Natural Hazards Research and Applications Information Center Institute of Behavioral Science University of Colorado

Special Publication 38

IV

Hurricane Mitch and Nicaragua

Death and Destruction (But the Eyewall Never Came Close)

The problem of small nations and large hurricanes is nowhere better illustrated than with Hurricane Mitch and Nicaragua. Lost in much of the media coverage was the fact that the eye of the hurricane never touched the national territory of Nicaragua. Indeed, Mitch was damaging Nicaragua technically not as a hurricane but as a slow-moving tropical storm. Coastal storm surge and wind damage were life safety and property issues only along the less populated Atlantic coast of Nicaragua. Instead, Hurricane Mitch in Nicaragua was all about rainfall, flash floods, and riverine flooding. Moreover, more than half and perhaps as much as two-thirds of the human loss in Nicaragua occurred with the collapse of the Casitas volcano and the consequent downstream mudslide and debris flow. That is, without the Casitas "disaster within the disaster," Nicaragua would still have had great property and infrastructure damage but probably no more than 800 killed-not the eventual 2,800 plus. Indeed, the Casitas event illustrates that we still lack critical knowledge about how hurricanes act as a multi-hazard and how local factors (e.g., the weakness of the Casitas volcano sidewall) can have huge impacts on the relative vulnerability of specific sites or areas.

Nicaragua: A History of Disaster

Hurricane Mitch was hardly the first major catastrophe experienced by Nicaragua. Even more than that of other countries in Central America, the history of Nicaragua is a chronicle of natural disasters. The first western account of such an event actually comes from Columbus, whose ships were driven north along the Caribbean coast of Nicaragua by a hurricane in September 1502. Indeed, on September 12, 1502, Columbus, in distress, found more protected waters by rounding a cape in what is now northeast Nicaragua. He appropriately christened it *Gracias a Dios*. Other Nicaraguan disasters include: 1) multiple eruptions of Momotombo volcano (an event in 1606 led to the relocation of the city of Leon); 2) the great 1835 explosive eruption of Cosiguina volcano (which was heard as far away as Colombia, Mexico, and Jamaica); 3) the 1876 Managua flash flood ("*aluvion*"), the story of which is still handed down in the lore of many Nicaraguan families and which perhaps led to the first documented hazard mitigation project in the country (a six-kilometer floodway still in use as part of a larger structural flood control project); 4) the Managua earthquake of 1931 that killed an estimated 4,000 people and (with fires) destroyed much of the city; and 5) the 1972 Managua earthquake, which was essentially a repeat of the 1931 event but with more casualties (6,000 to 10,000 killed) and even greater damage to the government, financial, and business center of the country.

More than two dozen significant hurricanes or tropical storms have impacted Nicaragua in the last century. Recent events include Irene (1971), Joan (1988), Bret (1993), and Cesar (1996). Mitch, however, was a major disaster. Table 12 provides the government's official summary of losses as reported in mid-1999.

Table 12

Hurricane Mitch:
Government of Nicaragua, Official Losses

Dead	3,045
Affected population	1,000,000
Population still requiring assistance 07/99	400,000
Houses damaged or destroyed	151,215
Schools damaged or destroyed	512
Health centers damaged or destroyed	140
Roads damaged or destroyed	5,695
Bridges damaged or destroyed	1,933
Physical damage	US $1.3 billion

Focusing as usual on economics, the EIU made an early estimate that 30% of the second harvest of many 1998 crops in Nicaragua had been "wiped out" and that 70% of the transportation infrastructure was damaged (EIU [Nicaragua], Fourth Quarter, 1998, p. 7). The EIU also noted (p. 3) that like Honduras, Nicaragua was going into international receivership, at least for awhile:

> The government's main challenge over the next 18 months will be coping with the aftermath of Hurricane Mitch, which struck in late October. Growth will fall below expectations this year, and may be negative in 1999 owing to hurricane damage, but we expect a strong rebound in 2000. Shortages associated with the hurricane will prompt a surge in price pressures in the last two months of 1998, continuing into the early months of next year. The country will find it extremely difficult to meet the current IMF targets and will be heavily dependent on emergency international assistance in order to finance its massive external imbalance.

The political impacts, however, were at least as problematic as the economic impacts. According to the EIU, the government of Nicaragua was undergoing serious criticism for not declaring a disaster early enough:

> Assessments of the political impact of the hurricane are necessarily highly tentative at this stage. However, early indications suggest that in the medium term, the disaster may lead to an increase in popular opposition to the government of President Arnoldo Alemán Lacayo. For several weeks before the hurricane struck, producers had been calling for government assistance to help them cope with the impact of higher than usual rainfall through October. However, the government did not call a state of emergency until early November, after the hurricane had struck. This is likely to reinforce a growing sense among the populace that the current administration is indifferent to popular sentiment. [EIU (Nicaragua), Fourth Quarter, 1998, p. 7]

Other reports were more caustic (and interestingly similar to assessments regarding Hurricane Georges in the Dominican Republic):

> This was a disaster foretold. The central government basically ignored the weather service and civil defense reports, playing down the first warnings and instead advising Nicaraguan citizens that this was a

> localized phenomenon with no serious national implications.
>
> President . . . Alemán resisted the recommendations of many, including several ministers, to declare a state of national emergency and proceed with mass evacuation and rescue efforts. No, he said, such a mobilization would be something that the Sandinistas would do-and he was certainly no Sandinista. [Bendaña, 1999, p. 18]

This "Sandinista" issue was of major importance, and we will return to it below, but the fact remains that it was only on October 30, 1998, that Nicaragua's National Emergency Committee was formally convened and a disaster declared (and then only for nine of Nicaragua's main subdivisions, *departamentos*). Several interview subjects in Nicaraguan governmental weather and disaster-related agencies brought up the problem of governmental slowness or delay ("*demora*") in recognizing Mitch as a disaster/catastrophe-and by government they meant the president.

As in the Dominican Republic with Georges and in Honduras with Mitch, emergency aid distribution led to additional political problems. The EIU captured an entire set of interrelated issues:

> The immediate aftermath of Hurricane Mitch, which struck Nicaragua in late October, was marked by local-level infighting among members of the ruling Partido Liberal Constitucionalista (PLC), and between PLC members and the Frente Sandinista de Liberación Nacional (FSLN, the main opposition party) over distribution of aid to the hurricane-stricken areas. This damaged the reputation of both the president [Alemán] . . . and of the Sandinistas. Mr. Aleman's swift transfer of responsibility for the relief effort from local mayors to the Catholic church helped to improve aid delivery but did not entirely neutralise the political fall-out from the disaster. An opinion poll by CID-Gallup found that only 48% approved of Mr. Alemán's handling of the disaster, while 45% disapproved. Many felt that he had been wrong not to declare an official nationwide state of emergency. Many also objected to him ordering the dismantling of the ad hoc hurricane emergency committee as early as the end of November. [EIU (Nicaragua), First Quarter, 1999, p. 10]

Another report was a bit more explicit about the immediate post-impact assistance:

> Donors have long harbored serious doubts about the cronyism and corruption that characterizes central government in Nicaragua. In effect, the first deliveries of relief aid had a way of winding up in the hands of Liberal Party-dominated entities while having strange difficulties reaching Sandinista municipal governments. [Bendaña, 1999, p. 22).

Walker (2000, p. 84) highlighted several pre-Mitch personal scandals affecting both Daniel Ortega (FSLN) and President Alemán and then for the latter pulled a number of the problems together:

> Support for Alemán and the Liberals was also hurt by their poor handling of . . . Hurricane Mitch. Over twenty-four hundred people were killed and nearly a fifth of Nicaragua's population left homeless. Economic damages totaled over $1.5 billion. Working with a civil service stripped to the bone by a decade of neoliberal downsizing and further debilitated by corruption, cronyism, and incompetence, the Alemán administration was painfully slow in helping those hurt by the disaster. Further . . . Alemán channeled Nicaraguan public relief through local governments where Liberals were in power or through Liberal party organizations where they were not. He even attempted at first to deflect the flow of international assistance away from NGOs (seen by him as Sandinista) that he could not control.

Not all these criticisms were fair, but they formed part of the context in which memories and the "meaning" of Hurricane Mitch were being constructed. It should be noted, however, that the Nicaraguan government ultimately set up a much more open, accountable, and transparent relief receipt and distribution system, giving a prominent role to the more widely trusted Catholic Church. Nonetheless, this response mechanism was outside the government and temporary, and necessarily marginalized the Nicaraguan Civil Defense, which also found itself on the outside of the relief effort looking in.

Meanwhile, longer-term recovery and reconstruction-and the hundreds of millions of dollars involved-sparked

enormous interest among civil society in Nicaragua (even more than in Honduras). Literally hundreds of organizations emerged and/or coalesced to press for roles in reconstruction decisionmaking, and considerable political conflict ensued over how they were to relate to the National Reconstruction Commission (*Comision Nacional de Reconstrucción*), which was formed in the aftermath of Mitch, based on an organizational model from the 1972 Managua earthquake (hopefully with better results). Indeed, an interesting observation in this regard was that in post-Mitch Nicaragua, "the bulk of the grassroots organizations created during Sandinista rule [1979-1990] simply gave up on both their government and the FSLN-instead vigorously pulling together with national and international NGOs to confront the common disaster" (Walker, 2000, p. 85).

Setting aside the relief, recovery, and reconstruction issues, it is now useful to step back and examine the question of institutional disaster response and post-Mitch change. This is a particularly interesting issue, in part because Nicaragua is exceptionally complicated historically and politically.

Institutional Evolution: From *Somocismo* through Civil War to *Sandinismo*

Nicaragua can actually trace its history of organized disaster response to the 1876 Managua *aluvión*, when various committees were created to provide independent oversight of the receipt/expenditure of funds, manage relief, and plan mitigation (including the flood control channel noted previously). It was also in 1876 that the Presidential Guard was deployed in a disaster response role, an interesting Nicaraguan precedent for military involvement in disaster, but also a common model in most of Latin America and in other developing countries. In essence the 1876 disaster set the foundation for an emergency management model that included a response and a recovery phase and that incorporated such advanced concepts as risk assessment and hazard mitigation.

Following the 1931 Managua earthquake, the central government followed the 1876 pattern (including the independent oversight of relief funds) but with important differences-most notably a declaration of a state of war and the imposition of martial law "until the constitutional order shall have been restored." With a significant U.S. military presence at the time, the Nicaraguan National Guard (Army) was charged with providing the command structure and logistics to carry out all response, recovery, and many of the reconstruction/ restoration activities. The event contributed to the rise to power of the first member of the Somoza family, with the backing and full support of the U.S. government-highlighted by the presence of U.S. Marines, military aviation units, and warships anchored off Corinto, the main Nicaraguan port on the Pacific coast.

The 1931 disaster and its aftermath thus laid the foundation not only for the Somoza dynasty but also for armed resistance against foreign military intervention-historical developments not often appreciated outside Nicaragua. In essence, the combination of the rise of the first Somoza and the political-military presence of the United States sparked the famous guerrilla movement lead by Cesar Augusto Sandino, whose deeds (including having U.S. Marines chase him fruitlessly over half the country) inspired the modern leftist *Frente Sandinista de Liberación Nacional* (FSLN) or simply "*los sandinistas*."

After the 1972 earthquake, the central government (officially a three-member junta) declared a state of national emergency, again imposed martial law, and formed a National Emergency Committee comprising all the ministers of government, following the model from the 1876 and 1931 disasters. The one crucial difference in this case was that there was no independent oversight of funds. The director-in-chief of the National Guard, General Anastasio Somoza Debayle (yet another Somoza, 41 years after the 1931 earthquake), was designated as head of the committee. A separate advisory body, the National Reconstruction Committee, was subsequently formed and incorporated private sector and church leaders as well as public officials. This committee played an essential advisory role and was responsible for important policy recommendations, but final decisions were still the responsibility of the National Emergency Committee chaired by Somoza.

The omission of the independent and transparent committee and the centralization and control of all international and local relief efforts, combined with actual acts of mismanagement and misappropriation, resulted in widespread corruption in the aftermath of the 1972 disaster. These transgressions fueled discontent with the regime on one hand and strengthened the Sandinista guerrilla movement on the other. Despite these negatives, the work of the National

Emergency Committee and the National Reconstruction Committee resulted in major emergency management and mitigation initiatives, including a 1973 building code for Managua and a legal base for disaster response (the 1973 Law of National Emergency, which gave the council of ministers authority to declare a state of emergency in cases of "public calamity").

In May 1976, the Law of Civil Defense was enacted, establishing the *Instituto de Defensa Civil de Nicaragua* under the authority of the Presidency of the Republic (still Somoza). This law clarified many of the concepts and objectives of the 1973 law and mandated a *Plan Nacional de Prevención y Control de Desastres* (a National Disaster Prevention and Control Plan), which also attempted to define the role of departmental and municipal governments in emergency management.

In July 1979, after a bitter and enormously destructive three-year civil war to oust the Somoza regime, the FSLN (the Sandinistas), with considerable overt and diplomatic support from the U.S. government, took power in Nicaragua. In 1981, the Sandinista government created the *Instituto Nacional de Estudios Territoriales* (INETER, the National Institute of Territorial Studies). INETER grouped under one structure different entities that had previously been dispersed. It also created new ones. INETER is currently responsible for providing government of Nicaragua technical support in geodesy and cartography (mapping), meteorology (weather services), water resources, geophysics, land use, and natural hazards.

A year after INETER was established, the Law of 1982 was enacted, creating the *Estado Mayor de Defensa Civil* (General Staff of Civil Defense) within the structure of the *Ejército Popular Sandinista* (EPS, the "new" Nicaraguan army). In truth, the basic function of Nicaraguan Civil Defense at the time was "defense of the revolution" during the war with the U.S.-backed *contras*. As such, it was an essentially political body, nominally civil but obviously closely connected to the EPS (a relationship that would prove problematic in 1998). To organize national (and civil) defense, the Sandinista government eventually divided the country into seven regions, each with considerable autonomy.

Importantly, a specialized curriculum was developed for military officers serving in Nicaraguan Civil Defense, and the program included several courses in emergency management. Therefore, by the late 1980s, Nicaragua for the first time had a cadre of at least rudimentarily trained emergency managers. The civil defense system was put to the test during Hurricane Joan, which traversed Nicaragua from Caribbean to Pacific in 1988. The new system was recognized as having helped to keep loss of life minimal during that disaster (only 25 dead). The system also worked effectively in the response and recovery efforts after the Pacific coast tsunami of 1992.

Nicaraguan Civil Defense was strengthened in 1992 under a regional cooperation agreement (Centro de Coordinación para la Prevención de los Desastres-CEPREDE-NAC), with funding from the European Community (mainly Germany and Sweden). A "CEPREDENAC NACIONAL" was subsequently formed as an umbrella organization for civil defense in Nicaragua, which included various government departments and, importantly, INETER.

Another event test, Hurricane Cesar, traversed Nicaragua from one coast to the other in 1996, but loss of life and damage were again minimal. The new structure, combining the efforts of INETER and Civil Defense, was credited with effecting good preparedness and raising public awareness through timely, clear, and specific warnings issued through a range of printed and electronic media.

Therefore, Nicaraguan Civil Defense was the apparent lead organization in the response to Hurricane Mitch in 1998. On paper, Civil Defense has a permanent staff of 58 officers distributed in seven regional offices. Field reports, interviews, and observations indicate, however, that Civil Defense was stronger on paper than in reality (perhaps on the order of 40%). Bendaña offered this more general observation about the state of preparedness at the local level in Nicaragua on the eve of Mitch:

> The elementary foundations of government presence-such as civil defense structures, police, fire brigades and health clinics, not to mention minimally empowered municipal entities-simply did not exist or were woefully understaffed, undertrained and underpaid with little or no communication links with the capital or with central authorities. [Bendaña, 1999, p. 18]

Thus, despite its previous relative successes with earlier disasters, Nicaraguan Civil Defense was overmatched by

Hurricane Mitch and its cruel, leisurely, and moisture-laden path through Central America. Operationally, Nicaraguan Civil Defense was almost immediately overshadowed by the regular military; then it was further marginalized when relief was rechanneled away from government and instead sent through the church and NGOs.

In part because of the losses at Casitas volcano, Hurricane Mitch will never be forgotten in Nicaragua. While life loss due to the hurricane was not on a par with the 1931 and 1972 Managua earthquakes, the casualties, homeless, and national infrastructure damage have earned Mitch a spot in Nicaragua's notorious history of disaster. The hurricane was also undoubtedly the most well-covered disaster by the media in the country's history.

Media Attention Span

Covering a 10-week period (October 20-December 29, 1998) and the three main Nicaraguan newspapers (*La Prensa*, *El Nuevo Diario*, and *La Tribuna*), Table 13 shows the total number of Mitch stories published per week. Beginning with the pre-impact week and following the evolution of the post-impact efforts, 942 stories were published detailing the impact of Mitch. The accompanying Figure 4 graphically displays the same data.

Table 13

Hurricane Mitch Coverage:
The "Big Three" Nicaraguan Newspapers

Week	***Number of Stories***
Week 1 (October 20-27)	30
Week 2 (October 28-November 3)	161
Week 3 (Nobember 4-10)	178
Week 4 (November 11-17)	68
Week 5 (November 18-24)	39
Week 6 (November 25-December 1)	29
Week 7 (December 2-8)	88
Week 8 (December 9-15)	88
Week 9 (December 16-22)	38
Week 10 (December 23-29)	23

As can be seen, coverage naturally rose as Mitch neared the country and began having impacts (week one), then rose steeply in weeks two and three as the storm's full effects became clear. Coverage sharply declined from week three (178 stories) to week four (68 stories) and continued to decline until week seven and eight, when reconstruction issues, especially financing, became paramount concerns (coverage actually tripled from week six to week seven, from 27 stories to 88 stories).

As in Honduras, there was a significant difference among newspapers regarding Hurricane Mitch coverage. *La Prensa* led with 356 stories, *El Nuevo Diario* had 216, and *La Tribuna* carried the least-170.

Assistance Credit

Tables 14 and 15 (pp. 56, 57) show how the Nicaraguan press reported foreign assistance. Again, these tables represent story counts of assistance reported by donor. Table 14 contains the story count for assistance by country. The most noted donor was the United States in 44 stories, followed by Spain in 19 and France in 11.

Table 14

Hurricane Mitch:
Nicaraguan Media Recognition of Assistance, by Donor Nation

Country	*Number of Stories*
USA	44
Spain	19
Cuba	11
France	9
Mexico	9
Brasil	7
Taiwan	7
Germany	6
Italy	6
Netherlands	6
Finland	5
Austria	4
Argentina	3
Canada	3
China	3
England	3
Japan	3
Denmark	2
European Union	2
Sweden	2
El Salvador	1

Panama	1
Russia	1
Uruguay	1

Table 15 contains the story count for NGO, IGO, and MNC assistance. The most noted donor in this category was the World Food Program (WFP) in seven stories, followed by the IADB in five stories, and the Red Cross in four. CARE and the World Bank follow with three each.

Table 15

Hurricane Mitch:
Nicaraguan Media Recognition of Assistance,
by NGOs, IGOs, and MNCs

NGO/IGO/MNC	*Number of Stories*
World Food Program	7
Inter-American Development Bank	5
Red Cross	4
World Bank	3
Care	3
GTZ (Germany)	2
Nicaraguans in Miami	2
Organization of American States	2
Pan American Health Organization	2
United Nations	2

The following NGOs, IGOs, and MNCs were mentioned in one story: ADES, ADRA-Denmark, Aldeas SOS, American Airlines, American Express, BCIE, Catholic Church, Green Peace, IDSM (Moravos), IMF, and Western Union.

Blame Themes

In contrast to the direct and highly visible involvement of President Flores in Honduras, Nicaragua's President Alemán tried to distance himself from Mitch and its consequences, in part because the media in Nicaragua are much more partisan than in Honduras, especially *El Nuevo Diario*, which is closely associated with the FSLN (Sandinista) party. *El Nuevo Diario* was constantly and consistently critical of the president and a major source of blame assignment. In contrast, *La Tribuna* and the *La Prensa* were more sympathetic and became primary mechanisms for blame deflection, emphasizing national "solidarity" and chances for "reconstruction of the society."

Stepping back and reviewing blame themes in general, however, we can identify the following:

1. *Lack of a Declaration*-President Alemán was pilloried, especially by the opposition, for taking so long to declare a national state of emergency. He tried to deflect this criticism by saying that he was concerned that the entire country was not even close to being equally affected and that "opportunistic" institutions and individuals might use an emergency declaration as a pretext to default on loans.
2. *Lack of Presidential Commitment*-Alemán was nicknamed the "come and go president " ("*el que llegó y se fué*"), as he traveled to different sites with caravans of advisors and press-but left without offering any significant response to the devastation.
3. *Refusing Cuban Doctors*-The Alemán government was strongly criticized, again primarily by *El Nuevo Diario*, for refusing assistance from a Cuban medial team and for halting their entry into Nicaragua at the Honduran border.
4. *Partisan Favoritism*-This criticism was complicated, but it seemed that everyone was blaming everyone else (fairly or unfairly) over aid distribution patterns. Local governments blamed the central government for lack of immediate assistance. The central government accused municipalities of distorting the facts, and the opposition Sandinistas chimed in with complaints about aid going only to the Catholic Church and primarily to municipalities controlled by the government party or one of its close coalition partners. (In the end, the IMF and other donors publicly urged an end to the bickering.)

In contrast to blame, all three newspapers praised the Nicaraguan military (and the U.S. military, which was a startling turnaround since the days of the *contra* war) for their efforts in rescue and assistance after Mitch. As in Honduras, international assistance received positive and essentially blameless coverage.

The Nicaraguan case is the acid test for media fairness in the treatment of international assistance, especially from the United States. If criticism and blame of international/U.S. assistance were to be found anywhere in the storms of 1998, it would have been with the opposition *El Nuevo Diario*, closely associated with the Sandinistas. Hearteningly, the Nicaraguan media, including *El Nuevo Diario*, gave extensive and positive coverage to assistance from the international community, and the U.S. received at least its fair share. Perhaps because of the disaster and the U.S. role in responding (including that of SOUTHCOM), it appears that a new era may indeed have begun in U.S.-Nicaragua relations.

As in both the Dominican Republic and Honduras, however, the media were much more critical, even scathing, of their own government. This increasing domestic politicization of disasters and disaster response is in interesting contrast to 20 years ago, when criticism of the international community in disaster response was extensive. That problem appears to have abated considerably, at least in the Western Hemisphere.

A Policy Work in Progress: Nicaragua's Post-Mitch Changes and Proposals

Several important policy measures that bear monitoring have been undertaken in Nicaragua since Hurricane Mitch. The most important are the following:

1. *Decentralization of emergency management by a) developing, through training and exercises, the capabilities of municipios, based on the 1992 Law of Autonomy of the Municipalities, and b) further regionalizing Civil Defense.*
2. *Reactivation of a law originally proposed-but not passed-in 1995*. This legislation, known as the Law Creating the National System of Civil Defense for the Prevention, Mitigation and Management of Disasters, was debated and passed in the 1999 legislative session. It potentially changes emergency management in Nicaragua in a very significant way by providing a budgeted *disaster fund* for the first time in Nicaraguan history. This legislation and its implementation should be monitored closely, especially since conflict appears to be developing between INETER and Nicaraguan Civil Defense over the role each institution should play in emergency management.
3. *Creation of a Natural Hazards Unit within INETER*. This unit is responsible for providing technical support for studies involving risk assessment, vulnerability assessment, and disaster preparedness and mitigation. This new unit has already undertaken several pilot studies and other projects with support from central government agencies, the municipal government of Managua, CEPREDENAC, and the Swedish Agency for International

Development.

4. *A central government commitment to the creation of a "national culture of disaster prevention and mitigation*." The vice president of Nicaragua has been charged with leading this effort, and one goal is to move from thinking only about response and reconstruction to considering "transformation of existing structures."

In Sum

Nicaraguan Civil Defense was overwhelmed by Hurricane Mitch and subsequently marginalized by the military itself and a combination of the church, NGOs, and in broad terms, Nicaraguan civil society. Indeed, even within the government, Nicaraguan Civil Defense had a problem, its long association with the EPS (and therefore the Sandinistas) causing the Alemán administration to view it with distrust. While this is peculiar to Nicaragua and a residual artifact of the civil war and then the contra war, it was important. The fact that Nicaraguan Civil Defense was not completely integrated with the army (it was, after all, nominally civil and reported officially to the presidency) meant that it was not viewed as "military" either. In sum, it was in an institutionally untenable position when faced with a catastrophe the size of Mitch.

More specifically focusing on the Nicaraguan response to the disaster, the following conclusions can be offered: 1) the tracking of the storm and the advising of central government authorities was accurate and reasonably timely; 2) however, central government recognition of the threat and activation of emergency plans was quite slow; 3) the initial response phase was less than effective because of the severity of event impacts; and 4) the tragic Casitas volcano debris flow/mudslide "disaster within the disaster" caught everyone by surprise.

It is still too early to tell (laws and plans are one thing; programs, projects, and budgets are the real test), but Hurricane Mitch may have finally focused Nicaragua (society and government) on a far more important issue: the interdependency of hazard vulnerability and effective emergency management structures in such diverse national activities as land use, planning, environmental management, development practices, and-above all-policy making.

In the past, to take an example, lack of coherent and responsible land-use policies clearly resulted in Nicaraguan centers of population being located in highly vulnerable areas. Hurricane Mitch revealed just how tragic that inattention can be. Mitch also demonstrated that infrastructure designs, even when they met broad engineering standards, often failed to take into account the relative vulnerability of specific sites. Unfortunately, these examples can be easily generalized to other countries-not just those in Central America-including such developed countries as the United States, which has experienced dramatically increasing urban development in coastal communities, floodplains, and other vulnerable locations.

Finally, describing one of the larger issues that bedevils Central America, and the world for that matter, the EIU offered this perspective:

> One of the key lessons learned from hurricane Mitch was that the pace of deforestation-currently estimated at some 100,000 ha per year-and the continuous advance of the agricultural sector into tropical forest reserves . . . has greatly magnified the destructive potential of natural disasters. . . . Post-hurricane assessments by [the UN, World Bank, and Inter-American Development Bank] have all emphasized the importance of a comprehensive environmental protection strategy to Nicaragua's long-term development. But to the dismay of the diplomatic community in Managua, when the [government of Nicaragua] presented its final list of projects to a public conference . . . not one project from the environmental commission had been included. [EIU (Nicaragua), Second Quarter, 1999, p. 18][3]

Note 3

Nonetheless, it bears mentioning that deforestation was not a contributing factor in the Casitas volcano debris flow/mudslide. An on-site inspection in early November 1998 and subsequent scientific study conducted by INETER point to a combination of geologic and hydrologic causes as the source of the debris flow and mudslide. It appears that a landslide at the top of the volcano, with an approximate volume of 130,000 cubic meters, became the triggering factor in the tragedy. The same study also identified similar landslides to the west

and to the north of the Mitch-induced event, with approximate respective volumes of 400,000 cubic meters and 600,000 cubic meters, that go back to prehistoric times.

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