one that in all probability will be repeated for well into the future.

By an accident of geography and geology, Nicaragua lies in the path of more naturally-occurring disasters than most other countries in the world. Disasters however, need not result in catastrophes. Foresight, planning, and preparedness can all help to minimize the impact of flooding or earthquakes on a country's citizens. Communities exposed to the threat of natural disasters need not necessarily be vulnerable to them. The siting and design of schools, hospitals, residential housing and key infrastructure such as dams,

bridges and power stations can be done in a way to minimize the probability of their destruction in a major flood or earthquake. Early warning systems, and well-organized civil defense teams can help to evacuate potentially vulnerable communities before disaster strikes. The impact of flooding can be reduced by well-designed land-use plans, the reforestation of deforested uplands and the terracing of vulnerable cultivated land.

When disaster does strike, well-prepared communities can do much to help themselves until such time as municipal, governmental or international assistance arrives. And when disease follows in the path of natural disasters, well-trained epidemiologists and properly-equipped laboratories, can stop disease outbreaks from turning into epidemics.

The US agencies' projects have covered all these areas. The US Army Corps of Engineers has trained technicians from INETER in the use of their bespoke software for analyzing river and stream flow characteristics and watershed behavior under different levels of rainfall. The USACE has also designed and built several replacement bridges, destroyed during Mitch, carried out a hydrologic assessment of Lake Managua and carried out a dam safety program for Nicaragua's three major dams.

The NOAA has provided INETER with a complete set of high-resolution aerial photography that will assist that institution in the process of developing large-scale zoning maps for municipalities, to avoid the construction of critical infrastructure in vulnerable areas in the future. Together with the USGS, NOAA has also set up automatic rainfall monitoring and stream gage stations, to provide flood-early warning systems for the Escondido and Malacatoya rivers. INETER technicians have been trained in their use, and the systems will be used as a model to expand to other watersheds in the future. The USGS has also been providing Geographic Information System technology to municipalities to help in the local planning and risk-reduction process.

The USDA has carried out a wide-ranging program of stream bank rehabilitation, land reclamation, reforestation, small reservoir construction, as well as animal and plant health training for extension workers, which has reached well over 150,000 people that live in the Mitch-affected zones of Nicaragua.

The CDC has meanwhile provided microbiology laboratory equipment to the national hospital system and trained technicians in their use, and has doubled the number of field epidemiologists in Nicaragua through a professional training program, which will greatly enhance the health authorities' ability to respond to future disease outbreaks.

The FEMA, HUD, EPA and DOT have in turn provided disaster prevention training to civil defense organizations, provided training in appropriate low-cost housing designs, provided training manuals and courses in protecting natural sources of potable water, and carried out assessments of the transportation network and its reconstruction needs.

All in all, the program has provided the Nicaraguan authorities with the physical and intellectual tools to greatly improve their readiness to forewarn of upcoming disasters, and to deal with them when they strike. At the same time many small projects in the countryside have improved road access to hundreds of remote communities, protected villages and small towns from future flooding, and helped thousands of farmers to protect their soils, reforest vulnerable slopes and to boost their productivity.

THE UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT (USAID)

The greatest percentage of the U.S. government's funding for hurricane Mitch reconstruction was allocated to USAID with a total budget of $103.6 million. The USAID program, implemented in the nine departments of Nicaragua most affected by the hurricane, had several components: improving public health; economic reactivation; restoring primary education; disaster mitigation; municipal restoration; and transparency and accountability in the use of national disaster funds by the government of Nicaragua.

Improving Public Health

The Hurricane Mitch Reconstruction Program included $30.6 million for rebuilding and expanding health care in areas affected by the hurricane. The USAID Prosalud project repaired and equipped 53 health facilities to provide full health services to 780,000 people. More than 30,000 families received household water filters. The USAID Environmental Health Project invested $9.5 million in building 2,930 water systems and 6,683 latrines. An important component of the project included training and education to insure better hygiene and proper use of water and sanitation systems.

Six private health clinics offering a full range of low-cost, quality health services were opened in Tipitapa, Esteli, Rio Blanco, Somoto and Jalapa.

The USAID Food Aid Program promoted nutrition and better health practices through the distribution of supplementary food rations for pregnant women and young children.

Economic Reactivation

USAID's $53.5 million economic reactivation program helped restore the economic livelihood for more than 200,000 households. Approximately 1,435 kilometers of rural roads were repaired and another 1,700 kilometers of roads were opened

up, benefiting over 40,000 families in 929 communities.

The program promoted crop diversification, irrigation systems and better farming methods that increased yields and farmers' incomes. One of the most successful components of USAID's agricultural assistance was the installation of drip irrigation systems and micro-greenhouse technology that allowed farmers to increase their income by producing vegetables all year long. Through the USAID program, farmers in two cooperatives in the Sébaco Valley planted improved onion seed and secured a $1 million contract to export to the U.S.

The distribution of silos reduced post harvest losses by about 30-40 percent and the profit margin for farmers increased up to 500 percent. USAID also funded the construction of six wet-process coffee mills that help small and medium producers negotiate better prices for their harvest by improving coffee quality.

In addition, $7.6 million in loans was provided to over 21,000 farmers. USAID helped thousands of small businesses through its micro-finance program. More than $9.6 million was lent to 28,000 microentrepreneurs, over 75 percent of whom are women.

Disaster Mitigation

With a budget of $6.6 million, USAID's disaster mitigation activities included the rehabilitation or construction of drainage and flood control structures, soil stabilization and conservation activities in areas prone to flooding and landslides. In addition 239 communities received training in disaster prevention. These activities included the formation of emergency committees in four indigenous territories of the Bosawas biosphere reserve and emergency plans, training and risk maps for 73 communities in the highly vulnerable Pacific volcanic chain area.

Education

With a budget of $4.5 million, USAID repaired and furnished 704 classrooms in 223 schools, damaged by hurricane Mitch. About 28,000 students received six deliveries over two school years of individual packets of school supplies and equipment. Teachers received training to meet the special needs of students traumatized by the hurricane. A $200,000 program provided tutoring, vocational skills training and recreational activities for 250 "at risk" students in the Nueva Vida resettlement community.

Municipal Restoration

USAID budgeted $2.9 million for 11 small-scale infrastructure projects in municipalities damaged by the hurricane. The program repaired the Posoltega dike, constructed a retaining wall in Matagalpa to prevent flooding by the Rio Grande River, built storm drains for a 20-block area in the city of Leon, paved streets in Palacaguina and El Tuma-La Dalia and repaired rural roads in Yalaguina and San Lucas. An important river dock, servicing indigenous communities along the Rio Coco, was constructed in Wiwilí.

Transparency and Accountability

USAID provided $1 million to ensure accountability of all donor and national funds used by the Nicaraguan government for Mitch reconstruction.

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Through its various departments, the NOAA is charged with providing weather, water, and climate warnings and forecasts, supporting US and international conservation and management of living marine resources, providing coastal and ocean stewardship, acquires and manages the United States' operational environmental satellites, and conducts and directs research in atmospheric, coastal, marine, and space sciences through its own laboratories and programs, and through networks of university-based programs. NOAA operates its own specialized fleet of aircraft for weather monitoring and remote sensing.

NOAA has played a central role in the post hurricane Mitch reconstruction program in Nicaragua.

In the immediate weeks and months following the hurricane, NOAA aircraft carried out a series of aerial reconnaissance missions to obtain high-resolution imagery of the affected areas. The full set of images has been provided to the Nicaraguan government under the "Open Skies" program.

A major US$3m program of work has been undertaken with the Nicaraguan Institute of Territorial Studies (INETER), to provide the Nicaraguan authorities with state-of-the-art weather and flood forecasting capabilities, to improve their topographic mapping capabilities through improvements to the geodetic network and to upgrade standards in maritime navigation safety.

INETER can now receive real-time weather and rainfall data from 14 automatic stations installed around the country through satellite and Internet links. Its forecasters can combine this information with NOAA weather satellite imagery received directly from the Regional Climate Center in Costa Rica, to accurately predict forthcoming weather and rainfall conditions over Nicaragua. Two separate river forecast systems have been created – a flood alert system on the Malacatoya River, and a flood forecast system on the Escondido River.

Three Continually Operating Reference Stations (CORS) have been installed by NOAA in Nicaragua, as part of a wider

global network, which allows modern global positioning systems (GPS) to function with an elevation accuracy of one to two centimeters. The CORS have been linked to two new sea-level monitoring stations at the ports of Corinto and Puerto Cabezas, and which are also equipped with meteorological equipment, which automatically transmit weather data on marine radio bands.

NOAA also carried out absolute gravity measurements over the country, which measure movements of major geological formations.

The "Open Skies" imagery, the CORS stations and geomagnetic studies, will all help INETER to improve the quality and accuracy of its mapping and to develop highly accurate digitalized topographical databases of the entire country.

Another important aspect of the NOAA program, is a US$1.3m project being carried out in coordination with marine biologists from the Shrimp Research Center at the Central American University (UCA) in Managua, Nicaragua, to develop a closed-system

shrimp farming system, which can boost productivity ten-fold, reduce disease incidence and production costs, and eliminate the environmental contamination usually associated with traditional shrimp farming practices.

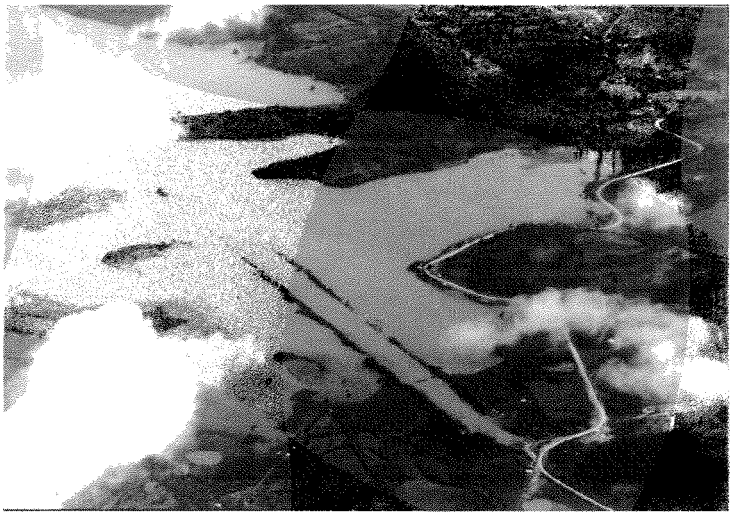
NOAA has financed the creation of a model shrimp farm in the north-west department of Chinandega in Nicaragua, which is one of the poorest areas of Nicaragua and one of the hardest hit by hurricane Mitch, and where shrimp farming is one of the most important sources of income for thousands of families.

NOAA specialists have also trained national and regional authorities in the development of maritime contingency plans to clean up and restore areas that have been damaged by oil spills – whether at sea, along coastlines or in ports.

US ARMY CORPS OF ENGINEERS

The US Army Corps of Engineers plays a major role in the management of the water resources and navigation facilities of the United States. The USACE is responsible for the maintenance of almost 20,000 kms of inland waterways in the United States, 235 locks, 300 commercial ports, 383 dams and reservoirs for flood control, 75 hydroelectric power plants and some 2,500 water-related recreational sites.

Its 35,000 personnel, over 95% of them civilian employees, have developed a vast experience in the study and management of large and complex watersheds, and have developed industry-standard software in hydrology and hydraulic engineering, much of which is available free of charge over the Internet.



Flooding of Lake Managua after hurricane Mitch.

It is this experience that has been brought to bear in the Hurricane Mitch Reconstruction Program. Some of the principal areas of work carried out by USACE engineers in Nicaragua over the past three years have been;

- Creation of a sophistic: customized hydrologic model for the Lake Managua watershed
- Completion of a safety evaluation of four dams and training in developing a dam safety program
- Completion of spillway adequacy studies for two of the dams, whose spillways were badly damaged in Hurricane Mitch
- Provided quality management technical assistance to US AID projects in rural clinic reconstruction
- Designed and constructed a number of rural road bridges through local NGO partners

- Carried out a feasibility study for realigning the Rio Negro which changed its course following hurricane Mitch.

The Lake Managua watershed study encompasses two major hydropower generation facilities. The model that has been developed will help the Nicaraguan authorities to better predict future changes in the lake level, and to better plan future water use of the lake in endeavors such as irrigation, navigation and hydropower potential.

Technicians at Nicaragua's Territorial Studies Institute (INETER) are being trained in the use of the software, and how to use it for forecasting and predicting future flood and drought conditions. The model will provide insights into sedimentation loads of the watershed, and will assist in the planning of other water-use projects. The future

The spillway at the Apanas dam was severely eroded by hurricane Mitch. The USACE has completed a study and made recommendations for its reconstruction.

behavior of the Lake of Managua during floods, storms and droughts can be predicted with much greater accuracy as a result of this work.

The dam and spillway studies have involved a series of site visits and evaluations over the past year by some 10 engineering and geological specialists from the USACE, as well as subsurface exploration to ascertain the nature of the bedrock at the dams and spillways as well as several hydrologic and hydraulic studies.

Recommendations on dam safety and monitoring procedures have been made to the Nicaraguan authorities and a spillway adequacy report containing repair alternatives and recommendations have been provided to the national power company (ENEL) that currently owns the dams.

The training of Nicaraguan technicians and professionals in the use of USACE-developed software has been an important part of the program.

The importance of the work lies in the fact that up to 30% of Nicaragua's power supplies are provided by the water stored in the reservoirs created by the dams, and failure of the spillways would imply major losses for the Nicaraguan economy.

Besides being the principal institution for implementing the US's agricultural policy, and providing guidance and assistance to the US's approximately 2m farmers and ranchers, the USDA also manages 192 million acres of national forests and rangelands, is the US's largest conservation agency, encouraging voluntary efforts to protect soil, water, and wildlife on the 70 percent of America's lands that are in private hands, is responsible for rural development efforts in bringing housing, modern telecommunications, and safe drinking water to rural areas of the US. It is responsible for the safety of meat and livestock products and carries out extensive research into issues such as human nutrition and new crop technologies that enable farmers to produce more food and fiber using less water and pesticides.

The USDA also provides food aid and technical assistance to needy people and countries overseas, as has been the case with Nicaragua after hurricane Mitch.

Given that the impact of the hurricane was greatest on Nicaragua's rural population, the USDA became one of the most prominent US government agency programs in the reconstruction effort.

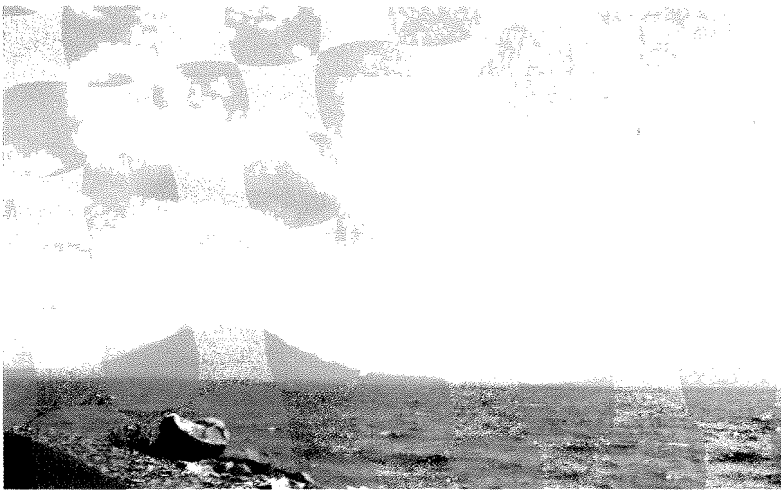
The US$6.5m USDA program in Nicaragua has focused on three themes: rural watershed rehabilitation, food security and food hygiene. A wide range of projects have been included from stream bank rehabilitation, rural road and bridge construction, reforestation, and land reclamation in the areas directly affected by the hurricane, to crop forecasting and food security planning techniques and sanitary and hygiene training in animal, crop and aquaculture husbandry practices.

Working through local producer's organizations and NGOs, experts from the Natural Resources Conservation Service (NRCS) of the USDA designed an assistance program to protect eroded stream banks with stone-filled gabions in half a dozen affected municipalities, to build fords and bridges over small rivers which had become impassable in wet weather, to reforest vulnerable watersheds, and to assist some 45,000 farmers to improve soil conservation through projects involving terracing, reforestation, and improved cultivation techniques. Training and extension work is an important part of the program, so that the producers that have benefitted from the assistance, will serve as innovators who can pass on their experiences to neighboring farmers.

The food security program has included the donation of nationwide Landsat 7 satellite imagery, the donation of sophisticated food security analysis software and training in its use, and technical assistance to improve the collection of agricultural statistics, sampling methods and data analysis. Departments of the USDA involved in the program have been PECAD, the Economic Research Services and the National Agricultural Statistics Service.

The animal, food and plant health program has involved the rehabilitation of veterinary laboratories, training for small and medium shrimp farmers and extension workers in sanitary practices and disease control, training in quarantine techniques for plant and animal health officials, integrated pest management training, training in the evaluation of pesticides in export crops, and training in sanitary techniques for small dairy farmers.

An important part of this program has been the creation of a Mediterranean fruit fly free zone on the island of Omotepe in southern Nicaragua. The US$0.5m project has monitored fruit fly pests for a year on the island, and trained local technicians in monitoring and quarantine techniques. Certification of the island as a Medfly-free area will enable producers on the island to export fresh produce directly to the United States.



In a parallel development, the USDA has also helped finance the construction of two cold stores for the processing and chilling of fresh fruit and vegetables, one at the international airport of Managua, and the other in the southern town of Rivas, close to Omotepe island. The cold stores are being operated by APENN, the national association of producers and exporters of non-traditional products.

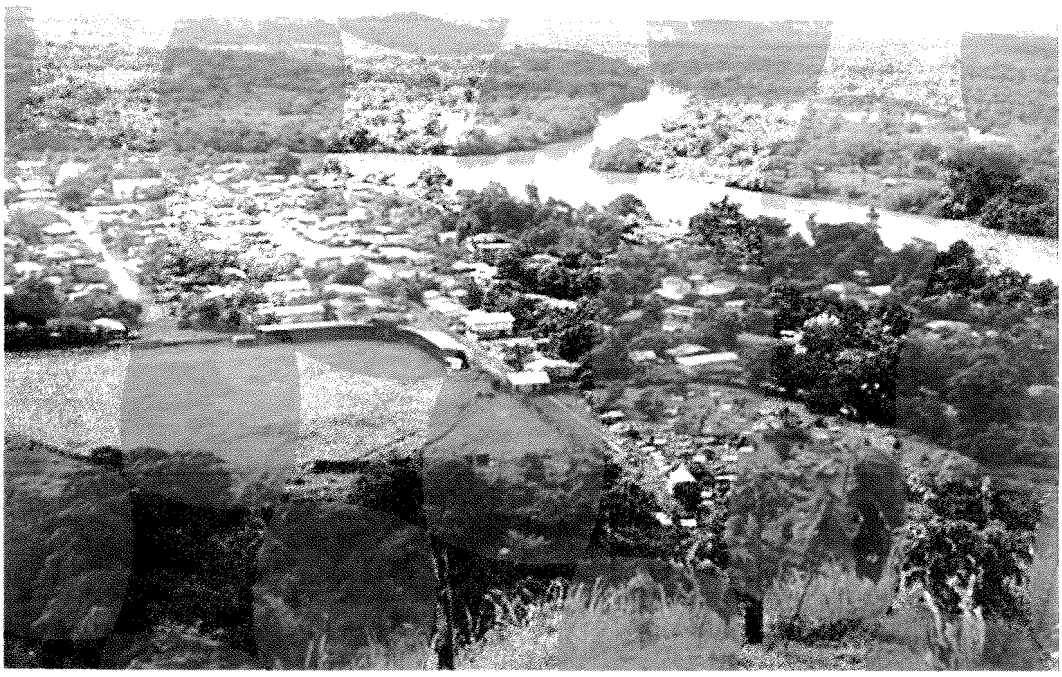
US GEOLOGICAL SURVEY

Originally established to classify and survey public lands in the United States in 1879, the role of the USGS has gradually expanded over the past 122 years to include continental-wide topographic and geologic mapping, the maintenance of over 7,000 stream gages, and surveys to study and map the hydrology, groundwater, hydropower potential, natural hazards, and energy and mineral resources of the entire United States.

Spurred by the Second World War, those activities were extended to overseas countries as well, and as the world entered the Space Age in late 1950s, the role of the USGS carried on to satellite-based mapping of the entire Earth, and to the mapping of other planets in our solar system.

The US government's Hurricane Mitch Reconstruction Program, called upon the USGS's skills and experience in a number of fields which included:

- Providing basic information to the Nicaraguan government in the form of topographic maps, aerial photography, satellite imagery, and public access to data and information through the development of an Internet clearinghouse
- Monitoring and assessing risk from floods, landslides, and debris flows and assessing damage to biological resources

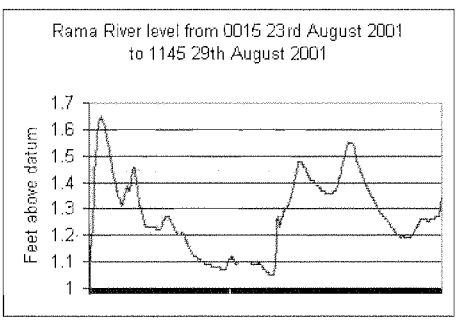


- Developing geographic information system (GIS) products for use by national and local officials in disaster mitigation and urban planning
- Strengthening the capacity of national agencies and local governments to monitor and assess hazards and develop strategies for risk reduction and disaster response.

The USGS' principal contributions to natural disaster risk reduction in Nicaragua include the following: topographic maps, aerial photography, Internet clearinghouse, satellite imagery, flood- and landslide-risk mapping, biological assessments, stream gages, GIS systems for decision support, training and capacity building.

The USGS's experience in managing the United States' national stream gauging network, has meant it took a leading role in establishing automatic stream gages on the Escondido and Malacatoya river basins, in conjunction with NOAA, to establish flood-warning schemes.

Information from these stream gages is available in real time over the Internet, such as the data shown in this graph.



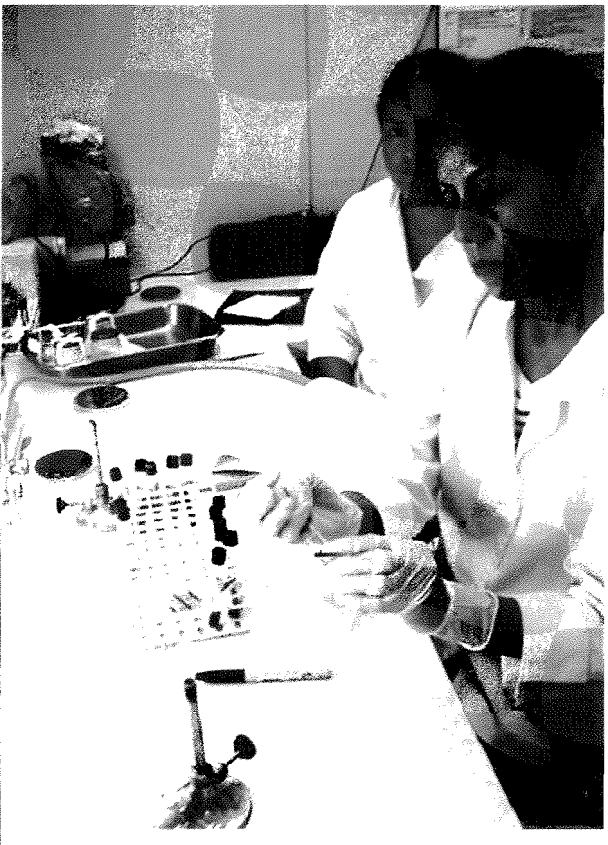
"Effective emergency response requires both technology and organization... the new technology provided by USGS and NOAA has been integrated successfully into the civil defense structure, and represents a major step forward in our capability to prepare and respond to natural disasters" said Lt. Col. Perez of Nicaragua's Civil Defense.

(On an historical note, it was more than 100 years ago, in 1897, when the first USGS surveyors came to Nicaragua to survey a potential inter-ocean canal route. Their report still stands as one of the best geological surveys of southern Nicaragua today.)

CENTERS FOR DISEASE CONTROL AND PREVENTION

The biological warfare threat that has emerged with the recent anthrax attacks in the US, has placed the Atlanta-based Centers for Disease Control and Prevention (CDC) in the spotlight and brought public prominence to an agency that is normally more concerned with the control of naturally-occurring diseases.

The CDC's vast expertise and skill in epidemic control was made available to Nicaragua after hurricane Mitch, in a US$1m program to provide microbiology laboratory equipment and training, and the training of a team of professional field epidemiologists to reinforce the Nicaraguan health authorities' ability to respond to future natural disasters and infectious disease outbreaks.



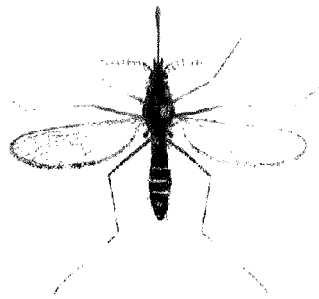
US$0.5m of the assistance provided by the CDC is enabling Nicaragua to rebuild a network of 21 microbiological laboratories across the country.

Equipment supplied to the Diagnostic Reference Center (DRC), the Nicaraguan equivalent of the CDC, at the Ministry of Health headquarters in Managua includes incubators, autoclaves, refrigerators, and precision weighing equipment, amongst other items. Similar equipment is being provided to the other hospital laboratories across the country. The American Association of Public Health Laboratories (APHL) was contracted by the CDC, to provide all the equipment and training. A total of 31 laboratory technicians have been trained under the program.

The other principal element of the CDC program has been to provide ongoing training to the country's field epidemiologists. These are the people that work on the front line of potential and actual epidemic outbreaks. They collect samples, examine patients of suspected infectious diseases and monitor local conditions. Their role is vital in controlling epidemics when natural disasters occur.

The training provided under the program is divided into two segments, one as a Master's Degree program for in-service training of senior field epidemiologists (FETP), and another to provide more focused training (Data for Decision-Making, DDM) on specific diseases for a wider group of epidemiologists. Nicaragua was chosen as the regional training center for the Master's program, for a total of 20 epidemiologists from seven countries in the region.

FETP trainees are already working on controlling the upsurge in dengue in the Puerto Cabezas region of the north Atlantic coast of the country that started in August this year. Others are tracking down the causes of high kidney failure rates amongst cane workers, and others are on the trail of bacteria believed to be behind a spate of newly-born infant deaths in a number of the country's hospitals.



Dengue fever is one of the most threatening diseases on the increase in Central America. A dengue epidemic in Nicaragua in 1984 affected an estimated 400,000 people in the capital alone and, caused losses to the economy of maybe some 2% of GDP in sick leave.

The strengthening of Nicaragua's laboratory network and the training of additional field epidemiologists and lab technicians under the CDC program has greatly enhanced the authorities' ability to localize future outbreaks and control these foci.

"Nicaragua has lacked an effective laboratory network for disease control for two decades", says Dr. Sergio López who helped design the CDC-financed project to re-establish the network

We are dealing satisfactorily with diseases once they have broken out. We have to make the next step to foresee them coming and to act preventively, because the main function of epidemiology is to give early warning of emerging diseases. The training program has been a major step forward because it has helped the field epidemiologists to understand the importance of planning and of coordination of the various bodies and institutions involved in disease control," he said.

Federal Emergency Management Agency (FEMA)

FEMA is the agency responsible for managing natural disaster response and preparedness in the United States. Its US$500,000 program in Nicaragua has included the completion of a report and recommendations on vulnerability assessment, risk management, early warning systems, emergency operations and community preparedness for the National Emergency Operations Center, and the Civil Defense authorities.

FEMA has also introduced its Project Impact concept, developed to build disaster-resistant communities in the United States, to three Nicaraguan cities; Bluefields, Esteli and Chinandega. Project Impact is an initiative aimed at creating partnerships between the public and private sector that involves taking action to limit damage and protect families, homes, businesses and communities before disasters hit. Training manuals and educational materials in Spanish have been provided under the program.

Department of Housing and Urban Development (HUD)

HUD has sent a series of delegations of experts from HUD and the private sector to Nicaragua since January 1999. The delegations have been working with government and the business sector to help them develop innovative ways of building affordable housing, improving land management and developing new and more appropriate building standards. The delegations have included representatives of the American Institute of Architects and the National Association of Home Builders. A series of training course and seminars were organized. HUD has provided more focused assistance to the municipalities of Ciudad Dario and Sébaco, in training municipal officials in the creation of municipal development plans.

The US$1.25m program has also involved providing assistance to the Nicaraguan government in developing a national housing policy, and low-cost housing finance mechanisms.

Environmental Protection Agency (EPA)

The EPA's principal focus in Nicaragua has been on providing safe drinking water through its Microbiologically Safe Drinking Water for Children's Health Initiative, which was initially piloted in El Salvador, shortly before hurricane Mitch.

EPA experts from across the Agency have been working with local partners as well as international agencies based in the region to provide information, training and technical assistance to the water authorities and Ministry of Health, in an effort to improve water quality nationwide. The program has included laboratory capacity building, treatment plant optimization, source water protection and development of safe drinking water programs.

Department of Transport (DOT)

DOT experts arrived in Nicaragua in late 1998 following hurricane Mitch to evaluate damages to Nicaragua's port and transportation infrastructure.

A series of reports have since been prepared for Nicaragua's port authorities, the Ministry of Transport, Ministry of Finance and Central Bank on a wide range of transportation-related issues including navigation safety, dredging, port security, trade forecasts, port improvements and road access, which are in the process of being used by the Nicaraguan government to rebuild the country's infrastructure.

The DOT's US$650,000 budget for its Nicaraguan projects also includes a national Hazard Model study and the training of local technicians in the use of geographic information system (GIS) technology in transportation and disaster-management applications.

Ships of the DOT's National Defense Reserve Fleet (NDRF) were also activated in 1998 to transport relief cargo to Central America following hurricane Mitch. The CAPE VINCENT, for example, delivered heavy construction equipment, trucks, tractors and trailers to Corinto, Nicaragua on Dec. 10, 1998.

The Port of Corinto has figured in a number of USG agency hurricane Mitch programs. The DOT made damage evaluations and recommendations on safety, dredging and road access improvements. The NOAA has installed geodetic and sea-level monitoring instruments.

Useful agency websites

There is a wealth of information now available via the agency websites, much of it relevant to Nicaragua (satellite imagery, crop forecasts, health publications and software, engineering software, pesticide information, for example). Following is a list of useful websites of the US government agencies referred to in this brochure. Most have search engines.

US Embassy, Managua Tel: 266 6010
http://usembassy.state.gov/managua/

US Agency for International Development
http://www.usaid.org.ni/

National Oceanic and Atmospheric Administration
http://www.noaa.gov/
Weather satellite imagery from NOAA
http://www.mpc.ncep.noaa.gov/shtml/satellite_imagery.shtml

US Department of Agriculture
http://www.usda.gov/
Foreign Agricultural Service
http://www.fas.usda.gov/
Production Estimates and Crop Assessment Division (hurricane Mitch references)
http://www.fas.usda.gov/pecad/
National Agricultural Statistics Service
http://www.usda.gov/nass/
Economic Research Service
http://www.ers.usda.gov/

US Army Corps of Engineers
http://www.usace.army.mil/
USACE Hydrologic Engineering Center (for software and publications (free)
http://www.hec.usace.army.mil/

US Geological Service
http://www.usgs.gov/
Real-time Nicaraguan raingage data
http://pr.water.usgs.gov/
Aerial and satellite photography
http://edcwww.cr.usgs.gov/webglis/
Geospatial Data Clearing House
http://www.clearinghouse.gob.ni/

Centers for Disease Control and Prevention
http://www.cdc.gov/
CDC en Español
http://www.cdc.gov/spanish/default.htm
CDC publications and software
http://www.cdc.gov/publications.htm
Post-Hurricane Mitch Reconstruction Project
http://www.cdc.gov/epo/dih/mitch.html

Federal Emergency Management Agency
http://www.fema.gov/

Housing and Urban Development Department
http://www.hud.gov/

Environmental Protection Agency
http://www.epa.gov/

US Department of Transport
http://www.bts.gov/

Our Principal Partners in the Hurricane Mitch Reconstruction Project

1. Non-Governmental Organizations (NGOs) and Private Voluntary Organizations (PVOs)

Academy for Educational Development (AED/BASE)
Adventist Development Relief Agency (ADRA)
ALISTAR
Asociación de Municipalidades de Nueva Segovia (AMUNSE)
Asoc. Nicaragüense de Productores y Exportadores de Productos No-Tradicionales (APENN)
Association of Public Health Authorities (APHL)
BASICS
Cooperative for Assistance & Relief Everywhere (CARE)
CHEMONICS/ARAP
CHISPA
Cooperative Housing Foundation (CHF)
Centro de Investigaciones y Estudios de Salud(CIES)
Cooperative League of the United States of America (CLUSA)
Commercial Marketing Strategies (CMS)
Catholic Relief Services (CRS)
Credit Union National Association (CUNA)
Development Alternatives Inc.(DAI)
Environmental Health Project (EHP)
Fundación de Apoyo a la Microempresa (FAMA)
Finca Nicaragua
Inter-American Institute for Cooperation on Agriculture (IICA)
John Hopkins University
KATALYSIS (FUNDENUSE / Fundación León 2000)
Management Science for Health (MSH/ PROSALUD)
Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA)
Planning and Development Collaborative International (PADCO)
Project Concern International (PCI)
Plan Internacional
Partners of the Americas (POA/ Wisconsin)
Project Hope
PROFAMILIA
PROMUJER
PVOs Networks /NICASALUD
Quality Assurance Project
Save the Children Fund
Universidad CentroAmericana (UCA)
Universidad Nacional Agraria (UNA)
Unión de Productores Agropecuarios de Nicaragua (UPANIC)
Universidad Panamericana El Zamorano
WINROCK International
Word Council of Credit Unions (WOCCU)
World Relief Corporation (WRC)

2. Nicaraguan Governmental Organizations/Institutions

Defensa Civil
Empresa Nicaragüense de Energía (ENEL)-Hidrogesa
Fondo de Inversión Social de Emergencia (FISE)
Instituto de Desarrollo Rural (IDR)
Instituto Nicaragüense de Estudios Territoriales (INETER)
Instituto Nicaragüense Forestal (INAFOR)
Ministerio Agropecuario y Forestal (MAGFOR)
Ministerio del Ambiente y Recursos Naturales de Nicaragua (Marena)
Ministerio de Salud (MINSA)
Ministerio de Transporte y Infraestructura (MTI)
Sistema Nacional para la Prevención, Mitigación y Atención de Desastres (SNPMAD)

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