TURNING CONFLICT INTO COOPERATION: ORGANIZATIONAL DESIGNS FOR COMMUNITY RESPONSE IN DISASTER

BY

Louise K. Comfort
University of Pittsburgh

Working Paper 90-2

UNIVERSITY OF CALIFORNIA AT BERKELEY

TURNING CONFLICT INTO COOPERATION:

ORGANIZATIONAL DESIGNS FOR COMMUNITY RESPONSE IN DISASTER

by

Louise K. Comfort

University of Pittsburgh

Prepared for submission to the International Journal of Mental Health, Guest Editor, Bruno Lima, M.D., M.P.H., December 9, 1989.

Turning Conflict into Cooperation: Organizational Designs for Community Response in Disaster

Louise K. Comfort

I. The Costs of Organizational Conflict in Disaster Operations

Conflict among organizations seeking to respond to the sudden, extraordinary demands generated by disaster is a recurring and well-recognized problem. News reports following disasters as diverse as the earthquakes in Mexico City (1985), San Salvador (1986), Napo Province, Ecuador (1987), and Armenia (1988), the oil spill in Valdez, Alaska (March, 1989) and Hurricane Hugo in Charleston, South Carolina (September, 1989) document disrupted communications between organizations, differing priorities, inconsistent procedures and contradictory observations regarding organizational response actions.[1] Interacting, these conditions generated delays in response operations in each event and contributed to ensuing high levels of anxiety and depression among the affected populations.[2] In each of these communities that suffered disaster, vulnerability to the specific hazards had long been established. Responsible members of scientific, professional, public and private organizations were aware of the risks presented to their respective communities, and emergency plans had been initiated, to some degree, in each. Why, then, were the communities so ill-prepared to cope with the actual events?

The difficulty lies in translating knowledge into action in the sudden, stressful, interdependent context of disaster. In

this uncertain, yet urgent environment, response operations necessarily cross disciplinary, organizational, and jurisdictional lines. Conventional processes of decision and organizational management repeatedly prove inadequate to meet the extraordinary demands generated by disaster. Effective problem solving in disaster environments requires a radically different approach.

This article explores the design of `inquiring systems' (Churchman, 1971) for communities vulnerable to disaster. Such systems rely upon the learning capacity of the entire community, and consciously seek to organize activities to achieve a common goal, for example, protection of life and property in the event of disaster. Participants rely upon feedback mechanisms to assess separate actions taken simultaneously and to inform, in turn, successive steps to reach their shared goal. An inquiring system may, for example, inform the dynamic shifts in command/exchange relationships (Lindblom, 1977) critical to effective disaster management.

Organizational interaction in disaster management necessarily involves relationships of both command and exchange. The urgency of time requires relationships of command (Perrow, 1981). The hierarchy of military discipline, designed for use on the battlefield, represents the classic example of command relationships. The uncertainty of outcomes reinforces relationships of exchange (Lindblom, 1977). Mutual aid agreements between fire or police departments in a given geographic region represent examples of exchange relationships. Urgency plus

uncertainty drive the search for innovative combinations to meet the unpredictable demands of disaster environments. Both types of relationships are needed to serve differing functions in disaster management. Consequently, the relationships between managers of organizations with disaster responsibilities, their respective personnel and the populations they serve will vary with the functions performed in disaster operations.

Maintaining the appropriate balance between command and exchange in disaster operations requires continual adjustment both among the emergency organizations legally responsible for protection of life and property and between the set of response organizations and the population of the affected communities. This balance varies with the degree of uncertainty in the operating environment and the degree of relevant information available to the responsible disaster managers. The balance needs to be maintained not only for each primary function performed in disaster operations, but also within the total set of disaster functions performed in interaction with community residents. Creating the knowledge needed to adjust this balance appropriately in terms of both community needs and capacity for action is essential in each disaster and critical to effective disaster management.

Carefully designed, an inquiring system may increase efficiency among response organizations in the conduct of disaster operations, and simultaneously, increase capacity for effective interaction between the set of response organizations

and the affected population. The anticipated effect would be to enable citizens to take informed action to protect themselves and others, under the guidance of professional response organizations. Further, engaging in constructive action to serve community needs is likely to reduce the level of stress experienced by participants, thereby increasing the capacity of the entire community to cope with the trauma of disaster (Lima, 1987).

Managing disaster operations requires exceptional organizational skills. Sorting complexity in ways that allow given organizations and individuals to identify timely, appropriate actions is vital. Integrating separate actions taken by multiple individuals and organizations at differing levels of jurisdiction simultaneously is crucial to coordinated disaster response. Collective action, in the chaotic environment of disaster, requires organization and a design for problem solving, which depends upon communication of relevant information.

Left to chance, interaction between the responding organizations and the populations they serve is likely to generate conflict. Guided by clear goals and flexible processes of communication and adaptation (Holland, 1975; Axelrod, 1984; Comfort, 1987), interaction is likely to produce creative solutions (Cohen, 1984; Comfort, 1985; Comfort and Namkoong, 1989.) In disaster management, designing processes of inquiry and interaction in anticipation of community needs for informed collective action constitutes a beginning step toward an inquiring system.

II. Organizational Designs for Disaster Response

While the goal in every disaster response process is the same, protection of life and property, differing means are used to achieve it. Balancing the detailed specification of tasks for action with the integration of concurrent outcomes into a coordinated response process in a dynamic disaster environment poses an extraordinarily complex problem for disaster managers. Practicing disaster managers recognize that the organization of disaster response actions affects the quality of service delivered to the affected population.[3]

Organizational interaction between response agencies and affected populations is a reciprocal process (Axelrod, 1984), varying with the scope, complexity and severity of the disaster. Earlier research (Comfort, 1989a) has identified the shifting dynamic between command and exchange (Lindblom, 1977) in decision processes in disaster management. This dynamic defines both style and content of the interaction between response organizations and affected populations over the cycle of disaster management (McLoughlin, 1985.) Differing demands are placed upon citizens and agencies in each of the four phases of this cycle -- mitigation, preparedness, response and recovery -- yet all require collective action.

Although serving differing demands for action, five primary functions[4] recur in each phase of disaster management. They are:

1) communication of information regarding the event and the immediate goal of disaster operations

2) assessment of needs and the status of the community

3) mobilization of resources, personnel and equipment for action

4) performance of tasks in accordance with stated priorities

5) feedback on performance in the process[5]

Each of these functions represents a continuum of interactions among participants in the disaster operations process, ranging from objective command to subjective exchange.[6] Further, each disaster operations process is likely to generate a differing balance of command/exchange relationships among the set of functions involved. As interactions veer toward the command ends of the continua, the organizations participating in response and recovery operations are likely to be more efficient but fall into conflict. Differences between disciplines, organizations or jurisdictions, suppressed under command relationships but left unresolved, are likely to generate misunderstanding of terms, misinterpretation of directions and mistakes in action. As interactions veer toward the exchange ends of the continua, disaster operations are likely to achieve greater cooperation but be more time-consuming, thereby missing urgent needs. Time taken to achieve consensus after the disaster occurs subtracts invaluable time from action. Finding the appropriate balance between command and exchange on each function, and further, within the set of functions for a given disaster environment, is the task of design in disaster management. It is not likely to occur by chance.

The style, content and timing of disaster preparedness

activities necessarily shape the likely alternatives for response actions in actual events. Organizational managers confront the uncertain task of designing, prior to disaster, the learning activities most likely to guide effective response actions when disaster occurs. Coping with uncertainty compels us to consider radical alternatives, when standard means of organizational performance would be inadequate to respond to the demands generated by an anticipated catastrophic event. By analyzing actions taken in previous disasters, we may be able to develop improved models for community disaster response. With improved models and consequent gains in community-wide knowledge and skills, we may increase our capacity for disaster response and recovery at the community level.

III. A Model for Community Response in Disaster

Traditionally, disaster management strategies have been highly centralized and directive.[7] Control is placed in the hands of a few experts, and other agencies and the general public are left relatively powerless. These strategies of command are efficient when the problems are well-defined, and all participants have the same training and level of understanding of the tasks. Effectiveness drops significantly, however, when conditions change and participants, rigidly bound to known rules of operation, are unable to adapt to shifting requirements for action. Conflict erupts, delays result and opportunities for saving lives and protecting property are missed.

When uncertainty is high or commonality in training and

experience among participants is low, a decentralized strategy of exchange appears preferable in disaster management. Errors are reduced, shared experience in constructive response creates trust among participants and adaptation to the dynamic conditions of disaster occurs more easily. Exchange of information, resources and experience increases the likelihood of effective action. Efficiency drops, however, and the cost in additional time is critical in life-threatening events (Klain et al, 1989.)

Identifying disaster as a risk shared by the community redefines the concept of disaster response[8]. In meeting a shared risk, disaster response necessarily engages all major organizations -- public, private and nonprofit -- in a community and includes as participants all population groups in the area. As both the range of participants and the scope of actions involved in disaster operations increases, however, the degree of complexity also increases by orders of magnitude. Consequently, the search for organizational designs that facilitate action and allow adaptation in complex, uncertain environments becomes critical to mobilizing effective disaster response operations at the community level.

The design of a Singerian inquiring system (Churchman, 1971) may serve this dual goal of enabling action and facilitating adaptation by community members as well as response organizations to the dynamic environment of disaster. This analysis will briefly discuss the Singerian model in reference to three communities that suffered earthquake disasters: Napo Province,

Ecuador (1987); Leninakan, Armenia SSR (1988) and the San Francisco Bay Area, California (1989.) We will explore the utility of the Singerian model as a means of increasing the capacity for informed community response in disaster, thereby reducing the level of anxiety and lingering tragedy among the population.

An inquiring system is fundamentally a means of organizing information and communications processes in order to solve problems for a specific group. There are several types of inquiring systems, but the type that appears most relevant to disaster management is the Singerian model (Churchman, 1971: 200-201.) Four premises underlie a Singerian inquiring system. First, it is goal-seeking. That is, the system is designed to serve a specific purpose for the members of its group, for example, the protection of life and property in event of disaster. Second, the system is an open-ended process. Inquiry is continuous, for as one problem is solved, it uncovers another that needs solution. Third, the system is enabling, as interaction between information and its users creates new knowledge and allows them to choose appropriate means to attain their desired ends.

Fourth, the system fosters cooperation. To function appropriately, a Singerian inquiring system critically needs a cooperative environment (Churchman, 1971:200.) Inquiry is essential to create cooperation and, conversely, cooperation is needed to create inquiry. Optimally, a Singerian inquiring

system stimulates and reinforces learning within the group. System norms are ethical, for irresponsible actions disrupt the system and stop the goal-seeking process. While a Singerian system is vulnerable to disruption, the corrective process of inquiry would focus on the source of disruption as a problem needing solution. Through inquiry, the problem would be solved and the goal-seeking process would continue. The cost of disruption is time lost from inquiry.

A Singerian model builds on the natural process of inquiry characteristic of human beings seeking to understand the environment in which they live (Argyris, 1982.) Through design, the inquiring process is consciously structured to focus attention on the selected goal and to increase the level of information and interaction among components of the system. In the process, problem solving skills among participants are enhanced, and the overall effect is to increase the level of creative performance within the system.

Three elements are critical in the application of a Singerian model to actual problems in context. First, the goal of the inquiry needs to be clearly stated, understood and accepted, at least in principle, by the members (Simon, 1969, 1981.) Second, the boundaries of the system need to be defined, at least for specific time periods. Over time, the boundaries of Singerian systems tend to expand (Churchman, 1971), as the number and type of interactions between members of the system and the environment increase. Third, the components of the system also need to be

identified, so that steps may be specified for participating actors to facilitate the problem solving process. Inquiry proceeds through communication, and the sequence, timing and content of interactions among the components of the system shape this process.

Elements of natural inquiry emerge in complex environments that may be extended to create functioning inquiring systems. This analysis will examine three disaster environments to assess the applicability of Singerian models to assist communities in response and recovery operations. The question is whether the systematic design of information and communications processes would increase the capacity for creative performance within communities vulnerable to recurring risk.

In communities subject to seismic risk, as in Ecuador, Armenia and California, seismologists estimate that severe earthquakes recur every 90 - 150 years, moderate events every 40 - 60 years (Boutacoff, 1989.) Given the long time span between major events in specific locations, it is necessary to collect data on a global scale in order to understand the interactive processes between citizens, organizations and the environment in communities at seismic risk. Three earthquakes in Ecuador (1987), Armenia (1988) and Northern California (1989) are sufficiently close in magnitude and time to be comparable, but vary by nation, culture, infrastructure and access to communications technology. Each disaster generated a different set of problems in its particular environment and precipitated differing

patterns of interaction between organizations and citizens in response and recovery. Yet all three events offer valuable insights into the continuing inquiry directed toward the shared goal of protecting life and property in zones of seismic risk.

This analysis will review the three cases in terms of the potential for initiating inquiring systems within the respective communities. It will also review the set of cases in terms of the possibility of designing a global inquiring system to address continuing problems of seismic risk.

IV. Models of Inquiry and Interaction in Disaster Environments

A. The Ecuadorian Earthquakes: Napo, Imbabura, Carchi and Pichincha Provinces

On Thursday, March 5, 1987, two earthquakes occurred in Napo Province, Ecuador. The first registered at 8:54 p.m. and measured 6.1 on the Richter scale. The second shock, more severe, occurred at 11:10 p.m. and registered 6.8 magnitude on the Richter scale. The epicenter was near the Volcano Reventador in the mountainous region of Central Napo Province, some eighty-five kilometers from Quito.[9] Buildings swayed in Quito, but the event was not life-threatening in the capital city. Initial reports from outlying regions were slow in coming to responsible organizations in Quito.

By Saturday, March 7, 1987, an overflight of the epicenter area revealed extraordinary destruction in the Andean region of Napo Province. The earthquakes had triggered a series of interdependent events, escalating the destruction enormously.

Heavy rains in the preceding weeks had softened the soils, and the earthquakes, shaking the mountainsides, had caused massive landslides, destroying approximately 30 kilometers of the TransEcuadorian Pipeline. Debris flows created natural dams in the rivers, causing flashfloods, destroying villages along the banks, and polluting the water supply for inhabitants of the region. Approximately 40 kilometers of the main highway that provided the only land route between the petroleum-producing region of Lago Agrio in eastern Napo Province and the markets of Quito was destroyed, as well as secondary roads, the oil pumping station at El Salado and seven bridges.[10] By March 7, 1987, reports of wide-spread destruction of housing in the Sierra region, on the western slopes of the Andes from the epicenter, had also reached Quito, adding more complete information to the assessment of damage for the nation.[11]

The total number of dead for the disaster was estimated at 1,000, with 5,000 persons left homeless or in need of resettlement.[12] The earthquakes had created damage in three distinct zones, each with particular needs and requirements for differing types of knowledge and action in response. The impact of the earthquake ricocheted through the society, as the event effectively shut off the transport of oil from the eastern oil fields to ports on the western coast where it was shipped to external markets. Oil production consequently was shut down. Without oil revenues, the national economy's revenue was cut by 50%. Many people were out of work. The price of gasoline increased

sharply, seriously affecting people on fixed incomes far from the earthquake zones. Transportation to the eastern zone was limited to air, which was costly or river, which was dangerous.[13]

The event poses a challenging set of conditions for the study of inquiring systems. In terms of the three basic elements for an inquiring system, the goal -- protection of life and property -- was clearly accepted by all participants. The boundaries of the system, however, were less clearly defined and the components, within the agreed boundaries, changed in both level of activity and influence on outcomes over the course of eight months following the disaster.

The problem of boundaries for an inquiring system was especially acute in the Ecuadorian case. The need for information was critical, yet, the tasks of gathering, processing and utilizing this information appropriately, given substantive differences in peoples, geographic regions and needs for assistance, were extremely difficult. The incumbent president of Ecuador, Leon Febres Cordero, created a national Emergency Committee to direct disaster operations for the entire affected area. This Committee included the ministers of Health, Finance, Public Works, Energy, Social Welfare, the Environment and the state and provincial directors of emergency management. The boundaries of the disaster operations process, and a possible inquiring system, were declared to be national.

In practice, the three disaster zones had differing problems with differing degrees of urgency and required differing types of

information, knowledge and resources for solution. Action necessarily would have to be fitted specifically to each zone, and the boundaries of inquiry for many of the residents remained in their respective zones. Yet, it was clear that the problems in each zone were interrelated, and that the set of problems, interacting, would have a profound effect upon the nation as a whole.[14] Consequently, the boundaries of inquiry shifted from zone to nation and back again, depending upon the function being performed in disaster operations.

The identification of components for inquiry shifted with the boundaries, often with the same people playing different roles in differing arenas of action. The classic components for an inquiring system include decision-makers, clients and a designer (Churchman, 1971: 47-49.) In this disaster, the legally responsible agencies could be seen as decision-makers, the citizens as clients and those individuals who, within agency or citizen roles, took initiative for action as designers. The distinctions blurred as the communities became engaged in action.

The shifting boundaries and consequent changes in the components of inquiry are clearly shown by the actual pattern of disaster operations. Zone 1 in Central Napo Province, the area of primary impact near the epicenter of earthquake, incurred the heaviest physical damage but, fortunately, was sparsely populated. Some villages were totally destroyed and were not likely to be rebuilt along the river banks. Surviving population were to be relocated to safer areas. Other communities suffered

damage to schools, hospitals, and public buildings as well as private residences. Community life needed to be restored, but resources were scarce in these roadway towns that were largely dependent on the crippled oil industry for jobs. Residents of these communities suffered from the cumulative anxiety of losing an already marginal economic existence coupled with fear of continuing to live in an unstable geologic area where the future could never be certain. Response action, initiated at the community level within the zone was clearly insufficient. The boundaries of inquiry, searching for solutions, shifted from the zone to the national level, and again to the international level, before policy could be returned to the zone for implementation.

Zone 2, the Sierra, was more heavily populated, but damage occurred primarily to housing, with little actual loss of life due to the earthquake. A total number of 73,261 homes were reported destroyed or damaged in the earthquakes, and of those, approximately 80%, or an estimated 60,000 were in the Sierra. The regional cities and towns in these Andean highlands faced the longer term problem of reconstruction of housing and community services in an area of seismic risk, again with marginal resources and the knowledge that earthquakes will recur.

Zone 3, eastern Napo Province, suffered relatively little structural damage and almost no loss of life from the immediate event of the earthquakes. However, the economy of the region was heavily dependent upon oil production, and with the disruption of the pipeline and transportation routes, many people were out of

work. Indian populations suffered from the devastation of the rivers, their primary source of water, food and transportation. Colonists in the region, isolated from markets and supplies, lost income from their crops. Without jobs and cut off economically, commercially and socially from the urban centers of the nation, residents of this area endured a slowly deepening economic crisis as the cost of lengthening isolation engendered by the earthquake altered their lives.

The problems facing the National Emergency Committee were extraordinarily complex. Returning to the five functions listed above (pp. 4-5), each function needed to be accomplished within each zone of the disaster for the Committee to be able to form an overall judgment of the comparative needs within the set of three zones. The Committee required a comprehensive profile of the disaster in order to plan national strategies of operation with limited resources and personnel. The balance of command to exchange in the performance of each function was difficult to establish, for in the rural areas and small villages, there was relatively little formal organization or equipment among the population to carry out functions of disaster response for the entire community. Exchange was the most practical mechanism for collective action at the local level and was reinforced by the Ecuadorian communal tradition of the `minga,' or cooperative work group. Yet, the tasks involved in recovery and reconstruction needed resources, skills and professional design from national and international organizations, most of which expected to use

relationships of command to increase efficiency.[15]

The five functions -- communication of information, assessment of needs, mobilization of resources, performance of tasks and feedback on performance -- created a sub-system of inquiry within each zone to some degree in order to get the work done.[16] The three sub-systems, in turn, formed a larger system of national inquiry to guide the response, recovery and reconstruction processes. In large part, this system of inquiry developed spontaneously after the earthquakes occurred. While it demonstrated genuine creativity on the part of both organizational leaders and citizens involved, costs in time, organization and anxiety could be lessened by prior design in a region where earthquakes will certainly recur.

Throughout the set of disaster operations, the functions from one zone affected performance in another. Performance at one level, for example community, affected resources allocated at another, national or international. While patterns of inquiry developed in all three zones and at all three levels of jurisdictional interaction, inquiry suffered from inadequate communications facilities and lack of prior design. Natural inquiry, arising from perceived needs and commitment to action, produced constructive steps toward collective action. These steps could serve as a legitimate basis for developing a more systematic, comprehensive, knowledge base to assist decision-makers and citizens in achieving their common goal more quickly in recurring seismic events, in Ecuador or other zones of seismic risk.

B. The Armenian Earthquakes, SSR

On December 7, 1988, two earthquakes occurred in northern Armenia, one of the southern republics of the Soviet Union. The first earthquake occurred at 11:41 a.m., measuring 6.9 on the Richter scale with an epicenter near Nalban, a village in the northern mountains. Four minutes later, an aftershock of magnitude 5.8 on the Richter scale amplified the instability created by the first shock, increasing the damage. The fault had erupted over approximately eight kilometers in a strong vertical motion,[17] with some horizontal thrust movement.[18] In more than 2,000 years of known seismic activity in Armenia, the earthquakes of December 7, 1988 caused the most severe damage.[19]

Unlike Ecuador, the earthquakes struck in a heavily populated zone and had devastating effects on four cities in northern Armenia -- Spitak, Leninakan, Kirovakan, Stepanavan -- and 58 villages in the area. In minutes, hundreds of buildings had collapsed, water, electricity and communications were destroyed, tens of thousands of people were killed or injured, and hundreds of thousands of people were left homeless. Nearly one-third of Armenia's population of 3.5 million was affected to some degree by the earthquakes. Governmental organizations, unprepared for such devastation, struggled to devise appropriate responses to the immensity of human needs generated by the seismic events. Catastrophe, in this context, was an understatement.

Summary figures offer a rudimentary profile of the size and scope of the disaster. Official reports listed the total number

of dead as 24,542, verified through standard means of identification.[20] Attending Soviet physicians, responsible for organizing the delivery of medical services in Maralik and Leninakan immediately after the earthquakes, estimated the actual number of dead at 45,000.[21] The difference in figures was due, apparently, to difficulty in maintaining systematic records under the traumatic conditions of disaster. Further, the northern cities were crowded with approximately 170,000 refugees from the largely Armenian region of Nagorno-Karabakh, fleeing civil conflict in Azerbaijan. Refugees may not have been formally registered as residents, and therefore were difficult to identify. Consequently, the exact number of dead may never be known.

Statistics offer grim detail of the deadliness of the disaster. Civil Defense Armenia listed 39,795 victims extricated from the rubble. Of that number, 15,254, or 38.3%, of the victims were extricated alive. An additional 31,279 persons were reported as injured.[22] A total of 119,318 persons were evacuated from the area, and of that number, 79,750, or 68.8%, persons were evacuated to other republics.[23] An estimated 8,000,000 square meters of housing were destroyed, leaving 514,000 persons homeless. Hospitals, schools, and factories were destroyed or damaged; others stopped functioning because of loss of water or power. Lifestock were killed or injured; crops in storage and farming equipment were destroyed or damaged. The total loss for the area, affecting approximately 1 million people, was estimated at $16 billion.[24]

Could an inquiring system emerge in an environment of such devastation? The goal was overwhelmingly clear. Protection of life was the first priority and drove all response actions. The boundaries of the system were less certain. Although rescue and response actions were needed immediately in the heavily damaged cities and villages, the capacity to take such actions in those cities had also been largely destroyed. In the small city of Spitak, for example, not a single building was left undamaged. The Central Telephone Office was a tangle of broken wires. In Leninakan, approximately 80% of the buildings were damaged or destroyed.[25] Personnel from emergency response organizations were themselves victims of the disaster. Assistance was necessarily required from outside areas. The boundaries of the system needed to include sources of assistance as well as the area that needed help.

From Spitak, Leninakan, Kirovakan and Stepanavan, the boundaries of problem-solving inquiry expanded rapidly to include the official governmental organizations of Armenia SSR, medical and professional organizations and virtually all remaining citizens in the Republic who could offer assistance, formally or informally. Beyond the Armenian republic, inquiry extended immediately to the national level, involving All-Union officials, governmental organizations responsible for emergencies, medical and professional organizations, volunteers with needed skills and solidarity contributions from other republics. Premier Mikhail Gorbachev, Prime Minister Ryzkov, and Minister Yevgeni Chazov,

Soviet Department of Health, respectively, visited the disaster site and gave their immediate attention and support to disaster response efforts. The event marked a major shift in the Soviet national government's previous position that left response primarily to the republic in which the disaster occurred.

The boundaries of inquiry for disaster operations extended well beyond the Soviet Union, as empathy and offers of support came spontaneously from other governments and scientific, professional and volunteer organizations across the world. In all, 111 nations and 7 international organizations responded with assistance in some form.[26] Professional skills, heavy equipment and specialized knowledge were critically important to meet the massive needs generated in this disaster. The large and well-organized Armenian Diaspora responded swiftly with contributions in money, supplies and, significantly, Armenian-speaking personnel to assist with the traumatic tasks of response and recovery.

As the boundaries extended, so did the components of inquiry. With the rapid increase in number of participants and scope of response activity, the complexity of disaster operations increased geometrically. Out of the initial chaos, order did begin to emerge as All-Union representatives arrived to assist the shattered municipal services and heavily strained response organizations of the Armenian Republic.[27] The time required for organization, however, subtracted invaluable time from life-saving operations.[28] Under these extremely stressful conditions, the distinction between decision-makers and clientele began to

fade. While governmental organizations were the primary decision-makers, the scope of the disaster was such that they simply could not respond to all needs. Consequently, citizen clientele took the initiative again and again in the rescue of their family, friends and neighbors. The obvious discrepancy was in lack of training, equipment and experienced mastery of skills required for the rigorous demands of disaster response.

Returning to the five functions central to disaster operations -- communication of information, assessment of needs, mobilization of resources, performance of tasks and feedback on performance, we see a different configuration of command to exchange in the performance of each. In the initial hours and days of the disaster, the organizational capacity at the local sites of the disaster was so devastated that command relationships did not function.[29] Instead, relationships of exchange formed spontaneously, as family members and friends took what actions they could to rescue victims. At times, however, individual initiatives hindered the development of community response. For example, gasoline was extremely limited. Individuals drained the available supply of gasoline to transport injured family members and friends to hospitals in Yerevan. The action, however, left community ambulances without gasoline, hindering the organized transport of victims to needed medical care. Clearly, the extraordinary conditions required relationships of both command and exchange, but the network of communications to enable such actions was extremely limited.[30]

Armenia had three zones of varying intensity of damage within one large geographic area of seismic impact. Within the zones, Armenia had separate centers of operations to support the rescue efforts. The near-total destruction of communications, power, transportation and medical facilities placed a serious constraint on disaster operations. For example, victims, when extricated from the excruciating ordeal of being trapped in a collapsed building, still needed to be transported to Yerevan, some three hours away by ambulance or car, for adequate medical care. While each of the five functions were carried out in disaster operations at multiple locations, levels of inquiry were required to support the conduct of a given task, such as the delivery of medical care, carried out across disciplinary, organizational and jurisdictional lines.

The tasks of organizing disaster response under these conditions of catastrophe were formidable. Inquiry began to focus on sets of problems, such as obtaining kidney dialysis machines for the treatment of crush syndrome. Other problems, such as disrupted sewage treatment facilities, were temporarily set aside because of the urgency of immediate needs, only to resurface later in exacerbated form. In this disaster, medical services were of primary importance, given the extraordinarily high number of victims, many with compound injuries, requiring treatment.

The cumulative burden of demands, left untreated or delayed in treatment under the stress of disaster conditions, resulted in

the subsequent manifestation of physical and psychological symptoms among the surviving population. With trauma compounded by uncertainty for the future and grief experienced on a national scale, the level of stress deepened for many survivors over subsequent weeks and months. Needs that, for understandable reasons could not be addressed during the actual response period, recurred with fresh intensity in a later phase. For example, eight months after the disaster, Soviet emergency physicians reported a sharp rise in the number of incidents reflecting a high level of stress among the Armenian population. In Leninakan, the number of heart attacks reported increased by a factor of three over the number reported for the same period prior to the disaster. The number of suicides also increased by a factor of three and the number of acts of violence, involving the use of weapons, increased by a factor of 10.[31] These are estimated figures cited by informed professionals, but they indicate profound, continuing needs among the surviving population that, unaddressed, escalate the costs of disaster.

Such needs require sub-systems of inquiry within each zone to focus on the detailed investigation of specific problems and integrating systems of inquiry between the levels of jurisdiction to coordinate action on community, republic, national and international levels. The components of inquiry -- decision-makers, clientele and designers -- shift to those who take initiative for action. Such a group did emerge in the Armenian disaster, including government officials, citizens and represen-

tatives of national and international organizations. It was defined by those who accepted responsibility for action in that harshest of environments and who sought to act upon the best information available to meet human needs. The Armenian experience raises the question of whether actual performance to protect lives and property in zones of known seismic risk would be increased by the design of a global inquiring system that crosses disciplinary, organizational and jurisdictional boundaries prior to an event.

C. The Loma Prieta Earthquake, Northern California

On October 17, 1989 at 5:04 p.m., a major earthquake occurred in the San Francisco Bay Area of Northern California. The earthquake registered 7.1 magnitude on the Richter scale and was located on the San Andreas fault, with an epicenter approximately 20 miles south of San Jose, California in the Santa Cruz Mountains.[32] Although the epicenter was close to the heavily populated metropolitan area surrounding San Francisco Bay, with 5.5 million inhabitants, the buildings and infrastructure of the major Bay Area cities, designed to meet current standards of earthquake engineering, largely withstood the severe shock. The damage was sufficient, however, that President Bush issued a federal disaster declaration for the counties of Alamdeda, San Francisco, San Mateo, Santa Clara, Santa Cruz, San Benito and Monterey, making federal disaster assistance available to the stricken counties, cities and citizens.[33]

The earthquake triggered major incidents of damage in the

cities of Oakland, San Francisco, Santa Cruz and the dramatic collapse of a section of the Bay Bridge spanning San Francisco Bay between the cities of Oakland and San Francisco. The seven-county disaster area registered 64 deaths.[34] A total of 2,750 persons were treated in emergency rooms at 112 Bay Area hospitals, but of that number, only 250 were hospitalized. Approximately 6,500 persons were reported to be displaced from their homes, although reports of severity of damage varied by city and county. Distance from the epicenter, interaction between soil conditions and ground motion, type of building construction and type of individual activity at the time of the event influenced the impact of the earthquake on the population of the Bay Area. The City of Oakland, furthest from the epicenter, reported the heaviest toll in lives, with 40 dead, and second highest cost in damage, $1.7 billion. This account includes the number of injuries from the collapse of the Interstate 880 freeway bridge and damage to downtown buildings, including City Hall.[35]

Emergency response actions focused on four major sites of construction failure: the I-880 freeway collapse in Oakland, the Bay Bridge collapse, the fire in the Marina District of San Francisco, and the shopping center collapse in Santa Cruz. To a substantial degree, local emergency response organizations brought these incidents under control, with assistance and support from neighboring jurisdictions through mutual aid agreements, county and state emergency response organizations.

The event created a startling personal tragedy for the

families and friends of those who died and a sobering alarm to residents of the region. Yet, with cautious relief, the population of the San Francisco Bay Area acknowledged that they had survived a major earthquake with moderate losses in deaths, injuries, number of homeless and destruction to human services and infrastructure.

Does the case of the Loma Prieta Earthquake, given its strong magnitude but relatively moderate amount of destruction, indicate the presence of a Singerian inquiring system functioning in the San Francisco Bay Area? Although representatives of public, private and nonprofit organizations, scientific and professional organizations, voluntary groups and individual citizens might not recognize it as such, there are clearly elements of a systematic process of inquiry informing public and private action in ways that limited the consequences of the earthquake for the metropolitan population.

Returning to the elements of a Singerian model, the goal of informed, cooperative action to protect lives and property against incidents of seismic risk was widely acknowledged and shared by residents and decision-makers in the area. California is a region of known seismic risk. Scientific and professional institutions in the state, including those affilated with the advanced research universities in the San Francisco Bay Area, have created a significant body of knowledge, from multiple disciplinary perspectives, regarding the consequences of a major earthquake on this metropolitan region of 5.5 million inhabi-

tants. This steadily developing body of knowledge has been communicated to both policy makers and the public through a variety of means. The State of California's Office of Emergency Services, for example, has increased its public education and training programs with emergency personnel from local municipalities and counties significantly over the past eight years.[36] There are gaps in the process, as demonstrated by the I-880 freeway collapse, but an increased level of public awareness of seismic risk and emergency preparedness was demonstrated repeatedly throughout the disaster operations.[37]

The boundaries of an identifiable inquiring system appear to include the nine-county Bay Area, but extend to state and national levels in specialized areas and return to sub-systems of inquiry for specific problems in local communities and counties. The density of overlapping patterns of communication and interaction gained through common training experiences and prior experience in disaster was reflected among participating emergency response personnel. Drawn from throughout the state, the response teams shared professional standards and skills which facilitated coordination in the difficult response to the collapsed Oakland freeway structure. Statewide, an informed and concerned citizenry has, for the past twenty years, voted to maintain strong building codes and to pass bonds for the structural reinforcement of schools and public buildings. Locally, an increasingly professional public service has reordered the priorities to hire personnel to develop earthquake preparedness

programs in cities like Oakland and Santa Cruz.

As the boundaries shift from community to metropolitan region to state and federal arenas of inquiry, and return again to the community level for action, the components of the inquiring system also change. In true Singerian fashion, the decision-makers, clients and designers begin to merge roles, as policy makers, citizens and professionals transform ideas into action. Circulating freely, information is enabling, and ready access to current information encourages citizens to take responsible action to protect themselves and others.[38] The design of systematic means of access to information about earthquakes and feedback from actions taken by principal organizations and citizen groups in the region has been an ongoing program for organizations such as the Bay Area Regional Earthquake Preparedness Program, State of California. Similarly, the Earthquake Engineering Research Center, University of California, Berkeley and the US Geological Survey, Menlo Park have contributed significantly to scientific knowledge about earthquakes in the region.

Interestingly, with increased training and ready access to information, the balance on command to exchange in performance of the five functions of disaster response (cited above, pp. 5-6) shifted markedly toward exchange in this disaster. This pattern was observed in the most demanding and uncertain environments, as in the urban heavy rescue effort to salvage the victims of the I-880 freeway collapse. Interorganizational and interdisciplinary

search and rescue teams were formed to cut through the forbidding tangle of concrete and steel to extricate victims, not because it was required by some external authority, as the coordinator of the Oakland Fire Department's team stated, but because it was necessary to do the work.[39]

A telling measure of performance was the response of the citizens to the event. With no prescribed roles, yet operating on the basis of prior awareness of earthquakes and the likelihood of danger, ordinary citizens responded with remarkable bravery, courage and generosity in response to the needs generated by the earthquake. At the site of the I-880 freeway collapse, for example, private companies located in the area brought heavy equipment to the scene within minutes. They improvised platforms with heavy containers and forklifts to elevate equipment to the upper levels of the freeway and to bring down injured victims. Neighbors risked their own lives to help strangers they had never met, demonstrating again the powerful ethical imperative to save lives in disaster.[40]

With quick thinking and responsible action, citizens, public organizations and private companies working together managed to rescue nearly all live persons from the collapsed freeway structure in approximately 11 hours. Fifty-six cars were located on the collapsed section of freeway. Approximately 200 persons were estimated to be on that stretch of freeway when it went down. Thirty-nine bodies were extricated in a grim effort to account for all missing persons. Hope was briefly renewed with

the live rescue of one survivor four and a half days after the event. Regrettably, the joy of rescue turned to sorrow as the courageous survivor succumbed to injuries sustained in the ordeal. The search and rescue process was largely spontaneous in the first hours and could doubtless be improved with design. But the fact that the initial rescue was done within hours, under the constraints of nightfall, with no electricity and limited communication, demonstrates the capacity for informed community response in disaster.

IV. Turning Conflict into Cooperation in Disaster Response

Ironically, disaster has a positive aspect in the study of organizational interaction in response operations. It affords the opportunity for participating organizations and concerned citizens to identify the weak points in their community processes and to improve their processes in future performance (Benveniste, 1977, 1983.) This reflective assessment is critical to learning in organizational performance (Schon, 1985).

Returning to the concept of an inquiring system, we see that four basic characteristics were present to some degree in each disaster - Ecuador, Armenia and Northern California. All three shared the common purpose of saving lives and protecting property. The degree of openness in the process of inquiry varied between Ecuador, Armenia and Northern California, yet in each set of disaster operations, previously existing patterns of organization were replaced with newly created ones in order to perform urgent tasks more satisfactorily. Information proved critical to

action, and while difficult to obtain in each setting, once available, it proved enabling to the participants in the process. Finally, on the basis of work performed, cooperation emerged repeatedly in the three sets of disaster operations. In the mingas of Ecuador, the student work groups of Armenia and the interdisciplinary search and rescue teams of Oakland, California, people learned to cooperate more readily to accomplish the extraordinarily difficult tasks of response and recovery from disaster. Obstacles and conflict were also apparent, but in each disaster, participating personnel improved their performance significantly during the actual experience of the disaster.

Several conclusions can be drawn from these three events in reference to future performance in disaster operations. They are:

1. Rapid mobilization of response requires prior training, shared commitment and common understanding of the tasks involved.

2. Building that response requires the creation of a community-wide knowledge system that makes available to responsible managers not only the physical resources, but also the intellectual understanding of how to adapt available materials to actual needs in disaster.

3. Effective disaster response involves a radical shift in the perception of roles where members of the community, united in common purpose with emergency response organizations, become part of a coherent community network of response that actively works to increase performance under disaster conditions.

Recognizing that members of the community are at once victims of the disaster and vital actors in the process of community response and recovery, a primary function of disaster management is to identify the points at which community residents may make the critical shift from passive victim to active

participant in the disaster recovery process. Activities that engage noninjured residents of the community in active participation for community response are likely to contribute to successful recovery. Conversely, if community residents are not informed or involved in constructive ways in the disaster operations process, they are likely to perceive themselves as victims and contribute to conflict among organizations participating in disaster operations.

Acknowledging the sources of organizational conflict in disaster response and transforming those sources into bases for cooperation among organizations is the first step toward strengthening organizational capacity for response in future hazardous events.

ACKNOWLEDGMENTS

Many people have contributed time, thoughtful attention and assistance to the conduct of research in the three disaster environments. I am especially indebted to Hernan Orellana, Renan Herrera, Alvaro Saenz, Mario Venegas and Maj. Luis Aguas of Ecuador; Peter Safar, University of Pittsburgh, Victor Semenov, the late Boris Gazetov, Moscow, Alezander Mikaelyan, Yerevan, and other members of the US-USSR Disaster Reanimatology Study Group; and Vitelmo Bertero, Earthquake Engineering Research Center, University of California, Berkeley.

Research for this study has been supported by the National Research Council, Washington, D.C.; Natural Hazards Research and Applications Information Center, University of Colorado; Center for Latin American Studies, Howard Heinz Endowment, University Center for International Studies, University Center for Social and Urban Research, Center for Russian and East European Studies, Graduate School of Public and International Affairs, International Resuscitation Research Institute, University of Pittsburgh; Institute of Reanimatology and Ministry of Health, Moscow, USSR; Asmund S. Laerdal Foundation, Stavanger, Norway and New York, USA; Pharmacia Company, Uppsala, Sweden; Institute of Governmental Studies, University of California, Berkeley. Thanks are also due Noel Benson for his translation of Russian documents and Willadean Bailey for her assistance in the production of this paper.

NOTES

1. The problem of organizational conflict has been addressed in separate studies of these disasters. Please see the following studies by L.K. Comfort: "International Disaster Assistance in the Mexico City Earthquake," New World, Vol. 1, No. 2, Fall 1986, 12-43; "Organizational Interaction in Response and Recovery" in Robert L. Schuster, ed., The March 5, 1987 Ecuadorian Earthquakes, (Washington, D.C.: National Research Council, Committee on International Disasters, Post-Disaster Research Report, in press, 1989.) In English and Spanish; "La Crisis como Oportunidad: El Diseno de Redes de Accion Organizacional en Ambientes de Desastre" in Bruno Lima, ed., Psicosociales Consecuencias de Desastre: La Esperiencia Latinoamericana (Chicago: Simon Bolivar Press, in press, 1989); "Learning from Risk: Organizational Interaction following the Armenian Earthquakes" with other members of the Disaster Reanimatology Study Group, University of Pittsburgh and Institute of General Reanimatology, Moscow, USSR; paper presented at the 1989 Annual Conference of the American Political Science Association, Atlanta, GA, August 31 - September 3, 1989.

2. See the discussion by Bruno R. Lima in "Primary Health Care in Disasters: Armero, Columbia." Paper presented in the Roundtable on Emergency Management Research at the 1987 Annual Conference of the American Society for Public Administration, Boston, March 28-April 1, 1987.

3. Interview, Boris Gazetov, Director, Department of Emergency Medicine, Sklifosovsky Institute of Emergency Medicine, Moscow, USSR, University of Pittsburgh, Pittsburgh, PA, September 28, 1989.

4. Function is used here in the teleological sense attributed to E.F. Singer, Jr. and Gregory Bateson. That is, elements are grouped together because they will produce a certain end result.

5. These characteristics draw upon both prior research and professional observation. See, for example, Rudi Klauss and Bernard Bass, Interpersonal Communication in Organizations, (New York: Academic Press, Inc., 1982); L.K. Comfort, "Action Research: A Model for Organizational Learning," Journal of Policy Analysis and Management, Vol. 5, No. 1, 1985: 100-118; and L.K. Comfort, "Organizational Interaction in the Ecuadorian Earthquakes, March 5, 1987," cited above.

6. Charles E. Lindblom, Politics and Markets (New York: Basic Books, 1977).

7. Legally mandated emergency plans identify functions in disaster response primarily for public organizations with mission responsibility to perform specific tasks during disaster operations. See, for example, Federal Emergency Management Agency, A Plan for a Catastrophic California Earthquake, Washington, D.C.: USGPO, 1981.

8. The concept of shared risk leading to shared responsibility is presented in L.K. Comfort, J. Abrams, J. Camillus and E. Ricci, "From Crisis to Community: The Pittsburgh Oil Spill," Industrial Crisis Quarterly, Vol. 3, No. 1, 1989: 17-39.

9. Cite report by INEMIN, Renan Herrera et al.
Check full citation.

10. Hoy, Quito, Ecuador, March 10, 1987, p. 3A.

11. Interview, Director, Peace Corps, Ecuador, Quito, Ecuador, July 6, 1987.

12. United Nations Economic Commission for Latin America and the Caribbean - ECLAC, "The Natural Disaster of March 1987 in Ecuador and its Impact on Social and Economic Development," Report #87-4-406, 6 May 1987, p. 1.

13. A detailed account of the organizational interaction in this disaster is presented by the author in "Organizational Interaction in Response and Recovery." This article will appear as Chapter Eight in the Reconnaissance Report on Robert L. Schuster, The Ecuadorian Earthquakes of March 5, 1987, National Research Council, Washington, D.C., forthcoming.

14. President Leon Febres Cordero stated that "...this is the most serious disaster in the history of Ecuador as a nation." Hoy, Quito, Ecuador, March 10, 1987, p. 1.

15. The Catholic Relief Services/CATEC program of disaster assistance in Central Napo Province was a notable exception. Please see L. Comfort, "Crisis as Opportunity", cited above, for a more detailed account of this innovative program.

16. For a more complete description of task performance in the three zones, please see two additional papers by this author, "Crisis as Opportunity: Designing Networks of Organizational Action in Disaster Environments" in Bruno R. Lima, ed. The Psychosocial Consequences of Disaster (Chicago: Simon Bolivar Press, 1989), in Spanish, and "Organizational Interaction in Response and Recovery" in Robert L. Schuster, ed., The Ecuadorian Earthquakes of March 5, 1987, (Washington, D.C.: National Research Council Reconnaissance Report, forthcoming.)

17. Boris Karapetian, Department of Civil Engineering, Yerevan Polytechnic University, Yerevan, Armenia, March 24, 1989.

18. Earthquake Engineering Research Institute, "Armenian Earthquakes of December, 1988," Videotape, El Cerrito, CA, 1989.

19. Boris Karapetian, ibid., 1989.

20. Data provided by the Director, Civil Defense, Armenia SSR, Yerevan, Armenia, March 21, 1989.

21. Chairman, Department of Emergency Medicine, Sklifosovsky Institute of Emergency Medicine, Moscow, USSR, Seminar, University of Pittsburgh, Pittsburgh, PA, September 26, 1989.

22. This figure was reported by the German Red Cross. Interview, Counselor, German Embassy, Moscow, USSR, March 16, 1989.

23. These figures were reported by the Director, Civil Defense, Armenia SSR. Briefing, Civil Defense Headquarters, Yerevan, Armenia, March 21, 1989.

24. Figures cited regarding the impact of the disaster were presented by the Director, Civil Defense, Armenia SSR, at a briefing in Yerevan, Armenia, March 21, 1989.

25. Earthquake Engineering Research Institute, Armenia Earthquake of December, 1988; Videotape, El Cerrito, CA, 1989.

26. Valentin Mikhajlovich Nikiforov, Assistant Foreign Minister, USSR as cited in Ekho Planety [The Planet's Echo], Moscow, USSR, No. 7 (46) 11-17 February 1989, pp. 11-12.

27. The role of the All-Union representatives in supporting disaster response was reported by the Director of Civil Defense, Armenia SSR. It was also confirmed through direct observations by the Chief of the British Search and Rescue Team. Interview, Norman Roundell, Chief, British Search and Rescue Team, Washington, D.C., May 9-10, 1989.

28. The data provided by Civil Defense Armenia showed that the number of live rescues increased significantly on Days 3 and 4, after the heavy rescue equipment arrived, but dropped sharply after Day 5, as the persons trapped in the rubble could no longer survive. These data are presented in Miroslav Klain et al., "Disaster Reanimatology Potentials: A Structured Interview Study in Armenia. I. Methodology and Preliminary Results," Prehospital and Disaster Medicine, Vol. 4, No. 2, (October - November) 1989: 135-157.

29. The Civil Defense organization depended upon local capacity for action. When the local personnel were themselves victims of the disaster, the mechanism proved ineffective. Briefing, Director, Civil Defense, Armenia SSR, March 21, 1989.

30. Amateur radio operators voluntarily tried to set up communications linkages for rescue operations, but found great difficulty in doing so. Radio, Moscow, USSR, March, 1989, pp. 5-7; April, 1989, pp. 14-17.

31. Soviet emergency physicians, Seminar, University of Pittsburgh, Pittsburgh, PA, September 26, 1989.

32. Seismographic Station, Department of Geology and Geophysics, University of California, Berkeley, "Santa Cruz Mountains Earthquake of October 17," Bulletin No. 3, October 23, 1989.

33. San Francisco Chronicle, October 19, 1989; San Jose Mercury, October 19, 1989; Los Angeles Times, October 19, 1989, p. 1.

34. 63 deaths were reported by the California Office of Emergency Services for the seven-county disaster area, New York Times, October 25, 1989, p. 14. Buck Helms, rescued live from the Cypress Street collapse subsequently died, bringing the total of victims from the earthquake to 64.

35. Disaster Operations Center, City of Oakland, October 23, 1989.

36. Most emergency response personnel who participated in disaster operations at the Cypress Structure in Oakland had qualified for the roles they assumed in disaster operations through training in the Incident Command System offered at the California State Training Institute, San Luis Obispo. Interview, Officer, California Department of Forestry, Command Post, Cypress Structure, Oakland, CA, October 22, 1989.

37. This observation was made by several news analysts and journalists for the national press. See, for example, the New York Times, October 19 - 29, 1989.

38. The local newspapers cited daily accounts of citizens helping citizens, directing traffic, organizing shelters, contributing time and skills to community recovery projects. San Francisco Chronicle, October 18 - 29, 1989; Oakland Tribune, October 18 - 29, 1989.

39. Interview, Coordinating Officer, Oakland Fire Department, Command Post, Cypress Structure, Oakland, CA, October 22, 1989.

40. Interviews, emergency response officers at the Cypress Street Command Post, Disaster Operations, Oakland, CA, October 22, 1989.

IGS Working Papers

1987

87-1 THE ROCKY ROAD TO PRIVATIZATION
Lyle C. Fitch

87-2 TOWARDS A TYPOLOGY OF NEW SUBNATIONAL GOVERNMENTAL ACTORS IN INTERNATIONAL RELATIONS
Ivo D. Duchacek

87-3 INFORMAL PLURALISM AND LDP GUIDANCE--EXAMINATION OF JAPAN'S PROTECTIONISM OF RAW SILK IMPORTATION
John Q. Zhao

87-4 THE RELUCTANT REVIVAL OF LANDOWNER RIGHTS
Dennis J. Coyle

87-5 A CRITICAL THEORY OF COMMUNITY
Dennis J. Coyle

87-6 THE REAGAN PRESIDENCY AFTER SIX YEARS
Eugene C. Lee (moderator)

87-7 THE POLITICS OF THE AIDS VACCINE OR HOW THE CALIFORNIA LEGISLATURE SEARCHED FOR THE MAGIC BULLET--AND WOUND UP SQUABBLING WITH THE TRIAL LAWYERS THE BUDGET-CUTTERS AND THE ALZHEIMER'S ESTABLISHMENT
David L. Kirp and Hugh Maher

1988

88-1 WHAT DO DECISION MODELS TELL US ABOUT INFORMATION USE?
Evert A. Lindquist

88-2 EARTHQUAKE ENGINEERING AND PUBLIC POLICY: KEY STRATEGIES FOR SEISMIC POLICY
Stanley Scott

88-3 RESEARCH APPLICATIONS: PERSPECTIVES ON THE CALIFORNIA SEISMIC SAFETY COMMISSION
Stanley Scott

88-4 CORPORATE CAMPAIGN SPENDING AND INITIATIVE OUTCOMES IN CALIFORNIA
Tom E. Thomas

88-5 AMERICAN ALL-MAIL BALLOTING: A SUMMATION OF A DECADE'S EXPERIENCE
Randy H. Hamilton

88-6 DO YOU HAVE TO BE CRAZY TO DO THIS JOB? CAUSES AND CONSEQUENCES OF JOB SATISFACTION AMONG LOCAL LEGISLATORS
Edward L. Lascher Jr.

88-7 CALIFORNIA AGENCY RECONNAISSANCE PROJECT REPORTS
Todd R. La Porte, David Hadwiger, Steven Stehr

88-8 ARE CHICANOS ASSIMILATING?
Jorge Chapa

88-9 WHITE REACTIONS TO BLACK CANDIDATES: WHEN DOES RACE MATTER?
Jack Citrin, Donald Philip Green, David O. Sears

88-10 ISSUES IN RURAL AND SMALL DEVELOPMENT, CASE STUDY: WATSONVILLE SANTA CRUZ COUNTY CALIFORNIA
Trish Ramos, Lakshmi Srinivas, Miriam Chion, Ana Lopez, Harry Hecht, Chris Broughton, Robert Murray

88-11 THE UNITED STATES AIR TRAFFIC SYSTEM: INCREASING RELIABILITY IN THE MIDST OF RAPID GROWTH
Todd La Porte

88-12 **THE REAGAN PRESIDENCY AFTER SEVEN YEARS**
Eugene C. Lee (moderator)

88-13 **THE IOWA CAUCUSES IN A FRONT-LOADED SYSTEM: A FEW HISTORICAL LESSONS**
Nelson W. Polsby

88-14 **MODERNIZATION OF THE U.S. SENATE**
Nelson W. Polsby

88-15 **AMERICAN DEMOCRACY IN WORLD PERSPECTIVE AND WHAT TO DO ABOUT IT**
Nelson W. Polsby

88-16 **THE ARROGANCE OF OPTIMISM**
Martin Landau, Donald Chisholm

88-17 **FROM CRISIS TO COMMUNITY: THE 1988 OIL SPILL IN THE PITTSBURGH METROPOLITAN REGION**
Louise Comfort, Joel Abrams, John Camillus and Edmund Ricci et al.

88-18 **TECHNOLOGY AND ADAPTIVE HIERARCHY: FORMAL AND INFORMAL ORGANIZATION FOR FLIGHT OPERATIONS IN THE U.S. NAVY**
Gene I. Rochlin and Energy Resources Group

88-19 **INSIDE JAPAN'S LEVIATHAN DECISION-MAKING IN THE GOVERNMENT BUREAUCRACY**
Brian Woodall and Nobuhiro Hiwatari

88-20 **THE DECAY OF FEDERAL THEORY**
S. Rufus Davis

88-21 **INFORMATION NETWORKS IN INTERNATIONAL DISASTER ASSISTANCE**
Louise K. Comfort

88-22 **THE LOGIC OF UNCERTAINTY: INTERORGANIZATIONAL COORDINATION IN INTERNATIONAL DISASTER ASSISTANCE**
Louise K. Comfort

88-23 **CRISIS AS OPPORTUNITY: DESIGNING NETWORKS OF ORGANIZATIONAL ACTION IN DISASTER ENVIRONMENTS**
Louise K. Comfort

88-24 **ENVIRONMENTAL ETHICS IN CALIFORNIA**
Carolyn Merchant

88-25 **COLD TURKEYS AND TASK FORCE: PURSUING HIGH RELIABILITY IN CALIFORNIA'S CENTRAL VALLEY**
Todd R. La Porte and Ted Lasher

88-26 **BRUCE KEITH'S ALMANAC: PATTERNS OF VOTING IN CALIFORNIA**
Bruce Keith

88-27 **LOCALITY AND CUSTOM: NON-ABORIGINAL CLAIMS TO CUSTOMARY USUFRUCTUARY RIGHTS AS A SOURCE OF RURAL PROTEST**
Louise Fortmann

<u>1989</u>

89-1 **AMERICAN IDENTITY AND THE POLITICS OF ETHNIC CHANGE**
Jack Citrin, Beth Reingold, Donald P. Green

89-2 **UKIAH, 1904: A MODEST FOOTNOTE TO THE HISTORY OF THE COUNCIL-MANAGER FORM OF MUNICIPAL GOVERNMENT IN THE UNITED STATES**
Randy H. Hamilton

89-3 **THE UNIVERSITY OF LONDON: AN AMERICAN PERSPECTIVE**
Eugene C. Lee, Frank M. Bowen

89-4 **LONDON 2001**
Peter Hall

89-5 **THE DISTRIBUTION OF ACADEMIC EARMARKS IN THE FEDERAL GOVERNMENT'S APPROPRIATIONS BILLS, FY 1980-1989**
James Savage

89-6 AMERICAN HIGHER EDUCATION: PAST, PRESENT AND FUTURE
Martin Trow

89-7 AMERICAN HIGHER EDUCATION: "EXCEPTIONAL" OR JUST DIFFERENT?
Martin Trow

89-8 1992, EUROPEAN INTEGRATION AND THE TIMES"
David Morgan

89-9 THE AMBIGUOUS STATUS OF SCIENCE AND TECHNOLOGY IN AUSTRALIA
Anthony Pecotich and Kelvin Willoughby

89-10 ERNST FRAENKEL LECTURE, FREE UNIVERSITY OF BERLIN THE AMERICAN ELECTION OF 1988: OUTCOME, PROCESS AND AFTERMATH
Nelson W. Polsby

89-11 PARTY, STATE AND IDEOLOGY IN THE U.S. HOUSE OF REPRESENTATIVES, 1967-76
K.G. Armstrong

89-12 HOW MUCH DOES LAW MATTER? LABOR RELATIONS IN ROTTERDAM AND U.S. PORTS
Robert A. Kagan

89-13 TECHNOLOGY AND THE FUTURE: ISSUES BEFORE THE BUSH ADMINISTRATION
Edward Wenk, Jr.

89-14 MUSIC OF THE SQUARES A LIFETIME OF STUDY OF PUBLIC ADMINISTRATION
Herbert Kaufman

89-15 WHY PRETEND ONE SIZE FITS ALL: AN EXAMINATION OF MANAGEMENT ISSUES THAT CONCERN SMALL FEDERAL AGENCIES
Randy H. Hamilton

89-16 SANTA CRUZ COUNTY PLANNING ISSUES: PAPERS ON PLANNING, HOUSING AND FORESTRY
Edward J. Blakely and Ted K. Bradshaw

89-17 THE RESEARCH ON HIGHER EDUCATION PROGRAM: AN APPRECIATION OF ESKIL BJORKLUND
Martin Trow

89-18 BINGO! AN UNTAPPED REVENUE FOR CALIFORNIA CITIES
William B. Rumford, Jr. and Randy H. Hamilton

89-19 CHOICE VS. CONTROL: INCREASING ORGANIZATIONAL EFFECTIVENESS IN INTERDEPENDENT ENVIRONMENTS
Louise K. Comfort and Keun Namkoong

89-20 THE CASE FOR EXPERIENTIAL KNOWLEDGE
Gene I. Rochlin

89-21 SAINTS AND CARDINALS IN APPROPRIATIONS SUBCOMMITTEES: ACADEMIC PORK BARRELING AND DISTRIBUTIVE POLITICS IN AN ERA OF REDISTRIBUTIVE BUDGETING
James D. Savage

89-22 THE ELUSIVENESS OF RURAL DEVELOPMENT THEORY AND PRACTICE: DOMESTIC AND THIRD WORLD PERSPECTIVES JOINED
Ted K. Bradshaw

89-23 LEARNING FROM RISK: ORGANIZATIONAL INTERACTION FOLLOWING THE ARMENIAN EARTHQUAKES
Louise K. Comfort

89-24 DESIGNING AN EMERGENCY INFORMATION SYSTEM: THE PITTSBURGH EXPERIENCE
Louise K. Comfort

89-25 TOP BUREAUCRATS AND THE DISTRIBUTION OF INFLUENCE IN REAGAN'S EXECUTIVE BRANCH
Steven D. Stehr

89-26 TOWARD A DISPERSED ELECTRICAL SYSTEM: CHALLENGES TO THE GRID
James Summerton and Ted K. Bradshaw

89-27 **ON CAMPAIGN FINANCE REFORM: THE ROOT OF ALL EVIL IS DEEPLY ROOTED**
Daniel Hays Lowenstein

90-1 **THE EFFECT OF CAMPAIGN SPENDING, TURNOUT, AND DROPOFF ON LOCAL BALLOT MEASURE OUTCOMES** and **THE INITIATIVE AND CALIFORNIA'S SLOW GROWTH MOVEMENT**
David Hadwiger

90-2 **TURNING CONFLICT INTO COOPERATION: ORGANIZATIONAL DESIGNS FOR COMMUNITY RESPONSE IN DISASTER**
Louise K. Comfort

SEND ORDER TO:
Institute of Governmental Studies
102 Moses Hall
University of California
Berkeley, CA 94720
(415) 642-5537

PLEASE PRE-PAY ALL ORDERS
UNDER $30: checks payable to The Regents of the University of California.
SALES TAX: California residents add sales tax.
HANDLING AND SHIPPING: add 20% of sales price. Allow 4 weeks for delivery.

Please add my name to the *PAR* mailing list (free). ____

TITLE	QUANTITY/COST

SUBTOTAL	
SALES TAX	
HANDLING (20%)	
TOTAL	

NAME _____
ADDRESS _____
_____
_____
CITY _____ STATE _____ ZIP _____