# An Interdisciplinary Quick Assessment Strategy to Support Decision-Making in Disaster Operations: The Costa Rica Earthquake, April 22, 1991

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# An Interdisciplinary Quick Assessment Strategy to Support Decision-Making in Disaster Operations: The Costa Rica Earthquake, April 22, 1991

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## Efficiency in Disaster Response Operations

This report presents findings from a quick response study to Costa Rica following the April 22, 1991 earthquake in the Valle de Estrella, on the Caribbean slope of the Cordillera de Talamanca, close to the southeastern border with Panama. The earthquake registered 7.4 on the Richter scale of surface wave magnitude,[1] the most powerful earthquake recorded in this century of Costa Rica's significant seismic history. The overall cost of damage caused to infrastructure, losses in export, commercial wood, commercial soils, housing and social infrastructure were estimated at US $965 million, close to US$ 1 billion (Bermudez, 1993:3-5). This sum represents approximately 7% of Costa Rica's Gross National Product, a substantial loss for a nation of 2.6 million people.

The research design proposed for this quick response study addressed the problem of efficiency in disaster response operations. Repeated studies of decision-making in disaster operations have identified the problem of accurate, timely, information to support decision-making as one of the primary needs of

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[1]Local magnitude, Ml, was reported as 7.2. These calculations were reported by the Seismological Department, University of Costa Rica. EQE International, Inc. 1991. The April 22, 1991 Valled de la Estrella Costa Rica Earthquake: A Quick Look Report. (May): p.3.

disaster managers. The problem is compounded in complex environments where decision processes in disaster operations necessarily cross disciplinary, organizational and jurisdictional boundaries. The problem is further compounded by the necessity to update and aggregate incoming information regarding the impact of the disaster event upon the affected community, its population and infrastructure with existing knowledge of the community, in order to provide timely, valid information to support policy making in disaster operations.

The research design proposed for this study sought to develop an interdisciplinary quick assessment strategy that would assess the capacity of a stricken community to respond to a disaster event in five critical disciplines: public policy and management, medicine, public health, engineering, and information processes. While other disciplines are relevant, these five disciplines were selected as essential to any disaster response. Timely assessment of conditions in the disaster environment from these five disciplinary perspectives is essential to mobilizing efficient response to disaster. Three components were envisioned for the quick assessment strategy: 1) identification of the information requirements for assessing the capacity of the affected community to respond to disaster both within and across the five disciplines; 2) design of an interdisciplinary, interorganizational format to process the incoming information from a specific disaster and transmit it to appropriate disaster management personnel in their respective organizations and jurisdic-

tions; and 3) design of a set of procedures for validation of incoming information, as well as continuous review and integration of this information with existing knowledge about the affected community.

This research design, developed to apply to a generic problem in disaster response, underwent some modifications in its implementation to fit the actual context of disaster operations following the April 22, 1991 earthquake in Costa Rica. This report presents the findings from a 14-day quick response trip to Costa Rica, April 24, 1991 - May 8, 1991. The report is organized in three parts: 1) the context of the disaster and identification of the major functions and organizations involved in disaster response; 2) the information processes used in disaster operations as they were observed through organizational interactions and on-site interviews; and 3) the validation of professional observation of these information processes through content analysis of professional reports and newspaper accounts of disaster response operations.

**The Context of Costa Rican Disaster Operations, April 22, 1991**

By observable criteria, in April, 1991, Costa Rica had one of the most advanced emergency planning organizations with high potential for emergency response in Latin America. The Comision Nacional Emergencia (CNE) was operating from modern, well-designed offices in San Jose, with a professional staff that included experts in geology, engineering, medicine, and computer science affiliated with the University of Costa Rica, major national

industries, such as the Refineria Costarricense de Petroleo (RECOPE), and major hospitals in San Jose. The National Emergency Plan assigned the primary responsibility for managing and coordinating all activities relating to disaster to the CNE, which reported directly to the President of the Republic.[2] The CNE had recently invested in a $2 million computerized emergency information system, and was engaged in developing a hazards vulnerability analysis for the entire country.[3]

The CNE had established good working relationships with international agencies located in San Jose that were also working to improve disaster preparedness and response: the US Regional Office of Foreign Disaster Assistance, the Regional Office of the Pan American Health Organization, and the Regional Office of the League of Red Cross Societies. It had organized planning exercises for its staff and affiliated institutions at the national level. In short, the CNE had a well-trained staff who were working hard to carry out the mission of their agency as they understood it. The staff had developed an ambitious agenda for a small nation that was vulnerable to a range of serious hazards.

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[2]National Emergency Plan. National Emergency Committee. San Jose, Costa Rica, 1991:4.1. Portions of the plan were translated and made available by Dr. Teofilo Sarkis as part of his report to the United Nations Interregional Seminar, Jakarta, Indonesia, December 13-18, 1993. Dr. Sarkis played an active role in Red Cross medical response in Limon during the disaster operations, April 22-28, 1991.

[3]This system, the Emergency Information System, was purchased with funds from the International Development Agency of Canada. Interview, Luis Diego Morales, Director of Planning, CNE, April 26, 1991.

It had prudently allocated scarce resources and early efforts in preparedness and training to the area of highest perceived risk and heaviest concentration of population, the Meseta Central which included the capitol city of San Jose.

When the earthquake occurred on April 22, 1991, the CNE assumed its legal obligations to coordinate response to the disaster. Nonetheless, by April 25, 1991, the third day after the severe earthquake, it was clear that there had been inadequate information gathered to support effective response to the city of Limon, the isolated towns of Limon province, and the canton of Turrialba, areas that suffered the heaviest damage.[4] President Rafael Calderon announced that he was assuming direct control of disaster operations and placed two of his Cabinet ministers, the Minister of Agricultura y Ganaderia and the Minister of Vivienda y Asentatmientos Humanos, in charge of disaster operations in the province of Limon. The CNE would play a support role to the government ministries in the conduct of disaster response and recovery operations.[5]

This set of events, which effectively reversed the role of the CNE according to the National Emergency Plan and the expectations of its president and executive director, illustrated vividly the dynamics inherent in the research question I had come to study: the design of an interdisciplinary quick assessment

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[4]La Nacion, April 25, 1991: pp. 4A, 6A, 8A, 11A

[5]Press conference conducted by Humberto Trejos, M.D., President, CNE, April 25, 1991, 6:00 p.m., San Jose, Costa Rica.

strategy to support effective action in disaster response. Occurring in the first days of my observation of disaster operations in Costa Rica, these events influenced the subsequent course of my study. Clearly, existing information processes had failed to provide the CNE with timely, accurate information to support response action, but why and how had this occurred, and what conditions were specific to this earthquake in contrast to the procedures outlined in the formal National Emergency Plan? My own observations of the CNE in operation and interviews with the executive director, director of planning, director of operations, and staff on site led me to reject the negative judgment of the CNE offered by the media and others[6] and to search for other conditions which may have contributed to this marked shift in an evolving emergency response system.

In this specific set of disaster operations, the processes for gathering and analyzing information to support decision making at the national level in response to local needs were not fully in place at the CNE. Its major investment in a computerized information system was relatively new, and most of the data for the area affected by the earthquake -- the city and towns in the province of Limon and the Valle de Estrella -- were not yet entered into the computerized knowledge base for the system.

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[6]I respectfully disagree with judgments made by Benjamin E. Aguirre in his report, "Social Aspects of the Costa Rica Earthquake of April 22, 1991":13. Examination of other sources and consideration of different aspects of the problem of management lead me to different conclusions regarding the role of the CNE in disaster preparedness and response in Costa Rica.

The CNE relied largely on the national telephone system for communication with outlying cities and towns, which went down immediately in some areas and was overloaded in others. Its radio system did not have the capacity to communicate across the mountains to the Atlantic coastal city of Limon and the smaller towns of Bataan, Matina, Sixaola and others in the affected area, nor did it have the transport capability to send helicopters immediately on reconnaissance flights to assess the damage. Neither did the local units of the Guardia Civil, Costa Rica's civilian response organization, have advanced communications capability. Local and provincial committees of the CNE were not yet developed and could not provide the two-way exchange of information regarding assessment of damage and communication of needs essential to mobilize national response action at the local level. In sum, the CNE had inadequate means for direct exchange of information between the stricken areas and its central office in San Jose and had little capacity for organizing local action in these outlying areas.

Ironically, the news media had both better equipment and better means of transportation for information search and damage assessment than the CNE, and early seized the lead in reporting the consequences of the earthquake to the wider population.[7] However, these reports, while timely, were made from a journalist's perspective and did not provide the kind of systematic,

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[7]Interview, reporter for La Nacion, Limon, Costa Rica, April 27, 1991.

professional assessment of damage to the infrastructure and needs of the earthquake-affected populations essential for effective disaster operations.

Consequently, without adequate transportation and communication facilities to support an initial damage assessment, the CNE's information search regarding the impact of the earthquake in these outlying cities and towns yielded delayed, vague, and incomplete reports that provided little basis for informed action. The President's actions in assuming lead responsibility for disaster response and operations reflected his ability to bring wider resources to the task and to obtain a more timely, accurate, and detailed assessment of needs in the provincial regions.

The response and recovery system that evolved in the Costa Rican disaster operations was clearly nonlinear,[8] marked by discontinuities in communication, coordination, and organization in contrast to its predesigned, centralized, linear National Emergency Plan. That is, the response system was "sensitive to the initial conditions" (Prigogine and Stengers, 1984) of the disaster affected area -- the city of Limon and the towns, villages, ports, and banana plantations in the area -- and

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[8]There is a substantial literature on nonlinear, adaptive systems that presents cogently the primary characteristics of these systems. See, for example, S. A. Kauffman. 1991. Origins of Order: Self-Organization and Selection in Evolution. New York: Oxford University Press; L. Comfort. 1994. "Self Organization in Complex Systems." Journal of Public Administration Research and Theory, Vol. 4, No. 3 (July):393-410.

continued to evolve in unpredictable ways. However, within this nonlinear system were sets of subsystems operating separately with reasonable stability and purpose. There was little coordination of action or shared information among them, but they did represent significant actions taken by separate groups in a self organizing approach to disaster response. The next section will identify the emergence of the major sub-systems and their contributions to a quick assessment strategy that informed action in disaster response.

**Organizational Sub-systems and their Information Processes**

When President Calderon assumed direct control of disaster operations, the formal organization of the CNE became a participating member of the disaster response system, rather than the active coordinator and manager of the system. Working under urgent demands for action, separate groups of organizations formed around common tasks and carried out their functions, often crossing jurisdictional boundaries within groups, but with relatively little interaction among the groups. Each group instead reported directly to the President. At least seven distinct sub-sets of organizations were identified that performed their own assessment of needs in the disaster-affected areas, and organized their actions accordingly. These subsets included organizations representing the five disciplines I had expected to study: public policy and management, medical response, engineering, public health, information processes, as well as two additional perspectives that proved especially important in this disaster: transportation and agriculture/commerce/industry. In

this account, emergency response is treated as a sub-subset of public policy and management, reflecting the urgent need for public action immediately upon impact of the earthquake. Each set of functions will be described briefly below. Some organizations performed functions in overlapping subsets, which will be noted in this analysis.

Emergency Response.

Fortunately, in this disaster, the loss of life was remarkably low, given the magnitude of the earthquake. Although different figures were cited for the number of dead and the number of injured, the most consistent figures reported were 47 dead and 198 persons seriously injured in Costa Rica (EQE International, Inc., 1991; B.E. Aguirre, 1991; A. Laval, 1993; T. Sarkis, 1993). The earthquake occurred on a Monday, April 22, 1991 at 3:57 p.m., with the major impact outside of the heavily populated area of the Meseta Central. In Limon, a city of approximately 75,000 residents that suffered the heaviest impact, buildings were largely one and two story wood-frame, concrete block, or concrete frame structures. Only one structure in Limon, the three-story International Hotel, completely collapsed, killing one man who was trapped inside. Eight other deaths were reported in Limon. More deaths occurred in the small towns of Talamanca (18) and Matina (20), where the structures were not as well built.

Search and rescue operations in Limon and the surrounding towns were largely carried out at the local level, by family, friends, local police and fire departments in the first few hours

after the earthquake. Trained urban search and rescue teams arrived from Switzerland and Great Britain with search dogs and special equipment, but by the time they arrived on Friday, April 26, 1991, there was no longer need for their services. Fires did break out, the most damaging at the RECOPE refinery near Moin, but local emergency response organizations effectively brought them under control.

Medical response.

The more urgent task in emergency response was setting up emergency medical facilities to care for the injured. Limon's primary hospital, Dr. Tony Fascio Castro Hospital, was damaged in the earthquake and declared unsafe for treating patients. Emergency care was established outside the hospital, but no surgery or treatment of serious injury could be performed. Patients requiring advanced medical care were transported by air to hospitals in San Jose.

Under the direction of a Red Cross physician, local medical personnel formed a hospital station at the airport to receive injured persons transported by helicopter from outlying towns and villages. Patients were stabilized at this airport station, and then transported by plane or helicopter to hospitals in San Jose for further treatment. A pharmacy was also established at the airport to provide ready access to medicine for injured patients transported to the airport from outlying towns, and, in turn, to make medicines available to patients in outlying towns which had been isolated by damage to the roads and bridges in the area.

Medical services offered by volunteer medical personnel were organized and provided to outlying communities via air transport, as needs were reported from reconnaissance flights.

Transportation.

Since Costa Rica has no military forces of its own that could provide heavy equipment for logistical needs, President Calderon requested transportation assistance from nearby nations. Nicaragua, Venezuela, and the United States Southern Command, based in Panama, provided military helicopters to assist with medical transport, reconnaissance of damaged roads and bridges, and transportation of needed supplies, water, and medicine to isolated towns and villages. The United Nations of Central America (ONUCA) also provided three helicopters for the transportation of injured patients and relief supplies. In addition to helicopters, the US provided a C-130 transport plane to carry relief supplies and heavy equipment to areas of need.

Transportation proved a crucial element of both emergency response and medical response, and the airport itself became an important locus of operations management and information exchange in this disaster. Local organizations established an operations headquarters at the airport, with radio communications, a fax machine, and telephones. This communications capability enabled direct communications with national ministries and organizations located in San Jose, as well as communications via radio to those

villages that could receive and send messages. Personnel at this airport headquarters office recorded incoming supplies and voluntary assistance from disaster relief organizations -- public, private, and nonprofit -- as well as reports of needs from outlying areas. In a spontaneous effort to match the flow of incoming supplies to reported needs from the disaster-affected towns and villages in the coastal region, this hastily established operations office organized a de facto communications exchange and record-keeping system that provided an important basis for informed decision. Professional guidance from the US Office of Foreign Disaster Assistance, which had established trusted relationships of long standing with the CNE, Red Cross, PAHO, ONUCA, and the Costa Rican ministries, served an important function in supporting the organization and operation of this office.[9] Accordingly, disaster relief supplies were received, stored, and dispensed to outlying communities from the airport in an increasingly ordered manner, as disaster operations progressed. As stated above, medical services to isolated towns in the disaster-affected area were coordinated from the airport through available air transport.

Engineering.

The engineering sub-set operated largely independently of the emergency response, medical response, and disaster relief organizations. The major damage from this earthquake affected

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[9]Professional observation and interviews with operations staff, Limon Airport, April 27, 1991.

the transportation infrastructure of the Atlantic Region, which severely disabled the dominant agricultural economy and commerce of the Region by preventing the transport of agricultural products to the Port of Limon to be shipped to international markets. In turn, damage to the lucrative agricultural sector created severe damage to the economy of this small nation. This earthquake illustrated the destructive triggering effect of natural disaster upon the interdependent economic and social relationships of this still developing nation.

Eight bridges were destroyed or severely damaged, and approximately 225 kilometers of roads were deeply fissured by the earthquake.[10] These routes were essential to transport the important banana crop across the six rivers flowing from the Cordillera de Talamanca to the coast for shipping to external markets. Equally damaging, the Port of Limon, which handles approximately 80% of the shipping to and from Costa Rica, was disabled by an unusual uplift of one meter in the coastal floor. This tectonic phenomenon created the appearance of a "receding sea," in which the water level dropped significantly, leaving previous loading docks dry and inaccessible to incoming ships, and docked ships, previously floating in water, beached on dry land. Damage was also reported at the Port of Moin, on the Atlantic Coast, the principal entry point for petroleum into the country. Given the primary roles of banana production and export and energy produc-

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[10] Interview, Lt. Col Richard Price, USACE, San Jose, Costa Rica, April 28, 1991; La Nacion, April 27, 1991.

tion in the economy of the country, reconstruction and repair of the damaged bridges and the Ports of Limon and Moin assumed a very high priority in the national recovery from disaster. The sub-set of organizations that formed the engineering group tasked to address this problem included international, national, and local organizations, both public and private.

Anticipating heavy expenditures in infrastructure reconstruction, President Calderon requested, and received, on April 23, 1991, a $60 million loan from the World Bank for emergency road and bridge repair.[11] He then requested a damage assessment of the failed bridges and an estimate of the cost of reconstruction. The US responded by sending a team of professional engineers from the US Army Corps of Engineers, Southern Command, based in Panama to conduct a technical assessment of the damage to the bridges. The assessment team, led by Lt. Col. Richard Price, USACE, included other professional engineers from the USACE, the Ministry of Obras Publicas y Transporte, and a private Costa Rican engineering firm. The group overflew all eight bridges in a US Army Blackhawk helicopter on Saturday, April 27, 1991.[12]

In this damage assessment, the engineering team checked the

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[11] Situation Report No. 1, US Office of Foreign Disaster Assistance, April24, 1991: p. 2.

[12] With permission from the commanding officer, I had the unusual opportunity to join this reconnaissance team in their overflight of the damaged areas and to observe the technical team as they carried out this assessment. San Jose, Costa Rica, April 27, 1991.

design of the original bridges against the soils structure, the expected traffic load, the tensile strength of the steel used in the bridges, the size and depth of the pilings, and other construction requirements needed for seismic resistance. The kinds of information they sought were largely well-structured, technical questions which were needed to develop a set of professional recommendations for rebuilding the bridges. The group completed their analysis of the failed bridges and their designs for reconstruction and presented their report to President Calderon in the following week. The president accepted their recommendations, allocated resources from the World Bank loan, and the program of bridge reconstruction began very quickly. In this instance, the types of information needed for action were well-defined, the means of obtaining it were available, the information gathered was credible and accepted by the relevant groups, and action followed without delay.

When asked to summarize the criteria used by the USACE in preparing its mission and in gathering data for its report, Lt. Col. Price listed six standard criteria used in any US military mission:

1. Clear statement of mission
2. Specific assignment of personnel who have the skills, knowledge, and capability to do the work
3. Detailed plan for logistics
4. Sufficient allocation of resources
5. Clear designation of administrative responsibilities
6. Designated time schedule for action

The actual content of the engineering criteria for the task is subsumed under the second criterion: personnel who have the

skills, knowledge, and capability to do the work. The other five criteria all relate to means needed to carry out the task. The effectiveness of the engineering mission and the ready acceptance of its recommendations for action by the interested parties indicates the value of this approach. When any one of these six criteria is not carefully met, Col. Price observed, the mission is likely to falter. The criteria, in effect, assisted the engineers in ordering and focusing the information needed for effective action among the participating international, national, and private organizations involved in the bridge reconstruction process.

In contrast to the clear and rapid identification, collection, and analysis of information for bridge reconstruction, quick assessment of damage and the development of an action strategy took a different form in reference to housing, a second engineering function. Approximately 850-1,000 homes were destroyed, leaving an estimated 3,500 people homeless. Shelters were established in parks and other public places, but the dominant response was to consider housing a matter for private or non-profit action. There appeared to be little coordination of housing services, except for the distribution of supplies of plastic and other materials extended through the Red Cross and other non-governmental organizations.[13] Most persons who suffered damaged or destroyed housing did not have insurance, and strug-

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[13] Situation Report No. 4, US Office of Foreign Disaster Assistance, Washington, DC, April 30, 1991: p. 4.

gled to cope with their losses with help from family and friends. The housing damage was more diffuse than the infrastructure losses, affecting individual families who had no real means of articulating their needs collectively, and no strong leadership emerged at the local level to press for assistance in meeting these needs. Information remained scattered, and policy makers moved to more urgent, that is, more sharply articulated, demands.

Public Health.

The functions of public health in this disaster were closely related to the destruction of housing and damage to the lifelines infrastructure. Consequently, it was difficult to meet the urgent needs for clean water, protection from infectious diseases, and post traumatic stress counseling for the affected population without addressing the problems of safe housing, reconstruction of damaged water and sewer mains, and restoration of electrical power. In examining and devising workable courses of action for this interdependent set of problems, the local and provincial offices of the Ministry of Public Health played a major role.

The Ministry of Public Health had the most extensive and well-developed organizational structure of any of the national ministries in the province of Limon and the municipalities affected by the earthquake. Local and provincial Public Health officials had developed strong associations with the citizen clientele they served, and represented familiar and respected sources of assistance, counsel, and organizational guidance in the local neighborhoods. Local Public Health officials worked

with municipal personnel to organize the delivery of clean water to neighborhoods with broken mains, advised citizens to boil water before drinking, identified families with old, sick, or very young patients who needed special food, clothing, or medical assistance, and served as a vital local reference center for information, requests for assistance, and guidance in the distribution of relief materials and the reconstruction of damaged homes and towns.

In their organizational efforts, the local and provincial Public Health officials were supported with resources and relief personnel from the national Ministry and the Pan American Health Organization. The long-standing development of local and provincial services in public health care enabled this ministry to play a substantive role of guidance and support at the local level. Public Health staff, further, served an important liaison role in working with voluntary nonprofit agencies that contributed goods, services, and professional skills to the recovery process.

Agriculture/Commerce/Industry.

Although relatively sparsely populated, the Atlantic Region plays a major role in the nation's economy. The major banana plantations are located in the area and ship their produce through the Port of Limon. The nation's only oil refinery, RECOPE, is located near the Port of Moin. The banana plantations are largely owned by international companies that sought assistance directly from the Costa Rican Government. They also increased the Government's negotiating power with international

monetary organizations such as the World Bank and International Monetary Fund. Although this group of private companies represents a small sub-set of organizations, they exercised a great deal of influence to obtain prompt action from the Costa Rican Government as well as substantial international monetary assistance and voluntary aid for the often overlooked region. These organizations included the United Fruit Company, Del Monte Company, Chiquita Brand, the Chiriqui Land Company, Standard Fruit Company, the Banana Development Corporation and others. These organizations reported their needs directly to the Ministry of Agriculture and Livestock and the Minstry of Public Works and Transport. These organizations illustrate the interdependence of economic and engineering functions in disaster response. Engaged in agriculture, commerce, and industry, these organizations were directly affected economically by the damage to the infrastructure, and they, in turn, exerted an active influence to mobilize the engineering resources needed to restore operations.

Information Processes.

As already indicated, existing communication and information processes did not function well to serve the CNE's formal role of coordination of disaster operations following this disaster (see above, pp. 3-5). Although the CNE remained actively involved in disaster response and recovery activities, the information processes in this disaster appeared fragmented and operated largely within functional groups that reported directly to the President. Within each group, substantial experience and exper-

tise was martialed to address specific types of problems and to devise practical courses of action. Yet, among the separate groups there appeared to be little exchange of information or coordination of action. This lack of overall coordination appeared to constrain the effective performance of participating organizations and to generate an unusual degree of distrust and animosity, especially among organizations with interdependent responsibilities. This pervasive distrust and barely concealed hostility among different groups participating in the common task of disaster operations inhibited frank, candid communication among them and diminished the willingness and capacity of the participating organizations to explore and execute the most appropriate, feasible, and efficient alternatives for action in response and recovery operations.

Content Analysis of Organizational Action in Disaster Response

One means of documenting the difference in actual organizational response in disaster operations in comparison to the formal response outlined in the National Emergency Plan is through a content analysis of the newspaper reports on this disaster. In Costa Rica, I obtained the daily editions from two national newspapers published in San Jose, La Nacion and La Republica, for the period, April 23, 1991 - May 8, 1991. From the news stories reported for this period, we identified the organizations engaged in disaster response by jurisdiction, source of

support, and type of transaction.[14] We then counted the number of mentions for each organization for the total period. The results provide a rough approximation of intensity of engagement of public, private, and nonprofit organizations in the disaster operations process, as reported in the newspapers.[15] Table 1 presents the public organizations named in disaster response operations by jurisdiction and frequency of mention. Table 2 presents the nonprofit organizations by the same measures, and Table 3 presents the private organizations by these measures.

The results show a remarkable discrepancy between the formal interjurisdictional structure of national, provincial, and local Committees of Emergency Preparedness described in the National Emergency Plan and actual organizational participation reported in the news stories. Table 1 shows that organizational response to the disaster was overwhelmingly national, with 52 national organizations and 59.1% of the mentions. International response was second, with 26 organizations and 31.8% of the mentions. Further, attention appeared to focus on a small number of organizations within these two categories. For example, five national organizations received over half (51.4%) of the mentions and four international actors received over half (50.1%) of the mentions

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[14]I acknowledge, with thanks and appreciation, the work of Leslie Mohr, who assisted me with this content analysis.

[15]In calculating the number of mentions, we found that there was considerable duplication in the stories reported by La Nacion and La Republica. To avoid double counting an organization's participation, we dropped the stories from La Republica in our analysis. Consequently, the frequencies reported all derive from news stories reported in La Nacion.

**TABLE 1**

**Public Organizations Engaged in Disaster Response Operations by Jurisdiction and Frequency of Mentions in Newspaper Reports**

| International | N | % | National | N | % | Provincial | N | % | Municipal | N | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| United States | 27 | 19.3% | Comision Nacional de Emergencia | 51 | 20.6% | Comision Regional de Emergencia | 3 | 25.0% | Tony Facio (Hosp.) | 6 | 21.4% |
| Nicaragua | 19 | 13.6% | Ministerio de Salud | 22 | 8.9% | Guardia de Asistencia Rural | 2 | 16.7% | Comision de Emergencia Local | 5 | 17.9% |
| Venezuela | 13 | 9.3% | Ministerio de Obras Publicas y Transportes | 21 | 8.5% | Direccion Regional de Transito | 2 | 16.7% | Mixico (Hosp.) | 2 | 7.1% |
| Mexico | 11 | 7.9% | Poder Ejecutivo | 17 | 6.9% | Junta de Adm. Portuaria y Desarrollo Econ. de la Vertiente Atlantica | 2 | 16.7% | Calderon Guardia (Hosp.) | 2 | 7.1% |
| Japan | 8 | 5.7% | Instituto C.R. de Acueductos y Alcantarrillados | 16 | 6.5% | Sexto Proyecto Sectorial de Transportes | 1 | 8.3% | San Jose (Hosp.) | 2 | 7.1% |
| Colombia | 7 | 5.0% | Caja C.R. de Seguro Social | 11 | 4.5% | Minicipalidad de Turrialba | 1 | 8.3% | Heredia (Hosp.) | 2 | 7.1% |
| El Salvador | 7 | 5.0% | Ministerio de Seguridad Publica | 7 | 2.8% | Comision Indigena de Emergencia | 1 | 8.3% | Nacional de Ninos (Hosp.) | 2 | 7.1% |
| Honduras | 7 | 5.0% | Consejo Nacional de Produccion | 7 | 2.8% | | | | Escuela Social San Juan XIII | 1 | 3.6% |
| Argentina | 4 | 2.9% | Ministerio de Comercio Exterior | 6 | 2.4% | | | | Instituto de Fomento y Asesoria Municipal | 1 | 3.6% |
| European Community | 4 | 2.9% | Ministerio de Agricultura y Ganaderia | 6 | 2.4% | | | | Centro de Salud de Siquirres | 1 | 3.6% |
| Panama | 4 | 2.9% | Ministerio de Educacion | 6 | 2.4% | | | | Alajuela (Hosp.) | 1 | 3.6% |
| Germany | 4 | 2.9% | Instituto C.R. de Electricidad | 5 | 2.0% | | | | Cartago (Hosp.) | 1 | 3.6% |
| Spain | 3 | 2.1% | La Asemblea Legislativa | 5 | 2.0% | | | | Comision Cantonal de Emergencia de Turrialba | 1 | 3.6% |
| Great Britain | 3 | 2.1% | Cuerpo de Bomberos | 4 | 1.6% | | | | Comision de Emergencia de Limon | 1 | 3.6% |
| Canada | 3 | 2.1% | | | | | | | | | |
| China | 3 | 2.1% | | | | | | | | | |
| USSR | 2 | 1.4% | | | | | | | | | |
| Dominican Republic | 2 | 1.4% | | | | | | | | | |
| Guatemala | 2 | 1.4% | | | | | | | | | |
| Switzerland | 2 | 1.4% | | | | | | | | | |
| Holland | 1 | 0.7% | | | | | | | | | |
| Brazil | 1 | 0.7% | | | | | | | | | |
| Italy | 1 | 0.7% | | | | | | | | | |
| Finland | 1 | 0.7% | | | | | | | | | |
| Denmark | 1 | 0.7% | | | | | | | | | |
| Ministerio de Salud de Panama | 1 | 0.7% | | | | | | | | | |
| Number of Mentions | 140 | 100.0% | Number of Mentions cont. | | | Number of Mentions | 12 | 100.0% | Number of Mentions | 28 | 100.0% |
| Number of Cases | 26 | | Number of Cases cont. | | | Number of Cases | 7 | | Number of Cases | 14 | |

**Table 1 Cont.**

| International | N | % | National | N | % | Provincial | N | % | Municipal | N | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sistema Nacional de Proteccion Civil | 4 | 1.6% | | | | | | |
| | | | Comision de Asuntos Hacendarios | 4 | 1.6% | | | | | | |
| | | | Guardia Civil | 4 | 1.6% | | | | | | |
| | | | Organismo de Investigacion Judici | 4 | 1.6% | | | | | | |
| | | | Ministerio de Agricultura y Agroindustria | 4 | 1.6% | | | | | | |
| | | | Ministerio de Economica | 3 | 1.2% | | | | | | |
| | | | Ministerio de Vivienda y Asentamientos Humanos | 3 | 1.2% | | | | | | |
| | | | Ministerio de Hacienda | 3 | 1.2% | | | | | | |
| | | | Instituto Nacional de Vivienda y Urbanismo | 3 | 1.2% | | | | | | |
| | | | Instituto C.R. de Ferrocarriles | 2 | 0.8% | | | | | | |
| | | | Ministerio de Transportes | 2 | 0.8% | | | | | | |
| | | | Radio RPC | 2 | 0.8% | | | | | | |
| | | | Ministerio de Industria y Comercio | 1 | 0.4% | | | | | | |
| | | | Ministerio de Relaciones Exteriores | 1 | 0.4% | | | | | | |
| | | | Comision Nacional de Vivienda | 1 | 0.4% | | | | | | |
| | | | Ministerio de Tourism | 1 | 0.4% | | | | | | |
| | | | Comision de Asuntos Indigenas | 1 | 0.4% | | | | | | |

| International | N | % | National | N | % | Provincial | N | % | Municipal | N | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Instituto Mixto de Ayuda Social | 1 | 0.4% | | | | | | |
| | | | Servicio Nacional de Erradicacion de la Malaria | 1 | 0.4% | | | | | | |
| | | | Los Servicios Sismologicos de C.I | 1 | 0.4% | | | | | | |
| | | | Ministerio de Recursos Naturales, Energia, y Minas | 1 | 0.4% | | | | | | |
| | | | Camara Nacional de Agricultura | 1 | 0.4% | | | | | | |
| | | | Instituto de Cafe de Costa Rica | 1 | 0.4% | | | | | | |
| | | | Sindicato de Empleados del Ministerio de Hacienda | 1 | 0.4% | | | | | | |
| | | | Ministerio de Energia | 1 | 0.4% | | | | | | |
| | | | Seguridad Industrial | 1 | 0.4% | | | | | | |
| | | | Ministerio de Trabajo | 1 | 0.4% | | | | | | |
| | | | Consejo Nacional de Pequenos y Medianos Productor | 1 | 0.4% | | | | | | |
| | | | Presupuesto Nacional de la Republica | 1 | 0.4% | | | | | | |
| | | | Administracion Portuaria | 1 | 0.4% | | | | | | |
| | | | Oficina de la Primera Dama | 1 | 0.4% | | | | | | |
| | | | Camara Nacional de Radio | 1 | 0.4% | | | | | | |
| | | | Federacion C.R. de Futbol | 1 | 0.4% | | | | | | |
| | | | Centro Nacional de Control de Energia | 1 | 0.4% | | | | | | |

**Table 1 Cont.**

| | | |
|---|---|---|
| Direccion de Aviacion Civil | 1 | 0.4% |
| Sistema Nacional de Radio y Television | 1 | 0.4% |
| Ministerio de Seguridad Social | 1 | 0.4% |
| Number of Mentions | 247 | 100.0% |
| Number of Cases | 52 | |

Summary, Public Organizations Engaged in Disaster Response Operations

| Total mentions | | % | Total Cases | | % |
|---|---|---|---|---|---|
| International | 140 | 31.8% | | 26 | 26.3% |
| National | 260 | 59.1% | | 52 | 52.5% |
| Provincial | 12 | 2.7% | | 7 | 7.1% |
| Municipal | 28 | 6.4% | | 14 | 14.1% |
| Total Mentions, All Jurisdictions | 440 | 100.0% | | 99 | 100.0% |

Source: La Nacion, April 23-May 8, 1991

**TABLE 2**

**Nonprofit Institutions Engaged in Disaster Response Operations by Jurisdiction and Frequency of Mentions in Newspaper Reports**

| ternational | N | % | National | N | % | Provincial | N | % | Municipal | N | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ed Nations | 15 | 30.0% | Costa Rica Red Cross | 32 | 54.2% | Limon Federation of Workers | 3 | 42.9% | St. Vincent de Paul Clinnic | 1 | 16.7% |
| ganization of American States | 6 | 12.0% | National Youth Movement | 4 | 6.8% | Comite de Apoyo al Istmo | 1 | 14.3% | Los Guias y Scouts | 1 | 16.7% |
| Doctors Without Borders | 4 | 8.0% | Students Federation of the Univ. of C.R. | 3 | 5.1% | Liga Agricola Industrial de la Cana de Azucar | 1 | 14.3% | Red Cross of Guapiles | 1 | 16.7% |
| Red Cross International | 2 | 4.0% | Catholic Church | 3 | 5.1% | Cooperguaria | 1 | 14.3% | Red Cross of Siquirres | 1 | 16.7% |
| International Rescue Corps | 2 | 4.0% | Lions Clubs | 2 | 3.4% | Assoc. de Desarrollo de Tayutic | 1 | 14.3% | Red Cross of Alajuela | 1 | 16.7% |
| World Food Program | 2 | 4.0% | Rotary | 2 | 3.4% | | | | Red Cross of Limon | 1 | 16.7% |
| Association of Israiel Women | 2 | 4.0% | Kiwanis Clubs | 1 | 1.7% | | | | | | |
| Panamerican Development Foundation | 1 | 2.0% | Media Luna Roja | 1 | 1.7% | | | | | | |
| Panamerican Health Organization | 1 | 2.0% | Clpeb | 1 | 1.7% | | | | | | |
| Swiss Relief Team | 1 | 2.0% | National Union of Baptist Churches | 1 | 1.7% | | | | | | |
| Interamerican Institute for Agricultural Cooperation | 1 | 2.0% | The Workers' Association | 1 | 1.7% | | | | | | |
| Arias Foundation | 1 | 2.0% | C.R. Cooperative Movement | 1 | 1.7% | | | | | | |
| Associacion Casa Argentino-C.R. | 1 | 2.0% | The Episcopal Conference | 1 | 1.7% | | | | | | |
| AmeriCares | 1 | 2.0% | Omar Dengo Foundation | 1 | 1.7% | | | | | | |
| Sociedad Interamericana de Radioaficionados | 1 | 2.0% | Consejo Permanente de Exportadores | 1 | 1.7% | | | | | | |
| Solidarity Assoc. | 1 | 2.0% | Asociados de la Camara de Exportadores | 1 | 1.7% | | | | | | |
| Asociacion of Argentinian Women | 1 | 2.0% | Asociacion de Professores de SegundaEnsenanza | 1 | 1.7% | | | | | | |

**Table 2 Cont.**

| International | N | % | National | N | % | Provincial | N | % | Municipal | N | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Conservacion International | 1 | 2.0% | Sindicato de Empleados de Ministerio de Hacienda | 1 | 1.7% | | | | | | |
| Agencia Espanola de Cooperacion International | 1 | 2.0% | Confederacion Nacional de Trabajadores | 1 | 1.7% | | | | | | |
| Operation USA | 1 | 2.0% | | | | | | | | | |
| Red Cross of Panama | 1 | 2.0% | | | | | | | | | |
| Red Cross of Bocas del Toro | 1 | 2.0% | | | | | | | | | |
| Costa Rica-Canada Rural Housing Foundation | 1 | 2.0% | | | | | | | | | |
| Reserva de la Biosfera La Amistad | 1 | 2.0% | | | | | | | | | |
| Number of Mentions | 50 | 100.0% | Number of Mentions | 59 | 100.0% | Number of Mentions | 7 | 100.0% | Number of Mentions | 6 | 100.0% |
| Number of Cases | 24 | | Number of Cases | 20 | | Number of Cases | 5 | | Number of Cases | 6 | |

Summary, Nonprofit Organizations

| Total Mentions | | % | Total Cases | | % |
|---|---|---|---|---|---|
| International | 50 | 41.0% | International | 24 | 43.6% |
| National | 59 | 48.4% | National | 20 | 36.4% |
| Provincial | 7 | 5.7% | Provincial | 5 | 9.1% |
| Municipal | 6 | 4.9% | Municipal | 6 | 10.9% |
| Total Mentions, All Jurisdictions | 122 | 100.0% | Total Cases, All Jurisdictions | 55 | 100.0% |

Source: La Nacion, San Jose, April 23 - May 8, 1991

**TABLE 3**

**Private Institutions Engaged in Disaster Response Operations by Jurisdiction and Frequency of Mentions in Newspaper Reports**

| International | N | % | National | N | % | Provincial | N | % | Municipal | N | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Citibank | 5 | 18.5% | Republic Tobacco | 2 | 15.4% | Cooperativa Dos | | | San Juan de Dios | 2 | 16.7% |
| Phillip Morris | 3 | 11.1% | DEMASA | 1 | 7.7% | Pinos | 5 | 62.5% | (hosp.) | | |
| Scott Paper | 2 | 7.4% | La Nacion | 1 | 7.7% | Jugos del Campo | 1 | 12.5% | San Vicente | 1 | 8.3% |
| American Sanitary | | | Chiriqui Land Co. | 1 | 7.7% | music groups | 1 | 12.5% | Cafe Dorado | 1 | 8.3% |
| Corporation | 2 | 7.4% | Arrocera Costa Rica | 1 | 7.7% | artists | 1 | 12.5% | Carice y Prica | 1 | 8.3% |
| Banana Development | | | Pastas Roma | 1 | 7.7% | | | | Mercado Burbon | 1 | 8.3% |
| Coporation | 2 | 7.4% | 3M of Costa Rica | 1 | 7.7% | | | | Panaderia | | |
| Irex | 1 | 3.7% | Coonaprosal R.L. | 1 | 7.7% | | | | Musmanni | 1 | 8.3% |
| Polymer | 1 | 3.7% | Canal 15 | 1 | 7.7% | | | | Funeraria Polini | 1 | 8.3% |
| Sea Land | 1 | 3.7% | Compania Taca | | | | | | Almacen Dragon de | | |
| United Fruit | 1 | 3.7% | International | | | | | | Oro | 1 | 8.3% |
| Borden | 1 | 3.7% | Airlines | 1 | 7.7% | | | | Punto Rojo | 1 | 8.3% |
| Wrangler | 1 | 3.7% | Corporacion Superior | 1 | 7.7% | | | | Mas y Menos | 1 | 8.3% |
| Del Monte | 1 | 3.7% | Tico Times | 1 | 7.7% | | | | Pali | 1 | 8.3% |
| Nestle | 1 | 3.7% | | | | | | | | | |
| Procter&Gamble | 1 | 3.7% | | | | | | | | | |
| Kimberly Clark | 1 | 3.7% | | | | | | | | | |
| CNN | 1 | 3.7% | | | | | | | | | |
| Chiquita Brand | 1 | 3.7% | | | | | | | | | |
| Standard Fruit Co. | 1 | 3.7% | | | | | | | | | |
| Number of Mentions | 27 | 100.0% | Number of Mentions | 13 | 100.0% | Number of Mentions | 8 | 100.0% | Number of Mentions | 12 | 100.0% |
| Number of Cases | 18 | | Number of Cases | 12 | | Number of Cases | 4 | | Number of Cases | 11 | |

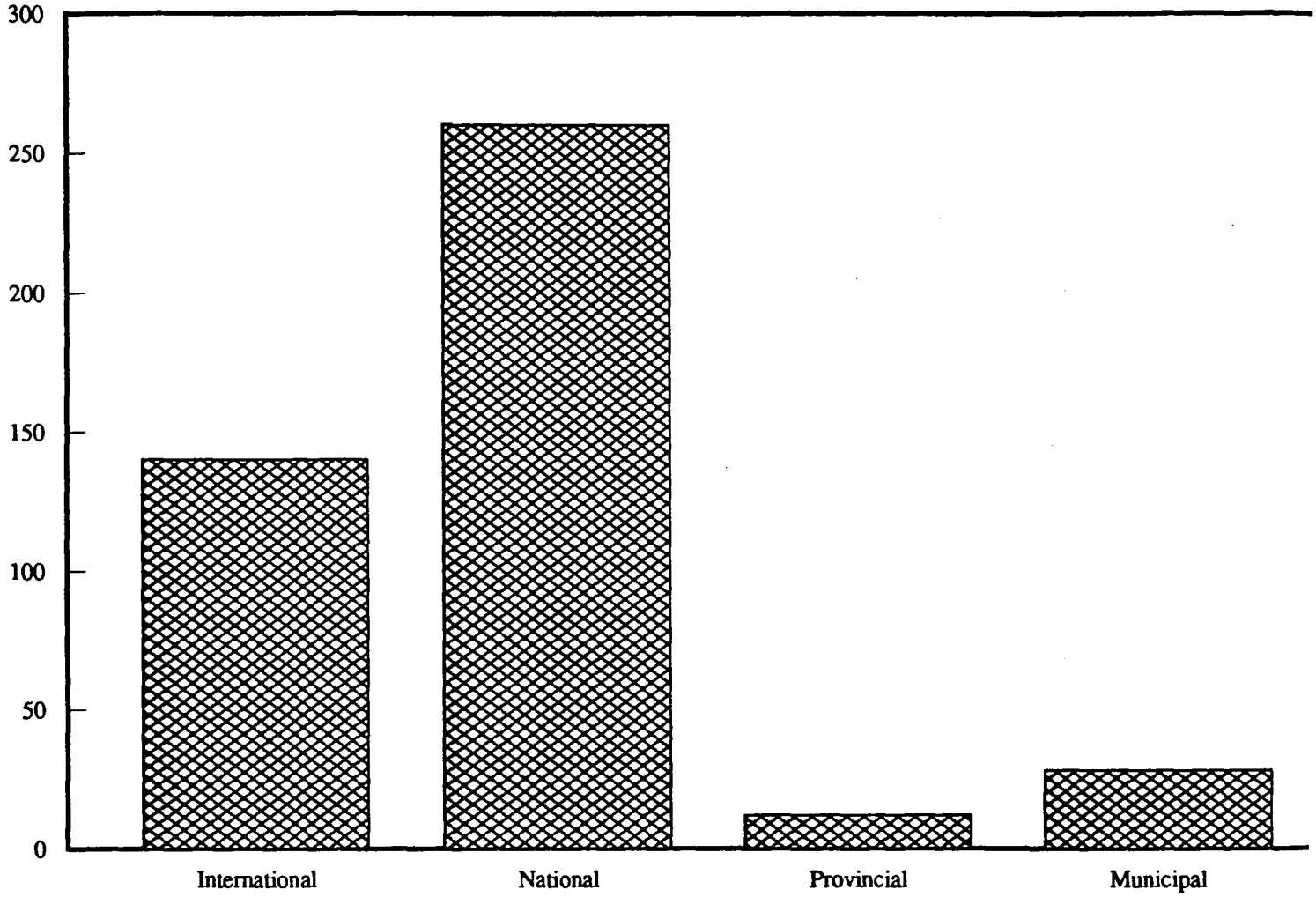
Summary, Private Institutions

| Total Mentions | | % | Total Cases | | % |
|---|---|---|---|---|---|
| International | 27 | 45.0% | International | 18 | 40.0% |
| National | 13 | 21.7% | National | 12 | 26.7% |
| Provincial | 8 | 13.3% | Provincial | 4 | 8.9% |
| Municipal | 12 | 20.0% | Municipal | 11 | 24.4% |
| Total Mentions, All Jurisdictions | 60 | 100.0% | Total Cases, All Jurisdictions | 45 | 100.0% |

Source: La Nacion, San Jose, April 23 - May 8, 1991

Figure 1

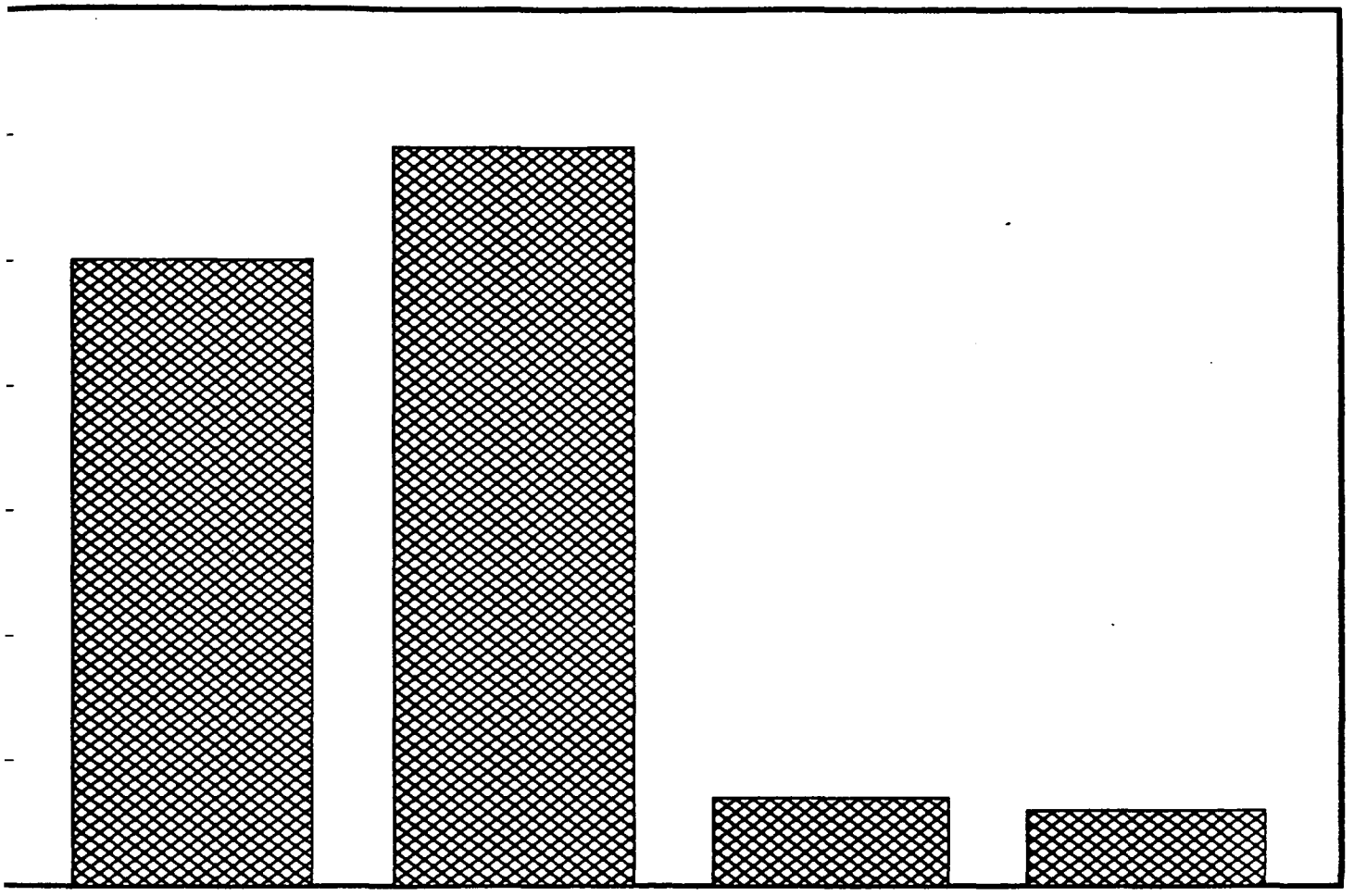
# Public Organizations, Number of Mentions




"La Nacion," San Jose, April 23 - May 8, 1991

Figure 2

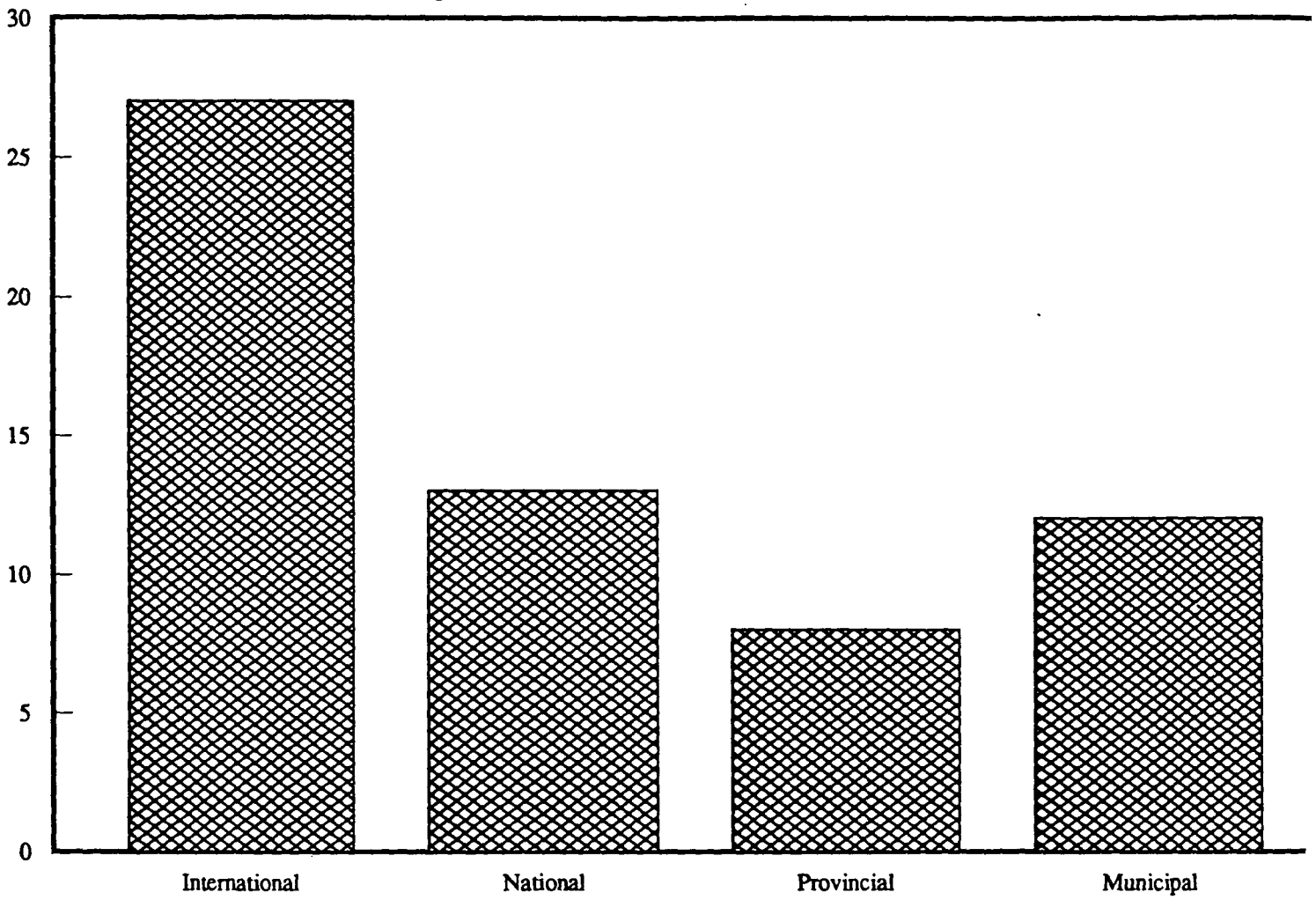
# Nonprofit Organizations, Number of Mentions




Nacion," San Jose, April 23-May 8, 1991

Figure 3

# Private Organizations, Number of Mentions




"La Nacion," San Jose, April 23-May 8, 1991

in their respective groups. Municipal response ranked a distant third with 28 organizations and 6.4% of the mentions, and provincial response received the least coverage with 12 organizations named and 2.7% of the total mentions. The local structures for emergency response were clearly underdeveloped in this region.

Table 2 presents similar data for nonprofit organizations. Interestingly, the largest number of nonprofit organizations are international, at 24, receiving 41% of the total mentions. National nonprofit organizations were the second largest group, at 20, receiving 48.4% of the mentions. Five provincial nonprofit organizations were identified, with 5.7% of the mentions, and six municipal nonprofit organizations were named, receiving 4.9% of the total mentions.

Table 3 presents the data for private organizations. Again, the largest number reported are international organizations (18 cases; 45% of mentions), with national organizations second (12 cases, with 21.7% of mentions. Municipal organizations were third (11 cases; 20% of the mentions) and provincial organizations were last with 4 cases and 13.3% of the mentions. These same data are represented visually in Figures 1 - 3, which show dramatically the different rates of participation among the four jurisdictional levels and the overwhelming number of activities by national and international organizations reported in comparison to activities by municipal and provincial organizations.

Two other breakdowns provided interesting perspectives on the shape of the emergency response system as it evolved. Table 4

**TABLE 4**

**Public Industries and Financial Institutions Engaged in Disaster Response Operations by Jurisdiction and Frequency of Mentions in Newspaper Reports**

| International | N | % | National | N | % | Provincial | N | % | Municipal | N | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| World Bank | 15 | 29.4% | Banco Nacional de Costa Rica | 9 | 29.0% | | | | | | |
| Interamerican Development Bank | 13 | 25.5% | Banco de Costa Rica | 7 | 22.6% | | | | | | |
| Fondo de Inversiones de Venezuela | 6 | 11.8% | Banco Centray y Hacienda | 3 | 9.7% | | | | | | |
| International Development Agency | 6 | 11.8% | Refinadora C.R. de Petroleo | 2 | 6.5% | | | | | | |
| International Monetary Fund | 5 | 9.8% | Banco Popular | 2 | 6.5% | | | | | | |
| International Bank of Reconstruction and Development | 3 | 5.9% | Corporacion Bananera Nacional | 2 | 6.5% | | | | | | |
| USAID | 2 | 3.9% | Banco Anglo C.R. | 2 | 6.5% | | | | | | |
| Central American Economic Integration Bank | 1 | 2.0% | Dept. de Control Fiscal del Ministerio de Gobernacion | 1 | 3.2% | | | | | | |
| | | | Industria Cerveceria Nacional | 1 | 3.2% | | | | | | |
| | | | Guardia de Asistencia Rural | 1 | 3.2% | | | | | | |
| | | | Sistema Bancarrio Nacional | 1 | 3.2% | | | | | | |
| Number of Mentions | 51 | 100.0% | | 31 | 100.0% | | | | | | |
| Number of Cases | 8 | | | | | | | | | | |

Table 4 Cont.

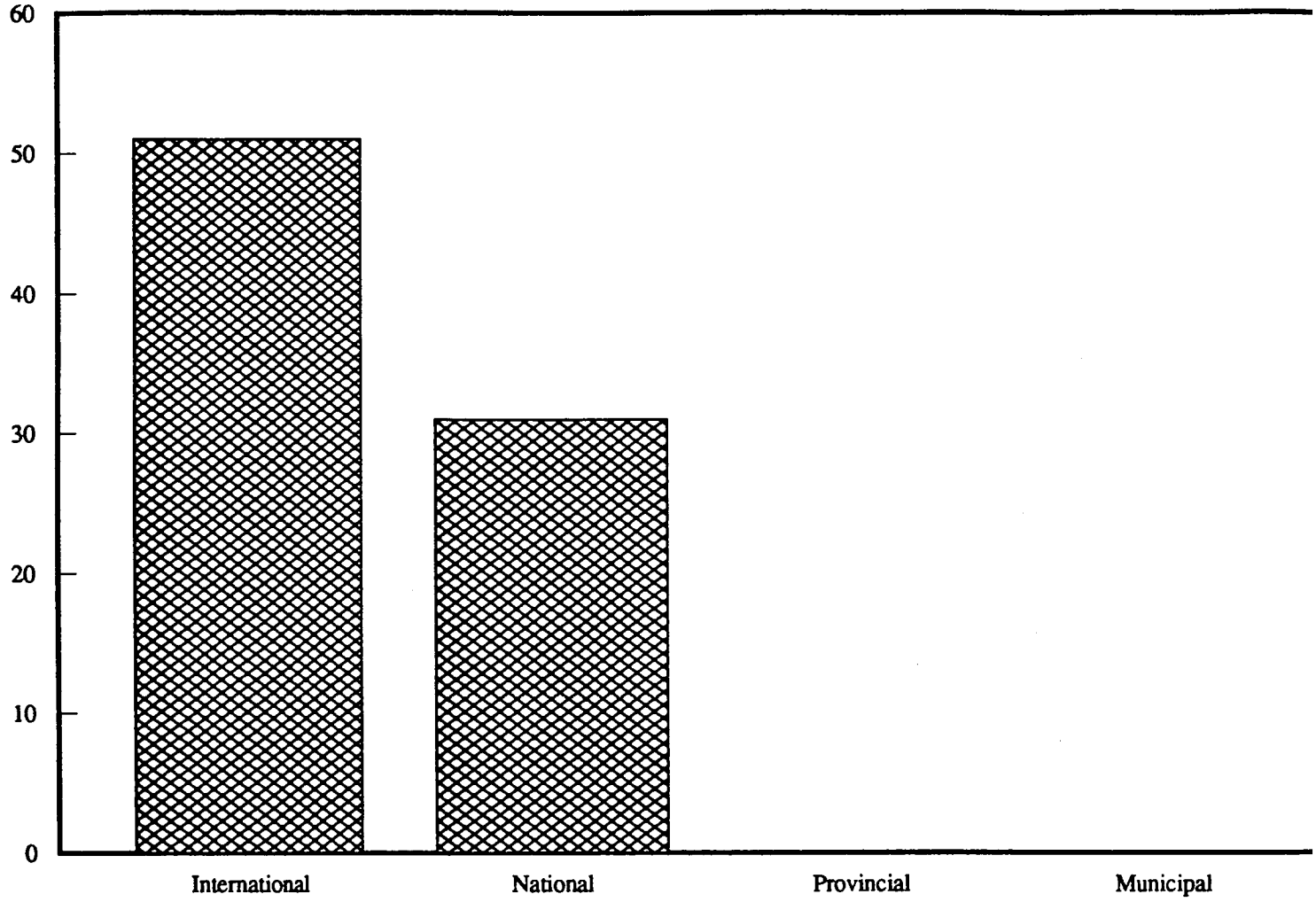
Summary, Public Industries and Financial Institutions

| Total Mentions | | % | Total Cases | | % |
|---|---|---|---|---|---|
| International | 51 | 62.2% | International | 8 | 40.0% |
| National | 31 | 37.8% | National | 12 | 60.0% |
| Provincial | 0 | | Provincial | 0 | |
| Municipal | 0 | | Municipal | 0 | |
| Total Mentions, All Jurisdictions | 82 | 100.0% | Total Cases, All jurisdictions | 20 | 100.0% |

Source: La Nacion, San Jose, April 23 - May 8, 1991

Figure 4

# Financial Institutions, Number of Mentions




"La Nacion," San Jose, April 23-May 8, 1991

## TABLE 5

**Public Research and Educational Institutions Engaged in Disaster Response Operations by Jurisdiction and Frequency of Mentions in Newspaper Reports**

| International | N | % | National | N | % | Provincial | N | % | Municipal | N | % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NASA | 3 | 27.3% | Observatorio Vulcanologico y Sismologico de C.R | 18 | 38.3% | Gimnasio Nacional | 1 | 100.0% | | | |
| Universidad Adventista de Centro America | 2 | 18.2% | Red Sismologica Nacional | 11 | 23.4% | | | | | | |
| University of California | 1 | 9.1% | Universidad de C.R. | 7 | 14.9% | | | | | | |
| National Earthquake Information Center (Golden, CO) | 1 | 9.1% | Centro Nacional de Infraestructura Educativa | 4 | 8.5% | | | | | | |
| University of Panama | 1 | 9.1% | Nacional University | 1 | 2.1% | | | | | | |
| Universidad Autonoma de Mexico | 1 | 9.1% | National Geographic Institute | 1 | 2.1% | | | | | | |
| Instituto de Geoscl-encias de la Univ. de Panama | 1 | 9.1% | Colegio Agropecuaric | 1 | 2.1% | | | | | | |
| US Geological Service | 1 | 9.1% | Nacional Meteorologic Institute | 1 | 2.1% | | | | | | |
| | | | Univ. Estatal a Distancia | 1 | 2.1% | | | | | | |
| | | | Instituto Technolog-ical de C.R. | 1 | 2.1% | | | | | | |
| | | | Servicio Maregrafico de C.R. | 1 | 2.1% | | | | | | |
| Number of Mentions | 11 | 100.0% | Number of Mentions | 47 | 100.0% | Number of Mentions | 1 | 100.0% | | | |
| Number of Cases | 8 | | Number of Cases | 11 | | Number of Cases | 1 | | | | |

**Table 5 Cont.**

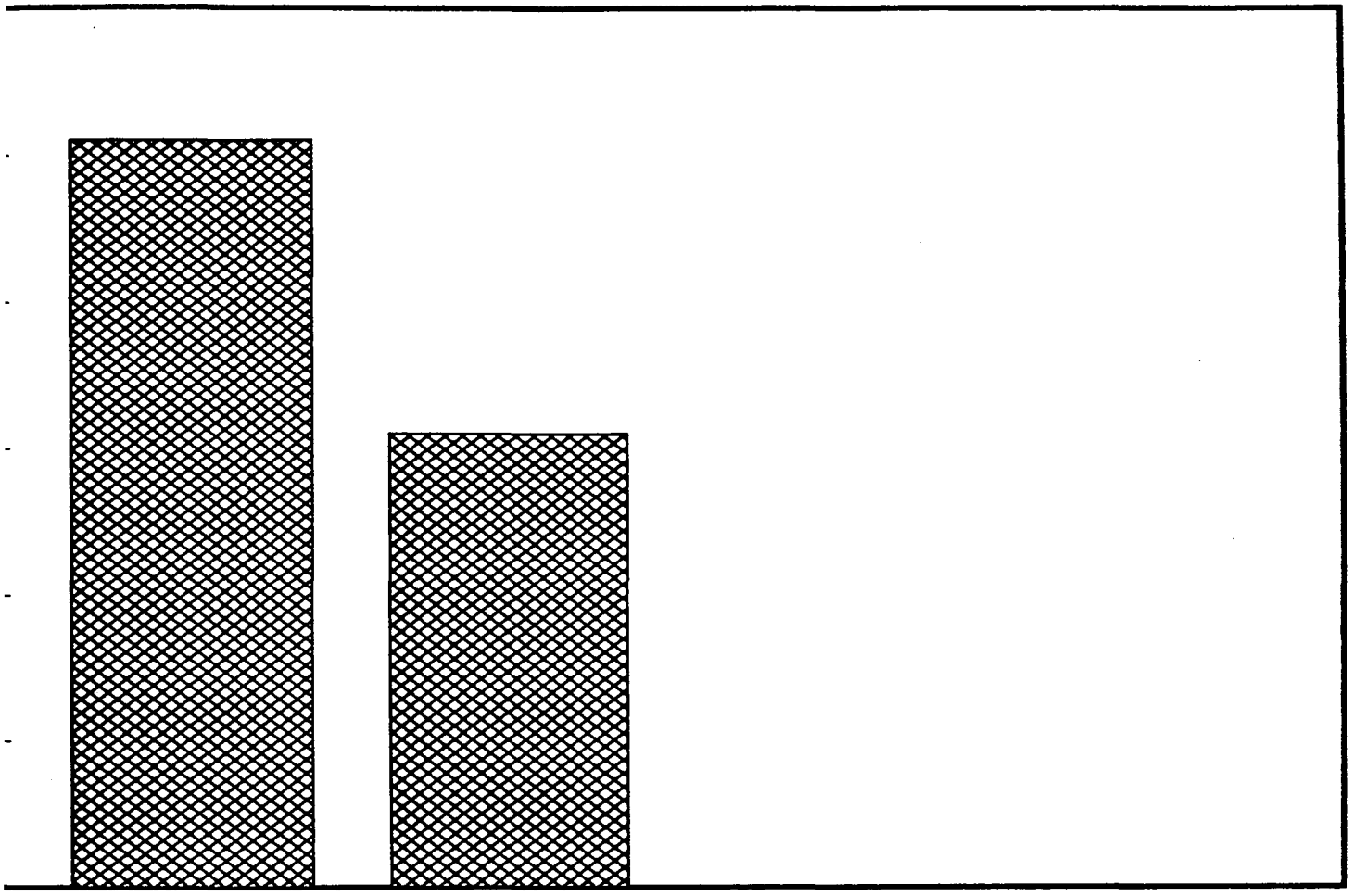
Summary, Public Research and Educational Institutions

| Total Mentions | | % | Total Cases | | % |
|---|---|---|---|---|---|
| International | 11 | 18.6% | International | 8 | 40.0% |
| National | 47 | 79.7% | National | 11 | 55.0% |
| Provincial | 1 | 1.7% | Provincial | 1 | 5.0% |
| Municipal | 0 | 0.0% | Municipal | 0 | 0.0% |
| | | | | | |
| Total Mentions, All Jurisdictions | 59 | 100.0% | Total Cases, All Jurisdictions | 20 | 100.0% |

Source: La Nacion, San Jose, April 23 - May 8, 1991

Figure 5

# Public Educational Organizations, Number of Mentions




Nacion," San Jose, April 23-May 8, 1991

shows the number of public industries and financial institutions involved in disaster response and reconstruction, and Figure 4 shows the corresponding bar graph for these data. The data show a dominant international response, accompanied by a strong national response, with no organizations named at the provincial and municipal levels. Table 5 shows the public research and educational institutions involved in this response, and Figure 5 presents the accompanying bar graph. The data show that the largest number of research and educational organizations involved in studying this disaster were national (11 cases, 79.7% of mentions) with the second largest group international organizations (8 cases; 18.6% of mentions). Only one provincial educational organization was named, with no municipal organizations reported.

These findings must be interpreted in the context of continuing economic and social development for Costa Rica (Lavell, 1991; Maskrey and Lavell, 1993). Although the design for emergency preparedness and response coordinating committees at the municipal and provincial levels of jurisdiction exists formally in the National Emergency Plan, these committees were not sufficiently developed in practice to play an active role in emergency response. Significant differences in organizational development, training, equipment, and investment of resources between the central government in San Jose and the provincial and municipal governments resulted in an underdeveloped organizational structure in the Atlantic Region with little capacity to mitigate or respond to disaster (Maskrey and Lavell, 1993). Local needs,

under these conditions, could only be met by national and international action.

Conclusions and Recommendations.

These findings document the serious lack of organizational development and response capacity at the provincial and municipal levels in Limon Province. While these findings illustrate a direct relationship between initial conditions at the local level and vulnerability to disaster, they also indicate productive directions for emergency management.

These findings suggest the importance of facilitating interaction among the organizational groups that addressed separate functions in common response to disaster. There appears to be no lack of professional capacity in Costa Rica, but rather a serious lack of trust among the diverse groups with responsibilities for disaster response and a perceived unwillingess on the part of many participating organizations to engage in an interorganizational approach to disaster response and recovery. Steps that facilitate information sharing and that support professional standards of interorganizational communication and coordination of actions are vital to increase the emergency response capacity for the entire country. An interdisciplinary quick assessment strategy, incorporated into emergency planning and training programs implemented at local jurisdictional levels, would strengthen the capacity for community action in continuing economic and social development, as well as increase efficiency in response to disaster.

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