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LIMA DISASTER PREPAREDNESS REPORT

VOLUME XII:

Critical Abstracts from the Literature: A field perspective on major earthquakes:

Peru, 5-31-70
Nicaragua, 12-23-72
Guatemala, 2-4-76

by

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in collaboration with

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for

Office of U. S. Foreign Disaster Assistance

Agency for International Development

November, 1981

The Lima Disaster Preparedness Report has 15 sections:

Volume I:	Methodology Employed
Volume II:	Port of Callao Infrastructure Security and Emergency Evacuation Needs
Volume III:	Electricity
Volume IV:	Water and Sewerage
Volume V:	Heavy Equipment Rehabilitation and Maintenance
Volume VI:	Airport and Aircraft Resources
Volume VII:	Education
Volume VIII:	Food
Volume IX:	Housing
Volume X:	Health
Volume XI:	International Donor Coordination
Volume XII:	Critical Abstracts from the Literature: A field perspective on major earthquakes: Peru, 5-31-70 Nicaragua, 12-23-72 Guatemala, 2-4-76
Volume XIII:	Review of Earthquake Prediction by Brian Brady
Volume XIV:	Other Issues
Volume XV:	Summary

FOREWORD

This is one section of a fifteen volume report concerning disaster preparedness in Lima, Peru. It was researched in Lima by a team of disaster specialists during the period July - November, 1981, for the Agency for International Development's Office of U. S. Foreign Disaster Assistance and USAID Mission in Peru. The report is supplemented by a considerable number of maps, charts and resource documents which are located in the USAID/ Peru Disaster Preparedness Resource Library in Lima.

November 1981

This work was done under Contract #PDC-0018-0-00-2075-00 by Robert Gersony, Raymond Lynch and Tony Jackson.

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INTRODUCTION/EXECUTIVE SUMMARY

In this volume, notes and summaries of thirty-two reports and books have been collected. The summaries and extracts concern previous earthquake disasters in the Americas. Nineteen of the documents concern Peru, and most of these discuss the 1970 earthquake there. The others were developed after the Managua (1972) and Guatemala (1976) earthquakes. A few of the documents address more than one of these disasters.

This collection is not based on an exhaustive or systematic search of all available literature on these subjects. Rather, it addresses some of the literature reviewed by an OFDA field team in Peru in 1981. The summaries and extracts sometimes reflect only one part or some sections of the document reviewed, especially including items of special interest to the team.

However, it was felt that this set of field notes would be valuable to persons involved in future disaster operations or in disaster preparedness activities in Peru, or perhaps elsewhere.

Most of the literature reviewed in this volume can be found in the resource files of the Mission Disaster Relief Officer, at the USAID Mission in Lima. Some can also be found in the Disaster Preparedness Office for Latin America and the Caribbean within the Office of Foreign Disaster Assistance, AID, Washington, D. C.

SECTION I

REVIEW OF THE LITERATURE: PERU

October 7, 1981

EXTRACT

USSOUTHCOM DISASTER AND ASSISTANCE SURVEY TEAM (DAST)(SIC) AFTER-ACTION REPORT - 1970 PERU EARTHQUAKE, submitted by Robert S. Beightler, Jr., Colonel, Infantry, DAST Commander, 8 July 1970, from Headquarters, 3d Civil Affairs Group (Airborne), Fort Clayton, Canal Zone

1. This report summarizes the activities of the DAST team which was deployed in Peru from June 2 - 28, 1970, as part of the U. S. Government's post-disaster assistance program.

The report contains a main narrative and four annexes -- individual reports on the activities of four technical components of the DAST (Veterinary, Engineering, Sanitary Engineering, Medical).

The document also contains a cover note (Disposition Form, DA2496) from Colonel J. W. Morris, Director, J-4, with critical analysis of some aspects of the major report.

2. Main Narrative

The DAST operations are described in four phases.

(a) Phase I Alert Phase The DAST was alerted at 2300 hours, June 1, of the need for their services in Peru. This alert took place 30 hours after the earthquake.

(b) Phase II Arrival In-Country By Tuesday afternoon, about 48 hours after the earthquake, the first plane touched down. Personnel and helicopters were deployed in C130's which landed at Jorge Chavez Airport, and from there proceeded to disaster areas.

Forty persons comprised the team, as follows:

4	Command Structure	Office-in-Charge, Deputy OIC, Civil Affairs Officer, Operations Officer
4	Medical Personnel	Two physicians; one laboratory technician; one preventive medicine technician
1	Veterinarian	
2	Engineers	One civil engineer, one sanitary engineer
4	Communicators	Specialists with equipment
6	Support Personnel	Supply Sergeant; Administrative Specialist; Operations Sergeant; Two General Duty Soldiers; One parachute rigger
1	Public Information Specialist	

16	Flight Personnel	Pilots and maintenance personnel comprising four complete crews for two UH1D helicopters
38		

(Disparity between 38 and 40 reported not accounted for.)

Their efforts were supplemented by a manned Bell Jet Ranger Helicopter provided by the Bell Helicopter Company.

The narrative summarizes much of the material included in the Annexes, but one interesting aspect of it is that medical treatment and evacuation operations continued for a fairly long period of time. On June 11, for example, close to two weeks after the earthquake, the DAST team initiated a mission assigned to it by the Peruvian Government to provide emergency medical treatment and medical evacuation services to some of the areas which had not yet been reached since the earthquake.

Some conflict emerged between the DAST Command and the OFDA representative on the scene. The OFDA representative contended that the DAST's only mission was to survey the area and report information, not to provide direct assistance. In addition, the OFDA representative contended that "after each day of surveying the DAST should report all information into him at the Embassy and, in fact, he requested that a helicopter be sent with a written report nightly from Anta to Lima (a physical impossibility)."

The DAST Commander felt that "it is the business of DAST not only to survey but also to assist and, indeed, during the first week of our operations emergency assistance was paramount and little surveying was done."

He adds that after the first week, a great deal of surveying was done and that the information was provided directly by DAST to the Peruvian teams responsible for relief operations, i.e., "to the agency which could act on this information." Later the DAST "made a point" of getting all of this information sent into the Embassy Command Post.

Clearly, there was a difference of emphasis between surveying and emergency assistance (the medical team, in its respective annex, comments that not to assist is impossible); the degree to which information should be fed, on a priority basis, to the responsible Peruvian officials vs. the Embassy Command Post or OFDA representative.

A Critical Fuel Problem The problem of fuel is described as "enormous" especially with respect to reaching the remote areas where assistance was needed. Helicopters had to carry a spare 55 gallon drum of fuel to forward points, etc., to insure that they were not stranded at the end of their Missions. However, that problem was managed.

More critical, however, was an apparent miscommunication regarding fuel specifications: "In the final phase (emphasis added) of our disaster relief operations...it was determined that the fuel which we had been receiving at Anta was not JP4 fuel, as we had been assured, but rather JP1. As a result, the CH47 helicopter was not able to develop full power and lift capability, and it also experienced overheating. Furthermore, it became necessary to

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to ground all UH1H helicopters until information was received from technical personnel in the Canal Zone or CONUS as to how many hours the UH1H may be flown safely using JP1 fuel without being turned in for extensive maintenance.

Considering that two helicopters were lost through crashes, and one went out of service due to severe maintenance problems (out of a fleet which never exceeded five), it is interesting that this problem is not linked in the report to the fuel problem. (If only to indicate there was no relationship between the two).

Ground Transportation The main narrative and each of the annexes indicate that ground transportation to back up the DAST operations was a serious problem. Details will be provided for each section.

Achievements

Helicopter Operations	125,000 pounds of relief supplies transported
	224 medical evacuations
	1,061 passengers transported
	506 sorties
	201 hours of mountain flying time
	292 communities visited, surveyed and assisted

Others are explained in the summaries of the attached annexes.

Recommendations

1. "That all DAST personnel be fluent in the Spanish language. This is particularly essential and was in fact indispensable in the case of our physicians assigned to the DAST. It is perhaps asking too much that all helicopter pilots be both expert in mountain flying and also bilingual, but it certainly would have helped."

2. There should be some form of ground transportation support.

3. An experienced communications officer should be included.

4. Experience of particularly helicopter pilots should be taken into account in assigning to such a Mission (re: high altitude in this case).

ANNEX I: VETERINARY REPORT

Some interesting observations were made by the veterinary member of the team, even though it did appear that the opportunity to use his expertise was somewhat limited:

> The medical doctors in Huaraz were very concerned about a superstition that dogs who ate human flesh were apt to develop rabies. After some discussions, they were partially convinced that dogs can only contact rabies from an infected animal. However, they still wanted to kill all the dogs because they insisted that rabies were enzootic in the area. They were reminded that this was true not only of this area but of practically every other large land mass in the world.
>
> Many problems would have arisen if it had been decided to destroy the dogs. If poison were to be used to kill the dogs, the children could possibly contact the poison. Moreover, if poisoned, the dogs would have crawled into an inaccessible area to die and have added to the decaying flesh. Shooting of the dogs would have been dangerous and the dead animals still would have had to be burned or buried.

At the conclusion of the report, the veterinarian had another dog-related experience:

> While in Lima awaiting transportation back to the Canal Zone a strange dog was noticed near the AF Mission. I was not present at the time the dog was killed. Earlier in the morning I had seen the dog and noticed nothing out of the ordinary. However, due to its strange actions before being killed, I obtained brain tissue and brought it back for testing. The dog was positive for rabies. Medical officers at Howard AFB are in charge of those personnel who were in contact with the dog just before its death.

The veterinarian observed some food distribution:

> Distribution was being made by preparing packets containing flour, rice, sugar , oats, beans, cooking oil and some other various items such as egg noodles. These packets were then taken to the various locations in the city for distribution. Only the heads of the families could receive food. All people that were able to work were not given food until they had proven that they had helped in the cleanup work. The military program evidence of this was the fact that those personnel who worked were issued chits and the completion of a day's work.

The veterinarian concludes that while there was not an extreme need for a veterinarian's services, he can be utilized in many ways and can provide needed advice, at times. The veterinarian in this case was: Sonny D. Reynolds, Major, Veterinary Corps.

ANNEX II - ENGINEERING REPORT

Major (Corps of Engineers) Harold M. Newman was the DAST Engineer Representative. His work was very varied, and he advised on a number of projects:

- June 3 Reconnaissance of Chimbote ("Much work was being done cleaning up the streets and even food distribution centers were set up and in operation. All of this work was started without US assistance and seemed to be well organized and effective.") Saw no need for US engineer assistance there.

- June 5 Assessment of Anta Airstrip Determined it was OK for C130 and C123 landings, and conducted additional air-surveys of surrounding areas.

- June 6 Preparation of Plan to "Clean-Up Huaraz": Worked with Peruvian Engineers to develop a plan for a Peruvian Engineer Company due to arrive that evening. To insure that the plan was OK "as to sequence".

- June 7 - Introduces CPT Wehmann Around and attends to other technical tasks.

- June 8 - Advises Benedictine Brothers in Los Pinos to Demolish Monastary Roof

- June 11 - 13 - Advises Government of Peru on Feasibility of Road Construction/Bridges Across the Hungay Landslides

Major Newman emphasizes that he was handicapped by lack of ground transportation. Particularly, the problem is that his Peruvian counterpart always shared transportation with him, but this meant both had to work together all the time, when they would have wanted to double their productivity by splitting up.

ANNEX III - SANITARY ENGINEERING ACTIVITIES

The Sanitary Engineer on the team was Captain Victor W. Wehman Jr.

His report is systematic and technical, describing each water system he worked with. Of particular interest, because of its applicability to Lima's water supply system, was his report on Chimbote, extracted as follows:

System Before Disruption by Earthquake Ths water production system for the public of Chimbote consists of three submergible chlorinated well pump stations serving about 40% of the city by direct distribution, and one Santa Corporation process water well (chlorinated) which is not usually used for public consumption. The Santa Corporation also has a high pressure water line (process water, non-chlorinated) coming directly from the Santa River.

Another water system available in the area is the new housing system of Buenos Aires. This subdivision is near Chimbote airport and has a complete water treatment plant which treats water brought in from the Santa River. The plant consists of primary lagooning of the water, coagulation, flocculation, sedimentation, filtering and chlorination of water, and was designed for a consumer population of 10,000 at 150 gallons/capita.

System After Disruption by Earthquake

a. All three Chimbote main water wells had been damaged to some extent. In all three cases the buildings surrounding them (reinforced concrete) were cracked, but not collapsed. Each well had sand-clogging up the well casings due to the tremors, however, by Thursday all three wells had been flushed.

All pump equipment was working except for minor repairs.

The main water storage reservoir (concrete) was not damaged.

The city uses steel pipe and the distribution system was very segmented. It was easy to see broken sections in the sand as the water turned it a reddish-brown color. Location of the breaks in the streets will be no problem. Engineer Gonzales estimated three weeks full-time working to restore the main line, but only if he gets the correct construction equipment.

Each pumping station has facilities to input vertical filling points (standpipes) for water trucks. Since only 40% of the city normally gets main distributed water, the practice of bringing water to the people in water trucks is an old one.

b. The Santa Corporation water well was functional Thursday afternoon with repairs being made to the water lines by line crews organized and paid by the Santa Corporation. The crews were operating with three front end loaders, a D-6 dozer, and about six dump trucks. The Santa Corporation well (chlorinated) also had vertical standpipes for distribution to water trucks available.

c. The Buenos Aires water system was severely damaged. The inlet structure on the Rio Santa had changed elevations, not allowing water to flow into the line. The realignment...should take about three weeks...

The water treatment plant had considerable damaged to the flocculating and sedimentation works, but little or no damage to the filters, pumps, filter-back wash elevated storage tank, chlorinators, or main concrete

storage reservoirs. With repairs to the inlet, a large volume of portable water can be produced and distributed.

Recommendations

CPT Wehman recommends the use of water trucks and 55-gallon drums until (about one month) the normal distribution lines can be restored. He suggests such trucks be brought in from Lima, and there should be enough trucks to keep 25,000 gallons "on the move" in Chimbote. About 300 of the 55-gallon drums are recommended.

Beyond that, he suggests specified heavy equipment required to repair the system.

He also includes several long-term recommendations:

1. "It was nearly to arrange for surface transportation" to carry out their duties. "Four to five jeeps for 25 men" would greatly facilitate and improve operating efficiency.

2. Portable water testing kits (similar to the HACH Model DREL) would add greatly to specific determination of water production and distribution problems.

3. Mobil purification units such as those produced in Germany should be placed into alert storage in the Canal Zone.

ANNEX 4 - MEDICAL ACTIVITIES

This report is interesting and is presented in chronological format:

Chimbote Hospital Obrero, originally a 40-bed facility, was operating at a 120-bed capacity. Typhoid vaccine and antibiotics were requested. We contributed 25,000 doses of typhoid vaccine and 10 cases of ampicillin.

Trip to Callejón de Huaylas We separated out only the most basic medical supplies such as antibiotics, analgesics, plaster of Paris, etc., because of weight limitations.

Caraz One of the main problems was the lack of antibiotics and analgesics.

The food situation appeared to be well under control as a fair amount of flour from the Alliance for Progress in addition to abundant cattle, oranges and unharvested wheat were available.

Huaraz The hospital director assigned us to the Emergency Room. The first floor of the hospital was basically in tact, while the second floor (the wards) was damaged, but for the most part could be utilized. We relieved the extremely tired physicians from the hospital. We were the first foreign physicians to arrive on the scene.

31 The hospital was built in 1963 with an 80-bed capacity; it was handling a 290-bed load. Patients were lying on the floor on mattresses, blankets, and received medical attention "only if they complained loudly.

The injured seen in the emergency room were primarily people who lived at a good distance from Huaraz and whose wounds were grossly infected by the time they could receive medical attention.

Our most immediate need was blankets, mattresses, tents, plaster of Paris, antibiotics and typhoid vaccine.

In Anta, a para-medic, a physician and Peruvian and American nurses set up an outpatient clinic in a tent.

Recommendations

Prior to departure, all DAST personnel should be briefed by intelligence personnel regarding the country, its people, climate, and current political considerations.

All personnel should be bilingual, but this is imperative for medical personnel. Injured and sick are more difficult to understand even in their native tongue.

Some form of intrinsic transportation must be provided in the interest of efficiency. The distance between the helipad and the hospital was 1-1/2 miles. Basically, no transportation was available.

It is impossible for a physician to enter any disaster area and not assist. Any surveyong done must be accomplished while assisting.

Deployment of medical personnel should avoid misplacement of personnel, as occurred in Peru. The laboratory technician who came with a portable laboratory was sent to another city where he was not utilized in his primary capacity.

The first two recommendations (above) are the same as the o offered by the Commander of Operation Blue Boy - Earthquake Relief Mission to Skopje, Yugoslavia.

This report was filed by Z. Szymonski, MD, Lieutenant Colonel, Medical Corps, Acting Chief Surgeon.

ANNEX 5 - FLIGHT SURGEON

This report deals with the sanitary and health aspect of support provided to U. S. personnel during the Mission, which is found somewhat lacking. However, the most interesting part concerns flight safety conditions in the Andes for U. S. pilots:

> This Valley in the high Andes was unfavorable for flight safety for many reasons. (However, it was essential to

operate from Anta because it was the only usable airfield.) The valley floor at Anta is approximately 9,000 feet above sea level and the pilots often had to fly above 14,000 feet in order to get through the passes. This constant exposure to altitude and its resultant low oxygen tension causes an increase in pilot fatigue. The lack of good rest accommodations made the situation even worse. Cold nights, poor food, and constant high altitude exposure are detrimental to personnel required to perform exacting physical and mental tasks.

Oxygen discipline was observed to be poor. Walk around oxygen bottles were available but were used infrequently during the flight which I observed. Several reasons exist: Helicopter pilots are not accustomed to using oxygen. Their helmets are not equipped with oxygen fittings and the talk around bottle masks are not adapted for use on helmets since this required a special microphone within the mask. Consequently, when oxygen was used, the pilot had to swing his boom mike out of the way and use one hand to hold the mask to his face. This is not workable since both hands must be on the controls when flying a helicopter. The majority of the helicopter pilots had not had flight altitude indoctrination. This program stresses the effect of hyporia and the insidious nature of this physiological state.

No physician was delegated to look after the physical and living needs of the aviation personnel. A flight surgeon was not provided as a member of the DAST.

Gersony

October 7, 1981

EXTRACT

MAAG - U. S. Military Advisory and Assistance Group /U. S. Embassy, Lima, Peru
After Action Report, Dennis Muldoon, Colonel, USAF, Chief, MAAG Unit, 21 July 1970 following the Peruvian Earthquake of May 31, 1970

1. This report is a first-person, detailed narrative of COL Muldoon's actions and problems during the period Sunday, May 31, 1970, until about June 10, and really provides concrete day-to-day operating problems certain to recur in another major disaster in Peru.

While not as technically oriented as the DAST report, this document provides a flavor of the kinds of operating problems involved -- and in a very entertaining, readable style. This extract tries to synthesize and highlight some of the problems raised.

2. Communications within the U. S. community were extremely difficult. It is clear that the Embassy Command Post, USAID Command Post, Airport and Field Positions needed to have had instant communications. By June 10, COL Muldoon finally requested two fully equipped communication jeeps from Panama -- obviously these should have come in right from the start.

3. OFDA Representative The narrative repeats numerous times that there were conflicts or problems in a cooperative relationship between the MAAG and OFDA representative, referred to as "a point in my posterior" in the report.

4. Peruvian Air Force The performance of the Peruvian Air Force was a serious problem. They provided little operational assistance in loading and unloading, leaving the job to COL Muldoon and one NCO, and the entire Peruvian crew quit at 5:30PM, normal quitting time.

This had two effects: (a) The aircraft provided by Panama were substantially underutilized; and (b) Assistance provided took much longer than necessary even under emergency conditions to reach its destination.

This problem was finally resolved when the U.S. operations were segregated from the other incoming resources. This allowed them to prepare cargo ahead of time to make better use of the equipment. The Peruvian Navy finally sent over 10 men to help with the loading, which eased the situation considerably.

One problem was that Group 8 of the Peruvian Air Force wanted to control and handle everything, but had no capacity and -- apparently -- no real desire to do a job commensurate with COL Muldoon's perception of the value of the U. S. inputs. So the net result was a bottleneck to be avoided in future.

In one operation, the Canadians and Argentinians promised some air support but failed to provide it when the moment arrived, leaving the U. S. contingent holding the bag.

Operations should be self-contained, with augmentation personnel automatically sent in to support the local Commander. Communications should be planned in advance and automatically activated.

There was also no control system at the airport, and cargo left Panama unmanifested. This contributed to the chaos on the scene.

Gersony

EXTRACT

PERU EARTHQUAKE - May 31, 1970, Carson O. Crocker, USAID/Peru, August, 1970

1. This is a general summary report of US post-disaster activities by an AID veteran who has worked in numerous post-disaster programs.

Only those points germaine to this particular mission are extracted.

2. Medical Statistics

47,000 killed in earthquake
20,000 killed in avalanche (Yungay etc.)
67,000

143,000 injured requiring treatment
4,657 required hospitalization

20,000 orphans created by disaster
200 orphans - not absorbed by local friends, relatives, etc.

3. US Assistance

(a) PL480 Food 23,000 metric tons = $5.9 million
Program limited to 120 days from June 1, 1970
"after which it is expected that local agricultural resources will adequately meet food needs."

(b) DAST: Need for Assistance demonstrated by comparison between Peru'a earthquake affected areas and Europe — it would cover all of Belgium, Holland and half of Denmark.

"The fact-gathering functions due, no doubt to misinterpretations of standing instructions by the DAST ...were not carried out as expected... They provided survey information to the host military commander who failed to disseminate this information to other than host authorities. It was then considered classified and not readily available for US use." In various parts of the report, this complaint is repeated.

(c) Private Medical Groups "Due to various circumstances, available medical personnel exceeded real needs. Peruvian hospitals had adequate space and Peruvian doctors backstopped by foreign volunteers were very much on top of the cases needing emergency care.

"Nevertheless, American doctors in groups insisted on the need of their services here. At least one group left disappointed when after generously donating their time they found no satisfactory functions."

(d) Information on operations was not forthcoming to active cooperators such as the U. S. Embassy, thereby negating certain potential assistance.

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Data on arrivals of supplies, pipeline, warehouse inventories, deliveries and distribution were very poor, and the field command was ...unable to make adequate advance plans for utilization of supplies. Since these matters were considered confidential, U. S. assistance was not possible in this area of operations except for our own inputs.

4. Resource Personnel

Dr. David Sencer, Director of CDC/Atlanta assigned in developing the epidemiological surveillance system.

Dr. Paul A. Blake, CDC, stationed in Puerto Rico, assisted in conduct of the surveillance program.

SUMMARY

The document also provides information on activities of other public and private sector donors, some general description on how the Peruvian operations were organized, and other valuable information.

Gersony

EXTRACT

Review of U. S. Assistance Activities Related to the Earthquake Disaster in Peru, Report of a Staff Survey Team to the SubCommittee for Review of Foreign Aid Programs, Committee on Foreign Affairs, U. S. House of Representatives, December 3, 1970 (U. S. Government Printing Office, Washington, D. C., 1970)

1. Summary This 25-page report was prepared by Messrs. Harry C. Cromer and Marian A. Czarnecki, staff consultants to the Committee on Foreign Affairs, after a nine-day trip to Peru, from August 6 - 15, 1970.

It deals in three parts with the disaster: emergency phase (3 weeks); rehabilitation and reconstruction phase; and conditions in Peru bearing on further U. S. assistance. In addition, in its introduction and throughout the document it provides some useful general data on damage to Peru from the May 31, 1970 earthquake.

2. Background Data

> The area affected by the disaster includes about 25,000 square miles, mainly the Department of Ancash, with an estimated population of over 1,000,000. Although precise figures are not available, more than 50,000 inhabitants of the affected area were killed; upward of 30,000 by collapsing buildings and more than 20,000 by the avalanche of rock and debris which buried the towns of Yungay and Ranrihirca in the Callejón de Huaylas (Huaylas Valley).
>
> An additional 50,000 people were injured badly enough to require medical treatment. 160,000 dwellings were affected, of which 100,000 were destroyed and 60,000 severely damaged. Some port facilities, inland roads, irrigation, water and sewage systems, and various productive units, including a major electric power generating plant, were damaged.
>
> The bulk of the destruction and damage was centered in two areas: the coastal strip which includes the ports of Casma and Chimbote, the latter a town of over 200,000 people; and a 40-mile section of the Huaylas Valley in the Andean Sierra, from Huaraz northward to Huallanca.
>
> The damage caused by the disaster is now estimated by the Government of Peru to exceed (US)$517 million...
>
> The area affected by the disaster contributes about 6 percent to Peru's gross national product...The one project of significant importance in the area is the electric power generating plant at Cañon del Pato which was slightly damaged by the earthquake. The relatively more populous coastal region features a steel mill and some 40 fishmeal factories in Chimbote which produce

about one fourth of Peru's foreign exchange earnings. The steel mill was only lightly damaged while the fish-meal plants appear to have survived the earthquake intact. Damage to the industrial productivity of the area can thus be met within the financial and technical capabilities of the industry without international assistance.

The immediate reconstruction needs of the area center on the provision of temporary housing to the inhabitants of the sierra region before the advent of the rainy reason which normally begins in October but which last year began in mid-September. In that region, 75,000 homes have been affected by the earthquake. About 65% of them have been destroyed, the remainder severely damaged.

From our inspection, many of the homes on the coast appear to have been rebuilt already, though frequently with straw rather than with customary adobe materials.

3. The paper's overall attitude toward the relief operations (first three weeks) seems quite positive and highlights the role of the DAST and USSOUTHCOM. "To put it as briefly as possible, the United States was there first and the assistance provided was a major and probably the crucial element in the total emergency relief operation."

Some of the problems highlighted by the paper:

> Even the US DAST group, operating in the mountain region, experienced serious problems: they could communicate with Panama but not with Lima....It would appear advisable for the US to consider establishing a mobile communications system and assigning it to the DAST group in Panama.
>
> There was an oversupply of some materials, particularly medical supplies of certain kinds, due to faulty information.
>
> In some cases, there was confusion about what was needed, where and by whom. The result was that too much assistance was delivered to some places, not enough to others. Due in part to poor communications and the failure to survey and identify the specific locations requiring food and clothing drops, many of the drops were made on a "scatter" basis. This resulted in relief supplies being maldistributed and being hoarded in large quantities by the lucky recipients.
>
> Although priority of needs was generally broadcast, they were not adhered to.

The overall emergency operation for the U. S. involved $2.6 million, primarily reimbursement to the U. S. military; and $6 million in PL480 food. (The participation of the U. S. private sector with an estimated $8.5 million is described as "impressive and well-received."

4. The reconstruction part of the paper reviews information already available elsewhere in the notes:

IDB	$35 million matched by $17.5 million from Government of Peru
IDRB	$125/150 million loan was "under consideration" at the time
U.S.	$9 million of emergency relief, $7.4 million for reconstruction under its bilateral program
UNDP	A list of studies and technical assistance resources
Sweden	Provides a military construction group to work on roads and infrastructure
UNESCO	Provides experts who study damage to cultural and historical monuments

The report comments that a "massive airlift" promised by the Soviet Union began late and "has not even reached its half-way mark", and that OAS and some European donors are considering longer-range reconstruction programs.

With respect to the Government of Peru's efforts, the report indicates that only about 2% of its current national budget -- about $20 million -- was committed to reconstruction of the area, as compared with initial pledges of $140/185 million by international sources. In addition, the Government placed priority on the structural reforms which it was carrying out in agriculture, industry, mining and commerce during that period.

However, it is clear that final decisions have not yet been made on the Government's level of support and strategy for reconstruction.

5. Conditions Bearing on U. S. Assistance

"Rehabilitation and reconstruction aid by the (BID - $35 million) and the U. S. Government ($7.4 million) were extended without a clear understanding of the real needs and local priorities -- in other words, too soon to be utilized promptly and effectively."

"Utilization of large-scale external assistance for reconstruction (and development) may create some serious internal problems for Peru. Extreme demands placed on local resources - manpower, equipment, and scarce supplies such as cement and building materials - can result in competitive bidding, diversion of resources from priority projects, conflicts of authority and inflation."

"The dividing line between reconstruction (restoration of the disaster area to pre-earthquake conditions) and development may be difficult to define and even more difficult to observe.

Chimbote is a good example of the type of difficulties which U. S. aid, intended for reconstruction, could encounter. According to a Peruvian official on the scene, prior to the earthquake Chimbote consisted of (a) the downtown area, (b) four small residential areas which were urbanized, and (c) fifty-some "shanty-towns" inhabited by about 180,000 Indians (out of a population of 200,000).

The "shanty-towns" lacked all the basic elements of urbanization: paved streets, sidewalks, sewers, adequate water supply, even electricity in some cases. The individual family dwellings, built by the Indians out of adobe bricks, were almost completely destroyed by the earthquake. They can probably be restored to their original condition by their occupants with a minimum governmental input.

It appears unlikely, however, that the Government of Peru is considering this type of "reconstruction". Plans calling for changing the layout of Chimbote, for moving whole sections of the town to previously uninhabited areas, and for providing those new sections with municipal services, are currently being studied. The implementation of such plans would go beyond mere "reconstruction" - it would involve substantial investment in "development". Any misunderstanding about the meaning of these terms could lead to friction and other difficulties if the United States should decide to provide additional aid to Peru for "reconstruction" only.

"The USAID Mission in Lima is not presently equipped to implement any sizeable new assistance program for Peru. ...As the U. S. experience following the Chilean earthquake has demonstrated, this is a severely limiting factor which would have to be remedied promptly if additional bilateral reconstruction aid for Peru were to be forthcoming."

6. State Department Response Only one issue is addressed by the State Department response - one which seemed of such little significance that it has not been included in the notes thus far. The report indicates that 4 UH-1H helicopters were not in use when the study was conducted: they had been used in relief operations, were then grounded, and were now about to be sold to the Peruvian Government. The study suggests, perhaps rather strongly, that these helicopters should have been being utilized at the time, not just sitting around at the airport.

The State Dept. indicates that as ground and animal transportation had been adequately re-established, there was less need for helicopter transport; that some helicopters were beginning to be used inappropriate, considering danger, cost and marginal effectiveness; that the U. S. had lost three helicopters in these operations already and that the value of additional flights for training purposes was marginal; and, perhaps, in my view, most importantly, the Peruvian Air Force helicopter capability "was not and is not" being used for these purposes.

7. Other Information The document includes a listing of all U. S. aid provided to Peru after the earthquake, and a copy of the principal agreements and amendments covering the $7.4 million grant. The report indicates that some material was deleted from the published report but remains available to committee staff -- this seems to deal with political matters, questions of abuse of assistance, and state of preparedness of the U. S. Mission before the disaster.

Gersony

July 26, 1981

SELECTIVE ANALYSIS

Completion Report of $7.4 Million Grant Agreement for Earthquake Rehabilitation and Reconstruction Program
Jacob Willebeek-Le Mair, General Engineer, USAID/Peru, September, 1974

1. Summary This 15 page report outlines the assistance provided to Peru under the $7.4 million grant. It touches on a number of implementational problems and makes some recommendations. The excerpts included in this summary are selected on the basis of relevance to our particular mission.

2. On June 29, 1970 -- about one month after the earthquake -- the AID Mission signed a US$7.4 million grant agreement with the Government of Peru for earthquake rehabilitation and reconstruction. The following projects were undertaken under this grant:

A	Temporary Housing	$444,000	
B	Housing Construction	$500,000	(via OAS)
C	Electric Power	$400,000	
D	Tools & Equipment	$410,000	
E	Education	$2,540,000	
F	Agricultural Credit	$757,000	
G	Health Centers	$417,000	
H	Irrigation	$790,000	
I	Self-Help Shelter	$700,000	
J	Farm Tools	$160,000	
K	Huaylas Homes	$50,000	
L	Studies	$200,000	
M	Other Studies	$140,000	(related to HIG Loan)
N	Piscobamba Center	$23,000	

TOTAL: 14 individual projects

Most of these projects had a number of associated sub-projects with them.

3. Problems Reported in the Document

"Lack of management capability within the newly created CRYRZA and of the various implementing agencies of the GOP."

"Underbidding on the construction projects...Contractors would run out of funds and halt all construction...Even though (they) were forced to post bond, the legal process for cashing a bond (was extremely time consuming). Those who won the contracts were often quick to abandon the work as soon as they ran into trouble. The poor showing...was also due to the lack of prequalification in the bid procedures thus permitting more inexperienced firms to win contracts. After USAID insisted on prequalification, more qualified firms received the contracts."

"...an overly stringent financial policy of USAID..." left implementing agencies without money, slowing up the process significantly. When a large revolving fund was established, progress improved notably.

"...all projects financed by a single donor (should) be physically concentrated in a limited area...donors (should) keep their projects concentrated in a limited number of sectors."

Despite the implementation problems, the report supports the use of the national reconstruction agency as the implementing agency for the program, seeing it as part of a positive strategy of institutional development.

4. Comments on individual projects:

Project 'C' - Electrical Power

The first generators ordered under the program did not arrive until March, 1971. Two 800KW generators ordered for Trujillo were not needed when they arrived because repairs to the system had been completed by then. This community "had suffered a separate earthquake on December 9, 1970, which caused extensive damage to their electrical installations."

By June 30, 1974, generators in about four out of seven towns for which they had been purchased were still not installed. Cause: mismanagement by national implementing agency; GOP funds promised for a related project had not come through.

Urban Tools and Equipment

Handtools were procured by July, 1971 - their intended use had been for rubble-clearing. By the time they arrived, the clearing had been completed.

Some of the heavy equipment (2 dumptrucks, 5 pickups) did not arrive until early in 1973. Six bulldozers, 6 air compressors and 6 dumptrucks were ready by October, 1971, about 1-1/3 years after the earthquake.

Education - $2,540,000

This was the biggest program component. 71% of these funds went into Centros Educativos Básicos, then a new concept in education, although AID had intended for the funds to go for rural schools. The CEB's were completed in February, 1974, about four years after the earthquake. There were serious problems with low-bidding contractors who didn't follow through on their commitments.

Agricultural Credit

Farm credit was made available through the Supervised Agriculture Credit Trust Fund. By August 31, 1971, all of the funds had been disbursed. Note: Would be interesting to follow up on collection.

A number of the housing programs are assessed in more detail in the Thompson 1976 Report - nothing in this report contradicts their findings.

Comments

1. Procurement appears to have been a major problem. If there is one problem which appears common to all disaster relief programs AID has undertaken, it appears to be slow procurement.

2. I was surprised by the number and variety of small projects undertaken by the Mission. This must have created a real management drain, with a need to cover so many sectors. This division could have been the result of political problems of the period; or perhaps the project just evolved in this form. I would be inclined, in future, to try to concentrat a bit more on specific sectors -- and agree with the report's suggestion that focus on a geographical area is valuable as well.

3. It would be important to take into account the timing realities, not only on procurement but on executing agreements (or sub-agreements) and in general implementation in setting up this kind of program in future.

Gersony

Report of Audit Earthquake Reconstruction and Rehabilitation
Grant USAID/Peru, Audit Report No. 71-3
September, 1970

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1. The scope of the audit includes the disbursement of US$2,570,061 in grant funds for the period June 29, 1970 - June 30, 1971 and focuses upon an evaluation of the USAID management of grant operations.

2. One of the largest natural disasters occurred when an earthquake struck Peru in May, 1970 and affected an estimated population of 1,700,000. About 70,000 were killed, 100,000 injured an 500,000 people left homeless.

   Sixty-six governments and private and international organizations provided assistance. Of the US$240 million in emergency help and reconstruction, US$91 million came from the GOP, US$61 million from the US and US$88 million from other countries and groups.

3. As of June 30, 1971 USAID had established eleven projects, three were completed (temporary housing), three were progressing slowly (agricultural credit, farm tools and electric power), and five were considerably slowed (education, irrigation, medical centers, urban tools and OAS reconstruction).

   "The principal factor limiting the rate of progress has been the management capability of the GOP which was underestimated by USAID in the development of the implementation plans." (p. 5)

4. A committee system was utilized for project implementation. The audit suggests that more engineers should have been utilized as project managers. USAID believed that the major problems were functional not technical so that engineering managers were not required.

5. The GOP created CRYRZA as a separate organizational unit with ministerial status to administer the reconstruction program in June, 1970. Initially this unit lacked managerial capability which improved over time. USAID reduced bureaucratic problems of CRYRZA by establishing good working relationships with the implementing agencies. (This same management approach might be useful in future disaster reconstruction efforts).

6. The planning process was hampered by the slowness of GOP efforts to assess damage and prepare the GOP program for reconstruction.

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7. "Experience has demonstrated that the standard guidelines (for procurement) have been very cumbersome to administer because of the large number of small value procurement transactions financed by the grant and conflicts with GOP procurement procedures". (p. 15). The audit firmly recommends that the assignment of a procurement specialist to this Mission during the critical period (first six months) could have improved both the efficiency and effectiveness of program operations. (FHO for one strongly supports this supposition based on emergency procurement of equipment and medicines under health loan and grant).

8. World Bank and InterAmerican Development Bank also experienced considerable delays in projects financed with their funds due to GOP interference with rapid implementation efforts.

9. There were eleven projects including:

   a. Temporary housing. Included three AID financed grant projects of US$1,700,000 as follows: OAS Temporary Housing: roofing materials and temporary housing for 15,000 families; Self-Help Shelter: roofing material for 20,000 families; AID Temporary Housing: temporary housing units and support services for 2,800 families. Auditors suggest that Self-Help Shelter was the most effective based on long term cost benefit analyses.

   b. Electric Power Project. Major problems in procurement and customs delays which reduced effectiveness of project to purchase electric generators.

   c. Tools Project. Procurement delays in both foreign and local procurement.

   d. Medical Centers Project. Major delays in GOP preparation of implementation and construction plans.

   e. Farm Tools Project. Good administration.

   f. Education Project. Weak technical and administrative management by Ministry of Education.

   g. Agricultural Credit Project. Okay.

   h. Irrigation Project. Weak administration and considerable contract delays.

   i. OAS Reconstruction Project. Not implemented.

Helene Kaufman

ANALYSIS

Preliminary Report on Post Disaster Housing in Peru, Paul and Charlotte Thompson, INTERTECT, 1976

1. General The report is a program-by-program description and analysis of the various temporary and permanent housing programs conducted by the Government of Peru and international agencies after the May 31, 1970, earthquake in Ancash and surrounding areas. It includes critical comments about the programs. The 108-page study contains valuable details and insights relevant to AID disaster planning for both Lima, as well as secondary cities and rural areas.

2. Temporary Shelter

(a) Tents

A total of about 12,430 tents reached Peru in response to the earthquake. The source of the tents was generally as follows:

Bilateral Assistance	10,508
(6,700 = 54% USG arrived mostly in July)	
International Agencies	1,863
(450 = 25% 7DA/CRS/CWS arrived mostly July 31)	
Peru	59
TOTAL	12,430

In 1970, the cost of a tent is estimated at US$100. The total amount of the US donation of tents was estimated at about $600,000 (not including transportation). The tents were distributed at no cost to beneficiaries, although it was widely held that many never reached them but were diverted en route for other purposes.

The tents were not used in the Coastal areas, reportedly because the weather there is milder. However, when they reached their destinations in the Sierra, it was found that most beneficiaries had already made their own temporary shelters, within which the tents were only a "marginal improvement". The tents did not wear well in the rain and were cold at night and hot duriqg the day.

(b) Estera

Nearly 5,000 esteras were provided in the Coastal regions to disaster victims, and an additional amount was provided by the Red Cross. It is also assumed that many (if not most) families purchased their own esteras. Temporary shelters required 7, 9 or 11 esteras, depending on the size of the family, so between 500 and 1,000 families were assisted in this manner.

Esteras are far more competitive as housing solutions than tents. However, they are subject to insect and humidity damage and are seen as temporary housing materials. The report states that the use of esteras and not tents "is now the current policy of the Peruvian Red Cross and USAID".

9b)

(c) Operación Techo

About 1440 barracks type buildings, each designed to hold about seven families, represented the Government of Peru's first major post-disaster housing program, principally in the Callejón de Huaylas area. Construction of the units was completed in December, 1970, about seven months after the earthquake, and, in 1970, cost about US$250 per family. Construction materials were maderita (masonite) walls; galvanized steel roofs; and interior partitions of estera. Due to negative reaction of local residents, some modifications were made in building materials, i.e., from lámina to corrugated cement-asbestos; interior partitions to plywood; the size of each family's unit was increased to 27m2. A total of US$2,362,812 was disbursed by the program.

As an emergency operation, the program was unsuccessful: as units became available three to six months after the earthquake, people had already made their own temporary living arrangements. However, in some ways it was an improvement over tents or makeshift shelters which some people had constructed. In one area, however, 231 family units were never used, and other communities reported similar, though not so extreme, reactions.

The complaints about the housing were: too dense, conditions described as 'living like animals', no windows, hot in daytime/cold at night, and most critical: lack of security between family units. For these reasons, project beneficiaries refused to assist in the construction of the units, although some were prepared to use them once Government had completed the work.

> "Greater care should have been taken in the siting of the shelters, spacing them in a culturally more normal density pattern and allowing for an identifiable exterior space."

Where there were improvements in the units observed in 1976, these were made only in cases where they had been physically removed to a site owned by the disaster victims. Otherwise, the units appear to have mainly provided transient housing for people leaving the rural areas en route to relocate in the City.

Somewhere in this area, about 300,000 sheets of lámina found their way into distribution channels, from the Peruvian Red Cross (268,000 sheets), Austrailia (70,000) and "Amigos de California" (25,000).

(d) USAID Temporary Housing

About 660 multi-family temporary units, each designed for four families (= 2,640 individual units) were provided by USAID at a cost of about US$450,000 (at US$170 per family). Construction began in October, 1970, and was completed in January, 1971, eight months after the disaster. The basic agreement covering the program was signed on August 20, 1970, about three months after the disaster. These shelters were built in the rural areas, complementing the GOP

program which concentrated on more urban settings. About 10% of the buildings were used for non-housing purposes because by the time they were constructed, "...there was no further demand for those modules."

The materials were the same as for Operación Techo, all shipped from Lima and constructed by a series of five contractors from Lima, with some PCV supervision. Much labor was contributed by the intended beneficiaries.

According to one of the PCV's, "the people were not happy living together in one building. The assumption that many occupants would be related and therefore comparible did not always occur...(there was) a feeling of poor quality construction."

Although the original project and AID's project termination report suggested that the materials could be used again in permanent co-struction, this was not feasible: the wood was untreated and rotted; the pressboard panels absorbed moisture and deteriorated; and the asbestos-cement sheets cracked because of poor installation practices.

(d) USAID Self-Help Shelter Program In addition, USAID, at a cost of US$700,000, provided 240,000 sheets of aluminum roofing, distributed to 20,000 families during November/December 1970 and January 1971. The materials were considered, "too lightweight and arrived to the site badly bent." Each family received twelve sheets. (Aluminum cannot be used for both emergency and reconstruction purposes).

(e) USAID Grant to OAS for Temporary Housing

AID's final temporary housing effort was a donation of US$500,000 to the OAS, under which about 350,000 sheets of galvanized steel were distributed to about 15,000 families during the October, 1970 January, 1971 period. Distribution was limited to disaster victims in the Huaylas area who were constructing single-family shelters using their own labor and other materials.

About 20% of the above materials, however, were used by OAS to build temporary shelters for people. Construction staff complained that the gauge of the materials was extremely light. Beneficiaries also "complained bitterly about the thermal characteristics of the shelter. One expressed that during the day it is like standing in an oven and at night not even ten blankets can stop the cold. The roof also leaks badly." Generally, people did not like the temporary arrangements and would have preferred to be able to get on with their permanent reconstruction. In 1976, some were still attempting to gain title to their "temporary" site so that they could begin a more permanent effort.

(g) West German Red Cross "Foam Igloos"

At a cost of US$200 each, the WG Red Cross provided 500 foam igloos which were all completed by the end of August, 1970, within three months of the earthquake. Twenty-six technicians and 100 tons of materials were flown to Lima to make the project possible. The igloos were provided free to disaster victims.

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Initially, states the report, the reception to the igloos was good: their round shape was not culturally unknown -- round houses with a stone base and thatch roof are not unusual in the rural areas. In terms of thermal characteristics, they were agreeable. Some of them were moved around into family clusters. A roll-down flap door was often replaced with a wooden door, for security purposes.

However, by 1976, the attitudes had changes:

> "...(The original gratitude) has been replaced with bitterness, since it has not been satisfying in the long term and no program of future replacement is in sight for those still occupying the igloo... (which)does not function well in an urban context and is not easily adopted to long-term use allowing for personalization and growth...except in awkward ways..."

END OF TEMPORARY SHELTER SECTION

Comments:

(a) Temporary shelter -- which we would have thought to have arrived in the emergency period -- took 3 to 6 months to provide. During that time, people had long since made provisional arrangements on which the expensive externally provided shelters were often just marginal improvements.

(b) The relative cost of the temporary solutions was, and would be today, enormous, in comparison with permanent solutions. Put toward permanent housing solutions, much of the financing of the temporary shelters could have done wonders.

(c) Providing shelters for people generated lots of complaints, most of them legitimate and attracted little cooperation in their construction. There was no "demand" component to the assistance.

(d) Many of the temporary shelters, with no improvements, evolved simply through the passage of time into permanent dwellings. This seems like a less than optimal use of donor funds. The study, conducted in 1976, found many such cases (Tents provided in 1974 to disaster victims around Lima are still reportedly in use as shelter).

(e) The provision of shelter for people tended to create the expectation of further free assistance which the Government (and outside cooperating agencies) could not provide. Yet this expectation must have slowed up self-directed efforts.

(f) The particular materials chosen were completely inappropriate to the environment where they were distributed. This is another problem when there is no "demand" feature to the assistance effort.

(g) Many of the temporary shelter sites were provided with water facilities which were culturally inappropriate. Although not specifically discussed in each of the above programs, there are numerous cases where latrines were provided and never used in the six years from the earthquake to the evaluation.

Note: An interesting observation in the introduction:

> "Most deaths in the earthquake occurred in the streets where the people ran to escape their collapsing house. Instead, the walls fell outwards leaving them no place to go."

Total damage from the earthquake is estimated at US$524 million.

3. Permanent Housing

(a) InterAmerican Development Bank (IDB)

On August 9, 1970 -- just two months after the earthquake -- the IDB signed a loan agreement with the Government of Peru for US$35 million, which, matched with Peruvian Government funds of US$17.5 million generated an investment package of US$52.5 million. About US$21.5 million of these funds (= 40%) were invested in programs related to housing; the balance were invested in transportation, communication, agriculture, power, and education.

Under the housing sector, there were four basic programs:

Supervised Credit	$3.1 million	(2,395 loans)
Core Houses	$3.0 million	(2,150 units - loan)
2/3 Bedroom Houses	$12.0 million	(2,259 units - loan)
Sites & Services	$3.0 million	(3,347 sites - actual disbursement: $1.5 million)
	$21.1 million	

For all programs involving credit sales, EMADI/PERU, the state real estate administrative agency, was responsible for credit collection.

Note: Should conduct follow-up to assess repayment patterns, rates of delinquency, etc., for such a major program.

(1) Supervised Credit

About 2,400 families received loans under this program. The average loan was for about US$1,200 - the minimum allowable was $110, the maximum $2,150. Requirements for beneficiaries were:

- Income less than $215 per month
- Ability to repay
- Presentation of earthquake resistant plans made by an engineer; retention of an engineer to supervise the construction.

92)

About 50% of the loans were disbursed in 1971; the balance were disbursed in 1972 and 1973 (There is a doubt whether they mean actual disbursement or approval of loans in my mind here).

The loans were distributed throughout 29 cities; however 1,099 of the 2,395 -- nearly 50% — went to Chimbote itself; the next largest recipient was Huaraz, where 217 loans (= 10% of total) were invested. Interest rates were 7% PA for 1 - 20 years, depending on ability to pay.

(2) Core Houses

About 2,150 core houses were constructed at a cost of about $3 million, using a credit financing approach similar to that described for the supervised credit program. Each core house consisted of one multi-functional room, a kitchen and a bathroom. Each house can be expanded, however, an advantage which the report reiterates several times.

It can be deduced from the report -- although it is not stated- that about 50% of the 2,150 houses -- somewhere over 1,000 units — were constructed in Chimbote.

Construction of project infrastructure began in July, 1971, and units were all ready for occupancy by 1973, about two years after the disaster. The core units' costs, depending on their location, ranged from US$800 to over US$1800.

Problems with the Approach: One of the benefits of the directed approach is the ability to influence siting of houses, especially to achieve seismic resistance. Yet on this project, "in all cases the facades of the units span the width of the relatively narrow lots forming a row house on the street." If, in fact, all of these buildings have contiguous walls, one of the advantages of the direct approach has been lost.

While the basic units - it can be assumed - were built to seismic resistance specifications; and although state regulations require approval of additions to the core units, the quality of the additions indicates that seismic resistant specifications are not adhered to.

Only a small percentage of the families who have these houses were actually victims of the disaster. Rather, in the Buenos Aires suburb of Chimbote — where about 50% of the houses are located — the area has been "populated mainly by young couples who were most able to afford housing in this area."

In addition, "the particular problem in Chimbote is the project's location in a zone that is continually subject to winds..." Trees have been planted to form wind breaks, but the desert environment does not encourage their growth.

(3) Two/Three Bedroom Houses

About 56% of the IDB/Housing Sector funds, or US$12 million, were used to construct about 2,250 two- and three-bedroom houses. Of these, 1,449, or 65%, were located in Chimbote. The approximate cost per unit is US$5,200. Construction began in July, 1971, and houses were ready for occupancy in early 1974, about three years after the disaster.

Financing (credit) arrangements are similar as the other loans, except for the higher cost (and probably income levels). The report concludes that,

> "these houses were essentially available to only a small percentage of roughly middle-class residents able to afford them."

(4) Sites & Services

About 3,350 sites were developed under this program. Of these, 3,025, or 90%, were located in Chimbote. Total cost: about $1.5 million.

By September, 1976 -- more than six years after the disaster, the report states that "few of the sites had houses occupying them.

> "According to ORDEZA (the reconstruction authority in the region)...the lack ot use to date is due to the relative unpopularity, until recently, of moving to the Buenos Aires area. This has been due to a lack of stores, transportation and an annoying wind." (my emphasis)

USAID (Housing Guaranty Program?)

Under this program -- which, although not identified as such, appears to be a HIG effort -- a loan of US$28.3 million was extended to the Peruvian Housing Bank. As a prerequisite to the loan, a 16-volume housing market analysis was conducted, although this was of only minor use to the project.

Interest rates on these loans are 8% PA, to be utilized over a period of 5 years, to be amortized over a period of 22 years.

About 4,000 units were built under the program, with an average cost of about $5,200 each. By 1976, some projects had been completed; others were yet to begin.

Two of the "sub-projects" under the loan -- specifically those aimed at housing assistance to the pueblos jovenes and community equipment -- were not implemented.

90)

(c) UN Casma/Cátac Project

Two UN projects, under which about 240 units were constructed, had as their purpose the demonstration of safer forms of building with traditional materials. Begun in July, 1972, the houses were constructed by about mid-1973. The cost of materials per one-family unit was about US$250.

The labor and locally-available materials (such as for adobe) were provided by each family, which also received about $250 for purchase of cement, roofing, woodbeams, doors/windows and plaster. Land was provided by ORDEZA - with expropriated land to be repaid in the form of 20 year bonds.

> "The principles of the self help and the techniques of construction seem to have been executed though some thought it took too long. However, the additions (to the basic house built under the program) do not seem to illustrate the continuing application of the construction principles except in a very few cases."

The major material expense was the cement asbestos roofing. Except for the lightweight quality and poorer insulation value it is not clear why galvanized steel roofing provided for the OAS temporary shelters was not reused.

Here again, repayment of credit was under the jusdiction of EMADI. An evaluation of repayment patterns should be made.

(d) Belgian Prefabricated Wood House Factory

With a US$200,000 grant from Belgium, backed up by smaller grants from CARITAS and two Belgian banks, a prefab wooden house factory was set up in Chimbote. The activity provided 148 jobs, but its main objective was to offer low-cost solutions to families who could not qualify for or gain access to credit.

As part of the initial grant, materials for 1,000 houses were provided. Thus, the program was able to "facilitate" houses for many families, some of whom received free housing. By 1976, however, the program was requiring 50% payment upon placement of order for the unit; and the balance within 60 days of that date. This, coupled with the high cost of production of the houses had, by 1976, "brought production of houses to a virtual standstill."

Some other problems with the approach:

- Peru'a lumber industry is not developed, so basing program on lumber supplies was not economical to begin with.

- The quality of hard wood in Peru is very high, making its processing extremely difficult.

- Wood houses are culturally unacceptable in the earthquake-affected region. Flamability, security and other considerations further discourage its use (possibly its thermal qualities as well)

- The cost of a wood house is about the same as that of the most desirable materials (materiales nobles) such as brick and concrete.

(e) USSR Prefabricated Houses

100 houses provided by the USSR arrived in Lima in October, 1970, coming into use in January, 1975, nearly five years after the earthquake. 90 of the houses were constructed in Yungay (the other ten burned in the warehouse before construction began).

Cost to recipients of the houses was $89/downpayment and $19 monthly payments for ten years, total US$2,370. However, many residents are not paying because they feel the houses were donated free to Peru.

The houses reportedly have the unusual appearance of chalets in the area - they are, in fact, built with prefab wood panels, tongue in groove type. They have high ceilings which assist in thermal adjustment of the units, and people seem pretty happy with them. They also have porches which people seem to like. But the important problem is fear of fires -- the houses are quite close together and one has already burned down (in addition to the ten that burned in the warehouse).

(f) CWS Stacksack Houses

Church World Services appears to have sponsored a pilot project of 100 houses using the stack sack system. Wall construction is done by filling burlap bags with a cement-sand-stone mixture, soaking them in water and stacking them up. The unfinished house costs about $700; finishing, including stucco facade, costs about $1,400, which for the type of house, according to the report, is the cheapest available.

EMADI/PERU is charged with loan collection - something that needs to be followed up to see how the program went.

The report indicates that people were enthusiastic about this small, pilot program.

(g) USAID Permanent Self-Help Construction

About 760 units, at a cost of about US$2,100 each, were constructed during the 1975/6 period, under an overall program of US$1.5 million. This is the largest self-help construction program undertaken by the Government of Peru up to 1976, according to the report. It is also the last housing program of ORDEZA's reconstruction efforts.

The $2,100 unit cost generally includes the cost of water, sewage and electricity. To qualify for a house, the household must have been a victim of the disaster whose family income was between $67 and $167 monthly. The loan is repaid over 20 years to the Peruvian Housing Bank (repayment rates should be checked out).

As the cost of building materials began to rise at the rate of 20% per year, the budget for each unit was inadequate. Yet the families somehow came up with the necessary materials and cash to supplement the program's resources.

One problem with the site planning is that the row-house pattern is used, with no space between buildings to absorb seismic shock.

The report indicates that most of the families were living in "temporary" (substandard) housing for six years before this program began. Further, there were virtually no savings between this "self-help" approach and contractor-built housing, as most of the labor was hired and ORDEZA's overhead was included in the loan cost.

4. Impact of Planning Studies

(Comment: One interesting aspect of the Peruvian Government's approach to housing reconstruction after the 1970 earthquake was its very strong emphasis on careful, detailed advance planning before it would permit building to go ahead. This was exactly the opposite of the Government of Guatemala's policy, which encouraged the most rapid possible reconstruction and which did not include the volume of planning activity which caracterized the Peruvian effort. Clearly, there are advantages and disadvantages of this planning process, and there are various approaches to such planning which can be taken. This aspect of the Thompson report is one of the most interesting. It tries to analyze some of the foregoing issues.)

A few of the planning efforts undertaken are summarized here:

(a) Plan for the Rehabilitation and Development of the Zone Affected by the Earthquake, three volumes, published March, 1971, 10 months after the earthquake

The overall approach addresses the philosophy according to the Government's political goals and the basic structural problems of the northern area of the country (beyond the area affected by the disaster). Gradual and effective participation in decision-making by residents, agricultural reform, extension of social services to marginal groups, and other goals are covered. The impact of the study was to provide some direction or approach and some statistics for the effort.

87)

(b) UNESCO/Japanese/French Technical Efforts on Town Siting, various efforts. UNESCO Report published November, 1970, in Paris.

The purpose of these various studies was to assess the vulnerability of alternative sites for towns destroyed in the landslides, taking into account soil conditions and other seismic information.

A number of reports were produced, chiefly, apparently, the UNESCO effort. Some of the recommendations were implemented; others were not.

(c) Planning Project for Reconstruction and Development of Chimbote, a nine-volume plan done between October, 1970, and June, 1973 by a team of 52 professional technicians, at a cost of nearly US$2 million ($1.2 million + 28 international technicians financed by UN; balance by GOP)

The plan was not analyzed by the Thompson report, although it appeared that some of the aspects of the plan were a bit unrealistic. Some of the proposals in the plan were rejected by Chimbote residents.

The establishment of the Buenos Aires site was the direct result of this planning effort.

(d) Master Plans: Huarmey, Yungay, Huaraz, Casma, Barranca, Pativilca; Caraz, Carhuaz, Recuay, an assortment of plans for nine towns, completed respectively by three contractors (at 3 towns each); produced about June, 1971. Total cost: US$130,000

These plans have had some impact; parts have been adopted, others discarded. The plans include a substantial number of economically unrealistic projections and projects.

GENERAL CONCLUSIONS BY THE THOMPSONS

1. Details about the choice of building materials are critical. Galvanized steel must be of substantial enough quality so that it will provide long-term use. Red coloring of asbestos roofing sheets probably facilitated the transition from traditional tile.

2. The planning approach was "high laudable but not highly successful. One result was a substantial loss of valuable time while awaiting policy recommendations. This may have been avoided if the critical decisions were staged and acted on as early as possible."

3. "It was of considerable loss that the educational program attempted in Peru was not more vigorous, especially since the manual was developed and such programs as that of the UN were demonstrating results."

4. If emergency shelters are to serve emergency needs, they must be available within the first week. However, most families can and did find alternative solutions.

Each of the solutions brought to the Sierra were met with strong - and valid - objections.

5. Layout of 'temporary camps' should consider the possibility that they will evolve into permanent settlements - they must consider adequate space per family and a strategy which will discourage seismically vulnerable row-house and other patterns.

(Some good reference materials are provided at the conclusion of the report).

Gersony

85)

August 23, 1981

NOTES

Convenio Unico entre ORDEZA y EMADIPERU Para la Administración de Créditos Supervisados y Bienes Inmeubles de la Zona Afectada por el Sismo del 31 de Mayo de 1970, dated 23 November 1977.

Evaluación de Resultados al 31 Diciembre 1978 en la Ejecución del Convenio Unico ORDENORCENTRO - EMADIPERU, Ing. Carlos Torrejon I., para el Directorio de EMADI-PERU

Both of the above documents are related to credit collection programs conducted in connection with housing reconstruction efforts after the earthquake of May 31, 1970.

The Convenio Unico is a synthesis of nine separate agreements between ORDEZA, the Government's reconstruction agency, and EMADI-PERU, the Government's credit collection agency. The Convenio Unico was considered necessary because of weak credit collection and serious disagreements concerning the actual amount of EMADI-PERU's costs in administering the program.

In particular, the document addresses the rather high rate of delinquency (not specified in the Convenio Unico) which plagues the program:

> "24° EMADIPERU cuidará que el pago de las amortizaciones se efectúe en la oportunidad establecida en el Contrato y deberá, dentro del término previsto en sus leyes especiales ejercitar la acción compulsiva que dichas leyes le franquee para evitar la morosidad."

The second document, prepared up to December 31, 1978, over a year later, is an evaluation of the credit collection system. The evaluation is based on data provided by EMADI through two offices: the Systems and Information Office, and the Economic Management Office.

The general conclusion:

> "02. A raíz de una evaluación de resultados a Diciembre de 1978, practicada en forma conjunta por funcionarios de las partes, se detectó marcadas deficiencias en la administración de los convenior suscritos, traducidos en: alta morosidad en las recuperaciones, dilatados procesos en los trámites administrativos, irregularidad en los desembolsos, y altos costos de administración."

Clearly the cost of administrating the credit had become a major issue between ORDENOR and EMEADI-PERU at the time of the evaluation. "La (EMADI-PERU), desde 1974 y en reiteradas oportunidades ha reclamado AL ORGANISMO le reconozca los "mayores gastos" en que ha incurrido en la administración de los Convenios."

In late 1977, a special Commission was set up to look into EMADI-PERU's complaints about insufficient reimbursement of administrative costs. But it was decided that the best thing to do was to defer discussions until they received the reports of a consulting group which was doing some work on the program. Discussions were deferred until April, 1978, but still no work was completed. So a special Commission was appointed by the Minister of Housing which met a few times beginning in November, 1978, and failed to meet again.

The overall Convenio, based on credits extended since 1972, could be described in financial terms as follows:

All in Millions of Soles

Type of Program	No. Loans or Units	Value (Net)	Recovered by 31 December 1978	Percentage Recovered
Supervised Credit	2,417	144.5	59.6	41%
Housing Units	8,349	626.2	188.1	30%
Total	10,766	770.7	247.7	32%

During this period, EMADI was paid S/40 million in Commissions, which was not deemed adequate to cover costs (runs at about 16% of what they collected, although for some reason the sheet shows they were to receive 9%). Insurance costs ran at about 7.2%.

Of the S/247.7 million collected, S/54.5 million were down-payments required in advance of delivery of housing units. So the actual amount of credit collected was S/193.2 million, or about 25% of outstanding net value.

The above data should be viewed with caution: it is not clear where interest is included; apparently the actual reimbursable costs to EMADI-PERU may be different from its commission -- thus collection costs could be much greater than estimated, etc.

What is really needed here is a follow-up survey by program. However, one definite figure which appears throughout the evaluation is that the delinquency rate is about 40%.

Further criticisms of program administration are:

"La revisión completa del texto del Convenio Unico (signed one year earlier to resolve program problems) permite establecer que (EMEADI-PERU) no ha dado cumplimiento a la mayoría de las Cláusulas que implican

compromisos de su parte."

There are differences within EMADI's two offices in terms of accounting records of 60% of the values involved.

Information provided by Economic Management Office is not precise, and the program is managed with only estimated figures.

EMADI-PERU has not complied with the requirement of forwarding to ORDENOR the monthly proceeds of credit collection, nor have reports and information required under the contract been provided.

The IBM-systems management approach taken by EMADI is overly cumbersome and should be replaced with a system which can provide up-to-date accountability data when needed.

Because of adequate supervision or evaluation, both in Chimbote and in Huaraz, there have been abuses of the units.

The type of fiscal-data management systems used by credit unions -- i.e., the savings book -- is recommended as a better management tool for this purpose.

The Thompson Report on Housing Programs after the 1970 earthquake should be taken as a basis, I feel, and the recovery of credit for each program should be studied. There may be significant disparities among approaches, among different particular programs within the same approach, etc.

Gersony

September 6, 1981

EXTRACT

El Terremoto de Lima del 3 de Octubre de 1974, InformeTécnico Preparado por CERESIS (Centro Regional de Sismología), por Dr. Alberto Giesecke, L. Ocola, E. Silgado, J. Herrera and H. Giuliani, published by CERESIS under a UNESCO Grant; Lima, 1980

This study was developed under a grant from UNESCO. It provides thorough seismological information about the 1974 earthquake in Lima.

In addition, this data presents a complete historical overview of the seismic and Tsunami history of the City. All in all, it is a good introduction to seismological phenomeno in Peru.

There are some comments on behavior of housing and some schools which are of interest to our particular project. However, generally there is little directly applicable information.

As a reference material, it should definitely be available in USAID.

Gersony

July 18, 1981

NOTES

Selected notes from
DRAFT: Report of the Disaster Preparedness Evaluation Mission to Peru, January 30, 1981, 27 pages (our copy without annexes)

1. Purpose The general purpose of the mission was to "identify modest projects and possible technical assistance activities which would form the basis of longer term disaster preparedness programs in each country," in this case Peru.

Specifically, the team was to:

- Review general civilian preparedness plans and resources (Civil Defense, Red Cross, private and voluntary agencies, etc.)

- Stimulate coordination among the various local preparedness groups.

- Plan an action program to improve the preparedness capability of each organization.

- Identify international resources to support these preparedness activities.

2. Visiting Participants The team was comprised of the following organizations:

- PAHO Enrique Massafero
  Jose Luis Zeballoj

- FEMA Jose Bravo

- LRC Alejandro James

- OFDA Ollie Davidson

- OTHERS Paul Flores (San Diego County)
  Douglas Zischke (Public Information Specialist)

3. Conclusions The conclusions of the team are excerpted and summarized in separate sections. The material excerpted is only that of interest to our particular team's mission.

4, Civil Defense

The low-priority status of CD within the overall government structure will make it almost impossible for the organization to manage the essential coordination of inter-ministry resources in responding to a major disaster.

The administrative procedures established to respond to a major disaster are not realistic. It is impossible to determine who would make major decisions. The Peruvian military would end up making all decisions.

There is no inventory of national resources to carry out the task. The existing organization is not prepared to respond to a major disaster. Response capability is reduced by lack of essential equipment, again due to overall low priority of CD.

Most likely, a plan for recovery and its implementation after a major disaster would have national priority and would not be, in the end, the responsibility of CD.

5. Red Cross

Region II of the RC is responsible for Lima. It also covers Ica, Cerro de Pasco, Huanvacelica, Junín, Huánaco, Ayuacucho, Callao, Coronel Portillo. It is assigned two major responsibilities in the event of a major disaster:

- First Aid

- Management of Emergency Camps

RC has little or no resource base of its own. It has one functioning ambulance; a few unreliable vehicles; no tents; few first aid supplies; three shaky generators.

6. Health Sector

(a) Ministry of Health has its own emergency committee for health. As a project for 1981, their few part-time personnel were to look at a resource inventory and to consider contingencies for hospitals, a concern which overshadows all other planning considerations (improperly in the view of the report). There is no coordination between the Ministry's own committee and Civil Defense authorities.

(b) Civil Defense Health Committee Formed in 1974, this committee has a rotating chairmanship, and no emergency plans. The Ministry of Health, Social Security, and the military health services are represented on the Committee.

7. Voluntary Agencies

The first major problem presented by the report is the feeling among the voluntary agencies that "Civil Defense views them as resources to be used after all Governmental and other resources are exhausted."

99)

The problem of clearing relief materials from ports and airports has apparently been an evolving problem for the voluntary agencies. This is apparently true in routine times and during emergencies. the 7DA group developed in Spanish four recommendations to deal with this issue:

- GOP should declare all relief materials as eligible for free entry in the country.
- GOP should facilitate the immediate removal of such materials from entry point, postponing the normal formal procedures for a later time.
- GOP through CD should divide the affected zones and distribute them among the voluntary groups and supporting agencies (?) to avoid duplication of relief efforts or depriving an affected area of assistance.
- The donations should be consigned by the donors directly to the (voluntary) agency which requested them. These agencies would undertake distribution in their assigned area, always in coordination with CD.

8. Recommendations

(a) Immediate Send some professional CD defense staffers to California to study procedures established there, participate in simulations, and learn about seismic research programs.

(b) Short-Term Technical assistance in three phases.

Phase I Develop a study of earthquake losses for greater Lima.

Phase II Develop EQ response strategies and estimates of emergency resources required, including international assistance.

Phase III Assess communications requirements required for a systematic response to an earthquake.

Phase IV Establish coordination systems for CD to manage inter-ministry resources in post-disaster context.

(c) Medium Term Develop composite risk analysis, with an evaluation plan for central Lima through six man/months of expertise.

9a)

(d) Long-Term

Establish a Civil Protection School which could serve first Peru and then the Region.

Make a detailed survey of the existing system to recommend improvements and emergency water provision systems.

Fund international symposia on seismic research, identification of risk, planning seismic safety.

Gersony

ANALYSIS

Cálculo de Recursos Alimenticios y Recursos Materiales para Los Sectores Críticos y a Nivel de Lima Metropolitana ante la Ocurrencia de un Sismo de Grado 8.4 (más o menos) 0.2 grados Escala de Richter produced in June, 1971, by the Office of Civil Defense, Lima, Peru

1. Purpose of Document: Although the document does not state its purpose, it apparently seeks to provide two sets of data concerning the need for food and equipment in order to respond to an emergency created by an earthquake in Lima. The first set of data provides lists of needs in the most critically damaged areas of Lima; the second set addresses needs of all critically damaged families in Lima.

The document assumes 60,000 dead; 700,000 severely injured; and 485,000 families whose homes have suffered severe damage.

2. Requirements: In response to the above disaster, the following emergency supplies would be required immediately, according to the study:

For Shelter and Warmth

485,000 tents	one for each family
64,667 tents	for emergency first aid
549,667 tents	TOTAL

690,000 blankets

862,500 pairs of pants
862,500 shirts
862,500 sweaters

874,255 camp beds
874,255 mattresses
356,755 bed sheets

For Rubble-Removal

230,000 picks
230,000 shovels
76,667 wheelbarrows
76,667 crowbars
46,000 sledge hammers

Food and Cooking Equipment

236,250 stoves
472,500 pots/pans
1,181,250 spoons
1,181,250 plates
1,181,250 cups or glasses

(60)

875 tons of food per day (= 6,125 tons of food per week = 135 million lbs)

including each day:	214,000 pounds	Milkpowder
	160,000 pounds	Fats/Oils (Veg Oil)
	214,000 pounds	Meat/Meat Products/Fish
	1,336,000 pounds	Basic Grains (Rice,Wheat,B
	1,924,000 pounds	= 875 metric tons per day

Halazone Tablets: 5,200,000 per week (about 741,910 per day)
53 gallon water containers: 142,702
5 gallon water containers: 1,455,000
Water Tankers of 3,500 gallons: 1,413 X 3 trips per day = 4,240 trips daily
Water: 14,838,206 gallons per day (= about 60,000,000 litres per day)

Candles: 485,000
Lanterns: 16,167
Lamps: 108,940
Kerosene: 242,500 gallons per day (= 4,575 cylinders daily)
Cylinders: 4,575

Note: In addition to appearing in the document, these figures were used to respond to a British inquiry on what kinds of supplies would be needed during the first 36 hours after an earthquake in Lima.

3. Analysis

It has not been possible to examine each individual item in the list, but analysis of some has given pause for thought.

Example: It appears probably that the number of tents in Peru at the moment is very limited. So that provision of tents from overseas, principally by donors, would be required in the emergency.

The 550,000 tents required would work out as follows:

at 80 lbs: 44,000,000 pounds = 22,000 short tons = 20,000 metric tons
at 8 m2: 4,400,000 cubic feet of cargo
at US$500 per tent: US$275 million + US$165 million transport = US$440 million

The logistical requirements for airlifting (or even shipping) these quantities would be staggering: perhaps 1,200 727-flights could aircarry the load.

79)

October 2, 1981

EXTRACT

PEOPLE AND HOUSING IN THIRD WORLD CITIES:
PERSPECTIVE ON THE PROBLEM OF
SPONTANEOUS SETTLEMENTS
D. J. Dwyer c. 1975 Longman Inc., N. Y.

(LYNCH)

This extract is related only to the expansion of Pueblos Jóvenes around Lima. The book also covers urban experiences in Caracas, Hong Kong, Malaysia and India.

Cuevas Movement north of city in 1960 - 500 people moved into the desert valley 6 kilometers from Lima largely from inner-city tenement areas in Lima. They formed an Asociación de Padres de Familia a few months before the move with the purpose of securing better housing. The Peruvian Government quickly evicted them from the land tempora .ly. However, since it was near Christmas, they allowed them to occupy part of the site.

At first the people set up estera mat shacks in a haphazard fashion. At the same time technicians hired by the leaders of the invasion were marking out regular house lots. As soon as the layout was completed, which took two months, each family transferred its temporary shack to the plot allocated by the organizers: Land was also set aside for schools and shops. Despite the general lack of urban services, within a few months most families had become very much better off environmentally than they had been in the inner city slums.

The attraction of the river valley, the hills and the desert was that they were vacant and usually publicly owned. As such, they provided ideal sites for the development of spontaneous settlements, or barriadas.

Much of Peru's industrial development of the last two or three decades has come to Lima, which now accounts for at least two-thirds of the industrial output of Peru and over nine-tenths of the financial activities. As a result, its inhabitants receive two-fifths of the total national income and the city contains over half the Peruvian population with incomes above subsistence level.

Between 1945-1965, the number of immigrants coming to Lima from Peru's small towns and impoverished rural areas increased from 25,000 to 80,000 annually, and accounted for slightly more than half of the total population growth of the city. At least two-thirds of the immigrants came from smaller provincial towns rather than directly from the countryside, indicating a pattern of step migration.

During the decade 1950-1960 an average of 6,847 housing units were completed annually, mostly by the private sector. But the population at this time was growing by 80,000 to 100,000 a year, and at an occupancy rate of five persons per unit. Lima required 16,000 to 20,000 new housing units a year (not counting replacements for deteriorated dwellings). Much of the housing deficit was met unofficially in the barriadas (pueblos jóvenes).

The mushrooming of spontaneous settlements in and around the city is a phenomenon only of the later 1950s and the decade of the 1960s, for during this period the number of squatters increased from 120,000 (in 1956) to approximately 800,000. Today (1975) squatters constitute almost 40% of the total population. In all, the construction of spontaneous settlements probably accounted for more than four-fifths of the physical growth of Metropolitan Lima during the last decade.

Poor and insecure households, perhaps dependent upon casual jobs in an uncertain labor market, will probably wish to maximize employment opportunities and therefore place a high premium upon the location of their dwelling in close proximity to sources of employment, usually in the inner parts of the cities. The less poor, more regularly employed will have a wider radius of housing choice and will be able to seize a building plot on the urban periphery more easily. (Note: I don't believe it's that simple).

Turner (see footnote) compares the usefulness of the self-built home in the spontaneous settlement and what he calls the 'instant development' procedure; that is, the officially provided minimum standard housing project. Favoring the former, he claims that much of what passes as conventional wisdom regarding urban housing problems in the developing countries is inappropriate to the real situation because of conceptual confusion between what he terms the "architecture of molds" and the "architecture of systems". Because the building forms of the barriada are based on a system they are flexible and can respond to changing needs and demands. Construction can be suspended if family income falls, for example; alternatively a second storey can be added to the dwelling to accomodate a third generation.

The public housing project, though superficially sophisticated, places its inhabitants into inflexible molds, Turner claims. As such, it is

unresponsive to the changing needs of the poor and inhibits their socio-economic development, upward mobility, the investment of their savings and their skills and initiative.

Turner consistently stresses the need of the inhabitants of spontaneous settlements for security of land-tenure. This is their most fundamental requirement; and he links aspirations to land-tenure with what he has called the 'creative' nature of home building, the need for an 'anchor of hope' and 'the stimulation of social development through the cultivation and strengthening of the family'. Spontaneous settlements represent a solution rather than a problem; they represent a solution to the housing problem of the low-income groups of the cities of the developing countries as conceptualized by the urban poor themselves.

The fostering of spontaneous settlement will, inevitably imply in a majority of cases a widely spread city of relatively low density with such settlements on the periphery. While this may have merit as a solution to the housing problem in certain circumstances, inherent difficulties of transport services, of the extension of roads, water supply, lighting and sewerage, of industrial location and of the journey to work must be recognized.

At a micro-level, one of the most critical difficulties lies in the poor design and layout both of the individual dwelling and of the community as a whole when constructed almost wholly by unskilled and often ignorant workers who, if not direct migrants, may be only a few years removed from rural hinterlands. At the level of the individual dwelling there is usually a marked tendency to produce already known but basically unsatisfactory forms, either those of the houses of the poor in the countryside or those of the urban slum near the city center.

Surveys of barriadas (pueblos jóvenes) in 1970 showed that the inhabitants had an intense feeling of concern not only with the lack of property title, but also the location of medical services. Among the physical facilities, the unpaved condition of streets, presumably because of the dust problem caused by Lima's dry climate; and the absence of water and sewerage services rank high as sources of dissatisfaction. Education was considered satisfactory.

The provision of technical aid for house construction ranked low in the survey. There was also very little interest in obtaining credit for house building through institutional channels, siting there was a reluctance to assume any continuing financial burden. Also, most families prefer to add to their houses piecemeal as and when money and time became available.

PREVI Project - The United Nations Development Program Special Fund, started the Proyecto Experimental de Vivienda (PREVI) in July 1968

using a mixed team of local and United Nations personnel. The overall objective was to develop new methods and techniques for application on a significant scale as part of Peru's housing policy. So far these new approaches have been sought through three pilot projects: in low-cost housing design; the improvement of inner urban areas; and planning for rational establishment and growth of new spontaneous settlements. Activities in the field of low cost housing design have proved controversial, especially in so far as they centered around an international competition held by PREVI in 1969 for the design of 1,500 dwellings, which was opened to Peruvian architects and to thirteen invited foreign architects.

This expensive competition was clearly not aimed at solving the problem of mass housing which concerns the poor, for the design specification requirements were better suited for lower white-collar workers seeking regular housing than for the inhabitants of Lima's pueblos jóvenes.

It has since been decided to build groups of pilot houses in various parts of the project area, using a large number of the designs submitted, not merely those of the competition winners. Criticism of these activities has grown considerably in Lima, especially at the lack of practical results that can be applied on a significant scale to current projects. PREVI's activities in the field of low-cost housing design seem to violate what should be a basic premise for action-oriented research in the field of technological development for Third World housing; that it is almost never possible to justify expensive investigations that are not directly oriented to building cities for the poor, cities planned around the basic housing and other environmental needs of the mass of the people.

NOTES FILM TITLE: ESPACIO VITAL

Catholic University Film about Pueblos Jovenes
provided by HKaufman, Family Health Officer, AID/P
Gersony & Lynch

1. Purpose In order to understand the background of the pueblos jovenes, the Family Health Officer arranged for a screening of this film, recently purchased by AID/P.

2. The film described a particular land invasion which led to the settlement of a pueblo joven in the Canto Grande area, one of the areas which we will be looking at in the field.

3. The invasion began on February 19, 1976, when a group of families invaded public lands near the Huascar Bridge, outside of Lima. The families were mainly renters (48%) and lodgers (52%) who lived in inner City slums.

For about four days the families lived in shelters which they constructed for themselves at the initial invasion site. During this time, additional families arrived.

The shelters which they constructed consisted of wood (2X2?) poles covered with fairly thick plastic (table-cloth type?) sheeting, with a combination of cardboard and plastic sheeting for roofing.

4. On February 23, 1976, the Government moved the invaders to a cleared site in Canto Grande, about 45 minutes from the center of Lima. The site had no services: it consisted of an open, flat area with plots of varying sizes (90, 120, 140 square meters) delineated with paint on the ground.

Sites were distributed to the families through a lottery: the size and location of the individual lot was a question of chance. People brought with them the shelter materials they had used at the initial site, plus some hardboard or plywood sheets, petates (esteras), mattresses, and other belongings.

One family showed how they had built their own simple latrine in 12 hours: basically a hole in the ground about 2.5 - 3 feet in diameter, reportedly more than 2 meters deep, covered by a wooden pallet. Their shelters were built again of the same materials used in the temporary site, but seemed to incorporate some of the other materials as well.

("...documentos en la mano y abiertos..." one person kept yelling during the lottery)

Water for the site was provided by private tank trucks, at that time charging S/10 per liter for fresh water, S/8 per liter for salt water. There were complaints that he didn't deliver much water to that area - he went to another area where people paid more for the water (PJ water rates are 15 times those of downtown areas).

Apparently very quickly after the new site was occupied, a store sprang up with basic foods and supplies - seemed well stocked.

5. By July, 1978, the same site appeared to be vastly better developed, at least in terms of quality of housing, thermal materials, etc. There seemed to be a lot of building with brick (some adobe?), but with concrete roofs. It seems unlikely that the roofs are stable. Could be a major source of injuries in an EQ 10PM - 6AM.

6. People seemed happy with their little plot of land. They had been paying S/700 a month rent before. The layout of the area was simple but adequate. There didn't seem to be much expectation for a lot of Government services. What is the applicability of this to emergencies (just life compressed by a factor of a thousand, anyhow)? Could a system be mobilized to get people onto their own land, even if somewhat remote, for 100,000 families in a few weeks? Somebody around here seems to know how to do it: can the ability be multiplied? land made available?

Note: This film is in the film library of USAID's Urban Development Division. Contact Person: Ing. Rodolfo Salinas

August 22, 1981

NOTES

Analysis of the Potential for Housing Improvement in High Risk, Vulnerable Areas of Peru, Frederick C. Cuny, INTERTECT, April, 1979 (developed under an AID Grant)

This booklet is a useful general overview of the potential for upgrading the seismic-resistance of housing in Peru; its conclusions seem pessimstic: this area is not a priority within governmental or non-governmental organizations, and the probability that activities designed to meet this need will be carried out is low. However, the technology for such improvement exists or is in advanced stages of development and some small-scale projects with limited objectives could probably be carried out.

A strong feature of the booklet is its overview of Governmental and non-Governmental agencies in relation to this theme: each major agency with an existing or potential role for participation in housing disaster mitigation programs is described and its activities reviewed in general terms. It is a good introduction to the field.

Two items of interest to a Lima plan:

- The Ministerio de Vivienda estimated in 1979 that about three million people — (60% of the population?) of Lima live in non-engineered structures that do not meet basic seismic-resistant guidelines. Spiraling costs are a main constraint for low-income families who might wish to incorporate seismic-resistant features in their buildings; the prices of lightweight roofing materials, cement, wire and, in many cases rock and gravel, combined with increased interest rates (in even the small number of cases where loans are available) make disaster mitigation activities very difficult.

- Under a section entitled "The Bureaucracy" Cuny comments:

  Even emergency programs (which in other countries can be developed and approved often in a matter of days following a disaster) have never gotten beyond the talking stage in Peru, due to the long bureaucratic process necessary to delegate funds. Unless a foreign agency is willing to put up the money and, in many cases, to staff the emergency program, small-scale disasters generally receive no more than a superficial site visit by the appropriate agency.

The paper contains some excellent graphic materials:

- Figure 1: A map of Peru graphically demonstrating the various types of housing built in different regions of Peru

- Figure 2: A simple presentation of plate tectonics of Peru, including (A) Principal Fault, and (B) Schematic of the Subduction Zone near Peru

- Figure 3: An 8-1/2 X 11 reproduction of a map showing seismic activity in Peru, including relative depth, pre- and post-1913.

- Figure 4: An 8-1/2 X 11 reproduction of a map showing Energía Liberada por Sismos Mas Superficiales que 400 Kilómetros

(Both Figures 3 and 4 are produced by the National Planning Institute Geographical Advisory Group)

- Figure 5: A map produced by INTERTECT dividing Peru into three zones, according to relative degrees of seismicity (Lima falls into Zona I).

Latin America: Housing Survey for Disaster Relief and Preparedness, OFDA, March, 1981; Peru Section (pages 94-105)

1. Average Number of People per Household: 5.1

2. The report summarizes the findings of the Thompson/OAS and INTERTECT reports on housing solutions after the 1970 earthquake:

(a) 500 Igloos supplied by the German Red Cross were still being used in 1976 but the people did not like them at all.

(b) Some barracks-style buildings (multi-family units) with corrugated cement/asbestos roofing were built but not appreciated. The communal living arrangement, dirt floors, and lack of windows have been cited as reasons for their generally negative reception. Their construction period (3-6 months) made them inappropriate as disaster solutions. The plan to reuse the materials in permanent structures was unfeasible. AID paid for about 600/700 of these units.

(c) Zinc sheets provided by OAS were not helpful because of their thermal characteristics.

(d) Tents provided by the USG "were still in use long after the initial emergency period. They could not provide adequate shelter in the disaster areas.

3. After the 1974 earthquake near Lima, USG financed the purchase of esteras (woven cane mats) to be used as shelters. They worked out OK but supply lines were all tied up because of the small number of producers.

Comment: This was a good option, but the problem was predictable. Let's find someone who worked on this, maybe in Ministerio de la Vivienda.

4. The report refers to an unannotated report that 75% of the population of Lima live in pueblos jovenes or in tugurios.

5. The report asserts that progressive improvement of living conditions and services have characterized the development of the pueblos joevens, as opposed to the tugurios. 71% of urban housing have permanent roofs (of which 25% are made of concrete).

6. Most of the information is drawn from the AID housing sector survey, or from the INTERTECT or Thompson reports mentioned above. Two points of interest:

(a) When the pueblos joevens began their development (which is the same situation as after an earthquake in some respects), what materials did they use. Apparently, given the incentive of their own lot, these materials were considered by them to be adequate.

(b) One of the biggest problems after the 1970 earthquake seems to have been the long-drawn out, confused planning process which followed as GOPattempted to guide rather specifically the reconstruction process. A major lesson was learned here, but what was it?

Estudio Sismico de las Viviendas en el Distrito de La Victoria

from Thesis by Jose L Medina Avila, 1977

Pozos tubular con equipo - ⊕ (WELLS)

N.B. The water table for this District is found to be between 70 & 120 ft.

ref. no.	approx address
2	980 Av. Canada
4	449 Av. Palermo
5	1180 Av. Canada
7	Kodak Peruano, Av. Alejandro Bussalleu, (near 501 bloc of Av. N. Arriola)

Pozos tubular sin equipo - O

5	Ministerio de Energia y Minas Compound

Housing types

Type A 75% adobe, ladrillo (highly vulnerable)
Type B 50% well preserved adobe, unreinforced brick

For El Distrito de La Victoria

Type A 41-60% found within the following quadrant
east boundary - Av. San Pablo
south boundary - Jiron Hipolito Unaue
west boundary - Jiron Abtao
north boundary - District border

Type B 41-60% found within the following quadrant
everything except for the eastern quadrant separated by the Av. Mexico & Av. Aviacion

The most vulnerable area in Distrito de La Vicotia appears to be the mid-northern section, most of the rest of the district is only moderately vulnerable (this is in relation to the type of construction that the residents are living) However, the most concentrated number of people appear to occupy the area north of Av. Mexico.

R. Lynch
28/7

142

September 7, 1981

EXTRACT

Mensaje al Congreso (STATE OF THE ECONOMY ADDRESS), Prime Minister Ulloa, August 27, 1980

There were a few points in this 50-page single-spaced speech which are of some interest to our project:

1. The housing deficit is estimated at one million units, of which 40% are in Lima. Thus, 51% of Peru's urban population live in conditions described as "tugurios desprovistos de las más elementales condiciones" as far as health, water and sewerage is concerned.

From 1968 to 1980, he reports, only 11,781 houses were constructed (assume he means by the State).

2. Of a population of 18 million persons, only 5-1/2 million can be classified as "economically active". Unemployment is 7%, but underemployment affects 52% of the population. Only 40% of the work force has stable employment and receives a salary equal to or greater than the minimum wage.

3. In the decade of the 1970's, the cooperative movement was distorted for political purposes by SINAMOS.

4. 50% of the annuel budget is dedicated to serving the debt and military spending.

5. Cooperatives On page 22 of the address, numerous comments are made concerning the cooperative movement. The policy of support for cooperatives is traced back to those of the democratic governments of 1963 - 1968. The Government "supports the objectives of developing the cooperative movement in all of its aspects" and particularly:

- Promotion and protection of cooperativism, and efficient system for the development of the national economy, strengthening democracy, and insuring social justice;

- State guaranteed right of cooperatives for its free development, and the autonomy of cooperative organizations;

- Re-establishment of the Instituto Nacional de Cooperativas, "con facultades y atribuciones más amplias";

- Encouragement of cooperative integration through tax incentives;

- Special emphasis on the Financial Integration of the Peruvian Cooperative Movement, including the Banco Nacional de Cooperativas.

- Perfecting (refining) the General Cooperative Laws, in accordance with suggestions of the national cooperative movement.

6. Housing A methodology for housing development includes utilization of "la capacidad de ahorro e iniciativa de la población encausándola al mejoramiento de sus instalaciones habitacionales implementando el Banco de Materiales."

Also, "el oportuno abatecimiento de materiales de construcción."

7. Electricity

Two essential projects are described for electricity:

The thermal plant for Lima, in which the World Bank has apparently expressed agreement, in principle, for financing of US$180 million.

Construction of a third major line from the Río Montaro hydroelectric plant to Lima, which could be a reality in three years if the programs is completed on time.

Comments

This STATE OF THE ECONOMY address obviously is not directly related to an emergency plan for Lima. But the emphasis on cooperatives, and the Government's strong support for an autonomous cooperative movement, are interesting and important in connection with the Government's reaction to cooperatives as a post-disaster distribution mechanism.

The mention of the Banco de Materiales is important, and might provide a good idea fo an implementing agency which could be considered.

The concept of the "housing" and "services" deficits will definitely come into discussions on post-disaster housing policy. Also, the number of houses built by the State appears to be an issue which is broached -- it could disappear as easily.

As one of our past approaches has addressed under- and un-employment rather effectively, this might be received sympathetically.

Gersony

July 16, 1981

NOTES

Extracted from:

Protección de Lima Metropolitana Ante Sismos Destructivos
Ing. Julio Kuroiwa H., Profesor Principal, Universidad Nacional de Ingeniería, y Miembro del Comité de Asesoramiento Científico del Comité Nacional de Defense Civil. (Published in 1977, a tribute to the 100th Anniversary of the University)

These notes don't attempt to serve as an ABSTRACT; I have noted only items which are of particular interest to the work we are undertaking.

1. The general purpose of the study is to determine the impact of the most probable destructive earthquake in Metropolitan Lima. This emphasis is justified because 25% of the population resides in this area and where 70% of Peru's economic activity is based.

Comment: This is an interesting justification - because that means that the other 75% of the population develops only 25% of the economic activity.

2. The most vulnerable zones of the parts of the City which were studied are:

Barrios Altos	Cercado
Rímac (Parts)	Barranco
Callao	Chorrillos

Their vulnerability is based on density of population, and use of construction materials (adobe and quincha) which have been severely weakened by humidity and time.

3. The least vulnerable of the areas studied are:

San Borja	Chacarilla del Estanque
Corpac	

4. In terms of risk to the water system, the three areas of danger are:

- Unfavorable soil
- Soils of mixed quality
- Old tubing

5. Japan is spending more than S/75,000,000,000 (=US$340 million?) per year on earthquake preparedness in Tokyo.

6. In general, the study concludes that adobe structures are the most vulnerable, but that brick buildings are not being built, except in a few cases, to seismic resistant specifications.

7. The study (presented in about 136 pages, double-spaced) required four years in preparation and is described by the author as a mere outline of the problem.

8. On October 3, 1974, Lima suffered an earthquake of a grade estimated at between VI and VII MM. A visiting Japanese expert, Professor Hajime Unemura of the University of Tokyo, estimated that if the intensity of the earthquake had been slightly higher, it would have resulted in a "true catastrophe".

This study takes as a base the same hypothesis: an earthquake just slightly more intense than that of October 3, 1974, and comes to the independent conclusion that Professor Unemura was correct in his assertion.

9. Metropolitan Lima includes an area of approximately 3,900 square kilometers (km2), with its urban core of about 261 km2. It covers 30 km from north to south and 25 kilometers from east to west.

Comment: On the map which we will prepared, the various sectors of the City will be identified by informal designation; districts; populations; and economic type of housing (tugurio, pueblo joven, urbanization, middle-class housing)

10. History of Earthquakes in Lima

Lima suffered its first recorded earthquake on July 2, 1552 (there are no records for earthquakes before the Spanish period). At that time, King Carlos V of Spain ordered that no construction in Lima could exceed 6 varas (= 5.20 meters).

On October 20, 1676 at 0415, Lima again suffered a XI level MM earthquake, this time including a Tsunami which destroyed Callao, killing 100 persons.

About sixty years later, at 2230 on October 28, 1746, Lima suffered the worst earthquake until that time and to date. Of 3,000 houses, only 25 remained standing. About 1,141 persons (of a population of 60,000), or about 1.9% of the population was killed. 90 minutes after the earthquake, two Tsunamis destroyed Callao, killing 4,800 or its 5,000 inhabitants. Nineteen vessels and the port were destroyed.

Another sixty years later, on December 1,1806 Lima suffered a strong tremor which lasted for 1.5 to 2 minutes.

One hundred and thirty years later, on May 24, 1940 at 1135, an VIII MM earthquake caused substantial damage: 180 killed (of which 100 in Callao). In Callao, 5,000 houses collapsed; in Chorrillos 80% collapsed.

Thirty years later, at 1533 on May 31, 1970, an VIII MM earthquake caused 65,000 deaths and massive destruction about 350 km (217 miles) north of Lima. But the actual damages in Lima were moderate.

Note: The above represents a selection of the more serious quakes in the not a comprehensive list.

7b)

11. A central hypothesis of the study is that soil quality is the central element in predicting earthquake damage, as depending on the quality of the soil it will absorb more or less of the impact of the seismic waves produced in an earthquake. Of course, the quality of construction of the resources which are analyzed is considered as well.

12. In housing, mostly the more central areas of Lima were considered, and a sample of about 0.95% (less than 1%) of 90,067 houses in the areas studied was used. These houses were located on 194 of a total of 1,881 blocks in the area studied.

The study refers to a 1967 research project which determined that 36% of the population of Lima lived in tugurios (inner city slums), occupying only 5% of the urbanized area of the districts. (Estimates are that 500,000 people live in these conditions in the City at present, but that needs to be checked, Ed note).

The most critical tugurio zones are:

Surquillo	34% of the population live in tugurios
Lima (Old City)	36.6%
San Miguel	28.5%
La Victoria	28.8%

Tugurio housing typically is old construction, 2 to three stories high, made of adobe and quincha, with only one central patio and one exit.

13. Hospitals

See attached chart, listing the hospitals studied and a thumbnail assessment of each.

What needs to be considered, in addition to everything else, is that some of these hospitals are going to collapse on their bed patients, many of whom will not be capable of moving to avoid injury, and who will need immediate medical care after an earthquake. Also, according to the report, 90% of the beds are full at all times. The study estimates 14,500 beds (11,800 in public beds, 2,700 in private sector).

Question: Does this include military hospitals, social security, etc? How many hospital beds will be needed after the earthquake.

14. Schools

The study looked at a 10% sample of 1,417 schools in Lima. Of the 144 schools examined, about 122 are primary schools and 22 are secondary.

About 20% of the primary schools would collapse immediately in an earthquake, while an additional 30% would be so severely damaged that their could not be occupied: a total of 50% of the primary stock out of commission.

75)

Of the secondary schools, only 5% would collapse immediately. But, significantly, about 65% would suffer severe damages renedering them unusable.

For both hospitals and schools, the tugurio areas and environs also have the weakest constructions for these types of buildings.

15. Industrial Buildings

Based on a sample of 92 industrial buildings (representing between 5% and 12% of such buildings depending on the type of industry), about 2% would collapse immediately. About 40% would suffer severe damages (these would break down as follows: food and food processing, 36%; light industry 26%; tobacco industry and heavy industry, 57%).

Of course, the effects on transport, shipping, finance and other areas could affect industry as well.

Breña is the area of Lima where the highest proportion of damage is anticipated (45% of its buildings).

50% of the industries studied had emergency plans, of which none had considered earthquakes. 10% of the factories have equipment and trained personnel to combat fires; 70% have only (I assume fairly small) fire extinguishers; 24% have nothing to fight fires with.

14% have no first aid equipment or medical services; 70% have first aid kits; 16% have some type of on-site medical assistance, of which 10% are on a scheduled basis and 6% are not.

16. Water

Comment: One statement in the study begins, "Además las epidémias pueden afectar a las poblaciones después de los sismos..." (In addition, epidemics can affect the population after an earthquake.). Miguel Gueri might want to talk with the author about this point.

ESAL operates 128 wells. But the Division of Underground Water of the Ministry of Agriculture has about 2,000 wells registered, controlled by private individuals.

17. Electricity

Comment: The study does not address whether the electrical distribution system shuts down automatically when it senses a tremor.

90% of the power comes from hydroelectric centers located in Santa Eulalia and Rímac. In 1972 ELECTRO-LIMA served 425,000 customers (= 1,830,000 people out of a population at that time of 3,355,000). No mention is made in the report of the water services provided by private tankers.

2.9% of its energy goes into well-pumping, as of 1972. 45% goes to industry, 30% to domestic consumption, 16% to commercial services, and 5% to public lighting.

18. Ham Radios As of 1977, there were 750 ham radio station/operators in Lima.

19. Tsunami Information : The first tsunamic wave would likely reach Callao 15 minutes after the earthquake, serving as a sort of warning to the population. But the study recommends preparedness for evacuation and training for people in the area if complete tragedy is to be avoided.

20. Fires

The principal causes of fire projected by the study are:

(a) Short circuits

(b) Breaks or leakages in containers of flammable liquids

(c) Electrical apparatuses which are turned on fall over.

(d) Escaping of flammable gas from leaky tubing

(e) sparks produced in explosive atmosphere

The problem is especially serious in local industries, because of the large variety of machinery and equipment and the presence of raw material and flammable materials, and the density of workers around the area, any one of whom can inadvertently cause the fire.

On the other hand, even in the best of times, water for fire fighting is short: ("...es notorio la desproporción entre la cantidad y disposición de los hidrantes contra incendio y la población actual...")

The volunteer fire corps, called BOMBEROS, "despite its outstanding efforts, it can count today with obsolete equipment; an inadequate number of pumping cars and telescopic ladders..."

Comment: Meaning curtailing the causes of fire is especially important.

With respect to Tokyo's disaster preparedness plan, the study states: Fires are investigated with great dedication...because of the danger of live fires (at the time of an earthquake) or short circuits .

Comment: What would be the feasibility of sending Peruvian officials to an earthquake somewhere else in the world at a moment's notice, so they could get an idea of what they would face?

21. The study proposes that Parques Zonales be used as temporary shelter areas, and that full services be provided by Government to those areas!

73)

22. Comment: What are the benefits of planning?

(a) Faster start on the response - a one-time benefit

(b) Ability to apply policy, not just react to circumstances

(c) Smoother coordination makes response more effective.

23. Bibliography There is a lengthy technical bibliography at the end of the study - of interest to scientists and engineers specializing in the area.

72)

(This sample was selected on the basis of patient capacity and location in areas of greatest anticipated destruction.)

ANALYSIS OF NINE KEY HOSPITALS*

	Name	Location	Number of Beds/ Normal Occupancy	Type of Construction	Access	Comments
1	Hospital Materno-Infantil San Bartolome	Barrios Altos, Lima	300/90%	Adobe/Quincha, single story; many walls disintegrating due to humidity; many have cracks from previous seismic activity**	Vulnerable: possible collapsed buildings on next block	Old construction - single storey
2	Maternidad de Lima	Barrios Altos, Lima	452/100%	Three types: adobe, brick, and a 5-storey concrete/steel building. The adobe section looks very weak.	Vulnerable: same as above	Could install add. beds in emergency
3	Hospital "2 de Mayo"	Ca. Plaza Carrion & Av. Grau, Lima	600/90%	Three types: (a) adobe, (b) brick, (c) concrete/steel. Both (a) and (b) have humdity/cracks and are very vulnerable.	Probably OK	95 additional beds could be installed 1000 minor cases could be handled daily.
4	Hospital "Arzobispo Loayza"	Lima, ca. plaza 2°de mayo y Ramón Castilla	700/95%	Built in 1924 - part adobe, part brick. Humidity/cracks.	Probably bad. Some additional exits should be installed.	50 additional beds could be mounted; 1000 minor cases daily could be handled.
5	Hospital del Niño	Breña	670/100%	Modern 8 storey + brick (2 & 3 storey) Construction looks OK	OK	Has some stand-by electrical equipment. Capacity for 230+beds/1200 mcd's
6	Hospital Centro de Salud/Rímac	Rímac	250/90%	Modern concrete/steel. Danger of damage from contiguous buildings.	OK	Stand-by power. Capacity: 40 + beds 1000 mcd's

* From "Protección de Lima Metropolitana Ante Sismos Destructivos", Ing. Julio Kuroiwa H., Universidad Nacional de Ingeniería, 1977

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* "Protección de Lima Metropolitana Ante Sismos Destructivos", Ing. Julio Kuroiwa H., Universidad Nacional de Ingeniería, 1977

7	Hospital Materno Infantil de Bellavista	Callao	30/100%	Modern - concrete/ steel & brick - OK	OK	Capacity for ten additional beds, can handle 200 minor cases daily
8	Hospital San Juan de Dios	Callao		Concrete/Steel but may have some deficient aspects - has suffered damage in previous tremors	OK but could use more exits	
9	Hospital Centro de Salud Santa Rosa	P. Libre	157/80%	Concrete/steel 2 - 5 storeys	OK but due to traffic could benefit from opening some rear exits	

Note: Except where otherwise indicated, all hospitals depend on the City system for water, electricity, and sewage removal.

July 16, 1981

ANALYSIS

Plan de Operaciones de Emergencia, Lima Metropolitana, Comité Nacional de Defensa Civil, Secretaría Ejecutíva, 1981, prepared with the technical assistance of Paul Flores, USAID Technical Assistance Contractor

1. This plan, published in June, 1981 is the first formal document of its kind for Lima which has been produced. Defensa Civil has had some very general documents related to disaster response, but none of these, according to Mr. Flores, remotely resembles the specificity of this one.

2. The document sets forth the following:

(a) An inventory of major tasks which would need to be accomplished following a major earthquake in Lima. The tasks are not presented in an order of priority. The list is not necessarily complete. The tasks are generally described in two sentences in conceptual form.

(b) For each task/concept, a number of Government agencies are listed. Each agency plays a role in addressing the specific task. In some cases, there are a few key points describing the substance of what needs to be accomplished; in others, the same rather general description is provided for all of the participating agencies.

(c) Several sections deal with the manner in which Civil Defense itself will organize to seek out, receive, process and manage information.

3. Value of the Document In our view, the chief value of the document is that it has provided a vehicle through which at least a basic list of 24 major tasks have been considered; and there is a list of the agencies which have the capacity to participate in the solution for each problem.

August 27, 1981

EXTRACTS

Audit Report: PL480 Title II Programs, USAID/Peru, Audit Report Number 1-527-81-2, October 30, 1980, Area Auditor General, Latin America, AID

1. Background

This audit report, covering the period July, 1977 through March, 1980, addresses the Title II program in Peru and its principal implementers: three voluntary agencies (OFASA, CARITAS, CWS/SEPAS), and the Government of Peru through the Ministry of Education, Ministry of Health and ONAA. The Foresty Division is included as it collaborates with SEPAS in the reforestation program.

The team originally requested this audit from the Food for Peace Office, but at that time the office was under the impression that it was classified and could not provide it.

This extract selectively focuses on issues -- most of them criticisms -- which could provide valuable lessons for disaster programs here. It is not meant to be a representative sampling of the audit's content.

2. Each of the voluntary agencies has received an OPG to assist in strengthening the operations of the Title II program; these grants have amounted to:

CRS/CARITAS	$160,000
CWS/SEPAS	343,000
SAWS/OFASA	388,000
	$891,000

These grants probably cover a period of about two years.

3. Pages 1 and 2 of the audit, under "Background" provide a brief but concise description of the activities of all of the agencies under the food program. With some editing, it would be useful to include in our plan as background information.

4. Beneficiary Data (Where Provided by Audit)

Agency	Type Program	Number of Beneficiaries 1977	1980	Target for 1981
CRS/CARITAS	FFW, MCH	240,000	473,000	500,000
CWS/SEPAS	FFW			100,000 (20,000 emp +80,000 dep
SAWS/OFASA	FFW, MCH	33,000	120,000	(120,000?)
GOP Min. Ed. Min. Health ONAA	SCH (a breakfast or a lunch)			500,000
				1,220,000 TARGET

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5. Findings (paraphrased unless in quotes)

(a) CARITAS: Little control over program; substantial changes implemented by local groups without awareness or approval of CARITAS Central or AID, "food was not being distributed in accordance with AID nutritional and developmental policies." Some of these changes, however, brought about for reasonable motives -- but finding highlights lack of monitoring and control not misuse (p. 4)

(b) Delays in Delivery of Food from Port (p. 5)

Port Authority require following documents to remove food from their warehouses:

Bill of Lading
Commercial Invoice
Phitosanitary Certificate from USDA
Phitosanitary Import Certificate signed by Min. Agriculture
Deed of Donation signed by Voluntary Agency
Duty-free Liberation Certificate

Getting the Ministry of Agriculture to issue their phitosanitary certificate was taking in excess of a month at the time of the audit, due to Ministry bureaucracy and inadequate follow-up by CRS/CARITAS before matter was brought to their attention by the auditors.

(c) Food Losses through Shipment, Robbery Not Reported and Apparent Falsification of Documents (p. 6, 7, 8) (CARITAS)

Food losses in ocean and other inland transportation may or may not be of great substance, but there is inadequate control and monitoring, and apparently no reporting: the audit highlights the absence of procedure as opposed to the possibility of major losses in shipment.

Losses through robbery (four are documented) are not reported. AID learned of one through a newspaper account.

"Employees responsible for maintaining control records, warehouse inventory records and approving issues of commodities to projects were instructed by CARITAS officials to falsify records to cover up inventory records.

"To cover up inventory shortages, persons responsible for signing as having received food acknowledged signing for food which was never distributed to them.

"Culpability for mismanagement was placed upon a local employee causing the CARITAS national office to request that the person be relieved of his duties for incompetence. The same person was...transferred to another position within the same diocesan office.

"The quantity of an inventory issue slip was increased to prevent detection of an inventory shortage.

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"The extent of the food losses covered up by the subterfuge (detected by the audit) was in excess of (US)$21,000."

(d) (CARITAS) Storage Procedures at Warehouses Need Improvement

Stacking of oil was improper; stacks of bags were flush against walls; openings not screened with wire netting; bags stored in courtyard; sides of stacks were not flush, making inventory impossible; some commodities not stored on pallets.

(e) (CARITAS) Accounting for Commodities Needs Strengthening

Unrecorded transfers of large amounts of food, not detected until audit; periodic inventories not taken; differences between physical inventory and accounting controls; issue forms pre-signed and entered into books before actually leaving warehouse; etc.

(f) Inspection and Supervision by CRS (of CARITAS) must be Improved

(g) CRS Internal Audit Recommendations Never Implemented: Several of the criticisms had already come up in a May, 1978, internal audit report by CRS; however, these nine recommendations had not been addressed two years later at the time of the AAG audit.

(h) CWS/SEPAS

"In our visits ... we observed that a large number of trees planted under the reforestation program had been destroyed by freezing weather, lack of water, livestock and people who did not want trees planted. In Puno the freezing weather had caused destruction of 30 to 90 percent of the trees at certain projects.

"At one location it was estimated that 9,000 of 10,000 plantings had died because of a lack of rain. At other sites, we were told that the plants died because they were not mature enough to withstand the local environment...Immature plants could have been planted just to meet the planting goals.

"Community people participating in the reforestation program said they had received no technical guidance of training on maintaining the trees. For example, at sites where trees had been destroyed for lack of water...(they said Ministry of Agriculture officials) had never instructed them that the trees should be watered after planting. They assumed that the rainfall would provide adequate moisture. Unfortunately rainfall had been considerably below normal in areas in trees were planted.

"For example, in the Department of Puno we were shown a project that had been visited by (Ministry of Agriculture) technicians in February 1980. At that date, the project's plants were reported in good condition with projected losses of ten percent due to lack of water. In our visit of July 1980, we found tree destruction to be 60 to 70 percent due to lack of water. Community leaders said (Ministry) personnel had not instructed them to water the plants. We noted that water was flowing in a creek about 100 meters from the planting site."

There are major, substantive conflicts among three sets of inventory, productivity and other reports submitted for the same program.

"...for the period April 1979 through March 1980, the (Ministry) reported planting 6,360 hectares of trees at Cuzco, 290 percent over the goal of 1,500 hectares. According to (Ministry) officials, about 1,100 trees can be planted on one hectare, or 4,796,000 trees should have been planted on 4,360 hectares. (The Ministry) reported planting 2,597,000 during the period at Cuzco, a difference of 2,199,000 trees, We were shown internal report that indicated 2,212 hectares with 2,340,000 trees had been planted during the one-year period. Because of an employees' strike at the close of this audit, we were unable to determine the correct number of trees that were planted."

"We believe the reumbursement procedures could be improved by making SEPAS responsible for paying the fuel and maintenance costs of vehicles...A petty cash fund could be established with the (eight SEPAS departmental representatives). The SEPAS representative would remit office expense vouchers directly to SEPAS/Lima, by-passing five GOP offices. The SEPAS Director felt this would eliminate 20 to 30 days in processing reimbursement requests and provide better assurance that funds would be available to pay for fuel and maintenance costs."

The audit highlighted an interesting (if disruptive) conflict between a local SEPAS representative and his counterpart in the Ministry's Department for Flora and Fauna:

"The SEPAS Director explained the fundamental reasons for the lack of coordination and communication was in project philosophy. SEPAS believes that participating communities should be motivated to accept the planting of trees and organized to carry out other community projects. The Cuzco (Ministry) sub-director does not share these feelings and only follows and complies with the legal decree governing the planting of trees in Peru. Sometimes this results in having <u>to use forceful means to plant the trees</u>. (Emphasis added.) However, this forceful method may have negative results because community members may not want to take care of the plants..."

(i) SAWS/OFASA

The audit comments that OFASA had not reached its goal in number of recipients in Lima.

"OFASA personnel said they had not been able to maintain the feeding objective of 120,000 recipients for several reasons. The geographic area being serviced by the program is small which limits the number of work projects. Also, SAWS/OFASA encourage work programs that will give a lasting benefit to the communities.

The FFW project in Lima is "to improve the living standards and nutritional status of the pueblos jóvenes poor by providing PL480 Title II commodities. We agree that over a short-term the poor have been helped by the supplemental food as many unemployed, especially women, were employed and provided food in the community projects. However, it is doubtful whether the nutritional status of the recipients has been appreciably increased as most of the projects were for short duration, usually about three months."

"We visited some FFW community development projects. Construction primarily because of a lack of materials was at different levels of completion. For example, we observed that school classrooms were half-completed because roofing, doors, windows and other materials ... were not available...At (another) project involving the construction of a water reservoir by 100 workers, work had stopped because the community needed money to buy cement and steel. No one knew when or from where the money would be obtained to buy the needed materials..."

The audit states that OFASA distributed three bags of infested cornmeal which were unfit for human consumption. "USAID should request SAWS/OFASA to instruct project community leaders on inspection and disposal procedures to follow on infested food."

"During a five-month period in 1977, the OFASA Director authorized issuances of (435 bags of dry peas valued at about $6000) to ten nonexistent projects...(they) were sold through an intermediary...It was also reported at the arresting site there were over 1,000 empty bags with OFASA markings. (The audit advises AID to send OFASA a bill for the missing merchandise).

(j) Ministry of Education/School Feeding Program "Needs to be Reorganized", "was not being effectively implemented. The GOP did not provide adequate funds for transportation of supervisors and inspectors, storage facilities, office space and equipment...Consequently the school children were not receiving the benefits planned and expected from the feeding program.

"In addition, we were unable to determine or receive from GOP officials (requested three times) the type and quantities of commodities of commodities that were purchased locally to suppor- the feeding program. However, based on discussions with school and other GOP officials involved with implementation of the program substantially less than the needed quantities were provided."

"School gardens were not producing the anticipated food that was to complement the PL480 TII commodities...Schools lacked adequate kitchen facilities, including pots, pans and other cooking utensils. Some schools we visited had inoperable kerosene stoves..

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"...Thousands of students in the Lima metropolitan area did not receive food during the months of May and June 1979 even though commodities had been available since the beginning of the school year in the implementing agencies' warehouses..."

"The on-going food distribution program does not appear to have had a nutritional impact on school children because of insufficient food."

Discrepancies in transfers from ONAA in deliveries to the Ministry of Health exceeded 600 tons over a two-year period.

"We doubt that the PL480 TII commodities distributed under the school feeding program have had a significant nutritional impact on school children. We found that schools did not receive a sufficient quantity of food to feed each eligible child each school day (Note: that excludes weekends, holidays and vacation months). Some schools receive food for the first two grades (only). However, school directors fed all students which results in food not being available after a few days. Other schools receive commodities for all the students, but there is a heavy dilution of the food rations due to younger siblings or ineligible persons being given food.

"USAID/P officials agreed that PL480 TII commodities given to school children were not having a nutritional impact...They feel that an evaluation of the school feeding program at this time would serve no worthwhile purpose. They prefer to work with GOP representatives to reorganize the school lunch program to assure that the...commodities will measurably improve the nutrition of school children."

(j) Port Clearance Procedures Should be Simplified

The audit states that substantial amounts of food are being left in exposed sites at the port. Deterioration in the bags caused by this exposure leads to higher rates of damage to materials when they are handled. Port officials did not want to use tarps to cover them because they feared the tarps would be stolen. Government importation of food is cleared from the Port in an expedited fashion; the audit suggests AID donated commodities should receive the same treatment.

Gersony

August 22, 1981

NOTES

La Industria en el Perú, Principales Indicadores, 1970 - 1980 Documento de Trabajo, Undated collection of statistics related to industrial activity in Peru - provided by the Sociedad de Industria, probably developed by the Ministry of Commerce and Industry

1. Of all employment provided by Peruvian industry, 75.8% of the jobs are located in Lima and El Callao (66.2% in Lima; 9.6% in El Callao), according to Chart No. 20, 1977 data.

The breakdown of employment by size of industry is shown as follows:

		% of Jobs	% of Remuneration
5 - 20 employees	53,534	20%	12%
21 - 30 employees	13,001	5%	4%
31 - 50 employees	26,617	10%	8%
51 -100 employees	33,516	13%	12%
101+ employees	138,788	52%	64%
	265,456	100%	100%

If 75.8% of 265,456 persons employed in Peruvian industry reside in Lima and El Callao, there are 201,200 such persons in this area.

The next largest center of industrial employment is Arequipa, with 4.1% of the total number of industrial employees.

2. According to Chart 19, about 16% of all employees are working in food-related production, and 13% in textiles. These are spread fairly evenly among the various-sized industries (by number of employees) listed above. About 30% of all employees work in these two sectors. The next largest category are those employed in production of metal products, 6.6%, where the 10 - 20 #employees category predominates.

3. There are approximately 3,800 industries in Peru.

Note: I am not really sure that I understand these figures. They should be checked with an Embassy or AID economist. Ing. Lanata indicated that at this point the number of persons employed in industry has increased to 400,000.

Gersony

SECTION II

REVIEW OF THE LITERATURE: MANAGUA

October 7, 1981

EXTRACT

USSOUTHCOM AFTER ACTION REPORT: MANAGUA, NICARAGUA EARTHQUAKE DISASTER, (Author Unnamed, USSOUTHCOM Personnel) Date: on or about March 6, 1973

This extract selects information of particular interest to our particular Mission only.

1. Fires "Fires created by downed power lines and ruptured fuel cells raged uncontrolled throughout the city for over 24 hours. Broken water mains and streets clogged with debris prevented the mounting of any coherent fire fighting effort.

"The USARSO disaster relief and recovery operation began on 23 Dec 72. The 518th Engineer Company (Augmented) was dispatched to Managua on the 25th of December and were immediately set to work cleaning streets and constructing a firebreak."

2. Command and Control The Military Assistance Group (MILGP) Commander operating under the U. S. Ambassador took charge of all US military efforts... This resulted in undue stress being placed on the MILGP Commander. He was almost completely tied up dealing with the Ambassador and General Somoza and could not devote the time required to the coordinating and directing of SOUTHCOM efforts.

3. Medical Efforts

(a) Unncessary excesses of medical personnel occurred when a group of 15 nurses and corpsmen arrived from Fort Hood to augment the 21st Evacuation Hospital at the very time when USARSO medical personnel were being returned to the Canal Zone. Throughout the operation, the Surgeon was more often in the position of having to refuse medical assets than requesting them.

(b) By the time any real on-the-ground medical assessment could be made, two field hospitals had already been requested (Note: By Ambassador Shelton). The speedy arrival of the 1st Tactical Hospital and its quick implementation proved very useful. The 21st Evacuation Hospital, however, was more than what was required, both in personnel and equipment. An evacuation hospital is "too large and cumbersome" for a disaster. A tent-type hospital has serious disadvantages in a windy, dusty type of environment such as Managua.

(c) Supplies: There was "considerable confusion" in assembling and organizing accompanying medical supplies and equipment on such short notice. Packaging was inadequate for this type of disaster. Several essential items were short and many were "entirely inappropriate". One chronic shortage was POLAROID X-Ray Film and certain orthopedic supplies - a result of the large number of orthopedic -type injuries.

All containers should have a packing list identfying the contents. Special attention should be given to X-Ray equipment and orthopedic supplies.

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(d) Medical Intelligence. There was little available information on medical resources in Nicaragua. A prior knowledge of hospital sizes and locations, physicians and epidemiologic data would have been helpful.

4. Engineering

Transmission of technical specifications. Several requests were made to provide electrical wiring, generation equipment and various supplies in which technical data and specifications were vague or non-existent.

Information should include intended use, available power sources, acceptable substitutes, soil conditions, area to be covered or cleared, and contact personnel on site. (Emphasis added).

5. Biological Contamination

"On 28 December 1972, the Howard Air Force Base Civil Engineering Decontamination Team traveled to Managua with a vehicle and driver from Fort Kobbe. The equipment used was the M12A1 Decontamination Apparatus; the chemicals used were Super Tropical Bleach (STB) and Calcium Hypocloride (HTH).

"The original reason for requesting the Decontamination Team was the fear of disease outbreak. It was discovered that the biological contamination also killed the bacteria causing flesh decomposition and, thus, reduced the odor.

"The team was requested to spray bodies trapped beneath buildings. Although the rubble depth handicapped the operation, it did reduce the odor to a level which continued cleanup work to continue.

"The Decontamination Team was requested to spray a meat canning factory containing several tons of decaying meat. Because of the odor, the owner could not hire personnel to enter the building to remove processing equipment before the building was demolished. After the area was sprayed, the odor was reduced to a level which allowed personnel to remove the equipment.

"Other tasks included spraying the Post Office basement with a lima solution to neutralize a large quantity of battery acid, disinfecting shower areas, and spraying for dust control. It was also found that strong solutions of agent aided in insect control.

"The team returned to Howard Air Force Based on January 11, 1973."

6. Public Affairs "The initial disaster response has the most value and impact from a Public Affairs standpoint; however, a senior Public Affairs officer was not on duty in Managua during the first 30 hours of the disaster relief effort to coordinate news activities and provide information on US military relief programs..." "This condition was a repeat of the 1970 Peruvian earthquake situation..

October 7, 1981

EXTRACT

AFTER ACTON SUMMARY: DISASTER RELIEF OPERATIONS - NICARAGUAN EARTHQUAKE
Prepared By: LTC Billy J. Chance, Lieutenant Colonel, GS, Chief, Army Section (Undated)

This extract selectively presents information considered relevant to this particular mission.

1. Airfield Command & Control The report supports the concept of a single U. S. commander/point of contact for all US military operations at the airfield. However, it suggests more rapid augmentation support for the Commander. "Forward support teams should be considered for immediate deployment."

2. DAST Composition: The report suggests that DAST teams should have both survey and operational personnel aboard.

It also suggests that a liaison officer should be assigned to the local Government's operation center.

For the MILGP, there should be such a liaison at the Government's operations center and at the Embassy.

3. Appropriateness of Food Donations "Large quantities of Corn-Soybean-Milk (CSM) and Wheat-Soybean-Barley (WSB) concentrates were distributed; however, some of the populace were not familiar with the proper methods of food preparation and consequently were reluctant to eat the food, or, when they did, became ill."

4. Handling Equipment No heavy duty forklifts or operators were immediately available to remove the heavy pallets of supplies from the aircrafts. DAST teams should bring at least two heavy duty forklifts and operators on the first aircraft.

5. Communications Approximately one month prior to the earthquake, the MILGP had acquired mobile and base stations FM radio capability. This proved invaluable during the emergency as it was the only means of reliable communication within Managua immediately after the disaster. Communication was established at COMUSMILGP's quarters, Ambassador's residence, military and commercial sections at airport and at Relief Operations Headquarters at El Retiro within hours after the disaster.

6. Water The water pumping station was not badly damaged and could pump water at full capacity of 20 million gallons per day. However, much of the water was lost through broken water mains. But about 25% of the population was served in this manner.

US aircraft flew 350,000 gallons of water in 5-gallon water containers, tankers and trailers. Water tanktruck and trailers were also diverted by the 21st Evacuation Hospital to meet initial needs.

To assure the flow of fresh water, five truck mounted water purification units were brought in from CONUS and USSOUTHCOM.

Six privately-owned water systems which were not functioning because the electricity system had broken down went back into operation on the fourth day with the assistance of generators (although only two generators, 60 and 100 KVA, respectively, are shown on the report of equipment provided could this have been adequate?).

The rest of the population received water from tanktruck distribution. There were 20 mobile tanks carrying about 300,000 gallons of water per day to temporary storage tanks and water distribution centers. (According to another report, the US provided six 400-gallon units).

7. Fires One of the earliest tasks for the 518th Engineer Company, which arrived on December 26 was to construct a 12-block fire-break area.

Gersony

July 24, 1981

EXTRACT

Efectos del Terremoto en el Sistema de Agua Potable de Managua, Ing. Normando Porras, published in Informa Final del Seminario Sobre Ingenieria Sanitaria en Situaciones de Desastre, October 14 - 18, 1974, Escuela de Salud Pública del Peru, Ministerio de Salud (with PAHO assistance)

1. Summary The author, Chief of the Sewage Division of Managua, Nicaragua, analyzes some aspects of the water problem in Managua after the December 23, 1972, earthquake there. Some of his facts are included in this extract - only those of direct interest to our mission.

2. The most damaged kind of water tubing was asbestos cement, in the 4" to 12" category. PVC was OK.

3. The system sustained approximately 1.15 faults per kilometer.

4. The Managua system had 615 kilometers of tubing, between 2" and 30" in diameter. They had storage capacity for 12.8 million gallons, of which 11.0 were concrete, balance steel. The City's population was expanding at the rate of 6% at the time of the disaster.

5. 80% of the homes in Managua were directly served by piped water. Of these, 75% suffered damages. In total, 40,000 homes were served by the system before the earthquake.

6. About 13,000 water meters were salavaged from the rubble after the earthquake.

7. Although the system per se was functioning within 24 hours of the earthquake, the problem was that the distribution system was completely shot, so very few people were getting water.

The water authorities organized water tank trucks from the Depto. de la Carretera, Ministerio del Distrito Nacional, Guardia Nacional, and private companies. These were supplemented by tank trucks provided by the USGovernment from Panama. Water distribution covered the whole City except the zones they wanted evacuated.

In addition, they equipped some wells with diesel generators/motors.

8. In repairing the water system, they took the pipes with widest diameters first and worked their way down. At first, they were losing 75% of the water. Five months later they were losing 50% of the water.

9. Interesting data not included but would have been useful: Number of trucks, capacity of trucks, local storage/distribution using trucks, source of water; also, did they provide water assistance to evacuation areas (Masaya, for example?)

10. Their administrative offices took 6 weeks to repair.

11. By the end of February, they were getting piped water in some form to 18,000 people;

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12. In 1973, their ingresos were lower by 50% than what had been anticipated, creating a fiscal crisis.

13. By the end of May, 1973, 60% of the 40,000 houses previously served were getting water.

14. They used development funds to build six new deep wells on the outskirts of town.

15. An interesting observation:

> "Mucha asistencia se obtuvo del extranjero en el área de consultoría, pero muy poca en el área operacional y a nivel de mano de obra especializada."

Is this a polite way of telling us to keep our good ideas to ourselves and try to supply some hard dollars or resources? Is he suggesting it would be more helpful if we would take some responsibility for operational aspects rather than just sending in experts? Is he simply stating a fact?

August 22, 1981

Emergency Shelter and Natural Disasters, Some Observations Based on Earthquakes in Skopje and Managua, Ian R. Davis, Principal Lecturer in Architecture, Oxford Polytechnic, Oxford, England, reprinted by INTERTECT/Dallas, text of a lecture delivered at Carnegie-Mellon University, October 17, 1975.

This is a reprint of a brief address given by Davis, as described above. All of the information in it appears in other formal publications. However, there is one set of statistics which might be of interest to our particular mission:

Tents: Provision and Utilization

	Number Provided	Number Used	
Managua (1972)	4,191	approx. 1,800	(43%)
Skopje (1963)	14,044	approx. 2,000	(14%)
	18,235	approx. 3,800	(21%)

According to Davis' figures, Managua had 24,000 houses damaged, 50,000 destroyed; Skopje suffered 9,217 damaged, 25,281 destroyed.

In terms of provision of emergency shelter, Davis mentions that in response to the Lice, Turkey, earthquake, 1975, OXFAM provided emergency hexagonal polyurethane igloos which had been field-tested in Bangladesh. They were scheduled to be delivered to Turkey 45 days after the earthquake as emergency shelter.

Professor Ambraseys of Imperial College is quoted as estimated that over 800,000 people have died in earthquakes since 1900, an average of 14,000 per year.

SECTION III

REVIEW OF THE LITERATURE: GUATEMALA

ANALYSIS

Guatemala Disaster Relief Operations: After Action Report, 23 April 1976, United States Southern Command/DOD, covering period 4 - 29 February 1976

1. Summary The report provides narrative and data covering USSOUTHCOM operations in Guatemala after the 1976 earthquake. The US Military were involved in the emergency operations for a period of about 25 days (The Corps of Engineers remained for a much longer period repairing the Atlantic Highway, we think).

Only items of direct interest to our particular mission are highlighted.

2. Outside Relief

Massive relief from various neighboring countries, from international relief agencies, to include US aid began arriving in large quantities on 4 February 1976. The main problem experienced at this time was segregating and distributing the most urgently needed items.

3. Based on DAST surveys on 5/6 February, priority needs were reported as follows:

(a) Food distribution, " immediate and pressing problem"

(b) "Extreme shortage of water"

(c) Thousands of people "in dire need of shelter and blankets"

(d) Medical supplies

4. Eight US Special Forces teams were introduced on 11 February, 7 days post-earthquake. The teams consisted of a medical corpsman, a communicator, and a Guatemalan Army soldier. Objectives: (a) survey isolated villages on foot for evidence of previously undetected damage; (b) perform emergency first aid and arrange medevacuation for seriously injured to 47th Field Hospital.

5. C130 airlift support was the "mainstay of the...operation." C130's conducted 22 missions, hauled 298 passengers and 186 short tons of cargo from Canal Zone to LaAurora Airport. MAC furnished 24 C141 and 2 C5 missions carrying total 345 passengers, 515 short tons of cargo, including the 47th Field Hospital.

6. 47th Field Hospital was in Guatemala 11 days. Average workload: 33 inpatients, 55 outpatients daily. Majority required surgical attention. Simple and compound fractures were majority of workload. BUT in lessons learned, report states: the hospital staff arrived without a cast man, adequate plaster bandages and plaster to set fractures and an additional Xray unit, which were all requested after arrival. STATE Department had indicated these kinds of needs would arise in deployment of 47th Field Hospital.

These resources had to be flown in after the Field Hospital was operational (about February 7 or 8?).

The direct costs involved in transporting and operating the field hospital are not stated as such in the report. The figure $1 million was rumored but there is no accounting here to provide actual data. Would have been useful to do so.

7. Operations used a combination of 8 Chinooks (CH47's) from Fort Hood; 9 UH-1H's from the Canal Zone; and 1 OH-58 observational helicopter also from the Canal Zone.

At first, Chinooks were bringing medical evacuees back to a central base and then transferring them to Huey's for onward flight to hospitals. In the end, they decided that it was better to have the Huey's pick up and deliver patients directly to the hospitals.

One problem encountered was the inability of the NEC to actually conceptualize the carrying power of particularly the Chinooks. Not until they actually saw the carrying loads in action did they begin adjusting their own planning to fully utilize the resource.

> "Among the most important early relief cargo was water. Without the unique ability of the CH-47 to lift 400 gallon water trailers ...many areas...would have suffered even greater hardships."

8. A water expert from the US Army Training and Doctrine Command (former CPT Wehmann) arrived in-country on February 7 and worked with Government of Guatemala officials on emergency water problems. One difficulty mentioned in the report: an up-to-date list of water officials was not available, slowing up contact for some in-coming technicians. The report recommends such lists be maintained and should also be available to the military in advance (A good idea with whatever we produce on this project as well).

134 3,000 rubber bladder water tanks were provided from US stocks in the Continental U. S. (CONUS).

9. Tab K to the report is a list of airlifts to Guatemala City from other Latin American nations (copy will be attached hereto - could be useful in planning airport needs). 12 countries flew 90 sorties; Mexico alone was the largest, flying 38 sorties. (All these flights used military aircraft, and the total cargo weights in pounds are provided by country except for flights arriving in first 72 hours).

10. Medical Resources for earthquakes: consider two types of injuries: normal trauma - so you need cast people, plaster, bandages, etc., but also fire, where you may need burn specialists and different types of supplies.

11. Voluntary Agencies: "It is extremely difficult to organize volunteer groups, even more difficult after the fact."

12. Lessons Learned: Fire Prevention due to Electrical Power Safety Shut-Off. SOUTHCOM recommends: "Host Governments be encouraged to adopt the central power shut-off system." "Dangling hot wires were the principal cause of fires in Managua in 1972. In Guatemala, the electrical power system contains a built-in safety factor that automatically shuts off all power to the city when an earthquake reaches a magnitude of three degrees (Richter)."

13. A few notes:

- Let's get the After Action Reports from SOUTHCOM on the Managua and Peru (1970) earthquakes, if we can.

- We should liaise with the DAST people to talk about the types of food and shelter experiences we have had after earthquakes, sharing experiences between the AID and MIL people more - perhaps some kind of meeting where there is a chance for informal discussion, or just a pass through en route back to the U. S. would be fine.

Gersony

EXTRACTS

from: DISASTERS: The International Journal of Disaster Studies and Practice, Pergamon Press, Oxford, Volume No. 2, 1977 (Special Guatemala Issue)

1. Housing and Shelter Provision Following the Earthquakes of February 4th and 6th, 1976, Ian Davis, Department of Architecture, Oxford Polytechnic, Oxford, U. K.

Housing and shelter in the first two weeks. During this period, which I was able to observe whilst in Guatemala, two characteristics could be seen:

Firstly, a massive relief operation which in the housing and shelter sphere was totally uncoordinated and possibly unnecessary.

Secondly, an extensive indigenous response by all the affected families who improvised shelter and embarked on reconstruction of their homes with a minimum of delay.

By 10AM on February 4th, just 7 hours after the earthquake, 5000 tents arrived in Guatemala from the U. S. Southern Command stockpile in Panama. Few of the tents that came during the first days seemed to find their way into the (affected area) Highlands.

Some regimented camp sites were laid out by the Guatemalan army and the Red Cross, but predictably this was not popular. ...(In San Ma-tín) 3,000 tents were set out by the army. After two weeks possibly 7 were occupied, and this despite threats by the army to force people in at gun-point. As with so many disaster situations the people of San Martín needed to be with their animals and household belongings, and a camp-site somewhere outside the town was not convenient for either. "Expulsion policies" have been equally unsuccessful in such diverse places as Darwin, Austrailia and Skopje, Yugoslavia and the Bustee Camps in Bangladesh.

One recurring problem, which is characteristic of the relief phase of any disaster was over-enthusiastic volunteers... One cheerful bull-dozer driver was waiting with me to meet the field director of one of the largest US charities. His declared aim was to "crack the problem" at Tecpán... and his solution was to bulldoze the town flat, clear away the rubble, and start reorganizing the street pattern.

I tried to suggest that such a policy, tempting as it may seem at first glance, would be seriously mistaken. The materials he wanted to sweep aside were not rubbish, they were vital building materials needed for reconstruction: time and adobe dust -- both of which could be recycled for new housing. As for undertaking to reorganize the street pattern, this would have all manner of adverse consequences. It would upset all land-tenure; there were likely to be services below most roads (even if these were of a simple nature), finally there are historical associations in a street pattern that are seen as very important.

Conclusions: Improvisation and Emergency Shelter

The extraordinary response in Guatemala City, where almost 50,000 temporary homes were improvised within 24 hours, underlines the growing awareness that immediate shelter is a low-priority issue for governments or agencies when seen in comparison with other urgent needs. It is far better to focus immediate energy and finance on rapid reconstruction than to waste precious resources on temporary structures which people are well able to provide for themselves.

Tents: Although some affected families found shelter within tents, it would appear that the vast majority of all tents erected were either used by non-deserving families, or they were simply unused. The greatest use in Guatemala was by wealthy families during the initial period when fears were highest over secondary earthquakes, and families were afraid of being trapped in their homes. The usage within the large campsites was minimal.

The lesson appears to be one of caution. Large sums of money can be sunk into the bulk of tents. They are almost always of unsuitable design, they are often unimaginatively sited by military or Red Cross personnel on large sites that are totally unattuned to the needs of families. It is significant that these findings on the subject of tents find an echo in the Managua earthquake of 1972 --(Reference Davis, I., Architectural Design, 42-47, January 1976).

2. Rural Centre and City Slum after the Guatemala Earthquake, Hazal Weymes (Department of Anthropology, University College, University College, London) and Julius Holt, London Technical Group.

Section I - describes Comalapa, a typical, very low-income municipio in the Highlands

If hunger and thirst were not grave problems after the earthquake, the threat of exposure was. For Comalapa is at an altitude of 6000 feet and warm sunny days surrender from about 5 in the afternoon to cold evenings and nights, when temperatures in the dry season can approach freezing point.

Most people had lost their bedding and extra clothing under the rubble, and it took most of the first week for sufficient usable articles to be excavated. Meanwhile the only possibility was for rough shelters, which were built immediately out of any material to hand: plastic and corrugated metal sheeting, wood, cloth, and cardboard.

Yet it is fair to say that whilst to shock and grief was added physical discomfort, those who survived injury due to collapse of their houses also survived the privations of the first few days.

At the time of the survey the clearance of rubble was still so little advanced that it was not yet possible to see whether a problem was developing similar to that of San Martín Jilotepeque, where people felt the ownership of their house sites to be threatened by wholesale rubble clearance and the flattening of the town. These people camped tenaciously on their home-sites despite all efforts to remove them to a large field of tents provided by the Red Cross at the edge of town. The tents remained unused.

The rubble of Comalapa was to be dumped by trucks over an abyss at the edge of the town. Since this meant some loss of basic building materials, especially adobe for bricks, individual householders were anxious to keep the better preserved bricks to add to the piles of wood and roofing tiles salvaged from their destroyed homes. Salvaging materials by individual householders added to the delays of mechanical rubble clearance and to the impatience of the army commander.

The families used great care in demolishing remaining walls and roofs before rebuilding. Every piece of wood tiling and corrugated sheeting had to be saved in tact. Children were set to pulling nails out of the wood.

One activity in which manual help from outside the town was appreciated was the wheat harvest. For although the staple maize had already been harvested, the wheat harvest, ripening later, had been interrupted by the disaster. It was estimated that not more than 1% of the wheat had been lost due to landslips on the hillsides, but there was a pressing danger that the overripe wheat would begin to spill to the ground...

Section II - Describes a growing city slum in Guatemala City

Many homeless families set up temporary shelters in the streets, squares and parks of the city, whilst others moved en masse to form settlements on pieces of land which were either officially provided or simply claimed by the new-comers. Indeed, some householders whose homes remained perfectly habitable were reported to have moved out of their homes in order to lay claim to a free piece of land. In a few instances we were able to confirm this. The belief that land would be given out free of charge even attracted people from outside the city; land for the homeless became a violent political issue.

The February 4th Settlement, across the ravine from the Colonia La Trinidad, soon filled the land next to the ring-road appropriated by the President. Makeshift shelters were constructed on neatly laid-out plots measuring an average of 8 x 10 meters. Interviews there from mid-March suggested that there were at least 35,000 people then residing in over 6000 shelters (social workers estimated the population at closer to 50,000). At the time of the survey, the Municipality was erecting 30 public latrines, and there were two 30,000 gallon water tanks on the site...filled at least once a day; the chronic shortage of water was a major complaint.

Since the settlement had been so recently founded, and new people were still arriving daily, it had an air of excitement and enthusiasm, and lacked the squalor and apathy often associated with this kind of settlement in later phases of development. There were not the clouds of dust which rose in the damaged areas of the city from the piles of broken adobe bricks. There was no electricity, and there was no school, but many small vendors were already offering fresh fruit, vegetables, eggs dry goods, bread and firewood. Prices were slightly higher than the city centre, since the vendors bought the goods at the Terminal Market and transported them by bus. One the bus route to and from the settlement a flat rate of 5¢ per journey was charged.

Conclusions

It has been claimed by more than one observer that agencies were much more willing to busy themselves in the rural areas than in the city slums after the earthquake...It should not be forgotten that the majority of victims were in the country areas, and it must also be realized that the problems of the city areas were more intractable than those of the country settlements. It was also deliberate Government policy to promote reconstruction in rural areas to keep people from flocking to the city in search of assistance.

...In this respect the city areas suffered more, because more people made a basic, not a secondary, living from artisanry, small shops and other services The earthquake destroyed many of these small businesses, and survivors found their customers moving out to other areas or impoverished and therefore unable to buy new goods or have old goods repaired. Small shops suffered a loss of customers due to free food distribution. Unemployment rose, and there were no harvest stocks to live on, for here people depended on a cash income, often on a day-to-day basis.

3. Considerations on Health Relief, Guatemala Earthquake, 1976, Michel F. Lechat, Centre for Research on the Epidemiology of Disasters, Université Catolique de Louvain, Brussels, Belgium

Disasters, be they natural or manmade, will go on occuring, go on increasing, and become more severe due to more people, more hazards, more technology and more social vulnerability. There is no use in preferring prevention to relief. Prevention is required, but relief will go on being necessary as long as the environment is as it is.

Relief needs preparedness in order to prevent or mitigate the consequences of a disaster and to speed up assistance once the disaster has occurred. Information is the essential component of preparedness. Information on the likely consequences of a disaster, the capacity of the community to cope, the required assistance, and where help may be found.

...in the Department of Chimaltenango (population 194,735) up to 90% of the houses were totally destroyed, while the death rate was only 7.1%...

A significant proportion of (donated) supplies were useless: drugs with expired dates for safe or effective use, opened

or partially used samples, already utilized disposable perfusion sets, etc.

Relatively few of the drugs donated by foreign countries had been sorted (an estimated 10%); proper sorting should consist of a single type of drug and presentation in each packing-case, which is properly identified and marked.

EXTRACT

Audit Report: Guatemala Earthquake Disaster Relief Program, Project No. 520-15-0241 USAID/Guatemala, Audit Report No. 1-520-81-10, Issue Date: March 31, 1981, Area Auditor General Latin America (AID)

This summary covers only items of interest to our particular mission.

1. Water

Water stations and storage systems were generally intact but many distribution systems were damaged or developed leaks that prevented the water from reaching its destination. Water and sewer lines which paralleled each other cracked, permitting sewage to contaminate the water lines. In Guatemala City some sections were without water and in others the water was not chlorinated...

Water was supplied by mobile trailer tanks or by U. S.-provided and installed 3,000 gallon, rubberized canvas water containers in the earthquake areas. However, keeping them filled was difficult.

In the rural areas, water sources were generally available but most distribution systems were destroyed. Partial or complete restoration was accomplished in some areas by self-help and efforts of relief assistance representatives.

Eventually, large water tanks were positioned in the larger population centers and 5-gallon containers were flown to the isolated areas.

2. Materials Distribution Program via Sales

The major USAID housing effort, which was called the USAID Emergency Materials Distribution and Work Program, was completed within two years of the earthquake. A parallel grant to the Save the Children Foundation (SCF), however, was still not completed at the time of the 1981 audit. Like the USAID program, SCF had sold the materials at subsidized prices; however, the management of the reflows was not similar. The audit comments:

Under the (USAID) program, funds were generated by selling building materials. The activity agreement required the funds to be used in the community that purchased the building supplies. The implementation period for projects was not stated but it was understood that projects would be undertaken as soon as possible.

We agree with the policy of using the money for community projects in the areas which purchases the building materials. We do not believe that disaster funds or any reflow funds resulting from disaster financed activities should be used to establish a loan fund.

3. Butler Buildings A number of comments are made concerning the Butler Building program. However, the use of disaster funds for some of the buildings is questioned. Comments:

> Overall the Butler building program was a success. The buildings were well-constructed and erected and should serve the Government of Guatemala for many years.
>
> In our opinion, many of the buildings did not replace destroyed and damaged facilities and therefore did not meet the intent of the Guatemala Relief and Rehabilitation Act of 1976.

4. Water Tanks (3,000 gallon rubberized canvass)

> We were unable to fully account for 134 portable rubberized canvas (3,000 gallon capacity) tanks. The acquisition cost plus transportation of the tanks was approximately $150,000.
>
> These tanks filled and are filling an important need as recognized by the grant agreement. We believe that proper accounting and storage of the tanks should be maintained in case they are needed in another emergency.

Gersony

August 4, 1981

NOTES

Manual del "II Seminario Sobre Ingeniería Sanitaria en Situación de Catastrofe", Universidad de San Carlos de Guatemala, Facultad de Ingeniería, patrocinado por PAHO, publicado Guatemala, Octubre de 1976.

(An extract of a few points of interest to this particular project).

1. Some of the thirty recommendations of the Seminar:

(a) Systems Inventory A complete set of plans, maps, and other data concerning the distribution network should be maintained, including the location of pipes - indicating the kind of pipe, size, location and distance from control points.

(b) Emergency Stock An adequate stock of emergency replacement pipes, engine and pump parts, and other vital equipment should be maintained so that it will be ready in case of an emergency.

(c) Quality Analysis Kits Portable kits should enable water technicians to make quick physical, chemical and bactereological analyses of water.

2. The Guatemala City water system has nine major wells which feed into the main distribution network; a number of new wells (at the time of the report 3 which were still not working); and a number (not reported) of privately held wells.

In the earthquake, according to the report of EMPAGUA - the City water agency - one of the wells lost its verticality, and another which had been troublesome before the earthquake went out of order completely (see p. 23).

According to the same report, the wells within the City (the foregoing were just outside the City) did not suffer any damages.

3. The number of teams working for EMPAGUA - workmen? - was increased from nine to 35 immediately after the earthquake.

4. One of EMPAGUA's first priorities was to rehabilitate the systems most susceptible to repair -- among them the restoration of well production, since only power was required to begin production.

5. A private company (not named) was contracted to detect and identify leaks in the distribution system.

6. Ing. José Gilberto Araneda C of INFOM comments on water levels:

Fuentes de Agua

El comportamiento de estas fue de lo más variado ya que un gran número incrementará su caudal temporalmente en períodos variables indudablemente dependió de la conformación de las capas aculferas y a la topografía del lugar. Hubo casos en que éstas decrecieron al punto de agotarse completamente para emerger en lugares aledaños y aún desparecer.

Es importante tomar en cuenta que posiblemente los efectos del terremoto persistieron - dandose recientemente la desaparición de un caudal apreciable de 18 Lts. - s (777 pajas) en San Miguel Dueñas donde se tenía registros de más de tres años y hubo de superar la obra de introducción de agua proyectada. Casos similares se han planeado en San Martín Jilotepeque, Atescatempa, San Miguel Petapa - aunque este caso pueden existir otros factores como serían la localización y perforación de pozos en áreas aledañas cuya influencia deberá ser establecida.

Los sistemas de bombeo existentes en el área afectada no presentaron efectos Inmediatos, pues al repararse las lineas de conducción fueron puestos en servicio, sin embargo se pudo notar posteriormente cierto incremento en desperfectos en un período relativamente corto, debido en algunos casos al efecto de la osciliación provocada por los temblores, a la operación forzada que tuvieron y el cuidado deficiente que se le dió por parte de los operadores.

Los pozos en servicio para las poblaciones algunos en áreas aparentemente dañadas, no han presentado a la fecha problemas estando todos en consideración teniéndose eso si conocimiento de varios pozos particulares que si fueron afectados, y que hubo necesidad de abandonarlos.

Ing. José Gilberto Araneda C.
INFOM
"Experiencias del Terremoto de Guatemala, en Relación a Sistemas de Agua Potable y Alcantarillado en Areas Urbanas" p34

(Will try to get an accurate translation of this).

7. Some data concerning the Maintenance of Heavy Equipment program which AID undertook with the Ministerio de Comunicación y Obras Públicas is provided in a report by Ing. Carlos Crowe, pages 74 - 79. By July 23, 28 pieces of heavy equipment had been repaired; an additional 7 pieces were en route to the two corporations (and Public Works garage) responsible for the repairs. By that time, about US$500,000 had been obligated out of a total of $635,000 reserved for that program (it was later expanded).

The data includes a list of the brands (mostly Caterpillar and Allis-Chalmers) equipment, models, type of equipment (mostly tractors and - probably front-end - loaders), and date on which repairs are completed. The first repair was completed on April 28, 1976, just under three months after the earthquake.

8. Well Damage: Other Data CEPIS Ing. Walter Castagnino and Ing. Guollermo Guzmán Chinchilla of EMPAGUA report on page 101 that 7 of the city's deep wells were out of order; and that in one well the treatment chemical cylinder broke, gras escaped, but the operators shut off the supply and the gas escaped into the air.

It is not clear whether these wells are out of service because there is no more power or for other reasons (probably the former?).

Comment: These seminar reports are valuable, but in my view it would be more effective to have one person gather all the data and present the salient points in one publication - the seminar results are impressive in size, but their use may be limited by organization of presentation.

Gersony

SECTION IV

REVIEW OF THE LITERATURE: LESSONS LEARNED FROM RECENT DISASTERS

August 22, 1981

EXTRACT

Issues and Problems in the Provision of Shelter and Housing
A Review of Experiences and Lessons from Recent Disasters
Frederick C. Cuny, Ian R. Davis, Frederick Krimgold,
Appropriate Reconstruction Training and Information Centre
(ARTIC), January, 1978, reprinted by INTERTECT/Dallas

1. Summary In 50 pages, this document inventories 59 lessons learned, conceptual pitfalls and suggestions for appropriate policies in the provision of post-disaster shelter. This extract selectively presents items of interest to our particular mission - for a complete summary, the reader is referred to the original report, which this extract makes no effort or representation to comprehensively reflect.

2. Accountability

The subject of emergency shelter has been predominantly viewed from the standpoint of the intervenors.

It is essential to view "shelter" or "housing" as a process, not simply a structure. In order to understand that process, and to evaluate true success or failure, the process must be viewed from the standpoint of the victims who are affected by the shelter program.

The primary objective of disaster relief should be to meet the needs of the disaster victims, rather than to respond to the pressures on the intervenors.

Examples of pressures to which organizations feel they must respond include:

(a) The need to provide assistance quickly.

(b) The need to provide as large an amount of material goods as possible...

(c) The need to respond without large "overhead" and administrative costs.

These "needs" have been shown to be largely the needs of the donors, not the victims...In emergency shelter programs, especially, the specification of needs by the victims is rare.

In most disasters, there is a gulf between the intervenor and the victim.

Disaster-victims, especially those who are from the low-income groups — almost never play a major role in developing or implementing relief programs... (International) agencies feel that they have an idea what the emergency needs are...Many agencies have developed standard operating procedures...(which)... they feel they can execute...without the advice or consent of the victims...Many agencies...do not feel comfortable encountering large groups on unfamiliar terrainñ and this reluctance, coupled with a feeling of confusion created by the disaster... serves to limit(such) initiatives.

(Thus)...intervenors lose the opportunity to determine the real priorities...Once citizen participation has been omitted in the emergency phase, there is a strong tendency...to continue to downgrade its importance during reconstruction.

3. Performance

Shelters provided by international relief agencies rarely play a major role in the actual emergency phase.

In the vast majority of cases where international relief agencies have attempted to supply an "emergency shelter unit", the units have arrived long after the emergency has passed. One example is that of the units supplied by a British voluntary agency to Lice, Turkey, in 1975. Here the emergency units were not occupied until after about 1,500 new permanent housing units had been completed by the Turkish Government.

The fact that victims, local organizations and national governments provide most emergency shelter underscores the need for expatriate organizations to explore other areas of the housing process in which theur participation can be more effective.

Disaster intervenors often provide aid in such as way as to inhibit the recovery process and create dependency relationships.

For example, much of the aid given is provided free. Although these methods of provision are usually based on good intentions, they often add to the difficulties of readjustment and prolong recovery. The establishment of the expectation of continued welfare support on the part of the disaster-stricken population presents an untenable situation for local and national governments...

Military organizations have consistently performed poorly in roles associated with emergency shelter.

...In all roles, with the exception of rapid transportation, the military has demonstrated a lack of skill in handling civilian problems following disasters.

In the field of emergency shelter and post-disaster housing, the record of the military has been especially poor. In trying to develop emergency shelter approaches, the military falls back on its own experience: tents. Much of the emphasis on the use of tents as emergency shelter units derives from the belief that military organizations already have tents, and thus are the best equipped to provide and erect them.

Military-style camps must be orderly and compact, and facilitate the achievement of a high-density population. It is precisely these requirements which make these military plans the least desirable for use as a refugee camp. High density encourages the spread of disease and the development of undesirable social conditions...

Evacuation of a population following a natural disaster normally complicates relief and reconstruction, and prolongs hardships for the disaster victims. (It may create the following problems:)

- It reduces the possibility of families salvaging their belongings and reassembling construction materials;

- It creates a demand for the provision of emergency shelters;

- It turns victims into refugees.

- It prevents or slows rapid reconstruction.

- It prolongs the psychological recovery of the victims.

Rapid, mechanized clearance activities hinder, rather than help, reconstruction activities.

There is growing evidence...that immediate and rapid use of mechanized equipment has a negative effect on reconstruction...

It destroys salvageable materials. Millions of dollars worth of both commercial and indigenous materials which could be re-used are often destroyed by the bull-dozing operations. Often, those responsible for carrying out the bulldozing operations do not realize the immense value in the materials which are being removed or destroyed. For example, in a Latin American home made of adobe, virtually every bit of the material in the destroyed house can be reused.

Broken adobes can be pulverized and reconstituted into new adobes. Wood in the roof can be re-used in a variety of ways, including a new roof; doors and windows, and in some cases can (sic) be used for the frame of an earthquake resistant structure. Reinforcing iron, cable, electrical wiring, glass, tiles and tin roofing -- all materials which are usually destroyed in bulldozing operations -- could be salvaged for re-use.

In fact, in many low-cost houses, the materials with which the original structure was built were salvaged from other sources in order to make the house.

(Precipitous rubble removal also) destroys landmarks. The psychological need to be able to identify with the pre-disaster site and structure cannot be overstressed. ...People want to re-establish the pre-disaster norm as soon as possible; and the more they have to guide them...the better.

There are some instances when mechanized bulldozing operations are required. Following natural disasters in large, urbanized areas, mechanized activities are necessary for demolishing large high-rise structures and commercial buildings. In any area where a building has been substantially damaged and there would be a danger to persons entering the building to salvage it by hand, mechanized demolition is advisable.

The creation of new settlements for landless victims can have a negative effect on the community. (There follows a list of nine problems which can be caused by such resettlement, although no alternatives are suggested for urban settings. See pages 10/11 of document).

4. Performance-Limiting Factors

The arbitrary administrative subdivision, by intervenors, of post-disaster housing activities into "emergency", "temporary" and "permanent" phases obscures an understanding of housing as a process rather than as an artifact.

The mandates given to many organizations -- to respond to needs within a certain defined period, and prohibiting them from involvement in other periods mean that real shelter needs and objectives cannot be adequately defined by the organization. These administrative divisions do not, in fact, correspond to any clear subdivision of the housing process or of post-disaster needs.

For example, the responsibilities of USAID's Office of Foreign Disaster Assistance have been defined by the U. S. Congress. This definition restricts their disaster role to the immediate relief period.

5. Cross-Cultural Problems

Reestablishment of the local economy and job security are usually more important for disaster victims than housing.

The vast majority of disasters affecting shelter occur in areas where climatic exposure does not pose a major threat to human survival...(Thus) the primary concern of victims is the reestablishment of a viable local economy...

The primary function of emergency shelter has not been protection from climatic exposure. There is a wide range of vital functions to be satisfied, which include:

(a) Storage and protection of property

(b) Reestablishing physical orientation

(c) Provision of a staging point for future action

(d) Emotional security

(e) Provision of a framework for social reorganization

(f) Provision of a starting point for salvage and reconstruction

The majority of disaster victims will be found in those tropical and temperate climate zones which do not pose a serious threat to survival...Disasters...in areas of serious climatic risk...are the exception rather than the rule.

The importance of timing, when initiating housing programs, is vastly ignored.

...Factors which must be considered in setting up post-disaster housing programs: (a) When do people have the time (to build); when do people have the money; when are materials available; what are local priorities? This (latter) is the most important factor. If the local priority at the time is agriculture, a housing program will have little success until the agricultural needs have been attended to.

In many developing countries, national government agencies and local professionals may identify more with the cultural values of donor countries than with those of the majority of disaster victims in their own country...This fact plays a key role in the evaluation of victim needs. Most victims are usually from rural areas or low-income areas of towns and cities. Major differences in cultural values and priorities

exist between such victim groups and the educated, urban members of official and governmental organizations.

It should be understood that the attitudes of victim populations must be viewed as the priority.

6. Aid

The role of intervenors is to support activities which local people and/or organizations cannot carry out themselves.

It is unrealistic to assume that foreign assistance sent to a disaster area will be applied in the emergency phase. Therefore, the emphasis on speed or "emergency response" should be changed to developing a response relevant to needs at an intermediate or advanced phase of recovery.

7. Development

The opportunities to create "change" following a disaster are limited.

Many organizations view a disaster as an opportunity to create or promote change...But these opportunities are much more limited than is currently believed...After a disaster, people simply want to get back to normal as quickly as possible. If change is to be effected during this period, it must be evolutionary and appropriate to the constraints previously existing within the society.

Relief and reconstruction must be conducted within the context of development....(and)...cannot be regarded as separate and distinct activities...It is apparent that most organizations, including some of the most progressive development groups, lose their perspective after a disaster and, blinded by the urgent, immediate needs, concentrate their energies on rapid delivery of relief items.

...agencies involved in housing reconstruction...must attempt to introduce improved building methods...in order to precent the disaster from recurring...The primary weakness has been the lack of an adequate understanding...as to how best to transfer the technology...

8. Resources

In every disaster studied, the primary response to the shelter needs of the victims has been provided by the victims themselves. ...The least effective response inevitably comes from expatriate organizations with no prior experience in the disaster-affected area. In no case have expatriate organizations provided more than 20% of the local shelter response (and it is normally well under this percentage).

The internal coping mechanisms of the society in the disaster affected area are consistently overlooked...

...a major problem confronting any intervenor is how to identify the coping mechanisms that exist in the society and how to relate outside help to these built-in disaster response systems. Furthermore, outside assistance must be provided in such a way as to encourage a collective response utilizing these mechanisms.

The state-of-the-art in disaster preparedness must be upgraded in order for programs to be truly effective. In determining emergency shelter activities, planners must decide what types of actions can be taken which will facilitate reconstruction. For example ... the vast majority of emergency shelters are provided by the victims themselves... The role of outside intervenors should be to encourage more comprehensive and responsive disaster ... plans, to assist in identifying post-disaster long-term needs (emphasis added), and to help...governments ...prepare to meet these needs.

9. Gaps

(The) lack of detailed information about programs means that each time a disaster occurs, everyone has to begin from scratch and relearn all the lessons that have been learned before.

There exists a very real need to analyze programs and strategies. Information is needed on actions at all stages of a relief operation, and at all levels of the...system; but most important, it is needed at the field level.

The majority of reports about relief operations describe actions and decisions made at the two top levels of the disaster system...There is almost no information on problems...encountered by (the) people who actually carry out...the program...There is also a pressing demand for information on the impact of programs, both the short-term impact and the long-term implications.

There is a lack of hard data on program philosophies: why a program was set up in a particular manner, and what the...objectives were. Few reports explain the program in terms of its social objectives or the philosophies which led to the selection of a particular approach.

The key to solving structural problems in emergency shelter and improved permanent housing is linked to providing an adequate roof. The majority of problems encountered...are related to the problem of finding adequate roofing materials...The performance of a structure in high winds or in an earthquake is dependent upon the weight and design of the roof, and how it is attached to the frame. Once these problems have been solved, it is almost inconsequential what type of infill is used in the walls...

Gersony

ANALYSIS

The Disaster Area Survey Team in Latin America, apparently prepared by Department of Defense (no author indicated, undated manuscript; from content, it can be inferred that it was prepared in 1976 or 1977 upon conclusion of the DAST Post-Guatemala Earthquake After Action Report)

1. Summary The document outlines the history and capability of the DAST team approach, based on lessons learned from Peru (1970), Managua (1972), Honduras (1974) and Guatemala (1976). It compares and contrasts the special needs created by each disaster and some aspects of the USG DAST response. It describes the components of the DAST team itself, its operational requirements, and its response time.

This analysis reflects only items of special interest to our particular mission.

2. The DAST concept was first used in the USSOUTHCOM theater during the Peruvian earthquake of May 31, 1970. The need for some kind of DAST response apparently emerged in the course of the disaster relief response in El Salvador (1965).

3. Data on Managua fires: (p. 8)

> Immediately following the earthquake numerous fires broke out due to electrical sparks and propane and oxygen gas explosions. With the streets blocked by rubble, water in critical demand, and the water distribution system destroyed, local firefighters could do little. Initial relief operations concentrated on emergency medical treatment of the injured and bulldozing fire breaks throughout the city.

4. Data on Guatemala City fires:

> The DAST saw no fires during their initial overflight of Guatemala City. In Guatemala, the electrical system contained a built-in safety device that automatically shut off all power to the city when a quake reached a magnitude of 3 on the Richter scale. (Dangling hot wires had been the principal cause of fires in Managua.)

5. At the time the report was prepared, DASTs had been used nine times in six years. Response-time history:

Managua (1972)	Within six hours from notification of the disaster
Honduras (1974)	The day after FIFI - delay due to weather conditions.

Guatemala (1976)	USSOUTHCOM notified of disaster at 0700 that same morning; Ambassador requested DAST at 1227; DAST deployed from Panama at 1800, initiating survey at first light next day.

"If a prompt decision is made, the initial DAST can be on the way within six hours."

6. In-country, DAST is under the command of the Commander, U.S. Military Group (COMUSMILGP).

7. The report suggests extensive briefing for the DAST team immediately upon arrival from experienced local personnel. Things DASTs can do:

(a) Determine damage sustained in metropolitan area and countryside.

(b) Determine damage to principal lines of communication

(c) Identify helicopter landing zones and conduct surveys of airfields

(d) Make plans to expand survey to include all villages within area

8. DAST Configuration

Office-in-Charge
Public Health/Sanitary Engineer
Civil Engineer
Communications
Aviation Liaison/Air Operations
Medical
Supply
Civil Affairs (Refugee Officer)
Operations/Administration
Combat Control Team
Airfield Survey

The initial DAST would probably be about 10 people, although it has contained from 2 to 60 on occasion, depending on the situation. The initial DAST would not contain all the skills listed above. Follow-on elements ranged in the area of 65 (Managua) to 138 (Guatemala).

"It is advantageous to colocate the USAID and MILGP command posts. This was done in Guatemala and it was one of the keys to the success of the relief operations there."

DAST teams have the capability to some some emergency medical work in the field and to evacuate serious cases to hospitals. Their experience is that they must evacuate family members who are not injured together with the injured.

9. Food: Rice, beans, cereals, cooking oil, sugar, salt, coffee and other basic foods are most useful. C-Rations should be used to feed the DAST teams. "But their high cost and US dietary orientation make them unacceptable for wide dissemination to disaster victims."

10. <u>Conclusion</u>:

> "...the need to promptly respond to all natural disasters... transcends national boundaries and language by facilitating communication and personal interchange between our military (units and individuals) and the striken country and its citizens. It brings the Americans closer together for the humanitarian good of all. USSOUTHCOM has a history of perpetuating this bond of friendship."

11. Suggestion: Could the addition of one additional skill to the DAST team be considered, to integrate some of the types of data collection which we have found helpful in previous disasters regarding housing, food, etc? Either through discussions with DAST personnel in Panama, or some special training of some of the people participating in one of the existing categories? Certain kinds of information would help us to respond quicker...a list of these kinds of points should be developed and discussed with OFDA.

August 30, 1981

EXTRACT

"North Field: Meeting the Triple R Challenge", by LTC Robert E. Boyer, Chief, Engineering Research Division, AFESC, Tyndall Air Force Base, Florida, and Phillip T. Nash, Director, North Field Test and Technology Base Program Manager, Engineering Research Division, Tyndall AFB/Florida, 4-page article appearing in Engineering & Services, an Air Force Quarterly Publication, AFRP 85-1, Vol. 22, No. 2, Summer, 1981

1. Background This article was provided by COL Norman H. Runge, USAF attaché in the U. S. Embassy, Lima, in connection with disaster preparedness activities.

COL Runge believes that the techniques described in the article have direct application to post-earthquake environments and suggested that consideration be given to the participation of Peruvian technicians in a possible course which could be arranged at Tyndall AFB for them.

2. North Field The article describes a USAF simulation exercise conducted in North Field, South Carolina. The exercise tests the RRR (Rapid Runway Repair) techniques developed as part of a nine-year Air Force research program.

The principal purpose of the program is to provide the capability to launch aircraft within five minutes after a successful attack on an airfield and to prepare a suitable expedient runway that can sustain limited operations within one hour.

Within this concept, the emergency repairs "must not pose a hazard to operating aircraft. Excessive surface roughness may damage aircraft tires, structures, personnel or pylon-suspended weapons. The RRR "HAVE BOUNCE" research is analyzing and testing a number of aircraft to determine surface roughness tolerance levels." These tests focus on two particular type of aircraft, of which the C-130, much used after disasters, is one.

The article describes the techniques, timing and success of the test at North Field, South Carolina, in repairing large craters created by explosives and in filling smaller potholes. One extract which might be of interest:

> Based upon "HAVE BOUNCE" test data, potholes in the runway surface deeper than 1-1/2 inches required repair. Compressed air was used to remove loose material, dust and moisture from the potholes. A quick-setting patented polymer concrete, Silikal, was used to fill in potholes. Liquid hardener is mixed with the power catalyst and pea-gravel in a polyethylene mixing bag. Contents were mixed thoroughly and then placed directly into the damaged area. The mixture set in 20 minutes after troweling flush with the runway surface. Mixture hardening times vary according to surface and temperature conditions.

3. Earthquake Applications Damage to Jorge Chavez airport, the main airport near Lima, was considered as a "given" in the simulation exercise conducted by Civil Defense last month and is often considered likely in a major earthquake. There are alternative airports which could be used in an emergency.

However, COL Runge points out that with the techniques developed at Tyndall AFB, there is no reason why a damaged airport runway cannot be rapidly repaired in a very short time. His suggestion is that this technology should be shared with appropriate Peruvian officials.

In the preparation of such a program, RRR technique experts would need to have a ground-level idea of what the problems might be; availability of various materials and equipment; etc. Perhaps part of the course (or overall program) might take place in Peru, and part in Florida.

Gersony