## MISCELLANEOUS REPORT #43

## A FRAMEWORK FOR MANAGEMENT FOR NATURAL DISASTERS\*

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\*This work was not done as part of the regular research program of the Disaster Research Center (DRC), but primarily as a thesis to meet the requirements of a degree in Public Administration. Therefore, the views expressed are those of the author and not necessarily those of DRC. However, DRC thought the work worthy of wider exposure and is making it available in this form for wider public distribution.

## PREFACE

ระการได้สูง เมษาสมนักษณฑรโปนแปรโปนการให้ได้ไปการการการไปแปรโปนตรายเป็นการได้เพราะไปได้เห็นไปกล่านได้สมประบบแปนแบบแม่นได้ระบบ

> Fatalities and property losses due to natural calamities appear to be mounting every year. Is this increase a result of growing exposure to hazards? And if so, what reasons can be attributed to such adverse trends? Are not the factors of population pressure and environmental degradation adding to existent vulnerability? In turn, is there a growing awareness and sensitivity to the issues involved? While seeking answers to such questions, а measure is achieved of the intrinsic complexities that surround the circumstances associated with natural disasters. And similarly, in addressing such issues, there emerges an urgent need to confront the challenges imposed by natural hazards in a comprehensive and effective manner. For, not only involved is an individual tragedy for victims and their families, but in a larger context, there is a continual thwarting of efforts at achieving economic development -- particularly so in the less developed countries.

> > It is in the backdrop of such considerations that

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this study has been attempted. Its purpose is to outline a framework for the management of natural disasters. The ultimate objective is to assist in the formulation of appropriate policy and administrative measures. Traditionally, a fairly ad-hoc approach was adopted in this regard. As and when "disaster" struck, relief agencies intervened to extend succor to victims and assist in absorbing post-impact stress and grief. Very little in effect was done to "learn" and apply past experiences for mitigating or preparing vulnerable communities from future occurrences. In essence, it was a post-impact, crisisoriented approach.

With increasing vulnerability and losses, particularly due to population pressure and environmental degradation, traditional forms of intervention appeared inadequate. In view of the complexities involved, the need more "rational" and concerted effort for а emerged. Research in the concerned social sciences began to address issues related to the field. Gradually, a "disciplinary" form emerged, which couched the issues related to natural disasters in conceptual terms. With the application of such research endeavour, an integrated approach to managing natural disasters was conceived that emphasized mitigation and preparedness measures. As an effort it is holistic in

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nature and links the various "activity-phases" in a comprehensive perspective.

It is these concepts and social science findings that form the foundations of the framework described. In that sense therefore, the scope is broad and general. Apart from summarizing the necessary concepts of the discipline, the study examines issues concerned with major activity groups related to natural disasters. The basic orientation of the discussion is in terms of relevant principles and issues.

such. it does not address any specific As geographical or political environment, but rather attempts to bear relevance to all socio-political systems that fall victim to extreme natural phenomena. However, there are certain portions and issues that do have particular developed relevance to the poorer, less countries. Expectantly, such a broad frame of reference will suffer from many limitations. Considering the diversity in cultural, political and administrative systems around the world, it is quite likely that there are many circumstances that fail to be addressed in the discussion. However, despite such constraints in the approach, there still appears be to sufficient merit that commends the adoption of the perspective taken. For one, a broad framework

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enables focusing upon the inter-disciplinary nature of the subject. Further, it provides necessary insights into overall linkages, dependencies, and constraints that determine the scope of policy and administrative options. These aspects in fact are highly significant since it is only through such a perspective that a holistic and comprehensive policy can be adopted, a policy that will then effectively address the issues in a concerted manner. And that in essence is the ultimate aim and objective of this entire exercise.

This study would have suffered grievously without the kind and able support of many. Gratitude is due to the members of the Committee that helped steer this effort. Dr. William Boyer (Professor, Political Science Department, University of Delaware), and Dr. Francis x. Tannian (Professor and Economist, College of Urban Affairs and Public Policy, University of Delaware), provided valuable suggestions that helped strengthen and shape the study. I also grateful to Dr. E.L. Quarentelli, am Director, Disaster Research Center (DRC.), University of Delaware, for advising and also extending me the facilities of the DRC., without which this study would have been severely constrained.

Special mention needs to be made for Dr. Dennis

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Wenger, (Co-Director, DRC.) who evinced keen interest in this project from the beginning and was a constant source of encouragement. His advice and guidance, which were always available, were particularly helpful in the writing of this study. Finally, I must express my regard and gratitude to Dr. Russell R. Dynes (Chairman, Department of Sociology and Co-Director DRC.), who very graciously agreed to chair the committee and provided continuous guidance in directing the course of this endeavour. Needless to say, limitations and shortcomings that persist in the study are the result of my own failings and do not reflect any lack of assistance, support, or guidance from those associated with the project.

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## CHAPTER ONE

- سيد فقد ا

in the sea

INTRODUCTION

## INTRODUCTION

You could see that dust storm coming, The cloud looked death-like black, And through our mighty nation It left a dreadful track.<sup>1</sup>

natural disasters of Ever so often, severe magnitude strike various parts of the world, leaving behind a horrid trail of death, mutilation, starving children, destitute women, the carcasses of animals and the rubble of damaged buildings. Each occurrence is a chronicle of human tragedy and despair. Earthquakes, droughts, hurricanes, floods, tornadoes, volcanoes, and similar natural phenomena are severe manifestations of the elements, the appearance of which throws in bold relief as it were, the frailty of ingenuity human existence. Human intellect, and resourcefulness however have devised various ways to withstand such extremities of nature. Noah's "ark" serves here as an exemplary model of a preparatory system. The dikes of the European Low Countries, the stilt constructions of South-East Asia, and the food stocking systems in medieval forts are further illustrations of

Moreover, from coping mechanisms. apart traditional devising such systems, in the event of a disaster, society has brought relief and succor to victims in the aftermath. Efficiency regarding post-disaster response systems was relief through refuqee and damage enhanced further reconstruction experiences of the two world wars. These undoubtedly served the immediate though limited purpose of alleviating post-impact sufferings.

Nevertheless with growing economic, demographic and environmental complexities on the one hand, and increasing societal and governmental responsibilities on the other, traditional ad-hoc response mechanisms appeared inadequate In their place a more holistic and incomplete. and conceptualized approach to managing disasters evolved, embracing in its fold a full range of interrelated activities in a common perspective. The following chapters identify activities and major features involved in the management of natural disasters. Relevant principles are distinguished that provide guidance for the formulation of appropriate policies and administrative measures in this regard.

#### THE NEED FOR DISASTER MANAGEMENT

In the modern context, issues concerning disasters are inextricably linked with environmental complexities. Vulnerability to natural hazards has steadily escalated due to the interaction between nature and human activity. One of the principal factors involved in this interface is the rising trend of demographic profiles. In fact, along with other variables associated with poverty, population expansion is a matter of serious concern in the poor, less developed countries, which are highly prone to suffer extensively during disasters. It is estimated that

The rate of growth will slow only marginally, from 1.8 percent a year to 1.7 percent. In terms of sheer numbers, population will be growing faster in 2000 than it is today, . . [where] Ninety percent of this growth will occur in the poorest countries.<sup>2</sup>

Given these circumstances. the concept of "marginality" further confounds and accentuates problems of poverty, as well as natural disasters. With burgeoning population, there is proportionate growth in demand for basics such as food, fuel and land for shelter and cultivation. In as much as well endowed lands are a limited resource, people are ( of necessity) forced to occupy lands that are marginally productive. The capacity of such lands to reproduce is limited by constraints because of the existent limitations of those utilizing such lands. For

example, poverty induces people to occupy poor quality lands such as hill slopes. Cultivation of such lands is tedious and demands much labor as well as other inputs to sustain any economically efficient level of production. However due to paucity of resources, poorer farmers are unable to obtain requisite inputs, and therefore productivity often tends to decline over time. Further, tillage of hill slopes leads to soil erosion, and in turn, the productive capacities of the land are also gradually eroded away.

Similarly, the need for habitation sites leads to occupation of other vulnerable areas such as flood plains. Fuel and timber requirements in the same manner result in deforestation and ecological instability. In these circumstances,

Perhaps the most troubling problems are those in which population growth and poverty lead to serious long-term declines in the productivity of renewable natural resource systems. In some areas capacity of renewable resource systems to the support human populations is already being seriously damaged by efforts of present populations to meet disparate immediate needs, and the damage threatens to become worse.<sup>3</sup>

Despite the alarming proportions such ecological fragility may have reached in various parts of the world, the circumstances they stem from are real, immediate and cannot be wished away. Without the introduction of

imaginative policies that provide substantive and viable alternatives, flood plains will continue to be occupied, hill slopes will be cultivated, forests will be lost, and marginal resources will be overused to meet current pressing needs of livelihood and sustenance. For instance, the following account describes vividly the starkness of the situation in the Wollo region of Ethiopia (1984). Needless to say similar desperate circumstances may be found in other parts of Africa and the developing world;

Throughout the region, farmers harnessed up weak oxen and began to sow what seeds they had left. But Wollo today is a moonscape of treeless hills and valleys. All the land that an ox can climb or a man stand upon has been cultivated. Farmers even suspend themselves by ropes to sow hillsides too steep to stand upon.<sup>4</sup>

While much world attention has been drawn to the plight of starving people in large parts of Africa, one root cause lies in the long-term environmental neglect. Abuse of the natural endowments of the area for immediate gains, and unimaginative experimentation under the guise of development have together with severe weather conditions, indeed led to the massive tragedy that confronts sub-Saharan Africa today. In fact Africa has

overdrawn its environmental accounts, and the result for much of Africa has been environmental bankruptcy. The big farm schemes of the Northern experts, and the small efforts to stay alive of the rapidly growing rural populations, have overcultivated, overgrazed and deforested the And therefore;

As the soil erodes, so do Africa's living standards. Bankrupt environments lead to bankrupt nations -- and may ultimately lead to a bankrupt continent.<sup>6</sup>

Inevitably, in view of the encroachment, abuse and depredation of nature on account of human activity, the term `natural disaster' is rendered suspect. Semantics aside, the issues briefed above are complex and present real problems that lie deeply enmeshed within environmental concerns, socio-economic development efforts and resource constraints. Indeed,

Environmental, resource, and population stresses are intensifying and will increasingly determine the quality of human life on our planet. These stresses are already severe enough to deny many millions of people basic needs for food, shelter, health, and jobs, or any hope for betterment. At the same time, the earth's carrying capacity-is eroding.<sup>7</sup>

And underlying all these stresses is the disturbing trend of increasing vulnerability to natural hazards. On the other hand, unless such tendencies of resource abuse are not curbed, or alternatives found, the prospects of environmental stability are indeed bleak. Long-term consequences are manifested through a higher incidence of disasters. For instance, due to deforestation, surface runoff and soil erosion are high. Thus retention capacity of

the land is reduced, while siltage in river basins increases. In effect, the area becomes highly prone to both floods and droughts.<sup>8</sup> In fact;

The Cox inquiry found evidence that on a scale perhaps unparalleled in history, humans are altering the environment in ways that are making it more prone to disasters.<sup>9</sup>

And not only is the frequency of such disaster occurrences increasing, but also,

the severity of natural disasters are rising. The upward trend is expected to continue. Predicts noted disaster expert E.L.Quarentelli: "we're going to have more and bigger disasters."<sup>10</sup>

it may, the answers to such enigmatic and Be as complex situations have so far found the world grappling relentlessly with them. The interaction between social, political, technological and economic. cultural, administrative variables involved is so highly dynamic and limitations invariably complex, that constraints and surface to frustrate efforts. No doubt conservation of the fundamental alteration in environment will require a present policies and practices. In the meanwhile, however, lives and property continue to be lost, and developmental efforts receive continual setbacks in the face of natural calamities. The immediate concern in this regard then inevitably must turn to devising adequate and comprehensive Measures coping measures. that enable vulnerable

coping measures -- measures that enable vulnerable communities to substantially mitigate the effects of extreme natural phenomena, or be better prepared to withstand the adversity of weather and geo-physical factors. These, then, are the basic arguments that emphasize the need for disaster management and are the primary issues which form the backdrop to the discussion and analysis of the substantive portion of the text.

## **DEVELOPMENT OF DISASTER MANAGEMENT**

In the face of rising levels of vulnerability to natural hazards, greater concern and anxiety surfaced regarding overall adverse consequences of disasters. For not only is there the despair and tragedy of injury, loss of life, and damage to property, but also each successive incident causes economic hardships and social dislocations which have ramifications beyond the immediate area of impact. Considering the increasing all-round interdependencies that characterize the world today, such socioeconomic disruptions have temporal and spatial repercussions that affect other regions as well.

At the same time, with advances in mass communication technology, media reportage is typically characterized by speed and extent of coverage. Within

moments following an incident, radio, television and newspaper systems come into operation and provide intimate details of the occurrence. Audio-visual means are used to instantly flash across the globe live images of helpless people, disease, death, burning buildings and strewn debris, so as to draw greater attention to the calamity. All these factors then combine to enhance social and political consciousness and sensitivity to disasters.

The study of disasters has escalated considerably in the last decade or so. In fact it has been said that the growth of interest in the area has been exponential rather than linear.<sup>11</sup>

Considering the dimensions and severity of the overall long-term consequences of natural calamities, great pressure is exerted upon governments and concerned agencies to intervene and introduce comprehensive protective and coping measures to threatened communities. However, with rising needs and expectations, along with the multi-faceted nature of hazards, traditional ad-hoc systems appeared far too inadequate. Such measures were essentially limited to extending relief and succor to victims after the occurrence of a disaster. Overall response was largely unplanned, where each disaster was treated as a single isolated event. Its relationship to past occurrences or future possibilities was seldom traced. As a result there was

to gain insights for shaping and refining future responses. And due to the unplanned nature of these measures, economic efficiency suffered in the utilization of resources and applied relief.

In view of these lacunae, there emerged the need for a more effective and efficient coping mechanism. With the application of technology, and social science research, an integrated approach to the management of natural disasters gradually evolved. Resting on the principles of comprehensive planning, it seeks to correct the anomalies found in traditional response patterns.

Through research and development in technology and related physical sciences, a firmer grasp of meteorological and geophysical phenomena was achieved. Greater insights and deeper understanding of the physical characteristics, other dynamics of natural agents was properties and reached. Gradually on the strength of scientific knowledge society was able to effectively adopt and inputs, appropriate technology for mitigating the effects of disasters. Other products of scientific development such as communication equipment for instance, were applied to increase the level of social preparedness for meeting the eventuality of natural calamities. And through these scientific applications, levels of property damage and resulting loss of life or injury were sought to be reduced.

Concurrently, since the early nineteen fifties, social scientists, particularly within the field of sociology began to increasingly devote time and attention to study disasters and their effects upon communities. Factors such as social dislocations, family and group stress. organizational workings, inter-agency C0ordination, characteristics of disaster agents, sociopsychological elements in warnings and evacuation procedures were analyzed through detailed empirical research studies. Gradually traditional myths were diffused, and a more rationalized understanding of sociological and behavioral aspects of disaster related activities was arrived at. With such insights, the approach to managing hazards was steadily conceptualized and brought within formal parameters. Activities and phases were linked in logical conjunction with each other in order to raise the effectiveness of overall response. What was sought to be achieved was to place various intervening systems within a common perspective. And through such efforts, over a period of time, the discipline of disaster management emerged.12

As a field disaster management is extremely interdisciplinary in nature. It draws upon the experience and

disciplinary in nature. It draws upon the experience and knowledge of a wide array of disciplines such as geography, meteorology, seismology, hydrology, design and architecture, sociology, economics, psychology, public administration etc. With the application of all these fields, the beginnings of effective overall response mechanisms to disasters have been made possible. What had been informal and non-systematic has now begun to gain from analysis and cross comparisons of methods and strategies.

#### SCOPE AND PURPOSE

The attempted purpose of this study is to define the main elements and features of the activities that should lie within the scope of a working program for management of natural disasters. It is sought to explicate what such management involves, its interrelated character, the underlying theoretical principles, and how organized approaches can provide clear administrative advantages. This in effect forms the sum and substance of the material in the following pages. Where necessary, references to technical issues are included, though in the main, the study is non-technical in nature., Based on the essential findings of empirical research in the concerned social sciences, a framework is sought to be presented within which policy options for administrative action are

It must, however, be clarified at the outset, that the study assumes governments and concerned agencies to sensitive and conscious to the need for already be implementing a hazard management policy. The background and need for adopting a concerted effort to mitigate or cope with the effects of disasters has already been briefly outlined in a preceding section. It is considered that the trend in environmental degradation, increasing losses, and potential long term threats are significant and incentive enough to initiate serious efforts for stalling and countering the effects of negative externalities present in the world eco-systems. What is described here are the ways and means that are available to agencies for initiating an effective response strategy against natural hazards.

Starting with a description of the main social and theoretical principles of disaster agents, the study covers major aspects of the discipline, following through to the restoration' stage. In turn, by analyzing the details of the activity groups, various policy, methodological and administrative alternatives are explored. Theoretical principles form the source and strength of the framework. on the consideration that based This approach is administrative measures which disregard or are not founded be inherently weak and on theoretical models would

intrinsically misdirected.

Emergencies bring together a varied number of social groups such as families, government agencies, private groups and community organizations. The resulting interaction introduces a highly dynamic dimension to each situation. The social, psychological and administrative variables that emerge during such interaction helps determine in large measure the nature and quality of overall response. Therefore the insights provided by theoretical models on such aspects of sociological behavior, and tested by empirical research must be given cognizance and taken advantage of in order to strengthen administrative program design and action.

Further, through theoretical inputs, the critical non-formal variables involved in emergencies are taken into consideration. While each intervening organization directs its activities on the basis of mandate and resources. there are unquantifiable factors which lie in grey areas, outside the ambit of technology and procedural routine. Yet, to be effective, an agency must remain aware and sensitive to these elements. For instance. though a meteorological agency is technically oriented, while issuing warnings it must take cognizance of local cultural, psychological and social factors that emerge at the

psychological and social factors that emerge at the warnings. reception stage of the То merelv urge "evacuation" for instance will not achieve the desired results with all people. Sensitivity to local values and ways of thinking must be reflected in the content, style, and how information is relayed, in order for messages to be effective.

Finally, the study seeks to present various aspects of emergency management in a single common perspective. Such an exercise has considerable merits to commend it. Perhaps the most significant feature of the field is its interdisciplinary character. Inputs from various disciplines are required to ensure that the efforts made in this regard are meaningful. Yet tendencies to work in mutual isolation will often be discerned in organizational behavior. Agencies and departments are observed to constantly duplicate or be counter productive to the efforts of other departments due to lack of co-ordination, or bureau rivalry and attempts at dominance. It is typical to see sub-units in large and complex organizations exhibiting lack of awareness with regard to activities, priorities and resources of other divisions. As a result, there is a high degree of redundancy and waste of resources. The need thus for interdivision or inter-agency

co-ordination can scarcely be overemphasized. In the case of emergencies, this factor is highly critical to effective response. Organizations of various levels are brought into contact in a compressed state of time and space, where resources are scarce, experience is limited and the needs urgent. Activity performed during such circumstances, unless well co-ordinated, will frustrate efforts for minimizing the extent of loss and related adversity. And due to the interrelated nature of response mechanisms, weakness at one point will tend to undermine successive action. It is expected that by providing comprehensive details of major elements and inputs within disaster management, each agency or organization will be in a position to appreciate its own position with respect to that of the others. In brief, an overall perspective is presented to provide insights into various segments that together make up the format for managing natural calamities.

The study is general in approach. That is to say, no single type of natural disaster (such as droughts, floods or hurricanes) is the primary focus. Instead, principles that enable effective response to all types of natural calamities are described. The basic objective is to provide overall direction for the formulation of an

models and principles. In as much as concern is with policy and administrative action, providing of detailed measures becomes unpragmatic. Social, political and administrative variability frustrates any such attempt. Thus, general frames of reference are given so as to achieve larger applicability and relevance. Broad policy measures highlighted here can then be molded to local circumstances, where relevant policies and suitable projects can be drawn up and introduced.

#### OUTLINE

The order of the various chapters conforms to the sequence of activities as they would occur. Starting with a descriptive chapter on the theoretical aspects of disaster agents, the discussion develops along major elements of disaster management. Issues such as characteristics of natural phenomena, the spatial and temporal dimensions of disasters form the content matter of the following chapter.

Another important dimension to emergency management relates to the dynamics of organizational intervention. Government, private and social organizations of various types with multi-level operations involve themselves at different stages of disaster management. They bring together a host of disparate resources, which are either specialized or complementary to others. The details and various aspects related to their functioning within the context of disasters are outlined in the discussion of chapter three.

As a basic format, four major phases / groups of activities comprise the full range of measures involved in disaster management. These are mitigation, preparedness, and restoration. Of these, mitigation is response sequentially the first, and refers to general long-term measures which are particularly relevant with respect to environmental complexities discussed earlier. Preparedness on the other hand includes those set of activities that proceed up to the period that lies immediately prior to the point of impact. Essentially, these measures seek to enhance the level of preparedness and state of readiness of communities so as to effect efficient response by citizens and officials on the basis of planning.

Mitigation and preparedness are two primary strategy sets, and almost all prospective activity is inherently linked to them. Both are discussed at length in the fourth and fifth chapters respectively. A section on `risk analysis´ is also included along with the discussion on mitigation. This conjunction should however not be held to construe that risk analysis forms a sub-set of mitigation. Rather it is an independent activity, and is presented at the very outset in keeping with its purpose. Risk analysis information is fundamental, and indicates the estimated nature, gravity and scope of threat that each community is vulnerable to. Therefore, it must be recognized that any activity, unless based on the data provided by hazard analysis, would be misdirected and meaningless. Basic issues relating to such analysis are presented in the section.

As mentioned earlier, preparatory measures are carried out until just prior to the moment of impact. They need to be continual in nature, and a number of major segments comprise the gamut of preparatory activities. These are planning, warning and their communication, training and exercise. While planning and associated principles are outlined in chapter five, the other aspects listed above are separately detailed in the subsequent sixth and seventh chapters.

The remaining phases of "response" and "restoration" are the subjects of the eighth and ninth chapters. Working principles and formats for directing effective actions in regard to these issues are discussed at length. Quite certainly these are the two phases in which maximum concerted effort is called for, and it is

which maximum concerted effort is called for, and it is here that maximum experience is also available. Yet, in event after event, misdirected and at times unimaginative relief measures along with hastily devised restoration schemes frustrate all related efforts at assisting the affected population, and undermine economic efficiency in resource utilization. These two chapters seek to draw out the normal pitfalls that cause such problems. It will also be attempted to provide viable alternatives and approaches to enhance the effectiveness of overall relief and restoration efforts.

Certain principles and factors relate to disaster management in an intrinsic manner. That is, they have relevance to the respective individual segments of the subject, and at the same time bear influence on the discipline itself. While in the preceding chapters these are referred to in specific contexts only, in the tenth chapter they are discussed in a consolidated manner so as to draw attention to the larger frame of reference. This chapter consists of three sections which discusses first of all, the nature of overall constraints that exert influence in the determination of policy options. Secondly, the factors associated with the interdisciplinary nature of the subject are outlined. Finally, reference is made to the

enables the application of the framework described in this study to other types of disasters also. In the concluding chapter the essential elements of the discussion are brought together and arguments supporting the framework are linked up.

#### NOTES

1. Woody Guthrie, Dust Storm Disaster, song recorded 1942.

2.U.S. Council on Environmental Quality, and the U.S. Department of State, <u>The Global 2000 Report to the</u> <u>President, Entering the Twenty-First Century</u>, 3 vol. Great Britain, Penguin Books and Allen Lane, 1982, vol 1: 1. According to the same source, world population will have scarcely altered by the year 2000, and is expected to grow from 4 billion in 1975 to 6.35 billion in 2000, marking a more than fifty percent increase.

3.Ibid., pp. 40-41

4.Lloyd Timberlake, <u>Africa in Crisis, the Causes, the Cures</u> of <u>Environmental Bankruptcy</u>, ed. Jon Tinker, Philadelphia: New Society Publishers, published in co-operation with the International Institute for Environment and Development, London and Washington D.C., an Earthscan Paperback, 1986, p.21.

5.Ibid.,p. 9

6.Ibid.

7.U.S. Council on Environment Quality, The U.S. Department of State, <u>Global 2000 Report</u>, Letter of Transmittal, 1982 (no page number).

8. "Deforestation -- especially in South Asia, the Amazon basin, and central Africa -- will destabilize water flows, leading to siltation of streams, reservoirs behind hydroelectric dams, and irrigation works, to depletion of ground water, to intensified flooding, and to aggravated water shortages during dry periods". (Ibid., p. 36).

9." `Act of God' Often Caused by Act of Man ", <u>Atlanta</u> <u>Journal, The Atlanta Constitution</u>, 8 December, 1985, p. 12 A.

10.Ibid.

11.E.L.Quarentelli, ed. <u>Disasters, Theory and Research,</u> Sage Studies in International Sociology 13, sponsored by the International Sociological Association / ISA, London, Beverly Hills (California): Sage Publications, 1978, p. 2.

12." Sociologists, of course, have been prominent in the social-scientific effort and have been among the earliest involved. Thus, the first systematic social and behavioral study of a disaster was Prince's famous sociological study of the Halifax Explosion of 1920; and Sorokin in his book, **Man and Society in Calamity**, set forth the first theoretical sociological statement about certain aspects of calamities. . . . Sociology has been very well represented in the more recent interdisciplinary attacks upon disaster problems, particularly those of a practical nature." Ibid.

# CHAPTER TWO

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CONCEPTS OF NATURAL DISASTERS

## CONCEPTS OF NATURAL DISASTERS

a field, the management of natural disasters As emerged from the empirical studies of social scientists. A rationalized and structured form was given to the field on the basis of derived theoretical concepts and frameworks. Appreciation of relevant concepts at the outset itself is therefore considered essential to understanding the chief elements that comprise management of natural calamities. For it is such theoretical factors that define the scope and parameters of the discipline itself. Further, since the is to replace ad-hocism with purpose a rationalized approach to managing natural disasters, various activities involved must be linked together on the substantive format of theoretical principles in order to be meaningful. In keeping with this line of argument, it is proposed to outline the key theoretical elements associated with natural disasters in this chapter. This will enable a clearer grasp of subsequent discussions and analysis.

Essentially there are four primary theoretical aspects of natural calamities. While there are further sub-

elements and nuances to these factors, it is these that define the basic framework for discussion. These are; 1) the definition of natural disasters, 2) the characteristics of natural agents, 3) spatial and temporal aspects of disasters, and 4) the phases of disaster management. These four are the main elements upon which the edifice of disaster management stands. They emerged mainly from sociological studies, and provide clear direction for understanding and initiating appropriate measures to reduce the adversity of disasters.

#### DEFINITION OF NATURAL DISASTERS

The English Dictionary defines the word "disaster" as ;

Anything that befalls of ruinous or distressing nature, a sudden or great misfortune, mishap, or misadventure; a calamity.<sup>1</sup>

For the purpose at hand, such a definition is too general since its application can be wide and varied. It includes personal, community and national losses. The term may also be used to describe any situation that an individual, group or society may perceive as being unfavorable, negative in character or distasteful. For the present purpose, it will therefore be relevant to direct a sharper focus on the term, rather than to lose direction on account of distraction of generality.

First of all, reference is to "natural disasters". the adversity, or "calamity" created by the That is, circumstance of a natural phenomena or agent. Typical agents are hurricanes, droughts, earthquakes, volcanoes, floods, tornadoes etc.<sup>1</sup> For one, tsumanis. it must be clarified that floods, hurricanes, droughts etc. by themselves do not constitute a disaster. Rather they are the "agents" that carry the potential to usher adversity. Adversity here is referred to any form of death, injury, destruction. damage, deprivation, destitution and disruption that may have resulted as a consequence of the changed environment that the agent introduces.

It is important to recognize that the term disaster is pertinent only when it has social consequences. Thus an earthquake that occurs in the wilderness, or an avalanche in uninhabited mountain regions, remains at best a matter of scientific enquiry and concern. It can be termed as a disaster only when it affects humans or their social and

<sup>&</sup>lt;sup>1</sup> Droughts, floods, tropical cyclones and earthquakes are the four main causes of natural disasters. They are in fact responsible for causing more than ninety percent of loss of life and damage to property. It is also of interest to note that the World Meteorological Organization considers that natural phenomena of meteorological origin account for more than fifty percent of loss of life and property damage as caused by all natural disasters. See U.N., United Nations Environment Program, <u>Preview of the Priority</u> Subject Area, Natural Disasters, Report of the <u>Executive Director</u>, 1977, UNEP. Report No.3
#### physical structures.

The essence of a disaster event, therefore, lies in its social, not physical consequences. As will be noted, similar types of events, producing similar levels of physical disruption, can produce a disaster or crisis condition in one social context, and have no such effect in a different social setting.<sup>2</sup>

This can be appreciated by the experience of the proverbial flooding of the Nile. The overflowing waters provided benefits of fertility and growth. The area in fact became the cradle for one of the earliest human civilizations. Certainly such annual flooding cannot be construed as disastrous. Yet were the same overflowing waters of the Nile to take a toll of life , destroy crops, or damage property, then the situation would be appropriately termed as a disaster. In defining the scope of disasters, the important element is not the agent itself, rather it is the human consequence that is pertinent. And such consequences are imposed not only by natural factors such as floods and droughts, but also by industrial, chemical or nuclear accidents, gas or other hazardous material leaks, war or even riots.

The term "natural" on the other hand is prefixed to distinguish and identify disaster carrying agents that emanate from within natural phenomena. Similarly, other prefixes such as "chemical", "nuclear" etc., are employed

to identify the causal agent. Quite certainly a disaster is caused in all cases only when there is interaction or an interface between the agent and humans (including social structures). In one sense therefore they may all be seen as "man-made" events.<sup>3</sup> However, for purpose of definition such "man made" perspective is neither helpful nor а appropriate. For while the human ("man") factor remains constant (being a pre-requisite for a disaster to occur), it is recognition of the triggering agent that is more vital. It is important to capture the external causal element because, through identification of the agent, and by an understanding of its characteristics, appropriate protective measures can be initiated. While a number of principles are common to all types of disasters, effective response is possible only by focusing and examining the details of each. Obviously a chemical disaster requires measures that are different to those needed for natural disasters. For instance, the types of mitigation and protective measures, the period of forewarning and the kinds of medicines required will often differ. Therefore the term "natural" disasters used for identifying the of "change" is essential and highly external source relevant to the management of disasters.

For administrative purposes, an appropriate

analysis of natural disasters is provided by a sociological

perspective. It defines disasters as :

an event, concentrated in time and space, in which a society, or a relatively self-sufficient subdivision of a society, undergoes severe danger and incurs such losses to its members and physical appurtenances that the social structure is disrupted and the fulfillment of all or some of the essential functions of the society is prevented.<sup>4</sup>

Such a definition emphasizes the social context of disasters. It highlights the issue that the significance and level of a disaster is derived from its impact on social structures. And;

This a particularly useful way of thinking about disasters, since disaster agents create tasks with which a community has to cope. It creates these tasks at a time when the problem-solving ability of the community may be damaged. To put it in its more unqualified form, a disaster agent makes demands on a community when the capacity of the community to respond to these demands may be also damaged by the effects of impact.<sup>5</sup>

Thus, in the sociological context, the severity and magnitude of a disaster is determined by the resources and coping mechanisms that a community has, and can bring to bear upon the situation. And in as much as resources are disparately apportioned and distributed among communities, their respective capabilities to withstand hazards or conversely, their level of vulnerability is affected.

Therefore, it is possible that given two different communities, one with extensive crisis management mechanisms and the other with few such resources, disaster agents with similar characteristics may produce a crisis in the latter system, but only an emergency in the former.<sup>6</sup>

As may be discerned, there are several important perspectives to defining the scope of the term "natural disasters". The critical elements are that: a) natural agents are involved, b) that the impact should cause human adversity, and c) the magnitude is determined by the response capabilities of the respective communities. Between these three elements, the essential parameters of natural disasters are defined. The proceeding discussions are based upon these considerations.<sup>7</sup>

#### CHARACTERISTICS OF DISASTER AGENTS

While a comprehensive list of agents causing natural disasters can always be made available, enumeration and analysis of their characteristics has greater relevance to a systematic and conceptual study of disasters. Such an approach enables highlighting those aspects and dimensions of a disaster that require administrative attention. And this because "some characteristics of disaster agents not only influence the types of community tasks that are created but relate to the ability of the community to handle them."<sup>8</sup> While there are several listings of agent characteristics, the most comprehensive tabulation of such traits has been provided by Dynes. These are briefly summarized below.<sup>9</sup>

## Frequency

Due to geographical factors such as location, certain areas. towns or regions tend to be afflicted by certain disaster agents repeatedly. Thus, cities located over geological faults are prone to earthquakes, developments on low lying flood plains are subject to floods, and communities along coastal areas may be vulnerable to hurricanes and tidal waves. The essential point is that due to locational factors, certain types of disaster agents are likely to "frequent" themselves in those specific areas. Identification of such frequency patterns provides disaster managers at all levels with relevant information and equips them to face eventualities as and when they arise. Based on such frequency patterns, preparatory measures can be formulated and adopted.

## Predictability

Each disaster agent is distinguished by the scope it provides for advance prediction. As was mentioned earlier, over the years, greater technological and

scientific expertise has been applied to the study and understanding of disaster causing agents. A large part of this endeavour has been directed at attempts to predict, with as much accuracy as possible, the onset of any agent. Yet, despite current levels of achievement, neither has it been possible to predict all types of agents, nor has it been possible to achieve complete accuracy in all cases where some prediction is possible. Thus , while earthquakes cannot be predicted (though several efforts are underway), floods and hurricanes can be. However even here, it is possible to predict and forecast floods with greater accuracy than the specifics of hurricane landfalls. These distinctions are essential, because such information enables intervening agencies to be better equipped to undertake precautionary and emergency measures.<sup>10</sup>

## Controllability

Though on a limited scale, certain natural agents can be controlled so as to avoid a disaster. Flooding for instance can be prevented or at least the negative impacts lessened by the construction of embankments, dams and similar structures, and drought conditions can be contained by the introduction of "drought resistant" seed varieties. Thus again, on the strength of technology, certain agents can be controlled considerably so as to avoid the full

impact of a disaster. However, for all practical purpose, the element of controllability is extremely limited in scope and application. Nevertheless advances in this direction could no doubt bring favorable implications for mitigating the effects of natural calamities.

# Cause

Disaster agents vary with respect to their causes which provides indications for prospective action. The essential features of the disaster type are rooted in their causal elements, which in turn generate the nature of protective and preventive tasks. Disasters are caused by various phenomena such as movements of the earth, heavy rain, fierce winds, fire etc. What is important is that,

The causal agent has objective meaning for the tasks to be performed by a community. A flood means the need for boats while a tornado does not. An earthquake might necessitate using helicopters and small planes because of the more extensive damage to surface transportation.<sup>11</sup>

#### Mode of Onset

One of the most critical elements that characterize disaster agents is the "speed of onset". Each agent is distinguished by this trait, and helps determine the nature of preparatory measures, as well as the scope and quality of post-impact response. Due to the large variation in

speed of onset between various agents, this characteristic has been further sub-divided into three categories. These are 1) Rapid onset : There are several agents that strike rather rapidly, providing little time between pre and postdisaster phases. Tidal waves, flash floods and tornadoes are examples of this type. 2) Gradual onset: Several agents are slow in terms of onset. Agents such as droughts and floods manifest themselves on a gradual basis. However, with the passage of time, their degree of intensity and gravity also tend to increase. And as the event prolongs itself, the surface area covered, as well as the level of damage increase proportionately. Thus the requirements for relief and restoration are determined to a large extent due this characteristic itself. to 3) Repetitive onset : Finally there are disaster agents that make repeated strikes in one phase. Volcanic eruptions and earthquakes (at times hurricanes also) are typical examples.

They occur repetitively over a period of time, not so far apart that one would refer to them as separate disasters, but neither so close to one another that they would be confused with a single impact of an agent. One would refer to this mode of onset as repetitive.<sup>12</sup>

Administrative tasks are thus identified to an extent on the basis of "mode of onset". While rapidly arriving disasters provide limited scope for protective action, gradually onsetting agents on the other hand extend

reasonable opportunity for safety measures even during the period of impact. However in the latter case, the area under stress and the duration of impact may be significantly different to the former -- requiring thus a different set of resource commitments.

# Length of Possible Forewarning

classification is similar to the Though this characteristic of "mode of onset", there is an element that distinguishes the two. For " it is possible to have either a long period of warning or no forewarning associated with each of the three modes of onset."13 This characteristic has also been further divided into three sub-types. These 1) long period of forewarning, 2) brief forewarning are (less than a minute) and 3) little or no forewarning. This trait is relevant, since based on the interplay of these factors. the level and degree of the community's preparedness pattern is determined.

# Duration

Each type of disaster is marked by the element of time and duration in terms of impact. While some agents are swift, others are prolonged in their stay. Quite certainly, such a characteristic determines to a great extent the nature of response activities. For example, while flash floods strike on a limited time period, droughts mark their presence over a longer time frame. As a result, the severity of the situation and extent of adversity are enhanced. This in turn demands a heavier commitment of men and material in order to effect meaningful response. Therefore, this feature of disaster agents has to be taken cognizance of during the preparatory planning stage itself, so that necessary resources are identified in advance for possible commitment.

# Scope of Impact

Disaster agents differ on the basis of "scope" of impact. The term "scope" here is used with implications on the spatial pattern of impact. While some agents are geographically focused, others are more diffused in their impact. A tornado, or avalanche normally affects a limited area for instance. Droughts on the other hand tend to affect whole regions. And as is borne out by the current African experience, disasters can cross all national boundaries and assume sub-continental dimensions. Therefore the factor of scope of impact has a direct bearing on the nature of activities to be performed by intervening agencies. A widely spread disaster will call for larger commitment of resources such as transport and communication. Agencies of various levels and jurisdictions

will be involved, thus highlighting the need for region based co-ordination. Conversely, local resources would normally suffice for disasters with limited spatial impact, such as flash floods and fires.

#### Destructive Potential

Each disaster bearing agent is characterized by its potential to cause damage. Further, this distinction is also marked by the "nature" of damage it can cause. A drought for instance withers crops and affects water and fodder supplies. This causes loss to life and property, which is quite different in nature from that caused by a hurricane or an earthquake. Deaths for instance during droughts are results of malnutrition and disease. However electrification, water borne disease, suffocation, fatal injuries due to building damages, and drowning are the chief causes of death during hurricanes and earthquakes. Further, except for crops, land and cattle, droughts do not damage other property, while hurricanes, earthquakes and floods tend to destroy all types of property. What is relevant is that;

The greater the destruction, either of persons or property, the more organizationally relevant problems will be. The degree of damage is inversely proportional to the speed with which restoration of community equilibrium may be accomplished.<sup>14</sup>

Described above were the nine characteristics of disaster agents. Appreciation of these features provides valuable direction for the nature of administrative tasks that require to be performed. For each trait highlights certain fundamental elements. which determine the orientation of preparatory measures as well as response mechanisms.<sup>15</sup> While these issues emphasized the points of difference between various disaster agents, two other factors highlight similarities within disasters that bear administrative implications. These are the factors of space and time.

# SPACE

In theoretical terms, all disasters bear similarity in as much as their impact has "spatial" implications. While a disaster will seldom occur "only" on the same specific area, what is pertinent is that, depending on the locus of occurrence, " areas around the impact areas have similar functions".<sup>16</sup> This is to suggest that based on the factors of "point" of impact, and geographical scope of the occurrence, common elements in the social functioning manifest themselves. Graphically these functions may be portrayed

as a series of concentric circles. [and] Such a spatial pattern provides certain clues to the behavior of populations with different kinds and

degrees of involvement in the impact.<sup>16</sup>

Figure 2.1

Spatial Representation of a Disaster Event<sup>2</sup>



<sup>&</sup>lt;sup>2</sup>Anthony F. C. Wallace, <u>Tornado in Worcester : An</u> <u>Explanatory Study of Individual and Community Behavior in</u> <u>an Extreme Situation</u>, Washington: National Academy of Sciences, National Research Council, 1956, as adopted in Russell R. Dynes, <u>Organized Behavior in Disaster</u>, The <sup>4</sup>Disaster Research Center Series, eds. E. L. Quarentelli and Russell R. Dynes, Ohio : Disaster Research Center, 1974, p. 59.\_

The area (with reference to Fig. 2.1) where primary destruction, damage and loss occur, is described as the <u>Total Impact Area.</u> This is immediately followed by the <u>Fringe Impact Area</u>, where marginal damage may have been sustained. These two form the inner and outer core parameters of "immediate adversity", and are respectively the "primary" and "secondary" concerns of intervening organizations. Further, it is from within these areas that people who escaped personal disability initiate the process of "search and rescue".

The zone adjacent to the fringe area is labelled as the Filter Area. This zone becomes the conduit through which outside agencies intervene with supplies and aid material. Conversely, information emanating from the impact zone will also pass through this channel. Therefore operational facilities need be located within this area. The peripheral zones in turn are referred to as Organized Community Aid and Organized Regional Aid. The distinction between the two is primarily with reference to the geographical extent and scope of impact. "Community" here "region" refers to local areas. while connotes a jurisdiction that covers several communities and upwards. The functional features of these two zones are in terms of "organized aid". Formally structured agencies, which

eventually intervene operate from these jurisdictions. Police, health and welfare agencies, relief organizations, public utilities and similar formal organizations perform their functions from this zone. And it is here that coordinating functions are also performed.

Familiarity with these factors is relevant in that it highlights the behavioral pattern in the post-impact phase. In fact such knowledge provides insights from a sociological perspective that has bearing on the emergent response mechanisms that operate with reference to the impact area. Agencies involved with planning, preparedness and co-ordination would benefit considerably by taking cognizance of the issues involved.

# TIME

element The second that provides a common for all disaster agents is the factor of perspective "time". The temporal perspective essentially refers to the sequential stages of activity that are evoked on account of a particular disaster event. The first activity that occurs, and is relevant to this analysis is the process of warning. At the first sign of an approaching / developing threat, warning systems become operational. Sequentially, other sub-systems are also activated, corresponding to the

developments of the hazard. The remaining stages of activities are referred to as: threat, impact, inventory, rescue, remedy and recovery. Given below is a cursory description of each such stage in a tabulated form.<sup>18</sup>

STAGE

**FUNCTION** 

0, Predisaster Condition Determining to

Determining to some degree, the effect of and response to impact.

1, Warning Precautionary activity.

2, Threat Survival action.

3, Impact

4, Inventory

5, Rescue

"Holding on".

Diagnosis of situation and decision on action.

Spontaneous, local, unorganized extrication and first-aid, some preventive measures. 6, Remedy

Organized and professional relief, medical care, preventive and security measures.

7, Recovery

Individual rehabilitation and readjustment, community restoration of property and organizational preventive measures against recurrence

# PHASES OF DISASTER MANAGEMENT

There are four primary phases involved in the overall management of natural calamities. These are: mitigation, preparedness, response and recovery. These phases are conceptually distinct from the temporal aspects described immediately above. The former relates to a single event starting from the "detection" stage of the hazard. The phases described below however relate to the larger format of activity groups that define the scope and nature of the total disaster management exercise. By nature the latter describes and relates to a continual process. Between them, all activities related to the field are covered. Such a grouping of activities however should not be construed to suggest that they are mutually insulated from each other in separate tight compartments. Rather, they should be viewed as complementing and supportive of each other. Such groupings help provide a format for purpose of clarity and perspective, since each group consists of activities whose objectives and focus of effort are similar. Each involves a separate set of policy alternatives and priorities for resource allocation. Therefore, it is important to discern the distinctions that characterize the components of each phase of activity.

#### Mitigation

This is the initial stage, and refers essentially to those activities that seek to either actually eliminate, or substantially reduce the severity of a hazard. Primarily, such activities are characterized by the long term nature of their effects and implications. The concern here is essentially with the "controllability" aspect of disaster agents; though the characteristics of "scope of impact" and "destructive potential" are also relevant. Examples of activities conducted during this phase are; construction of flood embankments, soil conservation schemes, drudging of rivers, construction of dams and canals, afforestation, land-use regulations and development of drought resistent seed varieties. Financial measures

such as insurance schemes and tax policies are also associated with this phase. In view of the nature of measures involved, heavy technological and financial inputs are required. And due to the general competition and demand for resources, funding of mitigation projects becomes a major source of constraint. Similarly, weakness in political commitments for implementing and enforcing landuse laws limit the scope of such efforts.

# Preparedness

are those that seek to Preparedness measures prepare communities for facing the eventuality of The "preparatory" phase constitutes activities disasters. which are conducted up to the moment of impact. Their relevance stems from the fact that disasters usher an element of extreme uncertainty in the environment. While on the one hand it is difficult to predict where and when they will occur, the factor of uncertainty is equally pronounced after the event has occurred. Disasters cause social dislocations, well as as breakdowns in communication channels. Consequently, the regular flow of information is disrupted. Thus while the situation demands efficiency and urgency of action, lack of information and details about the "impact area" inhibits appropriate response. Since there is a high degree of uncertainty about localized

needs, relief measures are often misdirected. Therefore, in increase effectiveness of response, it is order to important to initiate planning exercises. By anticipating and taking into account the needs and demands that normally emerge during crisis periods, and also by identifying in advance the problems that surface during emergencies, a more concerted and effective response is made possible. In essence, planned as opposed to ad-hoc measures help increase the community's state of readiness and prepares it to meet emergencies in a better manner. Factors of resource allocation, interorganizational co-ordination, and agency role identification to avoid redundancy are all taken into account in planning mechanisms. Thus during the actual emergency, the uncertainty of role performance, and misutilization of scarce resources is considerably reduced.

Apart from planning efforts, other preparatory measures are; training, conducting of drills and simulation exercises, and increasing public awareness regarding relevant disaster related issues. Such measures seek to develop crisis management skills within large social units such as inter-agency personnel groups, and voluntary organizations. Contingencies such as evacuation are also prepared for during this phase. Finally, investments in the creation of infrastructure are made in relation to this phase. Examples include installation of meteorological monitoring aids like satellites and radars, establishment of communication and warning channels, construction (or identification) of shelter sites and stockpiling of food, medical and other essential commodities. The rationale of preparedness and planning efforts is based on assuming a high probability for the occurrence of disasters, and in view of this, social units are sought to be prepared for effecting an efficient response pattern during emergencies.

#### Response

The largest number of agencies, organizations and people engage themselves directly in this phase of disaster management. It relates to the period that follows immediately after impact. This period, which is the most critical, is characterized by high stress, and tests the mettle, ability and strength of each intervening group and organization. Typical activities that occur in this phase search and rescue, first-aid, removal of debris, are: provision of food and essential supplies and similar other vital assistance to victims. What is pertinent is that, while this phase involves the largest number and levels of intervening actors, many of them, such as local survivors and volunteers posses little experience, and normally have no previous training. Therefore, to organize, control,

direct and channelize their activities in a coherent manner itself becomes one of the major problems of the situation.

## Recovery

This phase is essentially the latter and longer end of the continuum of disaster management. It starts from the emergency response period, and extends well beyond. Some recovery activities, such as relocation of people in fact have mitigatory effects, thereby forming a cyclical chain "first" disaster related activity-phase of with the mitigation. The main concern here is to return the stricken to pre-disaster patterns of socio-economic community activity. This phase is further divided into two time related sub-groups. These are short-term and long-term recovery measures. The former includes activities which help restore vital systems and installations to operating levels. The latter concerns itself with general long-term rehabilitation, and may extend itself to few months, though at times it may also involve commitment for years-depending on the scope and level of impact, and the availability of resources and infrastructure.

## CONCLUSION

Described in this chapter are four primary concepts associated with management of natural disasters. They are in fact the cardinal principles that define the reference points, and form the parameters of the discipline. These concepts draw attention to the interplay of underlying principles in natural phenomena, and enhance understanding of the dynamics involved within the field. What is of particular significance is that they provide a sociological perspective to the study of natural disasters. What is emphasized is that it is not so much the physical properties and features of natural phenomena that are important. Rather, what is of greater concern and relevance is the social and human context of natural hazards.

Further, such a conceptual approach to natural calamities provides an overall perspective to the field. By defining for instance, the various activities in terms of temporal phases, an insight is afforded into the linkages and conjunctions between activities, that is of immense administrative value. There is in effect, a rationalization of the whole social effort to reduce the intensity and severity of natural disasters.

Understanding, and appreciation of such underlying

issues enables identification of the principles which are considered critical for evaluating relevant policies. And it is these principles that form the substantive basis for concrete administrative measures. The definition of natural disasters, the characteristics of disaster agents, the temporal and spatial elements of disasters, and the various phases of disaster management are founding aspects upon which the prospective structure of managing natural calamities rests. Therefore, these factors are kept as touchstones while extrapolating the framework for managing natural disasters.

# NOTES

1.<u>A New English Dictionary, On Historical Principles</u>, Oxford : Clarendon Press, 1897.

2.Dennis E. Wenger, " Community Response to Disasters: Functional and Structural Alterations ", in <u>Disasters</u>, <u>Theory and Research</u>, ed. E. L. Quarentelli, Sage Studies in International Sociology 13, sponsored by the International Sociological Association / ISA., London, Beverly Hills (California) : SAGE Publications, 1978 p.26

3.An element of fatalism is often associated with natural disasters. This is particularly so in the poor, less developed countries, where the degree of adversity is relatively higher. Storms, earthquakes and similar natural extremities are often perceived signals as of His displeasure, and the resulting suffering is accepted with stoical fortitude. Such fatalism however obfuscates clarity of perspective, and retards initiative for coping rationally with hazards. The helplessness associated with a fatalistic outlook inhibits people from adopting protective measures. Further, such an attitude evades the real underlying causes of natural disasters; the abuse and depredation of the environment on account of human activity. Therefore, those who emphasize and point out that natural disasters are not heaven inspired accidents, or "acts of god", but are in effect the consequence of our own actions, accurately address the issues by negating fatalism and accepting instead Mans' responsibility in this regard. See, for example, the series of reports entitled; "Natural Disasters : The Human Connection", The Atlanta Journal, and The Atlanta Constitution, December 8 to 15, 1985. Also see, Anders Wijkman and Lloyd Timberlake, Natural Disasters :

<u>Acts of God or Acts of Man</u> ? London : International Institute for Environment and Development, 1984.

However, in the context of conceptualizing and defining the scope and nature of natural disasters, to view them solely from the perspective of being "man-made" (along with the various other forms of hazards) is inappropriate and does not serve the purpose at hand. It is important to capture the external causal element since it has considerable implications for subsequent action. Further, the behavioral patterns that emerge during disasters differ on the basis of type of hazard involved:

"Disaster literature indicates that in natural disasters a heightened concern is expressed for other persons who are similarly affected. On the other hand, in man made disasters, while concern exists, a considerable resentment is directed the presumed human source; energy is toward often directed towards placing blame for the event" Russell R. Dynes, Organized Behavior in The Disaster Research Center Series, Disasters, eds. E. L. Quarentelli and Russell R. Dynes. Disaster Research Center, Ohio State n.p.: University, 1974, p.52.

4.Charles E. Fritz, <u>Disasters in Contemporary Social</u> <u>Problems</u>, eds. Robert K. Merton and Robert A. Nisbet, New York : Harcourt, Brace & World, 1961, p. 655

5.Russell R. Dynes, E. L. Quarentelli and Gary A. Kreps, <u>A</u> <u>Perspective on Disaster Planning</u>, 3d. ed., n.p.: Disaster Research Center, Ohio State University, May 1981, p.6.

6.Dennis E. Wenger, <u>Community Response to Disasters</u>, 1978, p. 28

7.For a more detailed examination of issues related to definitions of disasters see, Neil R. Britton, "Developing an Understanding of Disaster," <u>Australian Newzealand</u> Journal of Sociology 22 (July 1986): 254-271.

8. Russell R. Dynes, <u>Organized Behavior in Disasters</u>, 1974, pp. 51-52.

9. Ibid., pp. 51-55. Also see Allen H. Barton, <u>Communities</u> <u>in Disaster : A Sociological Analysis of Collective Stress</u> <u>Situations, Garden City : Doubleday and Co.,1969 pp. 40-45.</u> And also Ellwyn R. Stoddard, <u>Conceptual Models of Human</u> <u>Behavior in Disaster, El Paso : Texas Weston Press, 1968,</u> pp. 25-42

10.While `predictability' has been listed as an `agent' characteristic, it should be clarified that the potential for prediction lies not so much in the agent itself, as in of technological the level development. Thus, while hurricanes could not be predicted earlier, due to scientific advances, there has been much progress in this regard. Similarly, though the occurrence of an earthquake cannot be reliably predicted as yet, it is conceivable that current experiments in that direction may ultimately lead to positive results. Thus, this in sense, the characteristic is not inherent to the agent itself. That is, it cannot be stated that an agent cannot be predicted. It is appropriate instead to qualify the statement and suggest that due to limitations of available technology, certain agents cannot be predicted as yet. However, in the end the implications are the same; where agents can be forewarned against, better preparatory measures can be adopted, and the level of response enhanced.

11.Russell R. Dynes, <u>Organized Behavior in Disasters</u>, 1974, p.52

12.Ibid.

13.Ibid., p.53

14.Ibid., p.55

15. It has been appropriately discerned that a number of these characteristics are actually <u>social factors</u>, rather than physical elements inherent to disaster agents. For.

"Clear examination reveals that other components are inherently social factors, ie. they are dimensions that actually refer to society's ability to foresee and respond to the event, such as predictability, controllability, length of forewarning and destructive potential. With increased knowledge, improved technology, and more effective preparations these dimensions can be altered by human action. . . . [and this helps], to emphasize that the importance of disaster agents lies not only in their physical effects, but also in their social consequences in a specified social context." Dennis E. Wenger, "Community Response to Disasters," 1978, p. 25

16.Russell R. Dynes, <u>Organized Behavior in Disaster</u>, 1974, p.55.

17.Ibid.,p. 58.

18.Source: John Walker Powell, <u>An Introduction to the</u> <u>Natural History of Disaster</u>, University of Maryland: Disaster Research Project, June 30, 1954, pp. 5-13, as quoted in Russell R. Dynes, <u>Organized Behavior in Disaster</u>, 1974, p. 56

# CHAPTER THREE

# ORGANIZATIONS IN DISASTERS

# ORGANIZATIONS IN DISASTERS

A host of organizations involve themselves with the numerous tasks related to managing natural calamities. It must be noted that,

a disaster tends to affect all aspects of a community in a cross-sectional fashion-governmental, legal, religious, industrial and commercial, health, communication, welfare, educational, and other organizational aspects.<sup>1</sup>

In view of this, organizations from several sectors operate with reference to disasters, and function at multiple levels, under varying degrees of autonomy, acting on particular mandates, towards particular objectives, and with distinctive or complementary resources. And between the multitude of organizations, agencies and groups, the overall societal response capabilities are determined. Therefore, limitations and weaknesses that surface in the working relationships between organizations are also reflected in the response pattern. Thus, the functional abilities and structures of organizations is of extreme importance.

Organizations typically function at various

jurisdictional levels, ranging from the international to the local. However, at each level, only certain types of activities are performed. Understanding the matrix (page 73 below) formed between the two variables; of activity and level of jurisdiction, is important since it sets and defines the pattern of activity that is likely to take place. Apart from these two elements, there are a number of accompanying factors that together determine the nature and dynamics of organizational intervention with respect to disasters.

The nature of these organizations, the mandates on which they operate, the motivational factors, the levels at which they function, the interdependencies that organizations must accept, and the activities they perform are issues that need to be focused upon in order to facilitate proper understanding of the functioning of disaster related organizations. It is the purpose and attempt of this chapter to draw attention to such issues and aspects of organizations in disasters.

# LEVELS OF ORGANIZATIONS

Organizations engage themselves with disaster related activities due to a variety of motivational variables. Factors which shape agency activity are;

organizational goals, charters, legal responsibilities, factors which determine altruism and politics. Other organizational involvement are societal expectations and resource ownership. There are organizations whose basic responsibilities and mandates are such that it is expected of them to be engaged in one or more disaster related tasks. Local civil administration authorities, police and fire departments are examples of this. Other organizations like public works are involved because of the particular resources they possess. Also depending on the nature of the organization, it may operate at multiple levels of administrative jurisdictions, ranging from the international to the local. Within countries the level of operation is largely determined by existent legal and administrative systems. Thus,

Analysis of disaster literature shows the consistent involvement of certain kinds of organizations in disaster-related activities. There are differences, however, among societies in this regard. In many societies, responsibility for disaster activity ultimately rests at the While considerable autonomy national level. sometimes may be allowed local representatives of particular governmental agencies. the ultimate responsibility of action in such societies is at the national level.<sup>2</sup>

Characteristically, different organizations and their respective echelons bring forth a pool of distinctive and complementary resources. National level agencies for

example are better equipped to provide fiscal backing, technical and scientific inputs and policy guidance. State agencies on the other hand may appropriately apply their resources towards intermediary level co-ordination, disbursement of resources, implementing mitigation projects, and state level preparedness planning. Local government agencies on the other hand are directly involved in the planning, response and recovery activities. Drawing on all relevant local resources, they equip themselves to cope with emergencies. International bodies, charitable institutions, and private relief organizations may be involved with most aspects of disaster management, depending on organizational objectives and resources.

An analysis of the two variables, of organizations and nature of activities (in terms of level) is relevant, since it provides the basic pattern of response that is likely to occur. A descriptive matrix of these two elements is provided below.

## INTERNATIONAL LEVEL

There are primarily three types of agencies that operate at the international level. These are; 1) those that are part of the United Nations system. 2) government organizations for international assistance. And 3) private

international organizations. Together they provide the administrative channels for directing international effort towards the management of natural calamities.

Within the United Nations structure, the Office of the United Nations Disaster Relief Co-ordinator (U.N.D.R.O., at Geneva) has been specifically established to aid national governments in meeting the challenge posed by disasters. UNDRO not only assists in organizing and directing international relief efforts, but also promotes the study, prevention, control and prediction of natural disasters, including the collection and dissemination of information on technological developments. UNDRO in fact seeks to provide a strategy to "harness the collective human and material resources of the world towards removing the scourge which natural disasters represent for many disaster-prone developing countries."<sup>3</sup> Other organizations like the United Nations Development Program (U.N.D.P.), the World Meteorological Organization (W.M.O.), the Food and Agriculture Organization (F.A.O.) and the World Health Organization (W.H.O.) include in their program goals, the provision of assisting nations with disaster related activities in keeping with their respective areas of concern.

Apart from such U.N. based organizations,

individual national agencies (located in "developed" countries) have been set up to assist developing nations in developmental efforts, and include programs for disaster related activity, particularly those that have mitigation effects. Common examples are provision of assistance for soil conservation, irrigation, and forestry projects. Organizations such as the United States Agency for International Development (U.S.A.I.D.), the Canadian International Development Agency (C.I.D.A.) and similar Sweden, Denmark and other countries agencies in are examples of such organizations. Further there are organizations that have been set up in countries to specifically address certain aspects of disaster management assistance. The Swedish Special Unit for Disaster Relief (in service of the United Nations) and the United States Office for Foreign Disaster Assistance are noteworthy examples in this regard.

Finally, there are non-governmental, trans-national organizations which concern themselves with various aspects of disaster management. Example of such agencies are Oxfam, CARE, and religious organizations like Church World Service. Such organizations are normally involved in private development efforts in "Third World" countries and help supplement national efforts in the response and recovery phases of disaster management.

Miscellaneous organizations such as the United Nations High Commissioner for Refugees, Save the Children and UNICEF also become involved with response activities in certain disasters of a large magnitude (as in the current African case). Finally, it should be noted that in certain cases, due to mutual understanding and diplomatic functions, bilateral aid is provided on a one time basis during major events. Such assistance, normally consisting of foodgrain, is sent directly to the recipient country, and not as a contribution through another international relief effort or organization.

#### NATIONAL LEVEL

At the national level, both government and private organizations operate. Within government, normally one particular division (or agency) is specified to co-ordinate disaster related activities. There are also instances when such a co-ordinating / lead role is assumed by a section in the office of head of state / government itself (which highlights the significance attached to the subject). While nomenclature and governmental structures differ from country to country, the principal national agencies that are associated with natural calamities are those concerned
with the sectors of finance, planning, agriculture, meteorology, health, irrigation, water supply, defence, rural development, civil supplies (ie. essential commodities such as foodgrains, fuel etc.), transport and social welfare.

National level agencies are best equipped to provide on a country wide basis, financial assistance, and technical expertise to state governments with respect to natural disasters. However in cases of severe disasters, national agencies do get involved directly. In terms of phases, national organizations are primarily involved with mitigation activities; an area they are most suited to, since the scale of technical and financial commitments required for implementing mitigation measures are primarily available only with national departments. Further, measures which have inter-state dimensions are also appropriately co-ordinated by national agencies since they are in a position to provide a national perspective over parochial pressures. Finally, national governments can formulate model documents that could guide state and local governments in matters such as land use control and other non-structural mitigation measures.

With regard to preparedness measures, national agencies are concerned directly for providing technical

Establishing weather inter-state basis. inputs on an for advising state "watch groups" monitoring and governments, setting up of equipment and facilities such as radars and communication links for detecting and warning against developing / approaching `agents' such as floods or nationally generated examples of hurricanes are preparedness efforts. Apart from that, national governments can provide guidelines for planning and conduct training to help state and local government officials programs confronting better for natural prepare themselves disasters. Similarly, national governments can bring forth their resources in increasing community awareness regarding natural disasters. This can be achieved by initiating carry simple but regionally relevant campaigns that educating messages that increase the common understanding and comprehension of disaster related issues.

proximity The factor of physical in large role of national government regarding determines the response and recovery activities. Unless the magnitude of event is extremely severe, national agencies do not an themselves directly with these two normally involve activities. A notable exception is the military, which is used for rescue and relief operations frequently. However, national governments do provide substantial financial aid

to states that are affected by natural calamities. Also, any international assistance received with regard to relief is routed through the national government to the respective areas. Thus the role played by national agencies regarding response and recovery activities is by and large peripheral and is limited to providing financial and at times technical assistance.

As regards private organizations, their efforts are primarily directed towards preparedness measures. Organizations like the Red Cross, and the Salvation Army are examples of such national level private organizations. Stocking of relief materials, financing the construction of emergency shelter sites, and participating in public awareness campaigns are the types of disaster related activities that such organizations may be involved with. Essentially they supplement governmental efforts by offering the resources of their nation wide network of rescue and relief inventories.

#### STATE LEVEL

State/regional government agencies are, by virtue of their position, involved with all four phases of disaster management. State government resources; technical, financial, managerial and personnel are all brought to bear

on the specific planning and implementation of state and nationally sponsored mitigation projects. Further, the drawing up of a policy for initiating non-structural measures is also normally the responsibility of respective state governments. As regards preparedness measures, state governments are in a position to supplement national guidelines with regionally relevant information. Setting up communication links between local areas, rationalizing and codifying warning procedures, stockpiling of essential commodities, providing resources for medical facilities, and assisting in the preparation of local emergency plans are examples of the activities that state governments get involved with regarding preparedness measures.

Regarding the response and recovery phases, state agencies form the channel through which information to the national level, and material from external sources is routed. In view of this, the coordinating role assumed by the state is of critical importance. Thus it is normal to find a single office charged with the responsibility of coordinating state wide response and recovery activities. It is the state government that must also present the case to national authorities for provision of supplemental financial and material aid. And because of this, it becomes the responsibility of the state government to develop

appropriate systems for assessing damage and consequent needs during disasters. On the other hand, state agencies also co-ordinate the efforts of state level private organizations so as to achieve maximum efficiency in the utilization of resources. By involving private agencies at the planning stage itself, duplication of efforts and redundancy in resource allotment can be minimized to Thus in an overall sense a state significant levels. governments' position is unique on account of

. . . its status with respect to the private sector, and local and federal government actors. State government is in a position to ascertain what local disaster program needs are, as well as what federal government disaster resources are available. Further, it has the capability to acquisition, application and facilitate thecoordination of these resources. Thus the state unique resource is its government's most capability to broker relationships between those in need, at the local level, and those who can help at the federal government [and private] level.<sup>4</sup>

In the case of the private sector, apart from the state or regional chapters of the Red Cross or the Salvation Army, other charitable institutions and religious organizations may also be available for intervention. While their role in mitigation measures is limited, it is in the preparedness and planning areas that their contributions are significant. Their efforts are primarily directed at providing guidance and coordinating the activities of their units within the state / region. Further, they hold valuable inventories of relief materials and equipment that are needed during emergencies. Like their national level counterparts, state non-government agencies essentially supplement regional disaster related resources.

#### LOCAL LEVEL

The unique resources that local agencies bring to in disaster management are ; a) their detailed bear knowledge of the local area and the specific problems that and c) limited pertain to the locale. b) Manpower materials. In the chain of organizational responsibility, local effort is essentially directed at implementing mitigation policies and projects that may have been conceived by state or national governments. On the other local resources are mainly utilized in initiating hand, preparedness planning, response and recovery measures. Essentially international, national and state programs are formulated to supplement local disaster management efforts.

In view of the availability of detailed knowledge regarding the area, local agencies are best equipped to provide the data for vulnerability / risk analysis. Locally relevant vulnerability maps can be prepared on the basis of which prospective action can be initiated. Further, local

government is also appropriately responsible for formulating local emergency plans and providing the forum for coordinating all subsequent activity in the area. With reference to planning and preparedness, local agencies are for refining warning and communication systems, used conducting of drills and simulation exercises such as evacuation, and increasing community awareness. Coordination roles and lead is normally assumed by authorities such as town managers, police chiefs, mayors, district officers, assisted and in turn by the infrastructure of their staff and subordinate organizations.

Regarding response related activities, primary responsibility rests with local organizations. Measures such as initiating search and rescue operations, providing shelter camps, medical assistance and food relief are all conducted by groups and personnel from the local area. Even though `outside' groups do get involved as the emergency prolongs itself, first response is always by local personnel, private or government. Similarly, recovery activities are also initiated by local agencies. Restoration of essential services, provision of security arrangements, receipt, organization and distribution of relief material, assessment of the situation and providing of relevant information to outside agencies and the opening of relief works are examples of such recovery related measures that are performed by local organizations. The basic skills that are required at this level are `tactical' in nature. Agencies that engage themselves at this level are the police and fire services, public works and utilities, medical services, civil defence units and local administrators.

In the case of non-governmental agencies, their prime task is related to response and recovery activities. They provide the multitude of volunteers who extend valuable services such as search and rescue, first-aid, transportation of victims, supply of food, clothing and utensils. In some cases they also open and manage relief camps and shelter sites. As regards preparedness activity, private organizations maintain lists of volunteers and locally relevant stocks of essential commodities.

**Chart 3.1** below presents at a glance the relationship between levels of `actors' and the nature of their involvement with the various phases of disasters.

Mitigation	Preparedness	Response	Recove Short	∍ry Long
x	Y	_	x	Y
X	Y		Х	Y

----

Y

Х

Х

х

Х

Y

Y

Y

----

Х

Y

х

Х

\_

Х

х

\_\_\_\_

Υ

Y

Х

Х

Х

Y

Chart 3.1<sup>1</sup>

X : Primary Responsibility Y: Secondary Responsibility

# FACTORS IN ORGANIZATIONAL FUNCTIONING

Given the eventuality of a disaster, the pressure of responsibility then rests largely with local organizations and mechanisms. The effectiveness of the final response is therefore for all practical purpose determined by their actions. As far as local organizations are concerned, a disaster event creates a) a sharp increase in demands made on them and b) it changes the external environment in which these demands have to be met. These

<sup>1</sup> Format adapted from : U.S., National Governors Association, Center for Policy Research, 1978 Emergency Preparedness Project, Final Report, May 1979, P. 112.

Organization

Level

National

Bilateral

National: Government

Private

State: Government

Private

Private

Local: Government ----

Х

\_

Х

Y

Global: U.N.O. alterations in the work environment are the result of five factors which influence organizational functioning and role performance, particularly at the local level. These factors are briefly discussed below.<sup>5</sup>

#### **Uncertainty**

Local agencies and groups have to operate under conditions of extreme uncertainty. This uncertainty relates to lack of information about details of the demands generated on account of disasters, and the availability of to satisfy necessary resources those demands. Thus. performance of an organization is greatly handicapped on this count and limits effectiveness in functioning. Such constrictions lead to organizational stress and psychological strain. Therefore an organization's response capabilities are dependent on its capacities to evaluate the situation and mobilize appropriate resources. The longer it takes in such assessment, the weaker its response will be. And this in turn leads to higher incidence of adversity and degree of disaster.

# Urgency

Organizations operate under conditions of urgency. In view of the existent uncertainty, and assumption of nontraditional responsibilities in a crisis environment, a

greater sense of urgency is created. This necessitates the re-orientation of priorities, re-deployment of resources and personnel. Routine procedures are set aside, normal channels of communication and authority are by-passed, all of which introduces additional elements of stress on the internal systems of an organization.

# **Emergency** Consensus

Since a number of agencies are simultaneously engaged, all working under a sense of uncertainty and pressure of urgency, they need to orient their activities through "community consensus", i.e., re-formulation of priorities in coordination with others. Also, emergencies require giving increased attention and importance to certain sub-sectors within an organization that may have previously rested at a "lower status". This in turn affects the existing pattern of coordination among the various departments. Such altered status of importance often imposes fresh burdens on inter-organization relationships, that undermine effective response.

#### Lost Autonomy

Prior to a disaster event, each organization functions on a relatively autonomous routine. However in view of the cross-sectoral nature of disaster generated

demands, these organizations can no longer function in isolation, but must coordinate and perform their duties in conjunction and complement to one another. Organizations that have had no dealings with another agency, or those aware of the other's resources will find themselves not extremely constrained in their efforts. This in turn will hinder accomplishment of agency objectives. It must therefore be recognized that during emergencies, organizations lose their relative independence and must take measures to pool resources on a coordinated basis to effect efficient response.

# Changed Basis of Compliance

While the factors described above are constraints upon effective organizational functioning, this last factor has certain positive implications. Concern here is primarily with motivational aspect of personnel engaged in disaster work. While at the pre-disaster stage personnel work on motivations of renumeration (or coercion), during disasters such considerations are overridden by normative reasons. There is an acceptance that the demands and objectives of an organization are legitimate, and are therefore complied with least resistance. This results in "savings of time energy for segments of the and organization."<sup>6</sup> A motivated group will achieve its

objectives effectively and efficiently, thus enhancing the degree and quality of response.

#### LESS DEVELOPED COUNTRIES

Hazards posed by natural agents, as also the thev create are unpredictable in their disasters occurrence. However the level of adversity they impose on communities vary with capabilities of the respective societies. These capabilities are based on administrative, technical and economic resources. Thus while "developed" countries are subject to impacts in the same manner as the "less developed" countries, the nature and extent of adversity differs between the two. While there is loss of human life and property in the `western' world, the losses are considerably and significantly more in the developing Already grappling with the tedious task of countries. socio-economic progress, natural disasters create further complexities, and thwart developmental efforts. In view of this, studies in disaster management must take into account the distinctive nature of less developed country problems, and the associated limitations that these societies must cope with. In the context of organizations, the environment and ethos within which less developed country organizations function must be focused on and clearly understood.

Developing countries are mostly nascent nation states, recently freed from colonial rule. They emerged as complex, fragile socio-economic entities, whose structures are continually gnawed by economic disparities, ethnic, religious and regional diversities, weak political and administrative systems and a scarce resource base. Faced with the task of stemming centrifugal forces on the one hand, and achieving equitable socio-economic development with limited national wealth on the other, leaders and administrators of these countries exercise the full potential of their abilities to stay abreast in their quest for "modernity". Considering these circumstances, government shoulders bulk of the responsibility for achieving national objectives. This necessitates government intervention and involvement on a scale far greater than experienced before. To foster,

Developmental aims, and the urgency with which they are sought inevitably mean that state action is the principal vehicle for accomplishment. Neither time means is available nor for gradualness or for primary reliance on private was possible in the western enterprise, as countries, which developed earlier. The political element almost automatically assumes a central importance in the developing society.<sup>7</sup>

Essentially this entails the development and burgeoning of domestic bureaucracies as state involvement increases and covers almost every aspect of the polity. As

a result, people in these countries tend to rely heavily upon governmental agencies for direction and provision of infrastructure and utilities. Government responsibility in the public utility sector like telephones, medical care, electricity, water, roads etc. is far greater in the "developing" countries, than in the developed ones. The increasing involvement raises further expectations and dependencies, which in turn lead to greater involvement of government machinery.

A study of disasters, in the context of developing countries, must therefore clearly recognize that the bulk of agencies involved would be those controlled and regulated by government. Other private, voluntary organizations will perforce have to take their cues from government agencies.

#### CONCLUSION

A multitude of organizations are engaged in various disaster related tasks. In fact in as much as organizations are the social vehicles for delivery of emergency services, overall response pattern to disasters is in large determined by the dynamics of their involvement. A number of variables operate in reference to organizational intervention, and some of the associated salient features were described above. Through such an analysis, it was sought to enhance understanding of some of the issues that influence and determine the role of organizations with reference to disaster management activities.

At the outset attention was turned towards presenting а framework for analyzing organizational intervention with reference to disasters. A descriptive matrix involving the variables of activities viz-a-viz levels of organizations was outlined. This enabled appreciation of the nature of resources that organizations bring forth in the exercise of their responsibilities. Thus, while national level agencies provide technical and financial resources, local agencies provide the necessary manpower and specialized knowledge of the area to meet the overall objective of reducing levels of adversity during Similarly, emergencies. by analyzing the matrix, а recognition is also gained regarding the type of activities that respective organizations engage themselves in. For instance, it was seen that due to proximity and nature of resources available, local agencies are mainly responsible for the response and recovery phases. Conversely, national agencies are appropriately suited to implement mitigation measures.

In as much as local agencies form the first line of

`response team', a major portion of the activity relates to this level of administrative jurisdiction. Therefore issues particularly this level were further pertaining to extrapolated. Finally, factors which determine the functional abilities of agencies were summarized. As was noted, most of these elements, such as uncertainty and urgency to act, imposed severe stress and constraints upon organizational functioning. Expectantly, by anticipating and addressing these issues at the outset itself. prospective strains that surface during crises in interorganizational relationships are likely to be reduced considerably.

Finally, focus was placed on the circumstances of `developing' countries. Due to the higher levels of `marginality', the incidence of disasters in these areas is significantly higher than in the developed countries. In view of this, the special circumstances. and the in which organizations in `less developed' environment countries function was described. As was noted, due to socio-political factors, societal expectations from government agencies in these countries are considerably high. This then increases the burden of responsibility of public organizations, and draws attention to the leadership role they are expected to play.

The various facets of organizations described above are important and relevant to any framework of disaster management. Further, organizational issues are also relevant to enable understanding of other aspects of disasters. These are described separately wherever appropriate. For instance, the framework for preparedness planning is conceived around organizational aspects of levels of jurisdiction, mandates and resources. Similarly, where appropriate, different formats of organizational factors are described in subsequent chapters. This in fact further reinforces the issue that organizational functioning extremely dynamic is and predominantly determines the nature of societal response to natural disasters. Attention may now be turned towards activities and measures involved in the management of natural disasters. Beginning with a description of risk analysis and mitigation measures, the discussion will then proceed towards preparedness, response and recovery activities in the following chapters.

#### NOTES

1.Russell R. Dynes, <u>Organized Behavior in Disasters</u>, the Disaster Research Center Series, eds. E. L. Quarentelli and Russell R. Dynes, n.p.: Disaster Research Center, Ohio State University, 1974, p.74.

2.Ibid., p. 16.

3.U.N., Office of the United Nations Disaster Relief Coordinator, <u>Disaster Prevention and Mitigation</u>, <u>A</u> <u>Compendium of Current Knowledge, Vol 5, Land Use Aspects,</u> UNDRO./22/76 1978, P.111.

4.U.S., National Governors Association, Center for Policy Research, <u>1978 Emergency Preparedness Project, Final</u> <u>Report</u>, May 1979, p. 111.

5.Russell R. Dynes, <u>Organized Behavior in Disaster</u>, 1974 pp. 165 - 172.

6.Ibid., p. 171.

7.Ferrel Heady, <u>Public Administration</u>, <u>A Comparative</u> <u>Perspective</u>, 3rd. ed., New York and Basel : Marcel Dekker, 1984, p.257.

# CHAPTER FOUR

# MITIGATION

# MITIGATION

Two primary administrative strategies available to managers of natural disasters are mitigation and preparedness. Together they provide the most comprehensive set of measures for negating or reducing the extent of adversity imposed by disasters. The adoption and implementation of either strategy is dependent on a number such as risk and vulnerability analysis, of factors resource availability (technical, financial as well as personnel), political commitments, socio-psychological variables prevalent in the society, administrative norms, characteristics of the natural phenomena concerned, and levels of administrative jurisdictions involved. However, it may be emphasized that neither strategy can be purposefully adopted by excluding one or the other. They complementary exercises supporting mutual are indeed efforts.

#### RISK ANALYSIS

In order to undertake a meaningful exercise in comprehensive disaster management, the primary requisite of conducting a risk/hazard analysis must be met. Potential threats to communities need to be identified and analyzed so that they can be addressed in a concerted manner. "Knowing what can happen, the likelihood of it happening, and having some idea of the magnitude of the problems that essential ingredients for emergency arise. are can planning."1 Risk analysis information is the data and evaluation methodology upon which the whole foundation of a rational design of future activity could rest. Mitigation as well as preparatory planning cannot be conceived in a converted manner without such material information. And any discrepancy, weakness or distortion in the analysis will inevitably be reflected in whatever future course is adopted and policies or strategies implemented.

Hazard analysis consists of two aspects, each complementing the other to form a whole. The first of these relates to the collection of information, and data pertaining to the "types" and kinds of hazards that tend to threaten a particular community, area or region. Normally such information can be at a macro or micro level. That is, certain agents may either pose threats to a wide

geographical area. For instance hurricanes tend to threaten whole coastlines, and earthquake faults lie beneath vast regions as a whole. Each may strike any point within the large vulnerable perimeter. Droughts in fact may threaten regions that transcend national boundaries. On a micro level on the other hand, spatially limited areas are vulnerable to locally generated hazards. Flash floods and fires are examples of this situation, wherein the effects though destructive are comparatively contained and localized. Quite naturally this distinction has bearing on the nature of efforts that may be initiated to counter their effects. For the former type, larger and complex networks of warning and communication systems will have to be introduced, whereas for the latter, local arrangements would suffice. As а corollary, for the former. responsibility for action may well lie with national agencies, whereas local resources and personnel would be adequate for the latter.

Apart from the identification of threats, risk analysis also involves assessing the likelihood of the occurrence of events. Such estimations include probability of occurrence both in terms of location and level of intensity. "Determination of probability, intensity and location can be made on the basis of historical evidence,

empirical research, or community perception."<sup>2</sup> In the mitigation and planning context this is particularly significant, since an area may be prone to more than one type of disaster, but where one is more frequent than the other(s). In such a case, the vulnerable community may have conceived of adequate coping mechanisms with reference to the "frequent" disaster, but may be totally unprepared for the other(s), thereby increasing vulnerability to a greater disaster, out of inadvertence or complacency. It is the task of planning to structure response mechanisms such that the community is in a position to cope with the frequent as well as the infrequent disaster agents.

The second aspect of hazard analysis requires obtaining information and knowledge about the community at risk. Such information is a tabulation of the community assets that are threatened and the likely value of such assets that may be damaged or lost in the event of a disaster occurrence.

Knowledge of the occurrence (in terms of probability) of disasters, and an estimation of the extent and scope of destruction that they are likely to cause provides a fair assessment of the level of vulnerability of a community.

Adequate information about the hazards will

enable a community to know how frequently damage from an event could occur, what the damage could be, and which portions of the community could be damaged. When the data for each hazard are combined and analyzed, the community can assign priorities to its emergency management needs.<sup>3</sup>

Information which provides clues regarding vulnerability of communities forms a substantive base upon which emergency management activities can be initiated. In fact it is only on the strength of such information that subsequent mitigation and or preparedness activities can be initiated and resources allocated. Thus for instance;

flood control measures of a preplanned permanent nature, as well as land use programs regulating building by location or design are effective in reducing the loss of life and property due to floods. <u>Such actions [however]</u> must be based on an assessment of the threat or risk for each locality. (emphasis added).<sup>4</sup>

#### SCOPE OF MITIGATION

Policies, plans and activities initiated to avert or withstand the impact of disaster agents define the scope and objectives of mitigation:

It includes activities that actually eliminate or, reduce the probability of occurrence of a disaster. . . It also includes activities that are designed to forestall the effects of a disaster. . . [and]those which help distribute the cost of disaster recovery.<sup>5</sup>

In effect, these are measures that substantially decrease the adverse consequences of natural phenomena, and at times achieve partial elimination of adversity.

Mitigation activities are characterized by certain common and distinctive features. These are i) based on scientific and technological systems; ii) steeped in legalities to a large extent; iii) require large financial and capital outlays; iv) require technical expertise (ie. scientific and legal) for formulation and implementation of policies and projects; and v) are characterized by their long range perspective. This long-term distinction refers to either, a) the longevity of program implications. That is, when measures taken or introduced have long lasting stipulations, bindings and requirements, as in zoning laws, construction design regulations etc. The other context relates to the measure of long-term probability occurrence factors, such as building structures to withstand, for instance, a once-in-fifty-years disaster.

### FACETS OF MITIGATION

Analysis reveals that mitigation activities comprise of four basic elements. These are, a) structural measures, b) non-structural measures, c) legal aspects and d) disciplinary aspects.

#### Structural Measures

the term suggests, some mitigation measures As refer to those set of activities that are concerned with and construction of building designing and other structures. These measures are essentially protective in nature and include designing, architecture, engineering and construction works. Designing and building of dams, dikes, reservoirs, canals, embankments etc. are examples of this tvpe. The financial requirements for such measures are usually high, and therefore the option is limited. More particularly, such technological and structural measures need to be carefully planned and implemented. It has been empirically observed that they tend to induce a false sense of security, and encourage building property in the lower reaches of the project. Further, such schemes also raise the magnitude of disasters as and when they do occur. As noted:

A society becomes vulnerable to catastrophe when it becomes dependent upon complex, energyand capital-intensive `high' technologies which radically extend control over nature, but simultaneously increase the potential for catastrophic side-effects and social breakdown.<sup>6</sup>

#### Non-Structural Measures

In contrast to the above, non-structural measures are comparatively economical (though opportunity costs may

be substantial). Primarily they are contained within the overall context of land-use planning and regulation. These policies are used for determining future use and development of risk bearing land sites. Through mechanisms of land-use planning, development is sought to be controlled or steered away from such vulnerable areas. Common instruments used for implementing land-use policies are zoning and sub-division regulations, land acquisition, taxation and insurance schemes.<sup>7</sup>

# Legal Aspects

Most mitigation activity, particularly nonstructural, is defined by the due processes of law that operate within a given society. Constitutional directives are significant in this regard. Since such measures seek to direct and control the use of land, be it through acquisition or regulation, the issue of fundamental right to property and its use are inevitably involved. While most constitutions do stipulate guarantees of right to enjoy private property, State controls can be justified (in the courts) on grounds of public interest, welfare and safety. However, the case can be strong only if it is supported by risk analysis data. Further, the issue of legality must also be viewed within the broader political context. The degree of political and administrative commitment to such

policies determines the quality and nature of implementation. Promulgation of laws restricting floodplain occupation is only one side of the effort. That such laws are weak, or tend to be circumvented or disregarded, underlines the problem of implementation and commitments.<sup>8</sup>

#### Disciplinary Aspects.

Mitigation measures in large are derived from two primary disciplines, Meteorology and Geology. An understanding of their concepts is necessary to initiate measures towards prevention or control of disasters.

# Meteorology

A large number of natural phenomena emanate from within the dynamics of meteorological elements. The main forces that bring about the causation of extremity are wind, water and temperatures. Through the interaction of these elements adverse weather conditions emerge and produce phenomena such as Cyclones<sup>1</sup>, tornadoes,

<sup>&</sup>lt;sup>1</sup> Different countries have separate terminology and references for tropical cyclones based on the speed of wind. In the U.S. for instance, when maximum sustained winds exceed 115 Kmph., tropical cyclones are referred to as "hurricanes" east of 180 degrees longitude, and as "typhoons" west of 180 degrees longitude. For further details regarding the usage of various terms and references see, World Meteorological Organization, Tropical Cyclone Programme, <u>Human Response to Tropical Cyclone Warnings and</u> <u>Their Content, Project No.12 ( n.d. ), p. A.1. Subsequent</u>

thunderstorms, lightning, hail, snow, river floods, storm surges, droughts, and landslides (on account of heavy rain or soil erosion). Any activity attempting to mitigate their effects must therefore be intimately associated with the discipline of meteorology.

# Geology

Disasters such those associated with as earthquakes, volcanoes and tsumanis are caused by geological factors. As a group they are all difficult to predict. Even where attempts have been made, they cannot be relied upon with complete confidence so as to initiate measures such as evacuation. However, through experience and development of the concerned disciplinary sciences, protective measures such as structural designing have evolved which increase impact resistance capabilities to significant levels. In the case of tsumanis however, though their inception lies in seismic dynamics, their manifestations involve hydrological factors.°

references in this thesis will use the term `hurricane'. However, depending on the context and where appropriate, the term `cyclone' will also be used.

#### **MITIGATION ACTIVITIES.**

A combination of the interrelationships between the four aspects described above provides the framework of various options that are available to concerned agencies involved with disaster mitigation.

# **STRUCTURAL -- METEOROLOGICAL**

Structural measures against meteorological phenomena require to be taken in both coastal and inland areas. The following are various possible alternative methodologies that can be adopted, depending on the circumstances.

## Spare Storage

Providing spare storage capacity and the construction of diversion to steer the flow of water away from habitations and developments is one such common measure. Such methods help in keeping water levels below critical points. Examples of this kind include construction of breakwaters, storm surge gates, and establishment of tree lines.

# Construction of Barriers

Construction of barriers and raising of the ground is another method utilized for effecting mitigation against water related disasters. These involve constant vigilance over water levels, so as to monitor and control the flow. However, they are cheaper alternatives than diversions. Examples of this kind include construction of dike systems and levees for controlling sea water flooding. While these two methods described above help control storm surge and tidal waves, the following are popular flood control measures.

#### Storage Methods

These schemes are used against inland floods. They,

require the `design flood ´ to be specified as a complete flood hydrography . . [where] the peak discharge is chosen in respect of a given frequency of occurrence, and values are derived by one or more methods of flood estimation.<sup>10</sup>

Frequencies depend on the effects of failure. Thus in instances where

failure does not have disastrous consequences are usually designed against peak discharges having frequencies ranging between 1 in 10 years to 1 in 50 years. Major schemes such as dams, where failure to protect might have catastrophic consequences and possibly cause loss of life, are frequently designed to protect against extreme peak discharge or some high percentage of it.<sup>11</sup>

The most common examples of such methods are the

construction of dams, reservoirs, tanks and storage systems in unoccupied flood plains upstream and away from an occupied area.

# Conveyance Methods

schemes which direct or control the These are levels of water flows in inland rivers to prevent inundation. Examples of this kind are, river bank levee constructions, cutting of by-pass channels, river channel improvements (re-aligning, enlarging cross-sectional area, or increasing bed slopes), dikes and canals. Such methods provide extra capacity for water discharges. Though protective in nature, if not carefully planned and used can,

displace the problem of river flooding to a downstream section (probably not affected previously) by increasing the peak discharge of outflow from the newly protected river reach.<sup>12</sup>

Here it must be emphasized that preventive measures are limited in their scope. Events do occur which exceed resistance and holding capacities. Unless this is recognized, greater calamities tend to occur in the "safe" zone as a result of complacency. "Construction of flood protection schemes often leads to intensification of flood plain occupancy due to an exaggerated sense of security induced in the people protected."<sup>13</sup> This in fact highlights an issue raised earlier, that mitigation and preparedness measures need to complement each other. Occupants of flood plains, even in protected areas, need to be made well aware of the limitations of the projects that induce such safety.

#### Barriers and Pre-emption

Apart from the water based disasters, the elements of wind and temperature cause extremities such as excess snow and avalanches. Measures are available to prevent such phenomena from becoming disasters. Snow at times accumulates on mountain sides below which habitations or vulnerable sites lie. In order to pre-empt them from causing harm before the snow accumulates heavily, it can be made to fall in stages through triggering devices such as blasting around the snow cover area. Other preventive means are afforestation, construction of barriers such as "shores" or "deflectors".14

# NON-STRUCTURAL -- METEOROLOGICAL

Apart from the structural methodologies available, mitigation of meteorological disasters can also be achieved through two types of non-structural approaches. These are regulatory and fiscal (the latter is discussed in a later section within this chapter). The two in fact work in conjunction with other non-structural measures. For

instance, fiscal policies that provide incentives and penalties can be employed so as to correspond and support regulatory requirements. A typical characteristic of nonstructural methods are steeped in legal issues and concepts. This can be appreciated from the details given below of the various options.

# Land-Use Planning

It was noted earlier that rapid population growth and "development" patterns have combined to exert pressure on the use of land. People occupy vulnerable sites such as low lying areas, flood plains etc. This raises serious questions regarding land-use patterns and the increased exposure to natural hazards. In this context it becomes extremely important to examine and introduce appropriate measures to plan and control the use and occupancy of such lands.

" In ideal conditions land-use planning is based on a composite vulnerability analysis which provides risk values for given locations and for various types of development in hazardous areas."<sup>15</sup>

The purpose is to control or steer development away from threatened areas, thereby preventing the occurrence of disasters. For instance, urbanization increases the flood potential due to reduced capacities for absorbing precipitation, causing in turn higher levels of run-off.

Also, the speed of run-off is accelerated due to reduction in time of concentration. Finally there is reduction in the surface retention capacities. Similarly, in rural areas, unregulated land-use has negative consequences. Increase in land drainage schemes causes discharges to increase, and modifications in vegetative cover enhance variability of flood response.<sup>16</sup> Soil conservation, catchment afforestation projects and similar environment oriented schemes are current attempts to restore the damage caused by indiscriminate land-use in fragile and precarious areas. long term objectives of mitigation can be met only The through proper and planned use of land. Several instruments and methodologies exist for implementing land use planning. Some of the salient types are discussed below.

# Zoning

Zoning refers to the classification of land on the basis of hazard vulnerability as well as with regard to its prospective usage such as industrial. residential, recreational, agricultural for pasture. An excellent or example of zoning policies is provided through the instance of flood plain zones. Flood plains may be divided into three categories for this purpose, and usage regulated accordingly.
<u>Prohibited Zone:</u> An area taken as an essential part of the floodway. Development of any kind is not permitted within the area.

Restricted Zone: This is the area which is frequently subjected to inundation. Activity is permitted, but on a restricted level for pasture, agriculture or recreational purposes.

Warning only Zone: This comprises an area that is on the periphery of the frequently inundated zone. While flooding is seldom, it is still potentially hazardous. Development though permitted, must be regulated to conform to basic flood protection and safety standards of building etc.<sup>17</sup>

### Regulations

As a corollary to land-use planning and zoning, regulatory devices are used to bring about conformity in land usage for upgrading the safety levels of the community. Two types of regulatory instruments are available in this regard; sub-divisions and building regulations.

<u>Sub-Division</u>: Sub-division regulations refer to the imposition of rules on the use of land that is sub-divided

into plots for purpose of sale. These regulations require developers to obtain approval of their plans from concerned authorities. Such approval can be obtained only if the plan is in conformity with existing regulations. Such regulations may specify space between buildings, width of streets and exits, location of resources such as fire hydrants etc. Thus regulations focusing on upgrading safety levels can be incorporated in development plans through sub-division controls.

Building Regulations: Buildings in hazardous areas are subject to heavy stress, though the nature of stress will differ according to disasters. In order to increase safety levels of such buildings, construction standards, based on discipline studies can be formulated and adopted through local laws covering construction activity. Buildings in hurricane prone areas for instance are subject to horizontal and uplifting wind forces, along with excessive rainfall. Codes requiring "tying of walls to roofs, and walls to foundations can be effective against the winds of a high proportion of tropical cyclones"18 in Similarly, codes can be adopted for other rural areas. hydrological phenomena, such as raising of foundation and floor levels for flood prone areas. In essence, building regulations are,

concerned with the physical aspects of new construction and an appropriate, rigorouslyenforced building code can be instrumental in mitigating the destructive effects of natural phenomena.<sup>19</sup>

### Land Acquisition

Despite their potential, zoning and regulatory measures are often marked by poor implementation.<sup>20</sup> Political and administrative commitments are found to be weak. On the other hand, pressures for circumvention of laws is normally high, particularly in view of the high opportunity costs involved. Thus such efforts have not always been successful in introducing safety levels up to their potential. A policy alternative to such methods is the direct approach of government intervention through acquisition of concerned lands. In view of the fact that large areas are hazard prone, such an option is limited on account of financial constraints. However, in high risk areas, where pressure for development is also high, government agencies may well intervene and acquire the land. On obtaining such ownership rights, regulation of its use becomes easier.

### NON-STRUCTURAL -- GEOLOGICAL

Based on risk analysis exercises, broad nonstructural mitigation options are available. Such measures in main are similar to the ones described earlier for meteorological phenomena.

Apart from flooding (due to tsumanis), geological/seismic hazards can be divided into three further categories. These are, surface faulting, ground shaking and ground failure. Different mitigation measures may be used for each of these categories respectively.

### Surface Faulting

The consequences of surface faulting can be mitigated through devices which regulate the type and density of structures allowed within the hazard zone. Thus,

for example, in the vicinity of active fault traces, the area can be zoned to prohibit structures altogether, and to permit only certain uses such as agriculture and recreation. At the very least, municipal zoning regulations should prohibit the building for human occupancy, or for public service facilities (such as bridges and utilities) on active fault traces.<sup>21</sup>

#### Ground Shaking

Similar to surface faulting, the effects of ground shaking can be minimized through low density land-use

patterns. Also, relevant building codes appropriate to shaking characteristics can be brought to bear on development activity. For instance, adoption of

special building code requirements for structures to be built on thick saturated sediments that have high (long) fundamental ground periods and that could be subjected to differential settlement during an earthquake.<sup>22</sup>

Also, geologic, soil and structural engineering analysis could be required for buildings whose occupancy rates are expected to be high. Adoption of ordinances for hazardous building abatements and removal of dangerous parapets are other measures for minimizing the effects of ground shaking.

#### Ground Failure

Landslides and sinking of the ground are examples of ground failure. They are slow to occur, and are normally preceded by precursors. Usually ground failures do not result in loss of life, except perhaps during earthquakes. Thus minimal regulations are sufficient and can be introduced by requiring construction designs to take cognizance of the threat. Or else,

General land-use policy to limit damage from ground failure might be guided partly by knowledge of broad areas where instability is believed to be so pervasive that, along with other considerations, its preservation as open space, or other non-occupancy may be indicated.<sup>23</sup>

#### STRUCTURAL -- GEOLOGICAL

With the aid of technical and scientific inputs, structural methods have been developed to resist the effects of seismic activity up to certain levels. This goes a long way in restricting the extent of damage and loss of life. These measures are to be found in engineering and construction methods. Reduction of risk to buildings is particularly significant since injury and loss of life are mainly caused by structural collapse. In fact,

the problem of building performance is central to the earthquake issue because by far the greatest death, injury, and property loss are caused by the relationship between building performance, ground motion and people.<sup>24</sup>

However. as in the case of meteorological mitigation building "shock methods, absorbers" are constructed in order to withstand pressure up to a certain level only; for instance cushioning a once-in-fifty-years flood or in this case a once-in-fifty-years earthquake. Beyond such a limit they are designed to effect collapse. Such defense mechanisms are modelled so as to cause limited, as opposed to extensive damage that would occur otherwise.

Collectively, seismic mitigation activity consists of making risk assessments, and preparing seismic maps

which are,

designed as inputs to land use planning (zoning) and specifying engineering practices and construction standards (codes) to insure that earthquake hazard is evaluated in determining acceptable use of land in high risk areas and critical structures reflect latest knowledge in damage resistance technology.<sup>25</sup>

#### FISCAL MEASURES

Apart from the regulatory and structural measures mitigation can be achieved through fiscal policies also. Two possibilities are available in this regard are taxation and insurance.

### <u>Taxation</u>

Taxation devices can be brought to bear for controlling and restricting the use of land. Therefore,

through the use of tax incentives and penalties [governments] can adopt a coherent tax <u>strategy</u> for disaster prevention. Special tax treatment could be accorded to certain land uses. For example flood plains could be taxed at onerous rates of development.<sup>26</sup>

It is common to find such strategies as `tax holidays' being used to invite development (such as industry) to particular locations. The same principles can be introduced to steer development away from risk bearing locations and areas also.

#### Insurance

Although still in an experimental stage, insurance schemes are being continually examined and explored to help control development and land-use. While there are complex issues related to insurance, it can be used effectively for implementing building codes and standards. As an incentive, subsidized insurance may be made available to those individuals/companies whose buildings conform to prescribed safety standards. Similarly, on a larger area, subsidized insurance may be made available to those municipal or administrative jurisdictions that adopt and enforce landuse regulations and codes in conformity with accepted risk ameliorating standards.<sup>27</sup>

#### CONCLUSION

Mitigation strategies were described within the matrix of disciplines and structural/non-structural factor relationships. Overall three limitations can be observed that restrict the scope of these efforts. There is, first, the recognition that mitigation measures are by and large so designed as to absorb limited extent of impact. Thus total elimination or prevention is rare. Secondly, the financial burdens they impose on communities does not always make them viable or feasible options. Finally due to

political and administrative considerations apparent weaknesses emerge in the implementation of codes and regulations for non-structural measures. This highlights in turn the importance of preparatory planning.

The objectives of mitigation and preparedness are not so much as to eliminate or totally prevent disasters. Such a premise indeed leads to graver consequences as a result of misplaced confidence and complacency. Generally these activities attempt to reduce the level and degree of impact of disasters. A limited extent of loss and destruction is assumed to occur. Priority is of course in saving human lives.

Finally, it should be noted that mitigation and preparatory measures are continual in nature. Techniques and methods of mitigation are constantly modified as fresh scientific or technical knowledge becomes available through research and development. Moreover, socio-economic dynamics will exert constant pressure upon managers to be sensitive to a changing environment. Increase in population, use of marginal lands, deforestation and industrial development few of the are a factors that continuously modify the setting in which mitigation and preparedness plans and policies are conceived and implemented. Therefore. intrinsically the exercise is a continuous one, wherein

plans must be kept flexible and adaptable to remain realistic and effective. Through such efforts, a systematic reduction of losses due to natural calamities can hope to be realized.

#### NOTES

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18.U.N., <u>Disaster Prevention and Mitigation</u>, vol.4, 1978, p. 12.

19.U.N., <u>Disaster Prevention and Mitigation</u>, vol.9, 1980, p. 12.

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21.Ibid., p. 32.

22.U.S., Department of the Interior, Geological Survey, <u>Primer on Improving the State of Earthquake Hazards</u> <u>Mitigation and Preparedness, 1984</u>, p. 118.

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24.Ibid., p.126.

25.U.S., Department of Commerce, <u>Federal Plan for Natural</u> Disaster Warning and Preparation, p. 74.

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## CHAPTER FIVE

i

# PREPAREDNESS PLANNING

### PREPAREDNESS PLANNING

In a social environment natural disasters impose an extreme degree of uncertainty. In terms of time and space, vagaries of weather and geophysical phenomena make it extremely difficult to accurately predict their consequences over any length of time. A whole region may be identified as prone to earthquakes or hurricanes due to location over faults or proximity to a coast. Yet it is difficult to predict the exact timing or location of an earthquake occurrence or a hurricane landfall. On the other hand, even after impact, the immediate environment of the "victim community" is surrounded by uncertainty. The extent of loss, the demands generated, the flow of information, the availability of resources etc., are not known immediately or accurately. Any unplanned, unorganized effort to intervene in these circumstances would therefore itself be drawn in the whirlpool of uncertainty, causing depletion and expending of scarce and valuable resources. It is therefore of utmost importance that preparatory measures are initiated, so that agencies and communities

are better equipped to face emergencies.

Preparedness involves those set of activities which are conducted immediately prior to the onset. It is an overall effort by society to reach a level of readiness to eventuality and their of disasters the confront consequences. There is thus an in built assumption that natural calamities will take place over a period of time and space. The whole exercise is anticipatory in nature. That is, it estimates the type of needs and demands that are likely to surface in emergencies, and in anticipating such need based requirements, preparations can be made in advance, so as to provide effective and efficient ways of meeting such demands.

Preparedness activities are necessary to the extent mitigation measures have not or will not prevent or forest [sic] all disasters. They are activities which minimize disaster damage (like forecasting and warning) and enhance disaster response operations (like stockpiling medical food stuffs). These activities and supplies individuals organizations and to generally respond to disasters.1

Considering the interdisciplinary and inter-sectoral nature of disaster related demands, preparatory measures undoubtedly have to be comprehensive and well coordinated. The major group of activities related to preparedness are related to planning, warnings and their communication. Of these, issues related to planning are discussed below. The

remaining two aspects of preparedness are described in subsequent chapters.

### FRAMEWORK FOR PLANNING

Any administrative apparatus which is concerned with and sensitive to consequences imposed by natural calamities would initiate efforts to reduce and limit their negative effects upon society. The effort cannot come only from a single source, but must be initiated concurrently at i.e., local, regional/state, and levels; a]] social realize efficient resource However, to national. utilization and effective response patterns, such efforts must be comprehensive in nature. Planning here is seen as a conceptual tool, used for rationalizing organizational output in an uncertain environment. It addresses broad complex issues and is brought to bear on the decision making process to achieve efficiency in overall response and resource utilization. The eventual objective is to reduce adverse social consequences imposed by natural hazards.

A number of variables in various combinations determine the nature, scope and perspective of planning. In this context a framework of planning can be drawn through two sets of organizational factors which can be placed a) horizontally and b) vertically.

### Horizontal Factors

"Across-the-board", various types and numbers of organizations function within a community. Each exists on the strength of its own mandates and the resources it commands. These can be legal or value based. Irrigation, fire and police agencies are example of the former, while religious and voluntary organizations are illustrative of the latter. On the other hand, resources are of three types; 1) personnel, 2) financial and 3) technical. The possible combination of these variables in turn determines the functional utility of an organization with respect to disaster related tasks. These factors can be summarized as in Figure 5.1 below.

#### Figure 5.1

Horizontal Factors



Disaster related organizations are available at various levels of the social structure. Planning must therefore be based on an accurate evaluation of these prospective actors. Mandates, for instance determine in large measure matters such as; which agency, at what level, must assume what type of responsibility. Similarly, which agency will perform co-ordination roles, and which organization will assume leadership in search and rescue operations (i.e., coordinating volunteers for example) are questions and issues that can be addressed only after a full view is taken of the mandates on which various organizations are structured. Similarly, the issue of where to obtain necessary resources, and which agency is best equipped for their utilization can be addressed only after determining the ownership of resources by respective organizations. The important issue here is that responsibilities are determined by organizational characteristics, and evaluation of these factors is an essential premise for preparedness planning.

### **Vertical Factors**

Organizations exist at various levels, local, state and national. Further, the authority or responsibility may span through all levels in some cases, while others may exist at local or intermediate levels only. On the other hand disaster agents possess characteristics which cause diversity in the scope and extent of impact. While some are purely local in nature, others cross state and even national boundaries. A pyramidical matrix can be presented to identify the levels of organizational involvement in response to disasters, as in Figure 5.2 below.



This matrix is presented to suggest that in terms of organizational levels and agent characteristics, planning must be initiated at all levels. Responsibility in this cannot be left to the exclusion of any one of them. This is particularly so when any community is threatened by more than one type of hazard. Response mechanism cannot be set up to respond to individual agents only, but rather must consider the implications of all the hazards that threaten the particular area.

Planning however cannot address the two factors (horizontal or vertical) separately, but must take a comprehensive view. Thus, though a disaster may threaten only a state level jurisdiction (vertical factor), the demands may still be such as to necessitate national assistance due to lack of local resources (ie. horizontal factors). Floods, for instance may threaten a number of communities within one state/region, but financial resources may have to be obtained from national sources to supplement regional or local efforts.

above was a framework of factors which a Given planning system must take cognizance of. National planning efforts need to allocate resources such that they are compatible with regional with regional and local priorities, requirements and plans. Each level thereby efforts of supports and supplements the the lower administrative echelons. Only on the basis of such comprehensive and complementary planning can effective

management of disasters take place.

#### PRINCIPLES OF PLANNING

Since there are a large number of unknown elements associated with disaster situations, preparatory planning is a rationalized effort to gain as much control over uncertainty as possible. What needs to be emphasized in this context is that stress can be reduced, but certainly not eliminated altogether. Thus, "in the vast majority of cases plans can only alter or modify what will happen. . . . [and] can help to indicate the range of problems that will occur and possible solutions to them."<sup>2</sup> One of the key elements that increases uncertainty is that the situation is in constant flux, and changes rapidly after the detection/warning stage. In this it sense makes it completely impractical to try and anticipate and plan for every possible contingency. Any attempt to structure a tight and rigid plan would therefore create response inefficiencies. What is therefore appropriate is that plans should be made to focus on the "principles" of the situation. As pointed out,

too many details leave the impression that every thing is of equal importance. . . [or that] A complex and detailed plan is generally forbidding to most potential users and tends to be ignored. Thus disaster planning, while it can not totally ignore details especially at the organizational

level, should focus on general principles, and in that sense ought to produce simple rather than complex disaster plans.<sup>3</sup>

Thus, while a plan may outline basic priorities, this should be done only on a suggestive basis. Delegation of authority and flexibility must be incorporated so that, should circumstances so demand, these priorities can be altered suitably.

In as much as a plan cannot conceive of and anticipate all the requirements of a situation, it also cannot be a static, one time exercise. Planning is essentially a `learning' effort, wherein each plan is kept open ended. With subsequent experience, the plan must be modified and altered in tune with any fresh insights that may have been gained. In this sense it is important to recognize that during emergencies, an eye should be kept out for reviewing implications for future planning. On the other hand,

. . , an unrevised or out-of-date emergency plan may create more of a problem than no disaster plan at all. Such a situation can give the illusion of being prepared and ready when this may not be the case at all.<sup>4</sup>

The primary goal of disaster preparedness and planning is seeking to alleviate and `soften' the impact of disasters upon the community. In attempting to do so, it considers the needs and resources available, and assigns

strategies. However, the actual priorities and implementation and success of a plan is dependent on its acceptance by the local community. Socio-psychological behavioral patterns already existent in the society will in large determine the nature of plan implementation. This factor therefore assumes great importance in plan conception. Any plan which fails to take cognizance of local attitudes. behavior patterns, social systems, traditions and culture would be inherently weak and ineffective. For instance caste. sex or ethnic considerations may surface in relief camps in traditional societies. Despatching of irrelevant or locally unacceptable relief material in fact is a common example of misdirected resource allocation. To expect that a warning/evacuation communication will imply immediate and action is again a reflection of acceptance poor assumptions and planning. In other words, planning cannot be conceived in an ideal situation, nor can it be simply imposed upon people. It would be futile to expect conformity to plan requirements, when these disregard local values and considerations.

In essence, these are principles that need to guide planning exercises. The issue to be emphasized is that plans must be realistic. Plans should be characterized by

flexibility, adaptability and continuity. On the other hand they should not assume unrealistic and ambitious objectives of attempting to totally eliminate stress and adversity. Finally, plans will be effective if and only if they incorporate local considerations, traditions and behavioral patterns.

#### DISASTER RELATED DEMANDS

Apart from the information provided by risk analysis, the other input to planning is the anticipation demands.<sup>5</sup> Such demands can be of disaster related the basis established fairly accurately on of past individual organizational experiences and social or The research. variables of vulnerability. agent characteristics and the temporal aspects of disasters provide a measure of the relevant needs that arise and require to be addressed. Preparatory efforts can be divided Those involved with 1) the preinto three main types. onset/impact stage, 2) post-impact/response stage and the 3) recovery stage of disasters. Together they cover the entire gamut of disaster preparedness measures. Such classification highlights that preparedness involves not only readiness to undertake relief operations, but also to reduce initial levels of impact, as well as to begin the reconstruction and recovery process as early as possible.

#### PRE-ONSET / IMPACT

There are a number of pre-impact preparatory measures with which concerned agencies will be involved. It can be expected that by increasing efficiency in these areas, the extent of loss and damage will be appreciably reduced during impact. Further, such measures also help ease post-impact stress to considerable levels. These set of measures are briefly described below.

#### Warnings

While it is not possible to issue warnings against all agents, where such possibilities do exist, there is a basis for action upon which losses can be minimized. Timely and appropriate issuance of warnings of an impending event provide opportunity for protective action. Safety measures can be adopted, and other preparatory mechanisms can be activated. However, the dispatch and receipt of warnings is dependent upon a number of variables such as communication and public receptivity. In the warning system systems. itself there are two main elements upon which the degree of stress reduction depends. These are a) the accuracy of warnings and b) the length of forewarning. While the latter would differ according to each disaster type, the former is dependent technical expertise. Despite existing on

constraints, warnings can and have been issued to effectively caution and advise threatened communities. (A detailed discussion of warning systems is presented in Chapter Seven).

### Communication

Information is appropriately described as the"life-blood of emergency management system."6 an Information is needed in large amounts and of varied kinds intervening so that agencies can respond to the circumstances appropriately. One of the problems that the communication of information confronts during disasters is the element of distortion and exaggeration. In fact the further the information travels (outward from the impact area) the greater the distortion. On the other hand, for effective response, the need is for greater accuracy and reliability. The allocation of resources, and establishment of response priorities are all dependent on this variable to a great extent. Therefore, there is need to plan for accurate reporting. Administrative mechanisms should be devised in advance to address this issue.

The other problem faced is that the systems and equipment for communication often breakdown and become disrupted. In order to sustain the flow of information from

enduring system must be disaster areas, an and to established, or backups/alternatives which support normal systems. The considerations for establishing such a system are based upon a) the durability aspect and b) the tasks to be performed (i.e., does communication between X and Y agencies have to be one or two way, does it require long distance systems etc.?). Other considerations are financial costs, availability of trained operators (of communication sets), and equipment compatibility. The concern here is to address these issues well in advance, and to initiate action so that communication links are maintained during the subsequent phases of the crisis.

### Protective Action

As a corollary to warnings, the factor of protective action needs prior consideration. As and when warnings are communicated, necessary safety and precautionary measures need to be taken, both at the social and individual levels. Such actions, when planned for in advance can considerably reduce loss of life and injuries and to some extent property damage (i.e., particularly moveable property). In the social sense, shutting off power systems to preempt injury from fallen wires during severe storms, and blocking roads to vulnerable areas are two such examples. Securing of loose objects, taping of windows, personal protection

(going to the basement, or lying down in ditches if caught during tornado) are instances of in the open а individual/family protective measures. One of the most comprehensive forms of protective action is evacuation. social and individual elements come together. Here. Families/individuals decide whether to evacuate, and at what time to do so. Community organizations such as the police or civil defence agencies may have to urge evacuation, as well as route and direct evacuees. Unless such contingencies are considered earlier, evacuation will be clumsy and inefficient. Therefore measures such as predetermination of major exit routes, evacuation drills, and direction of traffic/evacuees will have to be prepared for in advance.

### Stockpiling

availability of essential The commodities and necessary material during emergencies is critical to the effective management of the crisis. Items such as food. fuel, and medicines are needed on an urgent basis, in a larger volume and in a shorter period of time. Response would be extremely weak, if not altogether ineffectual, unless these materials were readily available. It is therefore essential to stockpile such items in the community. This is particularly so for areas, which due to

their location, are cut off and isolated -- such as villages in flooded delta areas.

Perhaps if there is a surge in demand for particular goods (like medicines), local stocks will have to be supplemented through external aid or purchase. Considering the overall scarcity of resources, a severe constraint on response is imposed. То overcome such limitations, resource management must be applied. Though exact needs cannot be anticipated at the pre-disaster stage, these can be estimated and incorporated in the planning stage. That is to say, local plan documents should include the awareness of where and what resources are available. Information about and access to such resources during the crisis can go a long way in alleviating the associated with stress resource shortages during emergencies. Valuable time can be saved if knowledge about the location and availability of stocks is present with emergency managers. For instance, if water pumping sets (for draining stagnant water) are in short supply, prior information regarding from where more of these can be obtained (say from the private sector, or neighboring towns), will save precious time.

### Public Awareness

No amount of planning and agency preparation will be effective unless it works through members of the local community. Measures such as warnings, communications, safety measures are directed to evoke a specific response from people. They are expected to conform to advisories being issued by authorities. However, unless the community is prepared and made aware of issues and factors involved, participation will be weak. While community members may be aware of certain aspects due to their own past experiences and knowledge, meaningful measures will not be possible unless overall level of awareness is increased. This can be achieved through means of mass media and other publicity methods such as posters, pamphlets, demonstrations (like fire drills), and audio-visual techniques. While people may be aware of the dangers of disasters, they may not have adequate knowledge about protective action. The dos' and don'ts of particular situations need to be publicized. The adoption of such protective action can be facilitated by appropriate propagation of tips and guidelines through awareness increasing campaigns. Community awareness is a requisite for efficient pre- and post-impact activity, and must be incorporated in the planning effort.

### Training

A large number of personnel from different agencies involve themselves with various stages and aspects of disasters. To increase efficiency of their efforts training Issues of agent be instituted. programs need to characteristics, management principles, communication skills, assessment methodologies and similar disaster related issues need to be highlighted during such programs. Further, such courses need to be conducted on an interagency bias, so that factors such as assets and weaknesses of each agency can be highlighted. This enables personnel to recognize their mutual strengths and limitations in advance. Through training programs, it is expected that the overall response will be greatly enhanced. (Chapter six treats the subject in greater detail).

#### POST-IMPACT

In addition to what can be done prior impact, other different demands are generated after impact. Planning and efforts must take advance action in anticipation of such needs also. There are seven such post-impact related demands discussed below.

#### Search and Rescue

immediate aftermath of impact, the main In the activity is to try and restrict further loss and suffering. A typical activity is of searching and rescuing injured and threatened people, and salvaging property. In the instance of earthquakes, victims entrapped under fallen material are In the case floods, marooned searched out and rescued. people brought to safety through boats and/or are helicopters. All these are examples of tasks that are and salvage" principles. The performed along the "save primary aim being to contain the extent of the disaster in terms of losses. Based on the type of hazard thus, search and rescue needs have to be anticipated and incorporated in the plans for the local area.

### Welfare Demands

Subsequent to  $\mathsf{the}$ immediate needs of the postimpact period, other demands surface with reference to survivors whose lives have been fundamentally disrupted. Family members may have lost their only bread winners. Others may lose their homes (or access to them), and require interim assistance such as provided through relief Destitute, old and infirm people, pregnant or camps. lactating women, and physically handicapped people form a

particularly vulnerable segment of society, requiring extended care and looking after. Relief activities typified as "food, clothing and shelter" are conducted as a response to such "welfare needs".<sup>7</sup> Making available such items as food, drinking water and medical assistance are the focus of attention. Relief materials from external sources is in response to these needs. Administrative measures required to cater to such demands therefore need to be estimated in advance and planned for.

#### Care of Dead and Injured

Despite efforts to save lives, fatalities and injury do occur. Such needs generates a separate set of activities. Identification of the deceased, body disposal, certification, and obtaining details of the surviving family members for purpose of subsequent assistance, are demands that need to be met in the case of loss of life. For those who are injured, medical assistance need be provided on the basis of assigning priorities (in terms of gravity of injury, etc.), setting up of mobile hospitals, requisitioning of medical teams, (doctors, surgeons and nurses). These are types of responsibilities that surface during such circumstances. However, unless these needs have been anticipated and identified in advance, they will not be effectively or efficiently undertaken.

### Community Order

During emergencies, there is an overall uncertainty and consequent stress, leading to a sense of extreme insecurity. It therefore becomes the responsibility of public organizations to provide measures that seek to reassure the community. Guarding of property, patrolling of streets, and the general presence of authority and symbols of control (such as uniformed policemen) conveys a sense of order and provides a measure of security. This of course commits of resources, personnel and vehicles etc., and must be planned for in advance.<sup>8</sup>

### Assessment of the Situation

Demands made by a community during and after disasters are varied and dynamic. There are needs that have to be catered to that arise out of the immediate stress situation. Subsequent needs are created as different actors become progressively involved. Thus a constant monitoring of the situation is required. There is the need to maintain a system that provides constant assessment. Droughts, for instance, first create the need for drinking water and fodder supply. Gradually, with the continuation of adverse conditions, the need to open relief camps and food distribution centers arises. Eventually "relief works" may

have to be opened, and agricultural inputs supplied so as to provide means of sustenance to the affected population. Food stocks in the meanwhile may have to be imported to the area. Requisitioning of such food items in turn generates other demands of transportation, storage and distribution. In the case of hurricanes or floods, demands change from initial alerting and warning to rescue and medical assistance. Other subsidiary demands also emerge in different directions/sectors, such as opening of relief camps, removal of debris, restoration of public utilities, distribution of relief materials etc. Similarly, as more organizations and volunteers groups emerge on the scene, and additional material arrives, they create their own needs that must be met. A mechanism therefore must operate that constantly assess and transmits such changing demands so that they are taken into account while allocating physical and personnel resources.

### Co-ordination

Response activity during disasters is performed in a compressed environment of time and space. There is also an urgency to act. These factors create the need to coordinate all activity. As the situation develops, a greater number of other demands surface. This in turn involves an increasing number of organizations and groups. These groups
and organizations are drawn to work together for the first time. A number of them may be new to the local scene such as volunteers from other locations, or international relief agencies. Many may become involved in activities that overlap with Finally, other agencies. even where organizations have had previous working relationships during emergencies, the previous relationships may not apply. Personnel or administrative units take up different roles that create new inter-agency relationships. Given these variables, efficient response will not be possible unless effective co-ordination is applied.

Similarly, different agencies bring with them distinct as well as complementary resources. Since disaster demands continue to change, resource utilization has to be appropriate in keeping with assigned priorities. However, since each organization comes with its own priorities and perspectives, disparate sets of priorities may operate, and scarce and valuable resources are inefficiently utilized. To prevent such inefficient activity, a co-ordinating mechanism is essential. Only with co-ordinated activity does overall response become meaningful.

Finally, as discussed earlier, disaster situations create the need for effective information and assessment of the situation. However, in order to assimilate the multiple

information channels that may surface during emergencies, a centralized system may be necessary to co-ordinate the flow of information. Such a mechanism enables checking, balancing and cross referencing information, and also helps appraise the fluctuating situation more efficiently. Based on proper information, the community is made aware of the extent and nature of the problems that require to be confronted, and accordingly priorities can be assigned and resources distributed.

In essence, effective response creates the need for co-ordinated activity. Mechanisms to achieve this should be incorporated in the planning process. Issues such as which organization will assume prime responsibility for basic tasks, and which agency will co-ordinate efforts, need to be addressed on a priority basis and included in the plan documents itself.

As a corollary to the above, it becomes equally essential to specify control and authority links." Which organization would perform lead roles in specific spheres of activities needs to be established prior to the disaster. Else. if each organization were to work independently, on the basis of their own respective spheres of domain, inefficiency and confusion are bound to surface. The question of "who is in charge here" should not arise

during disasters. Therefore specification of responsibility, authority and span of control need to be agreed upon and documented to obtain appropriate response patterns.

## Protection Against Continuing Threat

characteristics Disasters carry such that subsidiary hazards threaten communities after impact by the `parent' disaster. Action has to be taken to prevent them, or take protective action against them.<sup>10</sup> Droughts cause other problems such as malnutrition, which in turn leads to fatal consequences. Floods cause outbreaks of water borne disease, epidemics and pollution. Threats of fallen electrical wires, and fires resulting after earthquakes are other examples of "secondary" hazards that need to be anticipated and planned for. Otherwise, last minute, unplanned response efforts to such demands would indeed be extremely limited and inefficient.

#### RECOVERY

The final set of activities related to disaster management are conducted to effect recovery of the community. These may be so directed as to a) simply return the affected people to pre-disaster status, b) improve their position such that future vulnerability is reduced, or c) to plan recovery in such a manner that the community is mitigated against future disasters altogether. However, in terms of planning and preparedness objectives, two basic sets of activities need be considered; 1) restoration of essential services, and 2) rehabilitation.

#### Restoration of Essential Services

been forcefully It has argued that eventual restoration of a community to "normalcy" can be effectively achieved only after necessary and essential social services are restored.<sup>11</sup> Therefore early restoration of this sector would trigger a positive recovery chain-reaction in other sectors such as markets, business etc., in turn creating an environment wherein other activities can limp back towards normalcy. Considering this, it becomes extremely important to attend to these demands (as early as possible), in the overall effort to tide over the disaster. This highlights the role of public works and utility agencies like electricity, water and communication. Their role and contribution must be planned for and incorporated in the overall scheme of actions to realize early recovery.

#### Rehabilitation

Disasters damage or destroy economic opportunities upon which families may have supported themselves.

Droughts, floods, hurricanes, tidal waves etc destroy farmlands, crops, fishing vessels and gear, handicraft and cottage industry tools etc, which are the means upon which the vulnerable sections of society subsist. most Considering the marginal levels of economic support such sectors exist on, it becomes absolutely essential to cater to their requirements. Activities such as opening of relief works, provision of inputs and cheap credit need to be extended if response to these needs (urgent as they are) is to be meaningful. On the other hand, should this aspect be ignored then there is the real risk of rendering such families destitute. Planning and maintaining a list of relief works which can be initiated quickly for example, would facilitate early appropriations of necessary funds to initiate early rehabilitation activity.

The above section detailed various demands that tend to surface during emergencies. It highlights the need for addressing them at the planning stage of disaster management. This provides a guideline for the tasks that require to be anticipated and planned for. Through such preparatory measures, response and recovery are effective and efficient, as opposed to a crisis-oriented, ad-hoc management style of "as-it-comes" basis.

#### CONCLUSION

Disasters impose an environment of uncertainty and stress. To cope with such circumstances, society must adapt comprehensive measures. Planning is an important tool available to communities in this regard. Through planning efforts, a rational approach for confronting the issues can be adopted. The primary problems that the planning process addresses are identified through risk analysis, which reveals the vulnerable status of communities. Based on this information. assessment of needs, resources an and capacities can be carried out. In effect, rational options can be exercised in adopting future strategies and laying out of priorities.

The framework within which planning is contained was defined by "horizontal" and "vertical" factors. Evaluation of, and sensitivity to such factors in turn identifies options available for further action; in terms of levels of organizational intervention and strategies. A meaningful exercise is possible only if cognizance is taken of all the factors in one comprehensive, broad perspective.

The needs and demands that a plan must address were identified in three primary sets; a) pre-impact demands, b) post-impact demands and c) recovery related demands.

Sensitivity and appreciation of such requirements enhances the effectiveness of a plan and subsequent activity. Finally certain principles of planning were outlined. Issues such as the continuous nature of planning, the need to keep it flexible, adaptable and realistic were extrapolated.

In effect, preparatory planning is a comprehensive measure to cope with natural calamities. While environmental elements cannot be changed or modified, the severity of their impact is sought to be softened. And this is achieved through restraining impulsive reactions, and instead adopting organized, rational and appropriate coping mechanisms that are conceived well in advance.

## NOTES

1.U.S., National Governors Association, Center for Policy Research, <u>1978, Emergency Preparedness Project</u>, Final Report, May 1979, p. 106.

2.Russell R. Dynes, E. L. Quarentelli and Gary A. Kreps, <u>A</u> <u>Perspective on Disaster Planning</u>, 3rd. ed. Report Series 11, n.p.: Disaster Research Center, Ohio State University, May 1981, p. 2.

3.Ibid., p. 3.

4.Ibid., p.2

5.Preparedness planning is essentially concerned with three phases of disasters; pre-impact, response and recovery. It is by keeping this in mind that the format regarding preparedness measures has been developed. That is, preparatory activity is viewed as an effort to anticipate and plan for demands that are <u>likely</u> to arise during disasters. And since the correlation is with the pre-impact, response and recovery phases, planning activities have also been divided according to the respective demands of these three phases.

There is, however, another perspective for categorizing the planning-demand nexus. Instead of viewing demands in terms of phases of disasters, they are grouped into two types.

"The first set is those demands which are generated by the disaster agent as it impacts the community and are labelled <u>agent-generated demands</u>. In responding to these demands, the community will then be confronted with a new and more general set of demands; these are designated as <u>response-generated demands</u>." Ibid., p. 9.

In this format, the "agent generated" demands are; warning, pre-impact preparations (call up of personnel etc), search and rescue, care of injured and dead, welfare demands, (food, clothing and shelter), restoration of essential community services, protection against continuing threats, and community The list of "demands" addressed between the two formats is fairly similar. The scheme adopted in the text, however, provides one additional substantive element that is not readily traceable in the alternative approach. By proceeding sequentially, the demands of the `long-term' recovery phase are also incorporated in the framework.

ordination, control and authority.

6.U.N., Office of the United Nations Disaster Relief Co-ordinator, <u>Disaster Prevention and Mitigation, A Compendium of Current</u> <u>Knowledge, Vol. 2 Preparedness Aspects, UNDRO., 22/76, 1984.</u>

7.Russell R. Dynes, E. L. Quarentelli and Gary Kreps, <u>A</u> <u>Perspective on Disaster Planning</u>, 1981.

8.Empirical research conducted so far reveals little evidence that `looting' actually occurs during natural calamities. What is more important is that " many <u>stories</u> of looting will circulate, but actual instances will be rare and if they occur will be done by outsiders rather the impacted population itself". E. L. Quarentelli, "Research Findings on Organizational Behavior in Disasters and Their Applicability in Developing Countries", Preliminary Paper No. 107, Disaster Research Center, Newark (Delaware): University of Delaware, 1986, p. 5.

9.Russell R. Dynes, E. L. Quarentelli and Gary Kreps, <u>A</u> <u>Perspective on Disaster Planning</u>, 1981.

10.Ibid.

11.Ibid., p. 10.

## CHAPTER SIX

# TRAINING FOR DISASTER

## TRAINING FOR DISASTERS

The purpose of this chapter is to identify training requirements for organizations that engage in disaster preparedness, response, and recovery activities. At the outset, it must be recognized that considering the large number and levels of organizations involved, as also the innumerable overall response variables, the task of identifying specific training schedules is indeed fraught with inherent difficulties. Considering cross-national, or even intra-national cultural, social, economic, and administrative differences, any attempt at training evaluation per-se must be macro in nature and scope. Thus, the attempt in the following pages will be to highlight certain key principles that need to be kept in mind while preparing micro level training schedules. It is hoped that this would provide a background for guidance rather than any direct transplantation.

At the outset it must be recognized that in order to be effective, a training program should be based on conceptual frameworks. This provides consistency and

cohesiveness to the exercise. Therefore it is fundamental that there is complete familiarity with the various issues of disaster management such as ; it's sequential phases, agent characteristics, type and nature of organizational involvement, time and spatial factors of disasters etc. All such issues, aspects and concepts have direct bearing on training needs. Based on such background material, concrete training programs can be determined. However, in order to focus on the more important factors, some of the conceptual variables may be placed in conjunction with one another, and identify commonalities of approach and direction.

## AGENT CHARACTERISTICS

Regarding the characteristics of disaster agents, nine such traits have been identified<sup>1</sup>. However, for the purpose at hand, these will be grouped together such that functional similarities can be deduced. While the frequency aspect remains distinctive in character, the traits of predictability, speed of onset, and length of forewarning have a certain linking thread which enables their being grouped together. What is essentially relevant in these aspects is their relationship to the element of time and opportunity that they make available to agencies before the actual onset of the disaster. Further, the characteristics of duration and cause can be linked

together. The rational of such a grouping is that both have bearing on the nature of strategy that agencies adopt in the post-impact stage. Thus, while the **causal** aspect determines the type of tasks to be undertaken, **duration** has implications for the speed, endurance, and planning aspects. Both however are relevant at the preparatory stage of disaster management, and relate to the subsequent response and recovery phases of intervention.

Finally the characteristics of scope of impact and destructive potential may be joined. This because they are concerned, not with the elements of time and speed, endurance, and specific types of tasks, rather, they encompass the magnitude of the adversity in terms of time and resource. They have a direct bearing on logistical planning, and the degree of stress the community is likely to undergo and endure.

The ninth characteristic, controllability primarily relates to long term mitigation activity. It concerns itself more with technology and scientific research. It has little relevance to training aspects, and need not be included for further consideration in the present context.

The above combinations are by no means a suggestion to enclose the characteristics and mutually insulate them. Rather it has been introduced as a practical working rationale, based on which training principles can be evolved.

## A FRAMEWORK FOR TRAINING

is essentially undertaken to equip Training personnel to handle crisis situations as they develop from the stage of detection and issuance of warning. From this stage onwards, the machinery of response (and later of recovery) is activated, and agencies begin to commence work, primarily along the "time sequence" line of activity.<sup>2</sup> In order to focus upon factors that define training needs, the following variables are relevant: i) disaster agent characteristics as in their groupings above, ii) the "time sequence" of activities, iii) organizations with reference to their levels of operations and iv) with reference organizations to their tasks and responsibilities. By formatting these variables in a matrix which highlights their relationships to each other, a practical framework of reference for training programs can be formulated. Table 6.1 below provides, at a glance, such a matrix model.

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Table 6.1

AGENT CHARACTERISTIC	TIME	ACTIVITY/AGENCY
Frequency	Pre-disaster conditions, warning and Communication	Risk-mapping, Planning, Finance, Preparedness, and Coordination: National & State levels.
Predictasbility Speed of onset, Length of fore- warning.	Warning, Threat, Impact, Rescue.	Communication, Planning, Coordination, and Stockpiling: State and Local levels.
Duration, Cause.	Threat, Impact, Rescue, Remedy and, Recovery.	Emergency services, Local coordination, Relief supply, Shelter Camps: Local & State levels.
Scope of Impact, and Destructive potential.	Impact, Rescue, Inventory, Remedy and, Recovery.	Relief supplies, Logistics, Health, Fire Police, Public works, Utilities & Mass media: Local & State levels.

Table 6.1 is a reference framework which provides a springboard from which training principles can be drawn. The purpose of training is seen here as preparing emergency related personnel to confront response and recovery situations in as coherent a manner as possible. Like planning, training would "help delay impulsive reactions in preference to appropriate actions necessary in the situation"<sup>3</sup>. Therefore training highlights, at a pre-disaster stage, what various agencies and personnel will be required to do, and what they must expect from others, and what others expect from them during actual emergencies. Based on the background information on concepts, issues and characteristics of disasters, certain underlying principles upon which training programs can be drawn up can be formulated. The following pages seek to highlight such guiding principles. A brief tabulation of detailed types of training is also presented subsequently.

## PRINCIPLES OF TRAINING

With reference to **Table 6.1** we observe that the first agent characteristic is "frequency". This essentially concerns the mitigation and preparedness phase of emergency management. Based on this characteristic vulnerable areas and regions are identified. Once this has been achieved, further activity is conducted. In the time sequence of disaster response, the phase of "warning" and "threat" would be relevant. And these two variables of "frequency" and "warning" determine the nature of agencies and likely to be involved. Primarily resources that are agencies likely to bear responsibility due to these factors concerned with ; communication, planning, those are coordination, and preparedness. For instance, if a region has been identified as Hurricane prone, then preparatory will involve action meteorologists, mass-media. communications and warning personnel. On the other hand, if an area is declared drought prone, then a different set of strategies would be called for, even though the agencies involved would be roughly the same. Thus while in an area subject to hurricanes, the meteorological agency would use detecting and tracking instruments, in a flood prone area, the installations would be such as to measure precipitation and flow forecasts. What is pertinent is that these variables demand the attention of national level agencies. Organizations such as planning offices. finance departments, meteorological and land survey agencies, housing/development related organizations, irrigation, agriculture, and industry promoting agencies would be involved in this stage. As be observed. the can requirements are technical in nature and call for a great measure of coordination. Therefor at this level rather than

detailed training, familiarization with disaster situations, characteristics and concepts would be pertinent.

The next set of characteristics are concerned with time, warning, speed of onset, and opportunity available for pre-impact actions. Dependent on these variables are the time phases of warning, threat, impact, rescue, and remedy. The focus of attention would be state level organizations. Based on the frequency pattern, the detailed setting up of warning and communication links would be called for. This involves agencies such as mass media, units, land-line telex, state level meteorological telegraph systems, police radio mechanisms and private voluntary communication oriented organizations like HAM. The speed of onset variable determines the nature of preparatory measures taken for early response activity. Thus, agencies involved with shelter management, relief camps, public works and utilities, state level planners and coordinators would be concerned. The elements that require emphasis at the State level training programs will be centered around a) coordination strategies, b) planning, and c) communications. Therefor interorganizational goals and objectives, familiarity with organizational resources and constraints would need to be highlighted. Finally all

concerned State agency personnel should be made well aware of the values and possibilities of preparatory measures. This would enable them to conceive, plan and implement locally relevant schemes towards disaster preparedness.

At the sub-state, local levels, the characteristics of predictability, speed of onset, and length of forewarning are important. In the time reference these units would be directly involved with warning, threat, impact, rescue, and remedy. It is at this level that the reception of warning messages are translated into action, and local mechanisms are activated into responses. What requires to be emphasized at this level therefore would be; a) coordination with other local agencies, b) coordination with State level agencies, c) familiarity with resources and constraints of other local organizations and those in the adjoining vicinities, d) ability to receive and effectively communicate warnings and required actions. The variables of speed of onset and length of warning would call for; a) evacuation procedures and mechanisms, b) the effectiveness of communication facilities, c) gearing of immediate relief requirements, d) increasing the operational level of medical centers, and e) placing of public utility services on alert. The principles that require emphasis at this level are those of communication,

coordination, and crisis management.

factors are the durational and The next set of causal characteristics of agents in the context of their implications for response and recovery activity. The focus of activity here shifts from the state to the local level. Thus, prime training activity concerning these variables would be centered around local agencies. The issues around which local organizations require training will be coping mechanisms to deal with the `threat' stage of response based on survival actions. Thus, evacuation in terms of hurricanes and earthquakes would be likely situations that local community. Concerned agencies will will face the require training in dealing with such situations. Traffic. pre-determining evacuation routes and, directing of evacuees, are typical activities around which training would center. The subsequent phases of impact, inventory and rescue call for the peak performance of all emergency related units such as police, fire, health, public utilities and voluntary groups. Coordination, stockpiling and assessment of damage, restoration of public utilities, relief material inventories, opening of relief camps, distribution of medical and other aid ("food, clothes and utensils") are activities that would take place during this stage. Therefor training in crisis management roles,

assessments, inventory, first-aid, clearing of debris and obstacles, and shelter management will be called for. Dependent on the `cause' and `durational' elements of the disaster will be the recovery pattern. In case of short thelikely time available for duration disasters, initiating recovery programs is also shorter. Training should concern itself with measures such as opening of relief works, distribution of inputs and raw material such as seeds in order to assist victims towards restoration of normal activity. The principles involved are interorganizational coordination, collection and dissemination of relevant information to state level authorities, receipt and utilization of aid material and management of local human resources.

At the state level, training implications for these variables would be receiving and compiling damage reports, receipt and dispatch of relief materials, and informing national level agencies of current developments.

The final set of factors relate to the characteristics of scope of impact. As mentioned earlier, these considerations determine the magnitude, and extent of damage. These in turn affect the logistics of essential commodities, relief supplies, types and duration of shelter/camps, and levels of organizations to be involved.

There is also the implication for the "period" of response and recovery activity. The principles of training therefore include issues such as organizational sustenance and endurance, resource allocations, coverage of relief (personnel and other resources). Medical facilities, public works, public utilities, assessment units and media agencies would be involved.

While the above are local level requirements, at the state level (depending on the extent of impact) the organizational resources that may be called forth would be information based (i.e., receiving and processing information from local levels, and forwarding them, when necessary to national level agencies), commitment of larger resources, obtaining of national and international aid material and technical expertise.

#### TYPES OF TRAINING

Given above were certain general guiding principles around which training programs could be based. Finally certain catalogue of specific types of training and educational programs that could be adopted are presented below. These are arranged on the organizational level basis ie. national, state and local.

#### NATIONAL LEVEL

At the national level the following training and informational activities could be conducted :

- Conduct sessions to introduce information and concepts of disasters and their management.

- Dissemination of current advances in mitigation and preparatory methodologies.

- Evaluation of existing limitations in disaster management policies.

- Evaluation of ongoing disaster related projects and programs.

- Familiarize participants with current policy frameworks and guidelines.

- Familiarize participants with ongoing schemes/projects that have been successful.

The session to cover the above suggested aspects should involve national and state mid-career level officials from government and voluntary organizations. Agencies such as those involved with planning, finance, meteorology, agriculture, rural development, food supplies, health, social welfare, irrigation, education, housing, water supply, animal husbandry, Red Cross etc. need to be invited for deputing participants.

At the national level training center, a schedule should also be structured to impart training to those who could be called upon to train other personnel at the state and local level training sessions. Further at the national level, seminars and workshops should be organized at least once a year. These forums should be used to call upon non-government government and agencies to exchange information and knowledge and current issues relating to disasters. These forums would provide a good ground for injection of fresh ideas, technologies and methodologies, as well as provide a good opportunity for communication of research endeavors and direction. Through such exchanges, the general level of awareness would be greatly enhanced.

#### STATE / REGIONAL LEVEL

While it may not always be feasible to organize training courses for each state or province; taking geographical and administrative circumstances into consideration, training sessions could be organized at regional levels. These courses could be arranged subsequent to the national level course. The following aspects and issues need to be highlighted at this level:

- Introduction and familiarization with concepts and principles of disaster management.

- Introduction to the principles of emergency

planning.

- Familiarization with communication and warning devices and methodologies.

- Provide informative material to mass communicating agencies, ie. material such as would be useful for public educational purposes, like warning codes, and accurate reportage.

- Provide information on techniques, methodologies and relevant approaches for sanitation and health measures.

- Provide methodologies for setting up and establishing relief camps and centers.

- Provide ways and means for effecting evacuations.

- Provide methodologies for stockpiling of essential commodities.

- Conduct sessions to enhance inter-district (local levels) and state - local familiarization of mutually beneficial resources.

- Conduct simulation exercises to enhance managerial, communication and resource management skills, particularly between agencies of different administrative jurisdictions.

- Substantiate theoretical frameworks with case-study material on emergency planning, coordination and management approaches. Each participant may be asked to come prepared with a case study, and in order to make the training more effective and practical, such case studies be used as exercises.

- Provide general orientation with preparatory, response and recovery measures and methodologies.

The above training courses should normally involve state level mid-career and local town, district senior level officials. Participants should be drawn from the newspapers, following sectors; meteorology, radio television. health and sanitation, social welfare, agriculture, rural development, education, irrigation, drinking water supply, public utilities, voluntary organizations, industry, food, town, city and district managers and police personnel. The normal duration of the course should be about five days.

### LOCAL LEVEL

The level of efficiency in response and recovery are determined primarily by the nature of reaction by the local community to a disaster. It is thus at this level that coping mechanisms must be strengthened and regular programs be conducted as a matter of priority at this level of administrative jurisdiction.

Training aspects at this level should concentrate

or consist of the following features and aspects :

- Method and techniques for setting up shelters and camps and their management.

- Inventory techniques.

- Familiarization with local disaster situations; awareness of local vulnerable areas etc.

- Techniques and formats for damage assessment and reportage.

- Enhancement of communication skills.

- Professionalization of emergency medical procedures (ie. mass casualty situations etc), principles of stockpiling essential medical requirements.

- Methods for establishing mobile/temporary posts for health, relief and information.

- Logistic management.

- Methods and procedures for debris removal etc.
- Search and rescue methods.

- Principles of mass evacuation.

- Principles of local people participation.

Training sessions should be conducted with such frequency so as to cover an area at least once a year. Local level officials could be drawn from organizations such as; food stocking agencies, local voluntary personnel, civil defence, police, fire departments, municipal, health, sanitation, para-medics and public works personnel. Local town managers, police chiefs and village leadership should also be involved.

Apart from the above training session, regular drills and exercises should be conducted to increase response capabilities in the following aspects :

- Traffic control and regulation for evacuation contingencies.

- Fire fighting drills.

- Familiarization with warning messages and codes.

- Evacuation.

The key personnel for such exercises would be town managers, district officers, police, fire, health and paramedic staffs, civil defence and local political leadership.

Listed above were illustrative examples of the nature and type of training programs around which specific schedules could be drawn up. Training itself could be conducted from established centers at the state and national levels. In this regard it would be appropriate to set up a National Center for Emergency/Disaster Training, with sub-centers located at regional locations among the various states. To further utilize the resources of these centers their personnel should be made to research on local/regional requirements, characteristics and pattern of pertinent disaster related behavioral issues. As for the local level training programs, instead of deputing personnel to regional area centers it would be of advantage to hold the sessions locally.

#### CONCLUSION

The stated purpose of this chapter was to provide a framework for disaster related training needs. As was stated at the outset, due to the large number of variables involved, outlining of specific training schedules would be beyond the scope of this exercise. Instead, relevant information was provided so as to enable concerned authorities to draw particular schedules. Based on these, it is considered that lead agencies would be able to establish policies and schedules for training personnel, units and groups in disaster related issues, techniques and skills. To implement such policies, training centers need to be established, and arrangements made for recruiting qualified instructors, and obtaining of appropriate equipment and related material. Further such centers should be made to maintain and update training aids such as films. audio-visual material and literature relevant to disaster types and regional requirements (in local language where possible).

In effect, training programs should be held on a regular basis, and made to encompass the various areas of specialized skills and techniques. This would generate a body of skilled personnel who would assist in conducting effective operations during emergency and community stress.

Essentially training should be utilized in terms of imparting certain specific skills, as also general background information. Training (like planning) should be conceived;

in the broader sense of educating oneself and others about what can be anticipated to happen, what the problems can be, and what are the most efficient and effective responses possible in a community emergency.<sup>4</sup>

And this because disasters and emergencies subject communities to adversity and stress. This adversity and stress would be further compounded by lack of trained and skilled personnel, and would seriously handicap disaster related preparedness, response and recovery efforts.

## NOTES

1.Russell R. Dynes, <u>Organized Behavior in Disaster</u>, The Disaster Research Center Series, eds. E. L. Quarentelli and Russell R. Dynes, "n.p.", Disaster Research Center, Ohio State University. 1974, pp. 51 - 55.

2.See Chapter Two, pp.43-45.

3.Russell R. Dynes, E. L. Quarentelli, and Gary A. Kreps, <u>A</u> <u>Perspective on Disaster Planning</u>, 3rd. ed. Report Series 11, "n.p." Disaster Research Center, Ohio State University, May 1981, p. 2.

4.Russell R. Dynes, E. L. Quarentelli, and Gary A. Kreps, <u>A</u> <u>Perspective on Disaster Planning</u>, 1981, p. 3.

## CHAPTER SEVEN

# WARNINGS

# AND

# THEIR COMMUNICATION

## WARNINGS AND THEIR COMMUNICATION

One of the most critical elements that determines social preparedness in responding to natural disasters is effective warning system. It involves monitoring and an detecting significant alterations in the environment, and interpreting these changes with respect to the risk they Considering the physical may pose to a community. characteristics of extreme natural phenomenon, technical limitations exist in providing warnings against all types of natural hazards. However, with scientific progress, certain types of "agents" can be monitored and successfully warned against. Such warnings, if efficiently communicated, provide communities with valuable information that enables them to take protective action.

Apart from technical feasibility and considerations, there are other associated variables which exert constraints and limit the effectiveness of warnings. Two such factors are: the administrative infrastructure available and the socio-psychological behavioral patterns that exist within respective societies. These two are

respectively concerned with the communication and reception segments of a warning system. Thus warnings do not merely involve the collation and dissemination of information. Rather other related elements also influence the eventual outcome of the warning effort. and require to be acknowledged and incorporated at the outset itself. This highlights the importance of viewing warnings and their communication in an integrated perspective. Each segment is inherently linked to the others to form a complementary, mutually supportive system. It is the purpose of this chapter to describe the main features and elements that comprise such an integrated warning system.

While the importance of a warning system can scarcely be overemphasized, it is nevertheless disconcerting to observe that research, commensurate to needs has not taken place. It has been noted with surprise "to see that the proportion of findings dealing with warning processes is very small. Only 10% of all findings dealt with that topic."1 Further, since most of the available research has been conducted within the context of "Developed" nations, it is difficult to estimate its relevance and applicability to the "less developed" nations. Therefore, should (as indeed it may) external aid in the form of advice and equipment be determined by "western" oriented research, then, the likely benefits it will provide would be dubious. Irrelevant aid could very well lead to misapplication of limited resources, and a strain on national wealth and effort.

Another factor that draws attention is that most research towards warning has been oriented to the technical (collection, measurement, collation and interpretation of information) and response aspects (reactions by the community). Administrative issues have seldom been accorded the priority they merit. Essentially, activities included within an integrated warning system are divided into three sequential phases; 1) evaluation, 2) dissemination and 3) response.<sup>2</sup> As appears from the conducted research, constraints surround the polar aspects of evaluation and response, which are related to the technical and sociopsychological variables respectively. However, it may well be that overcoming these constraints may lie in the central aspect of dissemination and communication. Issues regarding who are to be warned, by whom, at what level, the terminology to be used, the content of messages, and determining the frequency and methods of communication are fundamental issues upon which effectiveness hinges. The answers to these questions do not lie so much in technical and socio-psychological issues. These are primarily related

to the actual, practical handling of the situation, and therefore in essence are administrative concerns.

The attempt in the following pages is to describe the chief elements of a warning system. In presenting relevant features, theoretical concepts and administrative principles are emphasized. While general principles are described along with appropriate examples, sight should not be lost of the fact that micro-level applications are dependent on societal and administrative differences.

#### WARNINGS AND PREPAREDNESS

For any community to protect itself from adversity of disasters, a comprehensive effort is required towards preparedness. Such measures incorporate detailed planning, coordination and establishment of infrastructure, so as to raise the community's level and quality of potential response to impending and actual occurrence of crises. Setting and establishing effective an warning and communication system is one such effort which is essentially

based in preparedness, whether it be warning of the impending initial impact of the agent (the half hour before a tornado), warning during impact (as in long-term floods), or warning after impact of secondary hazards (like fire).<sup>3</sup>

Essentially, "warning" has been defined as;
the transmission to individuals, groups, or populations of messages which provide them with information about (1) the existence of danger, and (2) what can be done to prevent, avoid, or minimize the danger.<sup>4</sup>

It must be noted that the second part of the definition is as critical to the concept as the first. Therefore to ignore it would defeat the purpose of warnings entirely. Yet,

In practice, it often seems that only the first part of the definition . . . is emphasized explicitly. The second part of the definition (what can be done to prevent, avoid, or minimize the danger) is often left on the level of an implicit intention of the communicator. A warning, then, is more than the notification of danger; it is a call to action.<sup>5</sup>

The appropriateness of a warning system is mainly dependent on local circumstances, of which hazard proneness is of prime importance. Thus, a system can be established only after a vulnerability analysis is carried out.

The assessment and evaluation of potential disaster risk within a community must precede planning in order to fully determine planning requirements and resource priorities. In much the same way that monitoring the environment and detecting the impending impact of a hazard precedes warning, preparedness for such an event is preceded by an understanding of the hazard potential in a community.<sup>6</sup>

As research in the social sciences has shown, other factors such as local socio-economic conditions, language, occupational patterns, past experience, administrative and political structures etc. are all relevant inputs to an effective warning system. This in turn highlights the fact that appropriate systems are relative, and success in place A is no assurance for place B. This remains true not only between the "developed" and "less developed" countries, but also, within continents and countries, when there is vast cultural diversity. Factors of language, customs, etc., play their part to check any indiscriminate imposition of common systems beyond a point. Preparedness measures must therefore take local factors into consideration while structuring a warning and communication system.

#### INTEGRATED WARNING SYSTEM

An "integrated warning system"<sup>7</sup> links in logical conjunction the various elements that are involved in warnings, and presents them in the perspective of their sequential linkages. The three main functional phases are 1) evaluation of the threat, 2) dissemination of the warnings and, 3) response to these warnings. Each of these facets are influenced by one another, as also by a number of external factors. This interplay determines the dynamics of warning systems and their operations.

### EVALUATION

Evaluation is the first functional element, and initiates the process of warning. It involves detection of elements in the environment that may pose as potential threats to communities. Measures performed during this stage include activities starting from the initial detection of hazards to the issuance of actual warning messages to outside agencies and communities at large. Normally, these functions are performed by specialized agencies such as meteorological establishments and flood control authorities, though at times certain hazards may be initially detected by others, such as, the sighting of an approaching tornado by an individual. However, in the main, responsibility rests with weather observing agencies.

The collation and evaluation of initial and additional information concerning the hazard are usually performed by some formalized hazardrelated organization such as the National Weather Service, for which such tasks are part of its normal operations.<sup>8</sup>

Apart from the actual detection of hazards, other processes involved in this phase are "measurement, collation and interpretation of available information on the threat."<sup>9</sup>These tasks are highly specialized and technical in nature, requiring technological equipment and expertise. These activities are all performed within the confines of the agencies concerned, with no external inputs. Even though such tasks form the first stage, they do not conclude with the dissemination of the initial warning. In some instances, like floods and hurricanes, a continuous "watch" has to be maintained until the all clear signal has been given, indicating return to normalcy.

Despite the importance attached to this stage of the warning process, certain limitations present themselves in achieving desired levels of efficiency. One of the constraining factors lies in the characteristics of disaster agents. Essentially nine such traits been identified.<sup>10</sup> and of these, three have bearings on this stage of the warning process. Predictability is one of the fundamental characteristics disaster agents, of and determines whether or not, or to what extent a particular agent can be predicted. Of the many manifestations of extreme natural phenomenon, only eleven are such that make prediction and forecast possible.11 However, of those that have a greater potential for impact and damage, only five can be forecasted practically. These are floods. hurricanes, tornadoes, tsumanis, and volcanoes. Further, between these there is considerable variation and room for possible improvement in prediction and accuracy.

Disaster agents are also distinguished by their

respective **speed and type of onset**. While some such as flash floods strike rapidly, regular floods are comparatively gradual. Volcanoes and earthquakes on the other hand may strike **repetitively**. These characteristics impose restrictions upon the evaluatory mechanism. Thus for instance "hazards which strike a community quickly, the warning period is short, fewer people are likely to receive warning, and there is little time to respond."<sup>12</sup>

Finally the durational aspect of disaster agents bears implications on the evaluation stage. Floods for example normally inundate areas for long periods of time. During the course of such flooding, the environment requires to be constantly monitored, and the inflow data continuously measured to "evaluate" whether the intensity is likely to increase, or prolong distress. Information on these issues in turn determines the communication and response patterns.

As may be observed, agent characteristics impose responsibilities, limitations and constraints on agencies involved with the evaluation process. While these restrictions are universal in application, a second constraining factor is the resources available within a particular society. Depending on levels of advancement, societies place themselves in relative advantage to others.

Considering that an efficient monitoring and evaluation system calls for sophisticated technology, the resources required are; specialized equipment, skilled personnel to handle the equipment and heavy financial investments. As opposed to "western' nations, developing countries are severely handicapped in this regard.

Finally, the "interpretation" stage concerns not only the translation of data into external information communications, but typically involves taking of certain important decisions. Based on technical material, a view has to be taken about the future course of action. Questions normally confronted at this juncture are: does existing data merits a warning to be issued? Should the warning be for an "alert" or of an advisory nature? Thus some fundamental questions surface and require to be resolved. And in addressing such issues, a gradual transition takes place away from technicalities towards matters which are essentially administrative; calling for a different kind of managerial acumen. The difficulties that present themselves in facing such decisions is illustrated by the following.

A dilemma arises between the increased awareness of meteorologists of the uncertainties in cyclonic behavior and the higher expectation of the public for more accurate forecasts made possible by new monitoring systems.<sup>13</sup> Therefore,

The challenge which confronts warning experts is to bridge the gap between public expectancy of high performance and the limitations of scientific predictability.<sup>14</sup>

The "challenge" is indeed fraught with complexities steeped in technicalities, past experience and knowledge of those taking the decisions on the one hand and the levels of community awareness and expectancy on the other. There are no easy answers to the "dilemma", and caution, tact and pragmatism will ultimately prevail as determinants. However, once the decision is taken, the chain of activity is set off, and the subsequent phase comes into operation, bringing with it a host of actors and agencies, involving a complex interplay of numerous variables.

To summarize; the first phase of a warning system evaluation. consists of detection. collation and measurement of various meteorological and geophysical data. This stage is influenced by three specific agent characteristics. For an effective system, resources both in terms of equipment and personnel of a specialized nature are required. And these may not be readily available to societies. poorer Based inputs on the and data, administrative decisions are made regarding future course of action. And this in turn activates the next phase of the warning system, while remaining in continuous operation

itself.

### DISSEMINATION

The actual conveyance of threat related communications to the endangered individuals, relief agencies and other intervening organizations is the second function of a comprehensive warning system. This activity is performed by a host of agencies, operating at various levels, which are governmental as well as privately mandated. Each of these agencies carry their own means of dissemination, reaching through various modes, the community in danger.

Since the focus of activity pertains to warning communications. and eliciting appropriate responses, reliance is placed upon the content and formats of messages, as well as the communication channels utilized. These in turn are determined by a host of factors such as organizational capabilities, experience, charters, agent characteristics and socio-psychological variables. Other determinants technical infrastructure, are economic abilities, legal and political systems. Included in this stage is also the feedback information received from the area of initial impact, which furnishes data for follow-up action or issuance of secondary warnings and advisories. In essence, while the dissemination phase is an outcome of the detection stage, it in turn determines response, which is the ultimate objective of the whole exercise. In order to provide a simplified framework of the elements involved within dissemination, an illustrative model is provided in Figure 7.1.

Dissemination consists of two primary elements, a) content of message and b) mode of communication. The former aspect in turn is determined by i) the nature of communications to be made, ii) organizations to be involved and iii) agent characteristics. On the other hand, "mode" of communication is dependent on i) technology available, ii) non-formal mechanisms and iii) types of organizations. Each of these variables are in turn determined by a number of other factors (as may be observed from the figure below).

#### MODE OF COMMUNICATION

## Technology

While determining the mode of communication, the first consideration is the selection and usage of appropriate communication channels to convey messages. Selection is determined by technical and resource considerations. While advanced countries are facilitated by



Figure 7.1

communication, "less of sophisticated means modern developed" countries have to make do with available means, which may not always serve the purpose. Similarly, due to better coverage of mass media agencies (particularly Television), "western" societies are in a position to place greater reliance on them. On the other hand, poorer societies resort to more traditional modes such as "beating" of "tom-toms", "church bells" and vehicle mounted loud-speakers. In as much as such means are more time consuming and also require more manpower, their effectiveness is limited.

#### <u>Organizations</u>

An important aspect of "mode of communications" is are transmitted at various levels that messages concurrently. Warning are usually issued simultaneously to mass media agencies as well as to official and voluntary organizations. As a result, while mass media agencies then reach threatened communities directly, and without loss of much time, information through other organizations is filtered, and therefore takes longer to be communicated. However, as messages percolate from central to "field" offices, each level of the organization is activated to ready itself for the performance of specific tasks that may already have been pre-determined.

#### Non-Formal Mechanisms

from weather monitoring Warnings communicated agencies to the field level are channelized through formal form of technological systems, requiring some infrastructure. However at the local level, communication occurs through informal and non-structural mechanisms. As news or information about threats are received in the area, level of insecurity and uncertainty is raised. This the prompts people to contact others for confirmation of reports. Individuals confer with family members, neighbors, influential personalities and local authorities. Information is thus passed along throughout the community. Such non-formal dissemination of information significantly influences and determines in large the nature of response to warnings (see section below on response). Considering the significance of this mode of dissemination, it is imperative that the potential be utilized efficiently. People under stress of uncertainty search for cues which may indicate in immediate tangible terms the nature of threat and the protective action required. Thus for instance, closing down of educational institutions and government offices helps provide necessary impetus for initiating precautionary measures. The magnitude of the

problem is raised in terms of local reference as people see authority backed institutions and organizations taking preventive actions. Accordingly, through such informal means of communication, response mechanisms are activated within the local community.

## CONTENT OF MESSAGES

As compared to mode of communication, the "content of message" aspect is dependent mainly on non-technical variables. The three essential elements that have a bearing on the content of messages are 1) organizations, 2) socioeconomic environment and 3) nature of communications.

## Organizations

Primarily three types of organizations are involved in the dissemination process; 1) those that only relay information, and do not respond in any other manner. These are organizations like weather/meteorological units, press, television and radio networks. 2) The second type of organizations are those that perform both tasks; the relay of information as well as response activity. Examples are; state, county and "district' offices of government and private voluntary organizations. Their responsibilities are not only to receive and transmit warnings, but also to add directives for subordinate agencies, so as to initiate

further action on the latter's part for responding to the threat. As may be observed, even within the dissemination stage, preliminary elements of response appear. 3) The of organizations involved are those that third type of precautionary initiate response mechanisms and protective nature. These are agencies at the field level, responsible for the relief recovery stages of and They lie closest to the area of impact (or disasters. within it itself). Agencies like local fire stations, sheriffs and police, para-medics, hospitals, local administrators are examples of this functional level. Such organizations are the recipients of both the "general" warnings that are issued through the mass media, as well as detailed instructional communications received from controlling offices.

Since each of the three sub-groups perform specific and distinct functions, the content of warnings to each must be such as to complement their role. Along with the functional elements, geographical distinctions need also be maintained. A community facing cyclonic threats along a sea-front is required to take protective actions that are different from inland communities which may lie in the post landfall path.

Other factors which affect organizational

involvement in the communication system are dependent on issues such as past experience, mandates, legal frameworks, and administrative ethos. Thus,

Communications between warning-related community organizations is affected by routine daily patterns of interaction between those organizations. Warning-related agencies which do not interact during normal times may experience more difficulty in transmitting warning-related information to each other in times of impending disaster. Such pre-disaster event . . organizational considerations affect the speed, manner, and form of interaction between warningrelated organizations, and consequently, the nature of warnings issued to a community.15

### Nature of Communications

A second factor that influences the content of communications is the nature of warnings, which in turn is determined by geographical and agent characteristic considerations. Earlier three characteristics were identified as influencing the detection stage of a warning system. Four further agent traits have a bearing on the nature and content of warnings. 1) Length of possible forewarning; as has been pointed out, a distinction should be kept between this characteristic and speed of onset.<sup>16</sup> While agents may have similar speeds of onset, they may provide different time frames of forewarning. This factor provides the scope and opportunity for protective action. 2) The durational aspect of agents also determines in part

the content of warnings. Depending on the time frame of a disaster, warning message contents have to be commensurate with the situation as it develops, so as to steer response The scope of impact is also a and relief activity. 3) factor which influences contents of warnings, particularly in terms of the geographical area to be covered. Instead of vaguely worded signals, threatened populations as well as intervening agencies are greatly assisted by being provided with precise, location-oriented information. 4) Finally, the destructive potential of disaster agents requires to be reflected in This warning messages. enhances the preciseness and focus of communications, and heightens the effect of the message. Given below is an example of a cyclone warning, which includes, as part of the message, elements of the characteristics described above.

Expected strike coast between Nellore and Ongole saturday morning - - - very heavy rain cause floods in the districts, gales reaching 150 kmph. uprooting big trees and causing widespread damage to houses and installations and total disruption of communications likely Nellore, Prakasam, and Guntur districts from this evening - - - tidal waves 5 meters above normal tide likely inundate coastal areas these districts saturday morning.<sup>17</sup>

It was mentioned earlier, that out of the eleven disaster agents that are currently predictable, only five were such as to pose grave threats to the society. Of these, floods and hurricanes provide the greatest opportunity of warning time and preventive/protective action. Warnings can be adapted to the changing situation, adding to accuracy and precision. Given this, it would be pertinent to go into some of the details of warnings and their content with reference to these two particular hazards. It would be observed that the underlying principles in these cases can be appropriately applied to some of the other types of hazards as well. A second factor that necessitates greater attention to floods and hurricanes is that a) they cause extensive loss to life and property, and b) that they occur very frequently in both "western" as well as "developing" countries.18

As with any dynamic environmental system, all round accuracy of prediction is constrained by several factors. Some of these limitations lie within the characteristics of the disaster agents themselves. Added to this is the fact that,

many of the synoptic features which turn fairly normal forecasting events into complex situations are partially or progressively revealed only as the monitoring . . proceeds. A prior recognition of the possibilities however, should enable warning centers to plan ahead to some extent, in respect of warning strategies and appropriate terminology.<sup>19</sup>

Some of the complex cyclonic "events" are those which "develop or intensify close to a populated coastline",<sup>20</sup> or are "unusually intense or slow or fast-moving,"<sup>21</sup> those

which display erratic motion such as "looping the loop,"<sup>22</sup> or those that move close and along the coastline, with a high probability of "turning on shore," "recurving," "reintensification," cyclones whose "decay over land is retarded,"<sup>23</sup> and those likely to affect previously unaffected and inexperienced areas.

In the instance of floods, examples of situations which make warning a complicated task are; dam bursts, river bank collapses, irrigation tank breaches, sudden changes in the river course and cloud bursts. Considering such difficulties on the one hand, and the importance of the content and terminology of warning messages, the following guiding principles are useful.

Cardinal principles that need to be adhered to are a) that there should be sustained consistency between all communications. This is not only for the issuance of warnings from a single source/agency, but also in the cumulative messages that the numerous agencies send out. For instance, the press, radio and television should be consistent with i) their earlier messages, ii) with each other, as also iii) with information being provided by other authorities. Inter-agency coordination is therefore of extreme importance. b) The second important principle to be maintained, particularly by meteorological and similar

agencies is that due to the inherent uncertainties in initial forecasts, successive communications must progressively build on the earlier ones, but with increased focus, accuracy and clarity. This can be achieved by initial conservatism in public information bulletins, until such time as precise forecasting is made possible.

More specifically, the terminology and content of messages are determined by the successive stages of the hazard's development. Essentially, there are four phases in the dissemination of warnings<sup>2 4</sup>. These are summarized below.

### Phase One (Information)

In the case of hurricanes, this stage requires the initial notification of the development and existence of a "depression" or "system" in the area, even though it is not threatening to create an impact short of forty eight hours. Announcements through mass media are issued so as to rouse general interest. No specific public "watch" messages or warnings are issued. Communications are general in nature, mentioning largely defined geographical areas. In the case of floods, similar messages are issued when inflow and precipitation data suggests that water levels are likely to rise above previously marked "danger" points.

# Phase Two (Alert)

In the event a cyclonic system contains potential to cause gales along a coastal sector between twenty-four to forty-eight hours, then communities are placed on an "alert" or "watch" status. It urges the public to pay increased attention to weather related broadcasts over the mass media. Messages may also include some preliminary suggestions for provisional response and action, such as securing of loose objects, or restraining fishermen from venturing too far out at sea.

In the case of floods, alerting messages are conveyed to downstream communities when water levels begin reaching danger marks. However, while issuing primary advisories, care is observed in considering future precipitations and inflows, which if not heavy, may reduce the impending threat. In other words, this stage is essentially to alert communities, and to place organizations in a state of "stand by" and readiness in case of eventuality. An example of a hurricane "watch" is given below.

A hurricane watch and gale warnings are continued from St. Augustine Florida to Brunswick Georgia, and from Cape Fear North Carolina, to cape Hatteras North Carolina. Operators of small craft from Cape Canaveral Florida to Virginia Beach Virginia should remain in port.<sup>25</sup>

In other cases, details are included which advise on matters such as ensuring the working of transistor radios and torch lights, securing of loose items, keeping firstaid kits at hand, and checking of escape routes and shelters in case of emergency.

## Phase Three (Warning)

This phase, which is the most critical has been further sub-divided into three sub-phases; i) preliminary, ii) advanced and, iii) when landfall is imminent. In the case of hurricanes, the first stage is initiated when cyclonic gales are developing within twenty-four hours. A geographical coastline from 600 to 800 kms. is covered for warnings. Frequency is intensified, with a sense of urgency in their content. Specific advisories are also included in messages. The "advanced" stage in turn is entered with expectations of gales within three to six hours and landfall is also about six hours away. Geographical area to be warned is narrowed down to 400 to 600 kms. Evacuation procedures would definitely be in full activation. Added information in terms of expected storm surge is included in messages. Details such as estimates of destructive wind gusts and potential flooding are also included. Since by this time cyclonic activity would be on coastal radar tracking, frequency and accuracy of warnings is

substantially increased. Finally, immediately prior to, and during landfall, warnings include cautionary statements regarding deceptive "calms" during the passage of the "eye". Also, hinterland and adjoining regions require to be warned of related consequences.

In the case of floods, this phase of warning is marked by a) the definite rising of water levels above danger marks, b) inflow and precipitation data indicating further intensification and c) initial signs of overflowing. Warnings include advisories for evacuation to higher grounds and sandbagging of vulnerable areas such as channels and banks which are likely to breach.

An example of a warning message during phase three would appear somewhat as follows :

At 12 noon CST severe tropical cyclone Tracy was centered 110 km. NWN of Darwin and is now moving slowly SE closer to Darwin.

The center is expected to cross the coast between Grose Island and the Vernons tomorrow morning.

Very destructive winds of 120 Km./h with gusts to 150 Km./h have been reported near the center and are expected in the Darwin area tonight and tomorrow.<sup>26</sup>

An example of a warning issued during the advanced stage of cyclonic activity is as follows :

Hurricane located 100 Kms South East of Ongole this morning. . . Expected strike coast between

Ongole and Masulipatanam this afternoon . . . . Tidal waves 5 meters above tide likely inundate coastal areas Prakasam, Guntur and Krishna Districts within next nine hours. . . people in these coastal areas advised to take shelter in high buildings. . . Gale reaching 150 Kmph likely uproot high trees and cause widespread damage to houses and installations and total disruptions of communications in these districts. Very heavy rain likely cause flood in Nellore, Prakasam, Guntur, Krishna, East and West Godavari and Vishakapatnam districts.<sup>27</sup>

Similar messages also include specific advisories like "stay indoors or cyclone shelters", "protect yourself with mattresses or blankets", "anchor yourself to strong fixtures", and "beware of calm eye".

#### Phase Four (Post-Landfall)

Post-landfall communications in the case of hurricanes deal with a) when "central circulation of the cyclone is still a dominating control", and b) the eventual weakening of the system and its possible interaction with "higher latitude systems".<sup>28</sup> At this stage, warnings are concerned with inundation and hinterland flooding due to excess rainfall. The phase is concluded with either "watch" or "all clear" messages. The following example illustrates a final message :

No further warning, but a severe weather watch is being maintained and gale, storm, strong wind, flood, or bush fire warnings will be issued if necessary.<sup>29</sup> Socio-Economic Environment : The third significant factor that determines content of warnings is the socioeconomic environment of the community to be warned. For,

In order to accomplish these transmissions successfully it is important to be aware of the social psychological and situational environments in which the recipients are living.<sup>30</sup>

Included in this sub-set of factors are issues such as local culture, language, customs, beliefs etc. Variables such as past experience, prior response patterns, perceptions of threat, fatalistic attitudes all need to be taken into consideration. For instance, coastal regions require simple advice with reference for instance to fishing activities. Sea vessels and air craft on the other hand need highly technical information. Similarly rural populations require information and advice quite different to urbanites. While it may not always be possible to keep such factors as direct determinants of terminology, they need to be borne in mind while preparing the general formats of warning messages. The importance of these variables in determining response pattern to warnings will become more evident in the subsequent section on response, where these variables are considered at greater length.

To summarize, the dissemination stage of a warning system consists of two key elements; the mode and content of warnings. These in turn are dependent upon a number of other variables, such as technology, resource availability, organizational set-ups, disaster agent characteristics and socio-economic issues. The examples of cyclones and floods were extrapolated in greater detail, to focus on the guiding principles for understanding the issues involved in the content and communication of warning messages. The purpose and effort during this stage of the "integrated warning system" is to activate response mechanisms; for "the most elaborate prediction and forecast procedures are irrelevant if the system does not warn members of an endangered public to take protective action."<sup>3 1</sup>

#### RESPONSE

Response is the third basic function of an integrated warning system. It is the adoption of protective behavior on the part of those who receive warnings, individuals, small groups, organizations and the community itself.<sup>3 2</sup>

While the detection stage of a warning system is steeped in technology, and the dissemination stage in administrative matters, the final phase is couched in the dynamics of socio-psychological factors. And it is the interplay of these unquantifiable variables that result in plurality of response patterns found among societies. Research has yet to establish a completely predictable response pattern, based on which concrete policies could be adopted. However, social-scientists have raised and analyzed a number of factors that do influence and determine the response of communities. While there are a number of ways to delve into the process, for the purpose of this discussion, the "response" sub-system of warnings will be seen in two operative groups; 1) organizations that receive and respond to warnings and 2) the public or the social structure over which the threat looms.

#### Organizations

An analysis of disaster literature and experience reveals that there are certain organizations that repeatedly and "consistently" involve themselves with disaster related tasks and responsibilities.<sup>33</sup>

Given the pattern of organizational involvement, two classifications can be put forward, viz-a-viz response to warnings. First, organizations that are activated to filter warning messages for purpose of providing in-house and down-the -line directives for preparatory action. As mentioned earlier, these are centralized controlling offices such as state government secretariats and voluntary agency regional headquarters. The second category of organizations are those which directly respond and intervene during moments that lie immediately prior to impact as well as during the post impact relief and rescue

periods. Typically these are field level organizations with emergency related responsibilities.

In the case of the first type of organizations, systems are normally pre-determined and their response almost routine. Depending levels of planning, on centralization. and organizational structures, their response is almost set. Initial communications to national and inter-state agencies may also be part of the activities performed by such organizations.

The other type of organizations involved are field level operators. They are distinguished by the possession emergency related resources. Such agencies have been of categorized as community emergency organizations and community relevant organizations.34 Examples of the former are agencies like local civil administration personnel, police, fire services, public works, medical units. hospitals, civil defense formations etc. Examples of the latter are charitable and religious institutions, Red Cross, Salvation Army, local press and media reporters.

# Community (Groups and individuals)

"I rode out hurricane Betsy sitting right here at my little old kitchen table, and I am not about to leave for Camille ." . . . " Sam Smith said this 24 hours before his home and his little old kitchen table were swept right into the Gulf of Mexico."35

The essence of the whole problem associated with public reactions to warnings is symbolized in the statement quoted Individuals and groups that are the focus of above. warnings provide a complex diversity of responses, which makes the task of authorities exceedingly difficult. There that contribute to the number of factors are а uncertainties of response. Many of these have been analyzed by social-scientists. Yet, co-relations have not been substantially established, based upon which policies could be confidently adopted. The dynamics of behavioral patterns provide guidance, but still are not conclusive in nature. However, some of the major factors that have been examined and appear to influence response are discussed below.

Primarily, individual and group reactions will be based on their respective perceptions of the hazard. Perception in this sense has been defined as;

an individual's understanding of the character and relevance of a hazard for self and/or community. The perception may include notions about speed of onset, scope, intensity, duration, frequency, temporal spacing, causal mechanisms and predictability.<sup>36</sup>

Another factor that merits attention is the "normalcy bias", i.e., "the tendency of people to err on the side of normalcy<sup>37</sup>. Thus,

Even where the existence, nature and time of the danger can be adequately forecast. . . , it is difficult to secure public attention of warning messages . . . They seize on any vagueness, ambiguity, or incompatibility in the warning message enabling them to interpret the situation optimistically. They search for more information that will confirm, deny, or clarify the warning message, and often they continue to interpret signs of danger as familiar, normal events until it is too late to take effective precautions.<sup>38</sup>

And also;

The recipients will seek further confirmation of the credibility and urgency of the message. This is done in a number of ways, only one of which is the issuance of further messages. People who are at home will often check to see what action their neighbors are taking, and people who are in a work or school setting will generally wait for some cues from the organization. In the absence of these cues the tendency is to interpret the situation as normal.<sup>3</sup>

exemplified by the "Sam Smith" story quoted As is is also tendency among people above. there а to underestimate the personal threat posed by an impending factor of prior disaster In this context the hazard. experience is highly pertinent, since it shapes to a large extent the future pattern of response.

Prior disaster experience may provide reference points that give a false sense of security and thus lessen the sense of urgency and adequacy of response of the (societal) social system.<sup>40</sup>

However, for people in coastal areas which are prone to severe storms and cyclones, or hinterland areas subject to repeated flooding are likely to view the hazard in more realistic terms, and believe in the likelihood of future recurrences. It has also been held that entities with previous experience, or those having a "direct economic relationship to the hazard" present a greater degree of accuracy in their perceptions<sup>41</sup>. Further, **recent severe experience** helps sharpen perceptive abilities.

While a number of assorted advisory warnings are issued (such as securing of loose objects, taping of windows etc.), the eventual warning seeks and urges evacuation. And this in fact poses the greatest difficulty in eliciting acceptance and compliance. And yet, when required, this course of action is perhaps the only recourse to saving lives during extreme environmental conditions. A number of studies have been made to analyze the sociological factors involved in the decision-making and response to evacuation advisories. It has been summarized that, as opposed to urbanites, rural populations are more reluctant to evacuate. The same also holds true for "societies where the family institution is dominant."42 Also some of the factors that are considered in reviewing whether sufficient danger exists to warrant evacuation have been noted thus;

People use their **past experience** ("the river never got higher than that before"); their **present direct perceptions** of the physical environment. . . ; their **perceptions of how**  others are responding. . . ; and their comparison of their own information and perceptions with people who are significant to them in their daily lives.

In deciding how to respond to a danger signal, people also take into account the **nature and** strength of the threat. . .; the time. . .; the effectiveness of available counter measures. . . , and the cost.<sup>43</sup>

As for the total response mechanism of groups and individuals, Mileti cites three emergent notions;

1) even though people may be listening to the same warning message, everybody hears and believes different things; 2) People respond to warnings on the basis of how what they hear, stimulates them to behave; and 3) people are stimulated differently depending on who they are, who they are with, and who and what they see.<sup>44</sup>

A large number of intricate factors come into play which determine response, and it is this complexity that frustrates generalizations. Quoted below are some examples of the variables and their relationships that determine response patterns to an extent. <sup>1</sup>

1) Any warning message broadcast, especially the early ones, will be accepted at face value only by a minority of the recipients. Most will engage

<sup>&</sup>lt;sup>1</sup><u>Source</u>: Haas, 1973, as quoted/adapted in Dennis S. Mileti, <u>Natural Hazard Warning Systems in the United</u> <u>States</u>, A Research Assessment Program on Technology, Environment, and Man, Monograph # NSF-RA-E-75-013/ "n.p.", Institute of Behavioral Science, the University of Colorado, 1975, pp. 21 - 22. While 16 salient factors have been quoted above, the source quoted from contains a total of 23 such influence bearing factors.

in confirmation efforts for a time.

2) The more warning messages received by an individual, the fewer the attempts at warning confirmation.

3) The closer the person is to the target area of a warning, the higher the incidence of face-toface communication, and the larger the number of sources used in confirmation attempts.

4) Warning from official sources (police, state patrol, fire departments), are more likely believed.

5) Message content per se influences belief. The more accurate and consistent the content across several messages, the greater the belief.

6) The more personal the manner in which a message is delivered, the more it will be believed.

8) The recipient's sense of the sender's certainty about the message is important to belief.

9) Message believability is related to what happens in the confirmation process. The response of official sources to questions which call for validation, corroboration or refutation helps determine believability.

10) A person is more likely to believe a warning of impending danger to the extent that perceived changes in the physical environment support the threat messages. 11) Persons who see others behaving as if they believe a warning to be valid are themselves more likely to believe the warning.

12) Past experience may render current warnings less credible if disaster is not part of the experience, or more credible, if disaster is part of the experience.

13) The closer the person is to the target area of warning, the more rumors he will hear and the less accurate will be his understanding of the character of the forecast events.

14) Persons do not readily evacuate on the basis of the first warning received, and the number of warnings received thereafter is directly related to evacuation.

15) As the warning message increases in its accuracy, and/or information about survival choices, and/or consistency with other warnings, and/or clarity about the nature of the threat, the probability of adaptive response increases.

18) Persons receiving face-to-face warnings in a family setting from authorities are more likely to evacuate.

19) Persons with recent disaster experience are more likely to take protective action.

To summarize, it was observed that in the chain of warning activities, the last phase is the most complex. All prior activities are aimed at eliciting optimal efficiency in response. Yet, due to many factors, the desired levels of reactions are not always achieved. Filial relationships, occupational considerations, individual and communal experiences, warning sources, visual manifestations in the environment of the threats, all play their part in determining perceptions of hazards and response mechanisms. The underlying theme lies in sociological factors, and factors appear differently in respective since these societal settings, the outcome is equally diverse. research most is based "western" Considering on observations, how much or in what way these factors interact, and how many other variables affect response systems in "less developed" countries remains a matter of surmise and conjecture, at best tempered with cursory observations.

On the other hand, the response of organizations are dependent past experience, upon inter-agency coordination, resource structures, specific mandates, responsibilities and public expectations. However, diversity exists from country to country and region to region. While general principles were presented above, local factors such as bureaucratic ethos, administrative practices, traditions and politics would influence to a large extent the nature of organizational response to warnings.

#### CONCLUSION

Within the preparedness stage of disaster management, one of the key components is the setting up of an efficient and effective warning system. A system that is initiated from the stage of detection of impending hazards, and culminates with the issuance of communications and eliciting of appropriate response. The main elements that compose an"integrated warning system" are technical, administrative and sociological. The critical nature of warning systems cannot be exaggerated, for it is through the means of these mechanisms that society can reduce the impact and adverse consequences of disasters. The warning stage however is steeped in complexities that are not readily unravelled; for involved are the dynamics of human behavior and socio-economic variables. This plurality of response in turn frustrates conclusive generalizations that could be used for purpose of planning. Yet, with the passage of time, greater awareness and knowledge is being gained. Be as it may, dependent upon the warning system is the pattern of subsequent activity, which lies in the "Response" phase of disaster management. Governmental and voluntary agencies from local, national, and international levels intervene, and mobilize resources, provide relief and extend succor to alleviate the adversity of the

stricken community. Their task would however be considerably minimized were warnings to achieve their objectives of prompting precautionary and protective activity within the community, prior to onset of the disaster. In the following issues pertaining to the response phase of disaster management attention is focused upon.
## NOTES

1.Dennis S. Mileti, Thomas E. Drabek and J. Eugene Haas, <u>Human Systems in Extreme Environments: A Sociological</u> <u>Perspective</u>, Program on Technology, Environment and Man, Monograph # 21,"n.p." Institute of Behavioral Science, The University of Colorado, 1975, p.12.

2.See, Dennis S. Mileti, <u>Natural Hazard Warning Systems in</u> the United States: A <u>Research Assessment</u>, Program on Technology, Environment and Man, Monograph # NSF-RA-E-75-013, "n.p." Institute of Behavioral Science, The University of Colorado, 1975.

3.Ibid., p.64.

4.Harry B. Williams, "Human Factors in Warning-and-Response Systems", in <u>The Threat of Impending Disasters,</u> <u>Contribution to the Psychology of Stress</u>, eds. George H. Grosser, Henry Wechsler and Milton Greenblatt, Cambridge (Massachusetts): M I T Press, 1964, p.80.

5.U.S., Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service (Southern Region), <u>The Warning System, A Social Science</u> <u>Perspective</u>, March 1973, p. 7.

6.Dennis S. Mileti, <u>Natural Hazard Warning Systems in the</u> <u>United States</u>, p. 63.

7.Ibid.

8.Ibid., p. 13.

9.Ibid.

10.Russell R. Dynes, <u>Organized Behavior in Disaster</u>, The Disaster Research Center Series, eds. E. L. Quarentelli and Russell R. Dynes, "n.p.", Disaster Research Center, Ohio State University, 1974, pp. 51-55.

11.Dennis S. Mileti, <u>Natural Warning Systems in the United</u> <u>States</u>, p. 10.

12.Ibid., p. 7.

13.World Meteorological Organization, Tropical Cyclone Program, <u>Human Response to Tropical Cyclone Warnings and</u> <u>Their Content</u>, Project No. 12, "n.p.", "n.d.", p. 3.1

14.Ibid., p. 3.2.

15.Dennis S. Mileti, <u>Natural Hazard Warning</u> Systems in the United States, p.10.

16.Russell R. Dynes, Organized Behavior in Disaster, p.53.

17.World Meteorological Organization, <u>Human Response to</u> <u>Tropical Cyclone Warnings and Their Content</u>, pp. 2.10 - 2.11.

18.Floods and tropical cyclones (along with droughts and earthquakes) are the main causes of natural disasters. They are in fact responsible for causing more than ninety percent of loss of life and damage to property. It is also of interest to note that theWorld Meteorological considers Organization that natural phenomenon of meteorological origin (such as floods and hurricanes) account for more than fifty percent of loss of life and property as caused by all natural phenomenon. See, U.N. United Nations Environment Program, Preview of the Priority Subject Area, Natural Disasters, Report of the Executive Director, 1977, U.N.E.P. Report No 3.

19.World Meteorological Organization, <u>Human Response to</u> Tropical Cyclone Warnings and Their Content, p. 3.4.

- 20.Ibid.,p. 3.3
- 21.Ibid.
- 22.Ibid.
- 23.Ibid.

24. Ibid., pp. 3.5 - 3.6. and 3.24 - 3.29.

25.Ibid., p. 2.21.
26.Ibid., p. 2.5.
27.Ibid., p. 2.11.
28.Ibid., p. 3.29.
29.Ibid., p. 2.6.

30.U.S. Department of Commerce, <u>The Warning System, A</u> Social Science Perspective, p. 8.

31.Dennis S. Mileti, <u>Natural Hazard Warning Systems in the</u> <u>United States</u>, p. 14.

32.Ibid.

33.Russell R. Dynes, <u>Organized Behavior in Disaster</u>, pp. 16 - 48.

34.Ibid., p. 18.

35.World Meteorological Organization, <u>Human Response to</u> <u>Tropical Cyclone Warnings and Their Content</u>, p. 4.1.

36.Dennis S. Mileti, Thomas E. Drabek and J. Eugene Haas, Human Systems in Extreme Environments, p. 23.

37.U.S., Department of Commerce, <u>The Warning System, A</u> Social Science Perspective, p. 22.

38.Charles E. Fritz, <u>Disaster</u> in <u>Contemporary Social</u> <u>Problems</u>, eds. Robert K. Merton and Robert A. Nisbet, New York : Harcourt, Brace & World, 1961, p. 665.

39.U.S. Department of Commerce, <u>The Warning System, A</u> Social Science Perspective, p. 22.

40.Benjamin F. McLuckie, " A Study of Functional Response to Stress in Three Societies", as quoted in Dennis S. Mileti, Thomas E. Drabek and J. Eugene Haas, <u>Human Systems</u> in Extreme Environments, p. 20.

41.Ibid., p.24.

42.Dennis S. Mileti, <u>Natural Hazard Warning</u> Systems in the <u>United States</u>, pp. 23 - 24.

43.Charles E. Fritz, <u>Disasters in Contemporary Social</u> <u>Problems</u>, p. 667

44.Dennis S. Mileti, <u>Natural Hazard Warning</u> Systems in the <u>United States</u>, pp. 18 - 19.

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## CHAPTER EIGHT

# RESPONSE

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#### RESPONSE

three preceding chapters outlined various The preparatory aspects of managing natural disasters. The efforts described there focus on raising the degree and level of social response to natural calamities. Through such measures it is sought to curtail the extent and scope of disaster. The next set of measures relating to disaster management constitutes the subsequent "phase", and are The most itself. concerned with the response aspect critical of all phases, it relates to the period that In terms of temporal and impact. immediately follows spatial concentrations, the largest number of organizations and personnel engage themselves in various tasks that surface during this period. Relatively, response is also the shortest of all four phases. In  $brief_{r'}$ 

Response activities are those which most clearly follow disaster impact. Generally, they are designed to provide emergency assistance for disaster casualties (like search and rescue, and emergency shelter), to reduce the probability of secondary damage (like shutting down utilities that experienced systemic damage.<sup>1</sup>

The "response" phase is typified by certain

if efficiently performed, activities, which can limit the gravity of social losses significantly and despite such efforts, it has been adversity. Yet, consistently observed empirically, that eventual response remains short of desired expectations. There is usually a considerable gap between the actual response pattern and the designated plan. Research efforts that have been brought to bear on this issue highlight a number of reasons for such differences. and their understanding and appreciation is important. For through such an analysis, prospective response mechanisms can be redefined to achieve greater efficiency.

It is the purpose of this chapter to focus upon the nature and types of activities and organizations that are typically involved during this phase of disaster management. Associated problems and constraints will also be examined, particularly from the organizational and administrative perspective. Secondly, it will be attempted to draw upon empirical research, and highlight the reasons for the dichotomy between planning and response. Hopefully, these two perspectives will provide gainful insights to understanding the dynamics of response.

In proceeding with the chapter, first of all the basic issues relating to the differences between planning

and response patterns are very briefly described. This is followed by an analysis of the relevant concepts of "domain", "tasks" and "activities". Subsequently, the various activities that occur during response are described within the format of social values and priorities. This analysis is followed by a descriptive section on the key organizations that normally intervene during this phase. Social research has documented the repeated occurrence of a number of problems that impose constraints upon organizational functioning during response. The final section of this chapter describes the main aspects of such constraining factors.

#### PLANNING AND RESPONSE

The "response" phase of a disaster is highly dynamic, and is characterized by extreme uncertainty and severe organizational stress and strain. As has been observed, "the first few hours following any large scale disaster present a complex array of organizational demands that constitute a unique managerial problem."<sup>2</sup> In order to cope effectively with the demands of such crisis situations, concerned agencies have begun to increasingly resort to advance planning so as to instill coherence in the overall response pattern. Yet, on the other hand, with existing levels of preparedness and planning efforts,

research reveals the existence of a considerable gap between the plan and observed response patterns. As noted;

Thus, overall we did not find the convergence or between preparedness planning linkage and have been emergency response which might anticipated. . . . [and even though the level of preparedness has improved over the years] when the cases of a decade or so ago and those of the current study are put side by side, the behavioral similarities in response patterns loom far larger than the differences.<sup>3</sup>

Problems associated with response are further accentuated when it is recognized that planning efforts are usually cursory, seldom kept updated, and limited in quality and perspective. Weaknesses in planning efforts have been observed on the following grounds;

(1) There is a failure to recognize that a system or overall perspective is needed both for planning and response. Also, (2) there is a frequent underestimation of the need to plan for flexibility and improvisation in the emergency response. (3) Finally, the inherent limits to planning are not always recognized.<sup>4</sup>

This of course is certainly not to discourage or underplay the importance and relevance of planning. Rather it is to suggest that, in as much as planning is anticipatory in nature, it should focus on the general pattern of response, with emphasis on the larger format of tasks and responsibilities. The positive effects of planning in fact have been documented through empirical research:

It would appear that where planning has occurred, response patterns have benefitted. This

statement is particularly valid with regard to resources utilization, physical facilities, and equipment. These are elements that an integrated emergency management system appears to be particularly adept at handling. Furthermore, in general, the organizational and political problems of communication, task coordination, and authority relationships were also better handled in those communities where there had been some planning activity. Where planning had not occurred, these problems are the most severe.<sup>5</sup>

Given the problems on the one hand, and the purpose and manifest advantages of planning, it can be argued that it would be appropriate for plans to expect and provide flexibility for confronting unanticipated contingencies, rather, than to try and outline rigid directions for them. The strength of this argument can be fully appreciated if the inherent features that characterize the response environment are further analyzed.

#### ORGANIZATIONAL RESPONSIBILITIES

In the earlier chapter concerning "concepts of natural disasters", a description of the associated temporal aspects was provided. Within the context of the "time" element, the "response" phase includes the stages of "impact", "rescue", "inventory", and "remedy". Reference to such a framework helps provide indication of the types of activities that are conducted during this period. Further, the nature of activities performed during the response phase were outlined in a cursory manner in the chapter on planning. It was mentioned there that in order to initiate comprehensive and meaningful exercise, а planning mechanisms must anticipate and address the demands likely to emerge during the various relevant phases of disasters. Thus, among others, seven "response" associated demands were discussed. In keeping with the principles of planning that caution against extensive details, descriptions of the various "demands" were analyzed in broad general terms so as to serve the requirements of planning appropriately. However, in the context of understanding the mechanisms and details involved during the response phase itself, an in depth analysis is necessary. Thus, on the strength of conceptual models and social science research, a deeper focus on the variables involved during response need be attempted. And through such a detailed examination, a finer understanding of the response process can be achieved.

At the outset, it is appropriate to highlight the distinctions that social-scientists have given to organizational functioning. As opposed to broadly viewing all response associated actions in terms of agency (or group) activities, a conceptual distinction has been discerned in terms of domain, tasks, and activities. Appreciation of such conceptual niceties enhances the analysis and understanding of response mechanisms.

#### DOMAIN

As was mentioned in the earlier chapter on "organizations", various agencies as well as aroups intervene in disaster situations on the strength and nature of their existent characteristics. Such characteristics include a combination of several elements such as legal mandates, public expectations, expertise, resources and values. Similarly, on the other hand, another set of factors that determine organizational intervention lie in the nature of demands that need to be addressed in the post-impact response phase. A conjunction of these two variables of agency characteristics and response related demands defines the nature/type of organizations that are likely to engage themselves during response. For instance, it can be expected that the Fire department will not only be involved in the response phase, but will be actively engaged in the vital tasks of search and rescue, putting out fires etc. And this because its mandates and resources qualify it to address the "demands" of search, rescue and fire fighting. Such a determination of agency intervention is defined in terms of organizational domain. It seeks to establish (or anticipate) which organizations are likely to involve themselves during the response phase, and further,

it helps identify the nature of activities and tasks which that particular agency will attend to. " Domain represents the translation of disaster-generated demands into spheres of social action."<sup>6</sup> It.

. . . specifies which of the disastergenerated demands are the responsibility of an organization. Thus, definitions of domain outline the general focus of attention of the group involved. This allows an organization to focus its response efforts on certain aspects of the situation and to ignore others.<sup>7</sup>

In conceptual terms, "domain" may be defined as,

the generalized image of the organized social action held by both participants and relevant others in any instance of organized disaster response, providing an overall orienting definition of the legitimate purposes of the behavior.<sup>8</sup>

It needs to be added at this point that organizational domain may exist at the pre-disaster stage, or it may well develop subsequent to impact.

Thus, in some cases domain is clearly mandated before the fact while in others this may be relatively unclear and emerge, i.e., become socially constructed within the disaster context. . . , both types of social action can be accounted for analytically if we view domain in processual rather than static terms.<sup>9</sup>

Fire, police and hospitals for instance may be seen as carrying domains that were established at the pre-disaster stage. On the other hand, emergent groups, such as local volunteers "develop" a domain at the post-impact stage for conducting search, rescue and transportation of victims to hospitals for example. Thus, while both types engage in life saving services, in the former case domain is predetermined, whereas for the latter it is evolutionary in nature. Such distinctions are useful in identifying appropriate organizations for relevant responsibilities in the post-impact stage, and aid in the effective utilization of resources.

#### TASK

Domain itself consists of a number of tasks. In this sense it is the larger format of organizational or social objectives, whereas tasks are the inner segments which must be individually addressed to realize the attainment of domain and community goals during disasters. "Tasks are social definitions of how a specified domain of organized response is to be accomplished."<sup>10</sup> Thus,

for example, if a group has the responsibility of feeding disaster victims, attention must somehow be given to the various tasks of acquiring, preparing, and dispensing food where it is needed. There are almost always multiple tasks necessary if a domain is to be met. Furthermore, these tasks must be related to one another.<sup>11</sup>

Basically there are three aspects to a conceptualized analysis of "tasks". These are; 1) identification, 2) interrelationships and, 3) priorities.

## Identification

In order to achieve clarity of purpose and ease of effort, appropriate tasks need to be identified with reference to specific domains. Normally, a number of tasks may be apparent from the outset itself. Particularly in the case of specialized agencies such as medical and fire departments, most of the tasks can be anticipated and incorporated within existing plans and exercises. However, it is unrealistic to attempt anticipation of all related tasks. Thus,

While assignment of organizational responsibility is relatively easy to do, it is sometimes difficult to anticipate all the necessary tasks that will have to be done to meet particular disaster-generated demands.<sup>12</sup>

The police department for instance usually finds itself confronting situations that it may not have adequate experience or appropriate resources. Yet, on account of its rather broad mandate, and an accompanying high level of public expectations, police personnel often find themselves committed to tasks which they could not have anticipated.

Therefore, the first aspect to analyzing "tasks" is with reference to identifying and planning for them on the basis of experience and expertise. However, by the same token, it needs to be recognized that new tasks normally emerge out of a situation that cannot be estimated in

advance. This is particularly true in the rather fluid and dynamic circumstances of the response period. In the light of such uncertainty, flexibility requires to be incorporated in organizational functioning in order to meet the various contingencies that surface unexpectedly.

#### Interrelationships

The second aspect related to tasks is that of their interrelationships. This is an issue that concerns coordination and control. On the one hand, several tasks normally need to be tied together so as to achieve domain goals -- as found in the "feeding" example listed above. However, at the same time, different organizations and groups tend to be responsible for the separate tasks, which together in combination realize social objectives. To take again the same "feeding" example, it is quite possible that the three responsibilities of acquiring, preparing and distributing of food may well lie with three separate agencies. In fact, the larger the magnitude and effects of a disaster, the greater the possibility of this happening. Further, it is also probable that the same task may be attended to by different organizations at different locations. Thus, private organizations like the Red Cross and the Salvation Army may both provide shelter to victims, at the same time a third shelter may well be operated by

local government agencies. Quite naturally this pluralistic tendency of task addressal has implications on the nature and effectiveness of response.

The other facet to interrelationships is in terms of sequence of tasks. While different organizations may be committed to achieving the same domain goals, the task may be such that there are dependent linkages between them. That is, the fulfillment of each subsequent responsibility is contingent on the prior completion of another. For instance, providing medical care to victims will depend on the completion of related tasks such as clearing of debris and road blocks, as also the availability of ambulances and other vehicles. Similarly. in order to effectively distribute relief material, a storage point for received material has to be identified (which is accessible for incoming vehicles carrying goods), personnel have to be engaged for sorting and distribution of material, victims need to be identified, and distribution systems developed for extending relief. To achieve this, transportation is necessary, which in turn is dependent upon access to sites where victims are located. It is highly probable that more than one organization will be involved for these various tasks, and recognition of such interrelationships is essential.

## **Priorities**

Finally, tasks need to be viewed in terms of relative importance and urgency. The immediate effects of a disaster in sociological and economic terms is that it creates a surge in demand for various goods and services, and at the same time, limits the capacity of social vehicles for the delivery of these goods and services. In effect, severe constraints are imposed upon the effective functioning of the community. In these circumstances, priorities have to be established, and resources and effort expended accordingly. However, unless there is an overall coordinating agency, each unit performing a certain task assumes its own importance, which may or may not be in line with community priorities. Even within an agency, decisions may have to be taken for establishing priorities, which are extremely difficult. For instance, medical authorities may be forced to choose apportioning scarce personnel between attending to hospital patients, or in diffusing a potential emergency, such as the controlling of a probable epidemic outbreak through a mass immunization program. Similarly, in terms of priorities, an electrical utility agency may well have to delay supply of power till potential dangers such as "fallen live wires" have been attended to, which in turn may be delayed till fallen debris has been cleared by the

concerned public works agency.

Therefore, the effectiveness of any organized response to a disaster is dependent not only on identifying and relating multiple tasks, but also ascertaining which tasks are necessary to the carrying out of other tasks.<sup>13</sup>

#### ACTIVITY

In order to measure effectiveness of response patterns, the concept of "activity" requires elaboration. To begin with, in a conceptual perspective it is distinct from "tasks". And in identifying this difference, a clearer focus is placed upon a measure of activity. Tasks, as opposed to activities are essentially couched in terms of domain goals and targets. That is, they are conceived with reference to providing direction for meeting the specific needs and fulfillment of social objectives. Activities on the other hand are the actual conducting and implementing of measures as an effort to meet these social goals. In brief;

Tasks are definitions of what should be done by participants; activities are what the observer actually sees them doing. . . [task] is what is needed to be done. . . [and activity] is actually what is being done.<sup>14</sup>

The fact that activities do not always accomplish the ends that are required by the task is a matter of central concern here.

This distinction between task and activity is a useful concept which serves as a guiding principle in two ways. First, it helps determine the focus of preparatory planning efforts. By appreciating such distinctions, it becomes clear that planning mechanisms need to be "task" rather than "activity" oriented. This because planning by principle should address issues in the broader context, rather than to extend and lose itself in detail. Since "tasks" are the broad "definitions of how a specified domain of organized response is to be accomplished"15, planning appropriately should concern itself with them. Thus, coordination, communication, assessment of damage etc. should be seen in terms of "tasks" and anticipated. For example, while planning sets up the mechanism for coordination during response (task), it need not be concerned with the unnecessary details of trying to anticipate and prescribe schedules and meetings (activities) to promote coordination.

The second purpose that the concepts of task and activity provides is in terms of evaluating the effectiveness of response. By recognizing the distinction between the two, a touchstone is made available for measuring the difference between what needed to be done, and what was actually implemented for achieving the end

objectives.

"Since activities may or may not conform to task definitions, the difference between the two can be used to make an evaluation of effectiveness."16 Thus for example, if an agency's domain is in terms of health and medication, and one of its tasks is to despatch medical supplies for relief, and it ends up by sending out irrelevant medicines, then on several counts its effectiveness ratings will be poor. First, it would have failed to achieve its domain goals of health improvement since its medicines were of no use locally. Second, it would not only have wasted its own material and personnel resources, but would also have unnecessarily tied the personnel time of those in charge of receipt and distribution. In this sense "activities may or may not conform to task definitions and the difference is of course germane to any characterization of interdependence of organized activity."17

#### TYPES OF ACTIVITY

Organized activity that follows impact is normally a reflection of the prevalent social value systems. That is, the sequence of activities performed are largely determined by the value that each society attaches to a particular objective. By incorporating such a value oriented

analytical framework, resources can be appropriately apportioned with reference to socio-economic priorities. For instance, quite universally, "the value which receives the highest priority centers on the care of victims"18, containment of injuries and loss of life. In recognizing this, a set of activities that relate to the attainment of the value can be identified and grouped together. Thus, activities such as search and rescue of victims, "providing first aid and transporting the injured to sources of medical attention are given the most immediate attention".<sup>19</sup> Resources required for undertaking such responsibilities are accordingly sanctioned as a matter of priority.

On the completion of such primary activities, attention is then focused on subsequent value oriented task sets, and so on. Given this frame of reference then, activities can be grouped and analyzed in two broad categories; 1) those associated with "core values" and, 11) those concerned with secondary activities, which also "support core values".<sup>20</sup> While the former relates to activities that typify the response phase, the latter come within the purview of "short-term" recovery tasks; and therefore will be discussed in the following chapter.

#### CORE VALUE ACTIVITY

Activities which relate to core values are those that are concerned with human life issues. Thus, saving of lives, rescuing and providing medical attention to the injured, caring for destitute, etc. are the type of activities that organizations and groups engage in with reference to core values. By and large these activities can be divided and discussed under four groups; i) search and rescue, ii) care of casualties, iii) protection against continuing threats and iv) relief for the survivors.<sup>21</sup>

## Search and Rescue

The first, and perhaps the most crucial activity that a community engages in after impact is search and rescue. Search and rescue operations are usually initiated by victim survivors from the immediate vicinity, and subsequently from the "fringe areas". As noted,

The fact that victims themselves performed most of the rescue work should not be too surprising. After all, in order to engage in immediate rescue activity, one has to be present in the total impact area. . . Soon they may be assisted by others coming in from the fringe area. People who live in the impact area have more accurate knowledge about what immediate potential damage might exist, which individuals in the area might need help, and the location of immediately necessary equipment.<sup>2</sup>

In fact, locally emergent groups stimulate the whole

response mechanism by initiating other related activities such as clearance of debris (where possible) to extricate entrapped individuals, transporting them to hospitals, and generally spreading information about the impact area; both in terms of damage details and resource needs.

Form and Nosow indicate that, during the first phase of the emergency period, people orient themselves to the search for others, informing others of their own safety, giving first aid, summoning aid, providing shelter and clothing, calming victims, caring for children etc. . . , and do many other things to facilitate rescue.<sup>23</sup>

Gradually, depending upon response time, emergency related organizations such as fire and police arrive, and join the ongoing efforts. Slowly these agencies assume greater responsibility and control over the activities. This assumption of responsibility by organizations is in fact facilitated by several factors such as the need for an overall perspective and appropriate resources. People entrapped in high-rise buildings, or under heavy debris cannot be rescued per se by unorganized neighborhood groups, whereas fire departments are well equipped to undertake such tasks.

There is the necessity for developing an overall picture of the disaster situation. This cannot usually be done by particular individuals or small groups of individuals since their observations would of necessity be limited. Also, there are tasks which, to be accomplished, require resources no aggregate of individuals would possess. Also, individual energy levels cannot sustain activity as well as can organized forms of cooperation and assistance.<sup>24</sup>

While the crucial nature of search and rescue cannot be overstated, it is equally important to discern the difficulties that surface during this stage that hinder efforts. Problems that are usually confronted stem from extreme uncertainty, sense of urgency and disorganization that surrounds and engulfs the community in the post impact phase.

rescue occurs early in the time sequence of the disaster so that it has to proceed during the time that the community is assessing the consequences of the event itself. Second, since the rescue phase of a disaster involves threat to human lives and the possibility that lives may be saved, there is a sense of urgency present which sometimes works against rational organizations. Third, since individuals are primarily involved in the initial stages, the operation tends to be somewhat haphazard and nonsystematic.<sup>25</sup>

#### Caring for Casualties

A major focus of attention in a disaster situation is the providing of care for those who are injured or physically incapacitated on some count as a result of the impact. Emergency medical care is a critical service which the community provides during response. By its very nature, caring for casualties is a fairly specialized task, requiring appropriate medical resources. And it is often the case, demand suddenly outstrips availability, thereby greatly impairing medical efforts. On the other hand even though medical relief supplies and external medical teams supplement local resources, such "aid" generally arrives after twenty four hours. This serves a limited purpose, since it is after the critical period for saving lives and alleviating pain in most cases. Thus, while providing this service, local personnel, equipment and medical resources are fully stretched out.

A resource that is usually developed by a community in anticipation of such large scale emergencies is to increase the number of people trained in first aid. as observed by empirical research, such trained However, individuals have very limited opportunities to contribute their skills, mainly because people tend to bypass them and proceed directly to established medical centers. An exaggerated sense of gravity appears to surface in perceiving disaster victim needs, and first aid is considered too inadequate.

Several studies of disaster operations have shown that established first aid stations are often bypassed because judgments are made by those transporting the injured that they need more than just first aid. . . This means, then, that hospitals bear both the major and also the initial responsibility for handling the injured from a disaster event.<sup>26</sup>

By implication this tends to weaken response, since on the one hand an investment (in training people in first aid) is

not used, and secondly it occupies valuable personnel time of the more specialized medical units.

## Protection Against Continuing Threat

is often the case that initial impacts are It followed or accompanied by other forms of threats and hazards. Such secondary impacts in fact tend to have serious damage potential, since they may strike upon an unsuspecting community, which is already experiencing stress and constraints on account of the primary impact. Common examples of such "continuing" and "secondary" threats are fires after earthquakes, fallen electrical wires, bursting of dams as a result of earthquakes, structurally damaged buildings and floods following a hurricane. Such secondary impacts not only create the need for precautionary measures, but also create tasks that require the commitment of resources and personnel. Thus "the initial impact may be only the beginning of a set of tasks for a community".27

In as much as secondary impacts threaten life and cause injury, the value of life protection determines that measures be initiated in this regard as a matter of priority at the expense of others. As an example, even though large areas may be affected by a power failure, unless and until the threat of fallen wires has been reduced, electrical utilities will usually not restore supply. Similarly, restrictions will be imposed for reentry or occupation of buildings that may have been structurally damaged, even though it may cause hardship and discomfort to occupants. In this sense, it can be anticipated that threats which continue to mark their presence restrict the initiation of recovery activities, and prolong the response phase.

#### Relief and Caring of Survivors

The traditional, and even currently perhaps the common form of organized external intervention in most disasters is in the form of relief and care of survivors. Voluntary organizations and material donations pour into the impact area to extend succor to the victim population in an attempt to alleviate the suffering and distress. In effect there are three basic groups of people who create the need for such relief. Firstly, there are those who were evacuated from their homes and sheltered in community "camps" or other sites. Depending of course on the nature of impact, such evacuee groups have to be provided for till after the threat is over. However should the impact have been such as to prevent their return, then relief efforts will sustain. The second group of people who require

community assistance are those whose homes may have been damaged or rendered inaccessible on some count. Unlike in the case of those evacuated, the "impact victims" are usually provided more ad-hoc shelters, mainly due to the unplanned nature of activity. Since it cannot be anticipated as to which area will generate demands, agencies intervene only after victims tend to gather in the nearest safe site. Thus, during heavy rains, when homes in low lying areas may get inundated, people will collect in school premises or similar community buildings. Relief agencies will then follow and provide for them. The third group that needs to be attended to are those who get cut off, entrapped or marooned in an area. The most typical situation can be found during floods when whole villages get cut off from the rest. With rising waters, people get on roofs, and even tree tops. Normal means of reaching such people are through boats and helicopters. These are used for rescuing people, as well as reaching food and material aid. In this context, experience shows that air dropping of food parcels is seldom effective, since food packets "burst" upon contact with the ground and spill open. And secondly, quite often, parcels drop in areas outside the reach of the marooned.

As mentioned above, extending relief is the most

common effort of externally involved organizations. Government, international and private voluntary agencies engage in collecting donations of funds and material for despatch to the affected area. However, experience reveals that time after time, inappropriate material is received. This is particularly the case of aid dispatched from overseas to less developed countries. Fancy footwear, nontraditional clothing, and unmarked irrelevant medicines are common examples of misdirected relief efforts.

The recurring instances of inappropriate aid offers perhaps the most glaring evidence of ineptitude. Examples:

. Five million Valium tablets sent to starving Ethiopians by a Canadian group.

. Crates containing used panty hose, electric frying pans, and high heeled shoes shipped to earthquake victims in Central America.<sup>28</sup>

While such "donations" point to the generous and charitable motivations of the donors, the problems it creates for the recipients is seldom recognized. For one, a number of people have to be engaged in sorting out the relevant from the inappropriate material. Secondly, such donations have to be stored locally, and take up valuable floor space. In effect such useless "aid" is a distraction and binds down valuable resources in the name of charity. Further, "outsiders" judgement of community needs in almost every case underestimates the basic resources which are still available in most communities"<sup>29</sup>. The principle that aid should supplement and not replace or duplicate local efforts is often overlooked.

Another common form of misdirected "external" assistance is in the provision of temporary housing. It has been observed that such "aid" has been consistently underutilized by the victim community. It has generally been noted that such "constructions" are usually ill suited to the local culture and environment.

"Reasons for this under use may include: overestimates of the homeless population; excessive volumes of aid; the location of the units (away from bus routes, a vital requirement as work gets back to normal); cultural rejection of unusual forms of housing; the almost universal hostility to multi-family units; and finally, the fact that as more permanent housing becomes available, thisis seen as better а alternative."<sup>30</sup>

Similar to the problem of deluging the area of impact with aid material is the problem of **personnel convergence**. Motivated by various factors ranging from mere curiosity to volunteering help, people descend upon the victim community, and impose a whole set of problems of their own. As documented by research,

Virtually all control authorities agreed that the control of traffic and the movement of population posed the worst problem with which they had to deal; and persons who were engaged with various rescue, medical, and relief activities often reported that the convergence action by outsiders frequently hindered the performance of their functions.<sup>31</sup> As can be appreciated, between the two convergence factors; of people<sup>1</sup> and material, local agencies have to develop coping systems and allocate resources to deal with such an influx. In turn, energy and attention is diverted away from the priority areas, resulting in a weakening of the response.

In the following section the organizational aspect of this phase is discussed. Typically certain organizations intervene at the local level. It is proposed to focus upon some of their characteristics so as to better understand the rationale of their functioning.

#### ORGANIZATIONS IN RESPONSE

There are certain organizations, which for specific reasons of mandate and public expectations, actively engage themselves in response efforts. These are organizations that usually carry special skills and resources, thus facilitating effectiveness in response. Such organizations in fact assume importance in view of the fact that they provide services which reach out to attain the ends of the

<sup>&</sup>lt;sup>1</sup>People who converge have been classified in five different types; 1) the returnees, 2) the curious, 3) the anxious, 4) the helpers and 5) the exploiters. See, Russell R. Dynes, <u>Organized Behavior in Disaster</u>, The Disaster Research Center Series, eds. E.L. Quarentelli and Russell R. Dynes, "n.p.", Disaster Research Center, Ohio State University, 1974, p. 126.

core social values of preservation of life.

Anything then which threatens the valued ends of the community is a potential demand for whatever organization has the responsibility for the particular area involved or possesses skills crucial in meeting the demands.<sup>32</sup>

It is pertinent to analyze the relevant characteristics of such organizations with reference to meeting such emergency demands. The following types of organizations will be discussed; the police, the fire department, hospitals, public works department the Red Cross and the Salvation Army.

#### POLICE DEPARTMENT

Police departments are one of the most strongly mandated organizations with reference to emergencies and social distress. Thus, they are one of the first organizations to associate themselves with activities pertaining to response.

The police department normally is seen as the organization called upon if any to be difficulties arise. In disasters, it is not only one of the first organizations on the scene, but the one which tends to symbolize the authority of the community. Its involvement in disaster activities is based its predisaster on orientation to preserving life and property.33

Due to its specific responsibility of maintaining life and providing security, police departments possess certain relevant resources, and function in a pattern that facilitates response operations. First of all, police departments usually function on a twenty-four hour basis, providing round the clock service.

Being organized on a 24-hour basis gives the police department certain advantages in coping with demands. A 24-hour work day means that the department normally has available more potential manpower than would an organization which only one or two shifts.<sup>34</sup>

A second advantage which the police department enjoys in the context of response is with reference to its are trained personnel. They to undertake respective responsibilities. Also due to their regimented character, police personnel can be deployed in a coherent and organized manner, with each individual knowing what to do. In fact, due to the nature of their training and work routine, policemen will normally bear a temperament that is conducive with emergencies. In an environment that is full of uncertainty, the calm and organized actions of a policeman are very reassuring. Further the fact that they are a uniformed group makes them more visible, and helps restore public morale. Their experience with handling crowds, and establishing control and authority also helps greatly enforcing public confidence and introduces a sense of security.

A third factor which enhance the effectiveness of

police intervention during disasters is their complete familiarity with the area. Due to the very nature of their routine work, policemen need to be totally familiar with their jurisdictions. Knowledge of the back alleys and sites has to be first hand to them. This greatly eases their movement, effort and deployment of resources. Normally, with past experience, policemen will also be aware of "vulnerable" locations, and therefore will be in a position to determine and reach out to the impacted area with little difficulty.

Further. the possession of vehicles and communication equipment enhances the effectiveness and relevance of their role. The fact that their frontline units are normally equipped with wireless systems provides special advantage in being able to communicate critical information when normal channels may be disrupted. Finally it is relevant to mention that due to the nature of their involvement, police personnel also assist in watching out for certain types of "secondary hazards";

Because of their early entry into the impact zone, police seek out hazards. In some instances they may have to make a decision concerning the safety of certain areas and then evacuate them or prevent access until repairs are made. In addition, the police often are the source of notification to those organizations which can initiate repairs.<sup>35</sup> The normal operations performed by the police departments during response relate to traffic and crowd control, providing security and protection to life and property, search and rescue, and warning and evacuation (on account of secondary threats).

#### FIRE DEPARTMENT

Fire departments are perhaps the most traditional emergency related organization. They therefore possess an unqualified mandate with regard to responding during the post-impact stage. Quite certainly, commensurate with their mandate, fire departments carry specialized equipment and skills. In a number of ways, they enjoy similar advantages as the police department with reference to disasters. Similarly they perform a multitude of tasks, which contrary to popular association, go beyond those related to fire hazards.

they are organized, equipped, and manned in anticipation of hazards to human life and property. . . , most urban fire departments respond to many kinds of emergencies which are not related even indirectly to fire suppression. For example, a large number of departments have units within them which routinely respond to drownings, electrocutions, asphyxiation, home and industrial accidents, and a host of other nonfire emergency-related tasks.<sup>36</sup>

As with the police, personnel of the fire department are rigorously trained to handle their
responsibilities. This introduces again the character of appropriate temperament and behavior during crises. Such trained persons do not squander, but instinctively conserve valuable resources. Thus,

To meet these emergency situations, fire departments must possess a cadre of skilled personnel and the equipment necessary to implement those skills. This fact, plus their community orientation, makes their involvement in major community emergencies inevitable.<sup>37</sup>

Organizationally, fire departments are structured along "traditional bureaucratic models"<sup>38</sup>, with departmental officers supervising and directing operations.

As regards disaster response functions performed by fire departments; they normally engage in fire fighting, search and rescue, removal or diffusing of secondary threats (apart from fires), and transporting victims to hospitals. However,

Disasters which do not involve long-term searchand-rescue or fire problems are largely peripheral to the skills and resources possessed by fire departments. Consequently, their response is usually confined to the immediate post-impact period.<sup>39</sup>

In view of their emergency related responsibilities, fire stations are typically located strategically so as to provide maximum and speedy coverage.

## PUBLIC WORKS DEPARTMENT

One of the most important organizations to be found among local jurisdictions is the public works department. It provides essential support and infrastructure services, which are critical to the normal functioning of a community. Therefore during disasters, when a number of such services are disrupted, the public works department (P.W.D.) assumes a significant role in response activity. As such, P.W.D.s normally consider emergency response as part of their mandate, and are appropriately geared towards that end. The transition from routine to crisis roles is further facilitated by the fact that,

The DPW continues tasks in the postimpact situation which are similar to their preemergency operations. Most of the tasks with which the DPW would be involved would be almost identical with what it does normally.<sup>40</sup>

It needs to be pointed out here that the nature of services provided by the PWDs rests in the response as well as the recovery phases. In a sense, their role constitutes a link which facilitates the transition from one to the Thus the usual demands made upon PWDs during other. and continuing disasters are related to sustaining essential support services. Of these the most important is clearing of debris, and opening of streets and roads.

Anything which renders streets impassable would

constitute a potential demand on the department. . ., [for example] tornadoes which dump debris on streets, high water which floods the streets [etc.]. . . It is important for the DPW to keep the street open for emergency vehicles of the police, ambulance service and others to rush resources to the impact area.<sup>41</sup>

A second responsibility undertaken by the PWD. is the supply and distribution of water. The significance of this activity can scarcely be exaggerated, particularly during moments of crisis when the demand may be on the rise, while supplies may be reduced due to disruptions. Hospitals, and fire services in fact may require more than normal supplies to meet their own respective ends. Further, portable water may have to be supplied through non-regular vehicles such as tankers, to areas such as shelter sites, or residential localities where supply may have been cut off. Thus, "any threat to clean water, to water pressure, or to other aspects of water use is a potential demand."<sup>42</sup>

Other activities in which PWDs are involved relate to maintaining sewer disposal systems, repair to buildings, assessment of damage to structures, as well as assessing the nature of public threat, if any, posed by such damaged structures.

Since the responsibilities of the public works department are specialized, they carry appropriate

equipment as well as trained personnel. And even though it may at times use local volunteers (for clearing of debris or distribution of water for example), it is primarily self-sufficient.

With its human resources, the DPW possesses many skills, crucial to the orderly, day-to-day functioning of the community. At the top is a core of highly trained professional engineers; below this core are a number of skilled and semiskilled employees; . . The DPW has personnel who are effectively able to design, construct, and maintain many of the vital services of the community.<sup>43</sup>

In effect thus, it can be observed that the public works department is a front line organization that performs vital tasks during post-impact response (and recovery) periods. Appropriately, it carries the necessary physical and human resources to undertake its responsibilities in an effective manner.

# HOSPITALS

Hospitals perform various functions, ranging from treatment of patients, to the keeping of records, and performing in-house chores. However, in the context of disaster response, the prime responsibility is with reference to care and treatment of patients. In order to analyze this function in greater detail, it can be viewed in terms of three sub-functions; (1) the treatment and care of injury, illness and pregnancy;
(2) the restoration and rehabilitation of surviving victims of illness and injury; and
(3) the prevention of illness, injury and complications arising therefrom.<sup>44</sup>

In as much as all these functions relate to the fulfillment of the core value of life preservation, hospitals became the focus of activity and attention. Victims that survive the impact along with others who are searched out and rescued, are all transported to hospital sites for treatment and care. Since,

The general population places very high value on maintenance of life and the minimization of physical suffering. . . Hospitals are defined by almost everyone as the place where persons suffering in an emergency should be immediately brought for treatment. Surprisingly little first aid is ever given outside of hospitals in major disasters, and there is a strong tendency to ignore such first aid stations as may be set up in the disaster area.<sup>45</sup>

Hospitals thus become centers of vital activities, and may assume an extraordinarily significant role during disasters. Depending of course on the nature and magnitude of impact, the demand made upon hospital resources rises steeply. It should however be recognized that the nature of the disaster also tends to determine the nature and type of demand that will be made upon resources. For example "fire/explosion disasters with many burn victims would require internists, surgeons, medical technologists, whereas tornado disasters would necessitate X-ray technicians, orthopedists, neurosurgeon".46

While care of injured and other patients normally takes place within hospitals, there are circumstances when hospital staff (medical) will need to go out into the community to provide services. This is particularly so with reference to the prevention of illness and disease aspect of their domain responsibility. Thus often, medical teams will have to be assigned away from hospitals to carry out mass-immunization programs against possible outbreaks of epidemics. In such cases, the resources of the hospital are stretched out even further.

The major problem that hospitals face is with reference to information. Mobilization of resources is retarded since hospital authorities have little idea or knowledge about the magnitude of impact, and nature of damage. Thus there is usually slack time before hospitals become fully alert to the problem they are likely to confront. Further,

Even when hospitals do mobilize, they are seldom able to get information from the impacted area. In many respects, they are forced to operate blindly as to the number and kinds of casualties there may be, and if and when the hospital might expect to receive them.<sup>47</sup>

The other problem that hospitals have to cope with during disasters is regarding "mass convergence" of people.

Relatives, friends, volunteers and people who are merely curious flood hospital compounds. This poses a severe distraction for hospital administrators and generates a set of tasks solely for dealing with it.

In brief, hospitals provide vital services to the community with reference to preservation of life. To undertake their responsibilities, specialized resources and qualified personnel are available. However during large disasters, the demands made upon existing facilities rises sharply, inducing organizational stress and strains. Yet, as pointed out in the previous section, external aid in the form of medical teams and medicines serves little immediate this because, incoming patients require purpose. And immediate assistance, whereas external help usually arrives after a considerable time gap -- normally more than twentyfour hours. Therefore local resources have of necessity to economically utilized. Normally other medically be qualified personnel in the community who volunteer their services become the best sources of support.

#### VOLUNTARY ORGANIZATIONS

Quasi government and private voluntary organizations emanating from a multitude of backgrounds intervene during response to extend relief, aid and succor

to victims. Of these. organizations that are two traditionally found to be actively involved with disaster relief work are the Red Cross and the Salvation Army. In fact both these organizations are mandated to engage in relief work. and similarly in both cases, public expectations for intervention are also high. Their primary disaster response tasks include;

The provision of food, clothing, shelter and medical and nursing care. . . [other] tasks include disaster fund raising, public information and equipment-supply facilities, disaster survey and disaster communications and transportation.<sup>48</sup>

There are several factors which contribute to facilitating the entry of these two organizations in the post-impact response activities. First of all, the preemergency orientation and tasks performed by these agencies are similar in nature to the response phase. For instance in the case of the Salvation Army, its

tasks are quite similar to the tasks it has historically undertaken in disaster situations, e.g., providing temporary housing and meals to transients and indigent, clothing to the needy, and money for individual emergencies. Second, the Army normally deals with the kinds of persons most likely to be disaster victims.<sup>49</sup>

The second advantage which these two organizations enjoy is their ability to quickly react and mobilize during emergencies. Because of their organizational experience with disasters, these agencies have developed systems for minimizing reaction time, and initiating the requisite activities. Further, this element of speed is aided by their ability to mobilize personnel quickly. Volunteers registered (and trained) by the organizations are routinely drilled and exercised for responding to such calls to duty.

Α third advantage which these two organizations bring with them during response is the social and public image they enjoy. Associated with positive values of charity and kind-heartedness, public acceptance of their intervention is easily granted. Further it is commonly expected that the quality of relief extended by them will be of a high quality. Because of these factors, people have little hesitation in accepting their services. Finally, the Salvation Army and the Red Cross have the advantage of holding relief related inventories at various points in a of their experience with such region. And because circumstances, over the years, the quality of such inventories has greatly improved -- in terms of carrying all relevant resources; from blankets to cooking materials. Further, since both organizations are sufficiently large in terms of organizational structure and networks, they can requisition and transport resources rather quickly to supplement local stocks.

A factor associated with inventories is that in

view of their traditional role, experience, and public image, these two organizations are often the focal point of receiving aid material. Appeals for funds and donations made by the Red Cross for instance, even internationally, is responded to with a positive attitude, particularly since there is faith and confidence that donations will not be misused. While in one sense this may appear to be an advantage, it also creates the problem of material convergence, demanding the sorting of materials which are not always appropriate or relevant for local use.

Another problem that these two organizations face is regarding the convergence of untrained, walk-in volunteers. In their case this problem is particularly severe since they are commonly perceived as dealing with charitable motives and in need of volunteers for the purpose. Since most volunteers are similarly motivated by charity an affinity develops that attracts them towards these organizations. The basic problem is of finding ways and means to organize and utilize such people. Feeding and sheltering them in turn sets off a separate group of activities for the organization.

To summarize, both the Red Cross and the Salvation Army are frontline organizations, which have traditionally intervened during the response phase to extend relief and

succor to the affected population. They bring with them a group of dedicated volunteers and material resources, which to alleviate distress effectively applied and are adversity. Both these organizations enjoy unqualified which reputation internationally, facilitates the acceptance of their intervention, both by the recipients as well as the donors of relief. The basic problems that these agencies confront are related to the convergence of people (irrelevant) material, which to some extent hinders and their overall effectiveness.

conclude this section on the organizational То aspects of response, it may be stated that there are seven features that are common to all the organizations They are all concerned with providing discussed. i) services that help preserve life, and reduce personal pain and adversity. ii) They all enjoy mandates and public expectations that are directly related to the response phase. iii) In view of the previous factor, all these agencies posses valuable disaster response related organizational experience. iv) In the case of all these organizations, the nature of responsibility and domain remains largely unchanged between pre and post disaster situations. v) Because of this, mobilization of personnel and resources is carried out quickly. vi) All these

organizations maintain appropriate and relevant resource inventories, and vii) are staffed by qualified and trained personnel. By understanding these common factors it becomes easier to appreciate the elements of advantage they enjoy. On the other hand there are several factors that limit the effective functioning of such disaster related agencies. In fact these constraining variables are responsible for the dichotomy that has been observed between planned efforts and actual response patterns. The following section analyses and focuses upon such limiting factors.

## ORGANIZATIONAL CONSTRAINTS

A number of dynamic elements surface during the post impact stage which result in organizational stress and strain. As a consequence, considerable resistance is created towards the effective functioning of agencies. By understanding such variables that cause hindrances, a feedback to planning systems can be effected, so that appropriate modifications are incorporated and taken into account for improving prospective activity. As noted;

extensive disaster experience and planning do not guarantee an effective response. While they facilitate it, local officials must implement developed plans and integrate past lessons into action to achieve maximum improvement.<sup>50</sup>

In this context, it is relevant now to focus upon such problems that commonly surface during times of organized response to disasters.

Limitations and constraints that appear during response basically stem from four factors; 1) the inherent uncertainty of the environment, particularly in terms of information, 2) the manifest need for initiating action on an urgent basis. 3) That within an extremely short time frame, a large number of agencies and groups are made to interact and conduct their activities with considerable loss of organizational autonomy. And finally 4) these agencies have to cope with a rather sudden rise in the demand for some of their resources and services. With such variables determining the post impact role of organizations, problems related to the following set of factors usually surface during response; a) convergence, b) communication, c) coordination, d) authority structure, e) availability of resources, and f) prior experience. <sup>2</sup> A

<sup>&</sup>lt;sup>2</sup> In the recent (Feb. 1987) Disaster Research Center study, "Disaster Analysis: Emergency Management Offices and Arrangements", the following factors have been identified as being critical determinants of effective response. By implication, absence or weakness in these areas is likely to cause problems in response. i) Communication which results in correct information collection and distribution. ii) A fully functioning E.O.C. iii) Appropriate procurement and distribution of human and material resource. iv) Proper task delegation and coordination. v) A legitimate authority structure. vi) Integrated and coordinated relationships with outside private, state, and federal organizations. Cooperative vii) relationships with mass media organizations. And viii) Response activities based upon real, not mythical needs. See, Dennis E. Wenger, E.L.

number of these factors, it may be observed have overlapping implications. The issues related to each are briefly discussed below.

#### COMMUNICATION

One of the most crucial elements determining the effectiveness of response is communication. There are two issues to this element; i) the content and ii) transmission. As regards the issue of transmission, it is necessary that there are no hindrances to communication channels. In the case of natural disasters of a large nature (with few exceptions such droughts), as communication lines and systems tend to get disrupted. The fact that such facilities (particularly wires and lines) are usually spread out geographically, the probabilities of their being "hit" are therefore usually high. Further by the time the concerned agencies recognize the nature of disruptions, mobilize resources, clear debris (if any) reach and rectify the facility, considerable time lags occur. And since an "emergency response agency must have the technical ability to effectively collect and distribute

Quarentelli, and Russell R. Dynes, <u>Disaster Analysis:</u> <u>Emergency Management Offices and Arrangements</u>, (for The Federal Emergency Management Agency), Newark, Delaware: The Disaster Research Center, University of Delaware, Feb. 1987, pp. 14-20.

information"<sup>51</sup>, till such time as services are restored, response delays occur.

The second aspect noted is with reference to the content of communication. It is imperative that correct and balanced information be communicated during emergencies. And in this sense, the main problem of communications "are often not technologically rooted, they are socially, intraorganizationally, and interorganizationally based."<sup>52</sup> Disorganized, exaggerated and scattered information circulates, with the result, till such time as details are sorted out and verified, resource allotment is either delayed, or more commonly misapplied.

Thus, typically a major difficulty is that the information obtained by the variously involved groups responding to the disaster never gets integrated and, thus, contributes to a lack of coordination. . . A lack of knowledge of the activities of various responding units results in simply not knowing with whom to communicate.<sup>53</sup>

Factors that have been observed to usually lead to problems in communication have been summarized as follows.

(1) agencies had a limited capacity to process the huge volume of information that was presented to them, (2) there were important disjunctures or breaks in the response networks, both between local units and with outside agencies, (3) no single unit had the authority to structure, control, or regulate the flow of messages across the network; this resulted in cross-checking and needless message flow within the already overburdened system.<sup>54</sup>

## COORDINATION

Apart from the need to coordinate information (as discussed above), there is a necessity to coordinate the activities of the various intervening organizations. This factor in fact has been sufficiently highlighted in the earlier chapter on "planning". Suffice it to mention here this issue is adequately addressed and that unless appropriate mechanisms planned out, serious lapses can occur during response. However, despite this need for planning coordinating systems, there are certain fundamental issues that raise problems of coordination during response.

The first of these problems relates to placing the term "coordination" itself in perspective. It is often incorrectly held to merely imply "having contact or communication with other organizations or groups."<sup>55</sup> Others appear to infer that coordination means "coopting" or obtaining the "concurrence from others for doing what the agency wants to do in the first place." What needs to be recognized is that;

coordination involves a meshing of concurrent actions. an integration of simultaneous activities towards relatively agreed upon purposes. Too often in disaster preparedness and disaster response, there is no coordination in that sense despite much interorganizational communication or groups informing others what

they are doing or will do in the situation.56

factor which leads to lack of Α related coordination is with reference to task assignments. In as much as a large number of organizations and units intervene during this phase, there is considerable division of responsibility. A great amount of time, energy and resources are poorly allocated and misapplied due to duplication of work. Such overlapping occurs mainly because local units try and maintain pre-disaster autonomous work dispositions, and fail to perceive their task in a holistic perspective, where other agencies also need to be seen as contributing to the same objective of distress alleviation. As evidenced by research;

Few of these managers evidenced an awareness of the whole. Since they did not fully perceive the totality of the response system. . , it is little wonder that they failed to realize the degree to which the overall system lacked coordination. The high degree of fragmentation was not perceived.<sup>57</sup>

Finally, lack of coordination results from poor relationships between organizations. Due to conflict of interest that may be present from the pre-disaster period, or may develop during response, communication and sharing of resources is severely strained between such organizations. Various factors lead to such strained interorganizational relationships, that result in constraining coordination. Most common among these are; i) domain ("turf") conflicts where organizations dispute the controlling of an area. ii) Conflicts also arise when organizational objectives clash, and a common perspective is hard to reach. iii) And finally, interorganizational relations are strained when personality clashes occur between agency heads or other counterpart personnel.

Such situations are more common when no single agency is in-charge of coordination. In a number of political-administrative systems, local agencies function independently of each other in rather autonomous patterns. And in these cases, unless an agency is pre-designated to assume control and provide leadership, organizational relations will tend be confused and lacking in direction.

## AUTHORITY STRUCTURE

Closely related to the last point made in the previous paragraph is the question of establishing authority structures relating to disaster response. Due to the variability in organizational intervention, there is usually a fragmented pattern of decision-making. Such diversity of decisions during response however are counterproductive and lead to overall inefficiency. It is imperative in this context that,

2 Managers of responding organizations should recognize explicitly that the demand structures produced by disasters exert pressures for transformations episodic of their internal operating systems, and their external patterns of relationships with other agencies. Intraorganizational processes evidence strain toward decentralization; interorganizational processes tend to shift towards increased centralization.58

Thus, in these circumstances, in order to undertake organized response, there is the need to specify and legitimize authority relationships and structures between organizations. Failing this the consequences are as observed below;

Given the diversity in sponsorship and pluralism in missions and structures, there often was intense ambiguity in authority. Official norms specifying who was in charge, and of what, remained problematic across these networks throughout the response period.<sup>59</sup>

In brief, unless the source of authority and overriding decision-making is clearly spelled out and established, effective response is seriously hampered.

#### PRIOR EXPERIENCE

Empirical evidence strongly supports that communities which have experienced disasters (ie. of the same type) tend to display greater resilience and efficiency in response. Conversely, communities that undergo a fresh crisis are handicapped by comparison. As has been noted;

In addition to the extensiveness of response, the <u>effectiveness</u> of that response appears also to be related to disaster experience. In general, we observed fewer problems in the response pattern of those communities with more extensive disaster experience.<sup>60</sup>

In this context however it should be pointed out that past experience has little value unless appropriate and relevant lessons have been incorporated into the existing planning structure. Else, it will remain only in the memories of individuals, with no organizational advantage being served.

These in brief are the types of problems that normally tend to exert themselves during response, and impose limitations upon organizational functioning.<sup>3</sup> In general they relate to poor organizational relationships, disorganized communication, pressures of convergence, and confused and weak authority structures. The basic forces that lead to such problems are those of uncertainty of information, urgency of action, loss of organizational autonomy and rise in demand for resources and services. While such problems repeatedly arise during disasters, they can be contained significantly if addressed comprehensively

<sup>&</sup>lt;sup>3</sup> There are three types of convergence patterns and these relate to; material, personal and information. These have been described in the preceding pages and therefore have not been detailed here again. See; pp.26-28, 43 and 47 in this regard.

in planning exercises. And this is specifically when "there appears to be a strong, positive relationship between the level of preparedness activity and the level of response."<sup>61</sup> In this sense, the factor of past experience is positively relevant. For "what is crucial is the **planning process** and not a planning product, i.e., a written disaster plan."<sup>62</sup>

#### CONCLUSION

The basic themes that this chapter seeks to highlight were a) to outline the nature of response mechanisms, and b) to place response activities in the larger/wider context of disaster planning and management. The purpose essentially being to provide insights into the dynamics that drive and determine response patterns. And secondly to provide linkages with other aspects of administering natural calamities (with emphasis on preparedness).

Response is usually the shortest and most hectic of all the phase-wise activities related to disaster management. Referring to the period that immediately follows impact, response is typified by activities related to the saving of lives, and alleviation of distress and pain. Considering that such activities are closely tied to core social values of life preservation, their significance and importance cannot be exaggerated. Apart from the nature of activity, another factor that typifies this phase is the variety and number of organizations, groups and individuals who intervene, bringing with them a plethora of skills and resources. In fact, traditionally, it is this phase that has attracted maximum organizational and social attention. Thus, leading to one of the severest problems experienced during response; convergence of humans, material and information. Similarly. due to various factors, other problems tend to repeatedly surface during response. The commonly observed ones concern matters of interorganizational relationships, communication and coordination. In fact empirical research documents the serious handicaps such constraining factors impose upon effective response. On the other hand, in the context of structured organizations, there are certain formally agencies that have historically been the prime organized responders to disasters. These are organizations such as the police, fire, health, and public works which provide critical public services. Similarly private organizations like the Red Cross are usually front line agencies that cover relief activities. All these organizations share certain common characteristics which stand as advantages and facilitate effective response.

As regards tasks and responsibilities, this chapter refers to conceptual distinctions between activities, tasks and domains. By incorporating this element, a format for analyzing organizational intervention is facilitated. Domain here was seen in the context of broad organizational objectives with reference to mandates. The distinction between tasks and activities on the other hand was expressed in terms of the former representing the type of responsibility that needs to be addressed to achieve domain objectives. Activities in turn were seen as the actual implementation of tasks. It was suggested that the difference between tasks and activities forms the essence of response patterns.

These then are the basic descriptive elements that made up the contents of this chapter. In the larger frame of reference, the implications of the arguments were to strengthen planning mechanisms. It was observed that there is normally a gap between planned measures and actual response patterns. However, two factors are seen as contributing to this dichotomy. The first is that planning is a continuous learning process, and therefore, with each subsequent experience, if proper lessons are taken cognizance of, then it can be attempted to close the gap between plans and actual response activity. Secondly, it

was also suggested that response creates an extreme amount of uncertainty, therefore, anticipation and planning for each contingency was neither recommended nor feasible. However, the basic argument submitted was that despite differences, planning mechanisms need to be continuously strengthened on the basis of experience, since

It would appear that where planning has occurred, response patterns have benefitted. This statement is particularly valid with regard to resource utilization, physical facilities, and equipment.<sup>63</sup>

#### However, what is more pertinent is that

The drawing up of plans, therefore, at most is only one [activity], and not **necessarily the most important one**, in the overall disaster planning process. Officials will learn much of what is needed by participating in the planning process, and will also recognize the process is a neverending one with no end point mistakenly signified by the production of a written document.<sup>64</sup>

Following the hectic pace of the response phase, is the comparatively protracted period of recovery. Depending on the magnitude of impact, this period can stretch out to several months. Thus it has been divided into two subphases of "short" and "long-term" recovery. While the basic focus of activity between the response and recovery phases are quite distinct, the transition from one phase to the other is less clear. Thus while some agencies may continue to provide response services, others may initiate the recovery stage. Analysis and discussion of the several aspects relating to this latter phase is the subject of attention in the following chapter.

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# C H A P T E R N I N E

R E C O V E R Y

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## RECOVERY

Tasks related to recovery form the final phase in the continuum of disaster related activities. They are initiated during the period when other response activities may still be continuing, and extend (depending of course on the nature of impact) from a few weeks to several months, (though in certain cases the process may be prolonged for several years). In view of this, the phase has been further divided into two temporal sub-groups; a) short-term and b) long-term;

Recovery activities continue beyond the emergency period immediately following a disaster. Their purpose is to return all systems to normal operating levels, consistent with local and state development plans. . . [short-term recovery activities] return vital systems to minimum operating standards. . . Long-term recovery activities may transpire for a number of years after a disaster. Their purpose is to stabilize all systems at normal, or improved, operating levels.<sup>1</sup>

At the outset, the nature and type of activities performed during the short-term period are discussed. Related short comings and limitations are also focused upon. Following this, the long-term recovery process is examined.

#### SHORT-TERM ACTIVITIES

In the previous chapter, several activities were defined in terms of their life preserving objectives; such as search and rescue, relief, medical aid etc. Due to the nature of such tasks, which relate to "core social values", priority is accorded them in the overall thrust of effort and allocation of resources. Following these are another set of secondary activities that on the one hand support core value activities, and on the other, initiate the process of social recovery. In a sense these activities function as a stabilizing factor; wherein further loss and halted, while concurrently efforts suffering is for reaching pre-disaster levels of normalcy are stimulated. Typical activities in this regard are information and assessment of impact, maintenance of community order and restoration of essential supplies and utilities. Issues pertaining to these activities are discussed below.

#### INFORMATION AND ASSESSMENT OF IMPACT

The assessment and collection of information pertaining to losses and damage due to impact is of crucial importance. It is the basic effort which seeks to reduce the distressing element of uncertainty that surrounds the

period immediately after impact. In the preceding chapter two forms of convergence problems were discussed, personnel and material. The third type of convergence problem is related to information. Assessment of impact is an activity which seeks to clear through the fog of informational bv sifting and collating relevant convergence, and necessary information. Based upon this, organized response can be made more focalized and coherent. After impact, typically, "the community then mobilizes what Barton has called a mass assault. To a certain extent, one could say that everyone starts doing everything at once".<sup>2</sup> And subsequently," as realistic needs become apparent, some mechanisms are necessary to allocate the resources of the community towards high priority needs."3 This recognition of "realistic needs" and laying down of priorities is in essence the basic purpose of assessment and information collection.

"This information is necessary in order to understand the dimension of the task which now faces the community. How many people are injured? . . . ? What areas of the community have suffered impact ? What is the nature of the damage in these areas ? What meaning does this damage have for the future operation of the community ?<sup>4</sup>

These are the driving questions that propel activity concerned with collection of data and information. Not only is it relevant for directing local efforts, but is

also necessary for obtaining appropriate external assistance

### MAINTENANCE OF SECURITY

During emergencies there is an overall sense of uncertainty, which leads to stress and insecurity.

The idea that disaster aftermath leads to conditions for the development of anti-social behavior is widespread. In particular, there is the assumption that widespread looting takes place.<sup>5</sup>

In such circumstances it becomes the responsibility of the government to address this by providing measures that seek to protect the community against disorders of any kind. It must be clarified however that research so far has found little evidence of looting (except in stray cases).

More recent studies point in the same direction. We have studied around 100 different disaster situations and while we frequently encounter <u>stories</u> of looting, we have been able to find extremely few verified cases of looting. Actual police records support these findings.<sup>6</sup>

What is pertinent in this context is not so much that looting does not occur, rather that it is **believed** to occur. Thus the insecurity that prevails is real, and needs to be addressed. Therefore, the guarding of property, patrolling of streets, and stationing the general presence of authority and symbols of control (such as uniformed policemen) is essential. Such measures convey a sense of order, and provide a measure of security that the community needs as a socio-psychological reassurance.

#### **RESTORATION OF ESSENTIAL UTILITIES**

Apart from personal losses, the basic stress caused in the social context is in terms of by disasters There are a number of disruptions of essential services. each community for meeting welfare services generated by and utility functions. A number of these services are deemed essential in that they are necessary for the continuation of socio-economic systems and in some cases for the sustenance of vital facilities. "Casualty care for example, depends upon the continuation of electric, water and gas supplies for hospital operations".7 Therefore one of the tasks assumed by organizations is to restore such of those services which are considered essential, and were disrupted during impact. Common examples of such services are, the supply of water, gas, electricity, communication links, and roads.

Many of these services, normally provided by the community and required for continued and efficient operation, become disrupted with impact. A significant part of community activity during the emergency period attempts to restore these services to some minimal but operating level.<sup>8</sup>

There are two related aspects to the issues here.
Firstly, it can be observed that such essential services are the domain of specialized agencies, handling specialized equipment by appropriately trained manpower. Secondly, in as much as these are pre-impact existent responsibilities of the concerned agencies, they require little prompting for initiating requisite measures.

In most instances, there are existing community organizations which have such activities as definite responsibilities. Thus, there is a degree of continuity in organizational activities since their predisaster experience applies to the disaster-created tasks.<sup>9</sup>

The advantage in this is that activity is initiated with the least delay. It is the responsibility of each agency to ensure sustained supply, and at the first sign of disruption are to take requisite measures with least possible delay.

Delay however does occur. There are several constraining factors that emerge during disaster impacts in this regard. First of all, there is always the possibility that the utility service system itself may have been damaged during impact. In which case resources will be first applied towards self-restoration. Secondly, post impact phase is characterized by lack of proper information. As opposed to normal periods, due to breakdown in communication systems during impact, delay is caused by the time taken to assess the extent and specifics of the

damage that requires to be attended. As a corollary, there is the factor of extensive damage. Needs and demands suddenly outstrip the capacity. This induces organizational stress. After taking stock of the situation, priorities are established and work initiated. Of course it may well be that areas which require priority in service may not be able to communicate their needs in time, while resources get allocated in the meanwhile. Or else important areas may pose their own constraints in service restoration. For example, though it is necessary to restore power supply to a hospital, repairs may be difficult due to debris or road inaccessibility to the trouble spot. Finally there are circumstances when the restoration of services may have to await till such time as continuing threats like fallen live wires have been diffused.

In the larger social context, restoration of community services is extremely important in that it not only helps support life preserving systems, but also signifies the initiation of the recovery phase. As general services are restored, roads opened, telephone services made operational, transportation systems resumed, then a positive cycle of activities is stimulated towards the recovery of the socio-economic systems within the community. Market forces are generally sensitive to such stimuli, and commercial networks begin to get operational. With resumptions in economic activity, other peripheral patterns of daily routine begin to pick-up, and the process of returning to normalcy is initiated.

#### LONG-TERM RECOVERY

The final stage in the chain of disaster related activities concerns long-term recovery measures. These aim at returning the stricken community to pre-disaster levels of normalcy. However, depending on the nature of the project, at times mitigatory effects with respect to prospective disasters are also realized. Schemes and projects during this phase involve the commitment of heavy financial and personnel resources over a protracted period of time. As a result, it is essentially the formally structured organizations -- mainly governmental -that remain behind to shoulder the related tasks and responsibilities.

"Spontaneous helping relationships dissipate and the work of relief is increasingly assumed by bureaucratically organized units who reflect concerns, actions, and requirements that are a sharp contrast. . . to the mood of the therapeutic community".<sup>10</sup>

The recovery process involves restoration of public utilities on the one hand, and individual/family systems on the other. The focus in the following pages is primarily upon the latter.

# TYPES OF ACTIVITIES

The ultimate objective of activities performed during this stage is to effect recovery in such manner as to restore socio-economic systems to pre-disaster positions of normalcy, or to effect some level of improvement. However due to scarcity of resources, it is usually the case to try and simply return the stricken community to its pre-disaster status. Primarily in this context, three types of activities are initiated. These are, opening of relief works, providing of input subsidy, and reconstruction of damaged houses. Issues related to these are discussed below.

#### RELIEF WORKS

Extreme natural phenomena tend to disrupt the means of sustenance and livelihood in a number of cases.<sup>1</sup> one of the factors that retards resumption of normal activities is the seasonality of a particular occupation. (The second being non-availability of necessary inputs). Agricultural

<sup>&</sup>lt;sup>1</sup> For a comprehensive examination of principles and issues related to economic disruptions, poverty, famines etc., see Amartya Sen, <u>Poverty and Famines, An Essay on</u> <u>Entitlement and Deprivation</u>, Delhi, Bombay, Calcutta, Madras: Oxford University Press, 1984.

operations for example cannot be resumed until the following season is due. Thus, when crops are damaged due to aberrant weather, not only is there the loss of crops to be borne, but also that farmers can do very little to earn a living till it is time for starting operations for the next crop. Therefore assistance has to be so devised as to provide employment opportunities to these individuals for the interim period.

A traditional form of meeting this objective has been the opening of relief works. That is, short-term projects, involving a large labor input are initiated around the victim community. By the opening of such works, opportunities are created to expand the demand for labor, thereby increasing the employment potential in the region.

initiating such "relief" programs, certain While factors need to be emphasized. First of all it must be recognized that the primary purpose here is to provide employment to a displaced/dislocated labor force that comes from the poorest strata of society. As is normally the their physical labor, these apart from own case. individuals carry few skills and resources. Thus, projects must be simple, and kept labor intensive, so as to absorb the expanded labor supply of the local market.

Secondly, given existent constraints, these projects should be geographically kept in near proximity to the area from where labor supply is to be drawn. Individuals who are already experiencing severe resource scarcity, will find it of little profit to spend time or money on transportation. On the other hand if the schemes are close to habitation sites, they are also likely to be seen as beneficial to the local community, and will invite more positive participation.

The third factor that should be kept in view is the durational aspect of the program. The objective of these projects is to provide interim assistance, and therefore, the time period should necessarily be kept short (two to four months, with exceptions of course). If on the other hand, longer works are started, then it is very likely that they will experience labor shortage subsequently, since as normal, traditional activity resumes, labor will be distracted away from relief works. This is particularly so since relief work renumeration is typically lower than the normal wage/income levels. Therefore, in order to avoid being abandoned, works should be of such nature as to correspond with the time factor for employment.

Normally, relief related projects cover sectors such as; minor irrigation, afforestation, soil

conservation, road construction/repair, water supply, drainage, and construction of "percolation" tanks. Not only are such projects labor intensive, but help create valuable assets for the local community. Considering most of them are environment oriented, a certain amount of long-term mitigatory benefit may also be realized. Thus, not only is the immediate objective of providing sustenance met, but certain medium and long-term advantages are also gained.

#### INPUT SUBSIDY

The second factor which hinders and prevents resumption of traditional activity is the non-availability of needed inputs. Such inputs are tools, equipment, raw material, seeds, fertilizers etc., which are necessary for the conduct of a trade, craft or occupation. These may be unavailable because of two reasons. First, that they may have been lost or damaged during impact, or secondly, that while existing inventories may have been spent already, no capital is available to purchase fresh stocks. For instance, a farmer would have already used up his stock of seeds, fertilizers etc. on the crop that was subsequently damaged during impact. Thus, while on the one hand he has already exhausted existing stocks, on account of the crop damage he has nothing to sell so as to be able to have the necessary capital for purchasing a fresh load of inputs. As

a result, till such time as these inputs are made available, normal activity cannot be resumed.

Therefore, in order to stimulate their economies, government or the concerned aid agency make efforts to provide and supply such "seed" items at subsidized rates. The rate of such subsidies are normally arrived by calculating the costs and requirements on the one hand, and the financial capacities of the aid giving agency. Thus for example, if agricultural input subsidy is to be provided, then first a needs assessment is carried out. Estimates are made of the inputs required per unit of land (hectare or acre), and their costs. By multiplying the total area to be subsidized with the per-unit figure, the total financial burden of inputs is derived. Then, depending on the financial strength of the subsidizing agency, the rate of assistance per unit of land can be derived and distributed.

Similarly, subsidies can be provided to other affected occupational groups in order to revive and restore their economic systems. The loss of cattle, damaged looms, fishing vessels and gear, etc., can thus be partly compensated for, and inducement provided for conducting repair or purchase of the needed material.

HOUSING

discussing the typology of disaster While management, the cyclical relationship between the four main phases was referred to. Certain forms of recovery patterns were seen as having mitigatory effects, thus completing the circle of disaster related activities. In this context, perhaps the most commonly noted example of recoverymitigation activity is rebuilding/relocation of housing. section, it therefore appears This being the final appropriate to conclude with an examination of certain housing related issues during the recovery phase.

One of the usual consequences of natural calamities is damage to houses. In fact, it may be stated that, a distinguishing feature in terms of patterns of impact is that damage to houses is more common during natural calamities as compared to other types of disasters. Considering that "shelter" is a basic necessity of life, damages in that respect cause severe family and personal dislocations. Therefore substantive effort is spent by victims, and intervening organizations to effect recovery in this regard. In an overall sense, two approaches are adopted; a) repair and restoration and b) relocation. Basic themes related to these are presented below.

# **Repair and Restoration**

the initial considerations of Once immediate personal and family safety have been attended to, victims of disasters will normally turn their attention to problem of housing. By and large people will try to return to their old houses and undertake necessary repairs as early as possible. However, this process may be hindered by several factors such as; death or serious injury to the head of family, continuation of primary threat (like inundation), or existence of secondary threat (like fire). Restricted individuals are then prone to accept living in thus. externally provided shelters for extended periods. However, it has been generally noted that in the end people will make all efforts to repair/rebuild their damaged houses and return thereto. As has been noted, ". . . the vast majority relocate back to their old location, often rebuilding on the same spot they occupied in preimpact times."11 In terms of psychological security, and personal satisfaction it is not difficult to understand why people will display strong motivations to return to their original homes. Further, the whole recovery process is linked to returning "home";

As the recovery process moves forward, victims press for a return to normalcy. They want to return home, or at least to have the issues of location settled so that they can begin making plans.<sup>12</sup>

Thus there is a sense of urgency attached to the matter. Accordingly, one common form of assistance is to provide money or material to victims for effecting repairs. A view has recently emerged that even though people may rebuild upon the same sites, improvements in construction could be introduced at the repair stage so that greater safety is introduced for the future. For instance it was noted that:

. . . considerable change has taken place in housing characteristics in Guatemala since the 1976 earthquake. . . people show a marked reduction in the use of tile for roofing as compared to before the earthquake.<sup>13</sup>

However, it is the general pattern that people will rebuild and repair houses without changing the structure, design, or material that is traditionally used in the region. This is particularly true in areas where locally available material such as mud, wood, and thatches are used for building houses. The essential factor here is that it is the availability of the material which determines construction patterns. Thus if safer methods of construction can be devised with the help of locally available material, it is conceivable that changes will be made, rather than when "foreign" material is used in the innovation. Similarly, if the design of the house is altered such as to go against traditional housing styles, then modifications are not likely to be accepted--

particularly when such modifications are oblivious to local cultural values.

# **Relocation**

Despite the urge to repair or rebuild houses at the same pre-disaster site, certain circumstances compel or encourage relocation. This is particularly so in vulnerable places such as low lying areas, flood plains etc. Relocation is also supported by the view that it leads to mitigation and "development" of the area in the long run.

While more recent years have seen some major examples of complete relocation, these remain exceptional cases. At times these may reflect mitigation efforts, e.g., relocation out of areas known to be highly flood prone or seismically active.<sup>14</sup>

However, as it appears such basic changes in habitation sites are not readily accepted, and are generally shied away from.

"many villagers would move into the new houses, stay for a short time, then return to the old site and rebuild their damaged homes. Consequently the new houses are in many instances uninhabited, are deteriorating, and are not being paid for."<sup>15</sup>

Factors such as requirement of heavy finances, personal sentiments, sense of security, proximity to occupation site, social and cultural factors (living among socially and culturally compatibles), all play a significant role in this regard. Therefore in the end, despite exceptional cases, relocation has not been found to be too popular or feasible. As observed;

Generally, disaster victims push to repair or rebuild at their original homesites. While some "extremists" representing varying ideological view points can be expected to propose visions of redevelopment -- including total community relocation -- that are drastically different from the original pattern, few victims seem to maintain much interest. <sup>16</sup>

#### CONCLUSION

The last phase of disaster management concerns short and long-term recovery measures. The former relates to information collection, maintenance of security and restoration of public utilities. Such activities can be viewed as introducing an element of stability and control in an uncertain environment. While preventing further losses on the one hand, these measures seek to initiate the process of returning socio-economic systems to normalcy. Also tasks such as the collection of information help in measuring the magnitude of impact, and the nature of relief and aid likely to be required in the area. And as transition occurs from response to short and long-term recovery activities, intervention by agencies becomes increasingly bureaucratic, as opposed to the spontaneity of initial response.

Long-term recovery measures are mainly in two

forms. The first set includes measures which help revive lost economic and occupational opportunities. Normally it is the poorer strata of society that is affected the most during disasters. In view of this it was argued that organizational aid should assist in providing sustenance through opening of relief works and revival of individual economies through provision of input subsidy. Such relief, it was observed, was likely to be the most effective in meeting the objectives of recovery.

Finally long-term measures include rebuilding and at times relocating of damaged houses. In fact, this aspect of recovery is commonly referred to illustrate the cyclical nature of disaster management activities. Improvements in housing structures or relocation have mitigating effects. Thus linking the activity with those conducted during the initial phase of mitigation. For just as in the latter, the objective here too is to reduce vulnerability against future threats through "structural" (improvements in design construction), "non-structural" (relocation) and and measures. On the other hand where such mitigation is not possible, as appears to be the usual case, it is expected that a more realistic sense of vulnerability is likely to prevail. And this in turn helps usher a sense of urgency in the community that prompts the initiation of planning and

other preparedness measures.

#### NOTES

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# CHAPTER TEN

# COMMON FACTORS

#### COMMON FACTORS

Before concluding this study, it is relevant to discuss a few key features of the field. Certain principles and factors relate to disaster management in an intrinsic manner. That is, they have relevance to the respective individual segments of the subject, and at the same time bear influence on the scope of the discipline itself. Thus these were referred to with respect to individual far, sections and elements only. In order to balance the perspective, it would be appropriate now to discuss some of these overriding features in a consolidated manner. It will be observed that these issues are essential and underlying determinants of policy and administrative options. Further it would also be appropriate at this stage to indicate the scope of expanding the framework described above with reference to other related areas of disaster management. Accordingly, three final sections are provided which focus in anoverall manner upon i) the constraints and limitations associated with the discipline, ii) the integrated nature of the field, and iii) the scope of

translating the principles of this framework to other types of disasters.

#### CONSTRAINTS

on the one hand preceding chapters outline While several options and methodologies for managing natural calamities, the overall purpose would be inadequately served, if the associated factors that impose constraints remained ignored. It is imperative, that where means of social action are determined, the implications of such limiting factors be recognized and gauged correctly. On the other hand, should such constraining elements remain exempt from consideration, then the effort is severely handicapped and is distracted from the realm of reality. Accordingly, relevant. wherever such factors were examined with reference to each major aspect of the framework. However admittedly, while discussing such issues in association with individual segments, the overall pattern of linkages between such constraining factors remain unaddressed. It is therefore appropriate at this juncture to examine these factors in an overall perspective. To extrapolate and examine issues that limit decision-making, two sets of factors need to be focused upon. These are related to; i) the uncertainty involved, and ii) socio-economic behavioral patterns. These are discussed below.

## UNCERTAINTY

The element of extreme uncertainty associated with natural disasters is perhaps the most overwhelming constraint imposed upon management of natural disasters. This uncertainty has three related variables. First of all, there is the factor of time. Uncertainty surrounds not only the actual point-in-time of the occurrence, but also the durational aspect. The second variable associated with uncertaintv is the spatial element. And finally, uncertainty is associated with the magnitude of a disaster. Magnitude here implies a measure of the type and degree of losses suffered. The implications of such uncertainty can be analyzed in terms of resource allocation and the lack of appropriate models for measuring related payoffs.

One of the typical responsibilities that preoccupies government is the providing of security and protection to their citizens from threats and hazards, including those emanating from natural hazards. However despite the existence of a number of efficient options in this regard;

There has been a consistent institutional and political lag in identifying and mitigating increasingly hazardous situations. Public administration has been generally been limited to a crisis-reactive management approach, whereas the seriousness of the situation demands a more proactive stance, specifically in the areas of

mitigation and preparedness.<sup>1</sup>

"institutional and political lag" is often This viewed as an attitude reflecting apathy. A closer examination however reveals that this is merely the symptom of a deeper problem. At the heart of it all is the question of determining and allocating scarce resources among competing demands, where inevitably they "view other current problems as more pressing and important."<sup>2</sup> And this because the choice involves choosing between investments that produce immediate tangible results which can be easily recognized and measured, as opposed to the uncertain probabilities of distant returns associated with risk protection. In essence, the root of the problem lies in the uncertainties attached to natural calamities.

In conceptual terms, social time preferences are exercised in favor of present consumption patterns, rather than for uncertain payoffs in a futuristic time-frame. Investments in mitigation and preparedness projects are therefore shied away from since, "political and/or economic costs are seen as disproportionate to the benefits of solving the problems."<sup>3</sup>

A related factor that adds to the problem is the lack of an appropriate theoretical model for risk related decision-making in the public sector. While the streams of benefit and costs received from investments made in other sectors can be effectively measured and assessed, in the case of hazard protection programs, this opportunity is not readily available. As has been observed;

We live in a world all too obviously dominated by risk and uncertainty. Facing the issue of risk and uncertainty, in the analysis of public investment decisions, is therefore no mere theoretical flourish. Rather, it is very close to the heart of the matter. Unfortunately, the conceptual difficulty of the problem is very great, and the "state of the art" in economics does not yet provide for its full solution.<sup>4</sup>

Thus it can be seen that economic frameworks that adequately address and measure the environment of uncertainty are still in an embryonic stage. Therefore, when hazard safety needs compete with other social welfare programs, they stand at a distinct disadvantage, for "hazard problems are rife with complexity and uncertainty and are not necessarily responsive to conventional economic rationality".<sup>5</sup> Yet on the other hand, when eventualities do arise, severe demands are placed upon the concerned public agencies to provide services for which skeleton resources Eventually, relief and rehabilitation were allocated. expenses are incurred that amount to high social costs in the long run. Thus the question of uncertainty has an overbearing influence on all aspects of disaster

management.

# SOCIO-ECONOMIC FACTORS

Literature concerned with environmental issues shows growing awareness of the rising levels of vulnerability to natural hazards. One of the prime factors that has led to this increase in vulnerability is the occupation of vulnerable lands and habitation sites. Examination of such occupational patterns reveals that despite awareness of the potential threat, individuals occupy these sites under compulsions of socio-economic necessities. Paradoxically, attempts by government to steer such occupation away from threatened areas appears in a number of instances to only further encourage such behavior. As a result, the number of individuals exposed to natural hazards continues to rise. In effect, such behavior, compelled by socio-economic factors imposes constraints on efforts that seek to prevent exposure to natural hazards.

While there are a number of factors that lead to increased vulnerability, the major contributing source is the occupation and or cultivation of areas such as hurricane prone coastlines, flood plains, hill sides, semiarid areas, and "cleared forests". In fact as has been

noted, "several researchers have examined different aspects of vulnerability. Typically, the conclusion is reached that location decisions are putting more people at risk".<sup>6</sup>

It is not that there is unawareness of the implications of such behavior patterns. Rather. such propensity is compelled by hard socio-economic realities, wherein the exercise of options is an extremely complex process. In order to capture this process of decisionmaking, a model of "bounded rationality" has been applied;

In that model, the individual decision maker is seen as choosing among a range of alternatives limited by his perception of them. He is responsive to characteristics of the physical and biological systems on the one hand and of the social system on the other. We suspect that his perception and weighing of those features and of likely consequences the is expressed in his description of therisk, his articulated appraisal of the possible effects, and his actual behavior.7

The actual behavior in fact may appear to be largely irrational considering the risks involved. But given the scarcity of alternatives, choices are made on the basis of factors that extend far beyond considerations of measuring utility satisfaction in traditional cost-benefit terms. As is illustrated by the following account, individuals are forced by circumstance of socio-economic realities to live on the threshold of life by continuously exposing themselves to danger: The 5,000 who were washed away in Bangladesh last May by cyclone-induced tidal waves had been cautioned repeatedly against inhabiting the tiny, shifting "char" islands formed by silt collecting in the river deltas. But land shortages caused by high populations had forced them there. After the storm, the survivors settled there once again, just as they did in 1970 after 300,000 perished in a similar storm.<sup>8</sup>

The most fundamental factor that has pushed people onto such "marginal" lands is the pressure exerted by population expansion; a factor of significant proportions in the "less developed countries". Thus due to lack of other sites, houses are built on vulnerable lands which eventually result in tragedies;

The 150 Puerto Rican peasants who lost their lives because population pressure and lack of affordable land had left them little choice but to build their shanty-town on a slope known to be unstable.<sup>9</sup> (Emphasis added.)

Similarly due to lack of employment opportunities and pressure in the rural areas, marginal lands are brought under the plow;

. . , all across Central America, previously undeveloped lands have been cleared, marginal or hillside lands have been brought into production, and already cultivated lands have been exploited more intensely at a breathtaking pace in recent decades.<sup>10</sup> (Emphasis added.)

Some of the other factors that lead to occupation of vulnerable areas have been summarized as follows;

Human occupance that persists in areas of recurrent hazard is justified in the view of the

occupants for the following reasons: 1. Superior economic ability; 2.Lack of satisfying alternative opportunities; 3. Short-term time horizons; 4. High ratios of reserves to potential loss.<sup>11</sup>

While the options of individuals are dictated by such socio-economic factors, it can be seen that similar issues also affect decision-making of government authorities. Such constraints can be viewed from three positions, which paradoxically induce vulnerability and occupation of hazard areas. First of all. iust as individuals are forced to migrate and settle on unstable lands, government under pressure are also pressed to provide lands to their burgeoning populations. Considering the shortage of land resources, forests and such areas are and given over to people for habitation and cleared, cultivation. As has been repeatedly pointed out, such practices disturb existing eco-systems, which eventually lead to natural disasters. To illustrate one such case;

The fires of Rondonia burn day and night, turning millions of acres of irreplaceable tropical rain forest into vast stretches of powdery white ash.

To the Brazilian Government, this is progress. The fires are being set by immigrants to clear forest for crops and settlement. . .

But to critics, the incessant blazes are spreading closer and closer to an environmental disaster that will leave many settlers unable to feed themselves and will render parts of the region an unproductive wasteland.<sup>12</sup>

The second form of government intervention is the introduction of structural protective measures such as dams and levees. Such "development" programs however become counter-productive in the long run. First of all. while such measures seek to provide security to downstream they generate ecological problems regions, in the Secondly, such constructions encourage "catchment areas". further occupation of the vulnerable flood plains in the lower reaches.

Structural devices such as dams, for example, often engender a false sense of security.

Numerous such studies have shown that total reliance on such protection schemes builds a greater potential for catastrophe by inducing a buildup of vulnerable property and causing the people to have a false sense of security and protection.<sup>13</sup>

Third, such technological and structural works tend to increase the magnitude of disaster, when it does occur. For instance studies have shown that;

. . . while the level of damage from the more frequent floods is curbed in protected flood plains, the probability of great catastrophes increases. Each stream reach protected by levees or dams is a candidate for a flood exceeding the design capacity of the planned control works.<sup>14</sup>

And again, in the case of droughts;

. . . while local impacts from recurrent drought events of similar magnitude are lessened through an elaboration of technology and social organization, the potential for catastrophe from events of rarer frequency is increased.<sup>15</sup> Finally, government intervention comes in the form of relief. Political and other considerations weigh heavily in this regard and concerned agencies respond promptly to calls for relief to effect recovery of individual and public systems.

The behavior of public officials is naturally influenced by individual reactions to hazards which they face. There is considerable empirical evidence documenting the lack of interest by residents of hazard-prone areas in adopting protective measures to mitigate losses or purchasing insurance voluntarily. Following a severe disaster, there is normally a clamor for disaster relief to aid uninsured victims and Congress has frequently responded with special legislation. In this sense the policy maker and individuals join forces since they both have the same objective -- a speedy recovery.<sup>16</sup>

However, such intervention does have deleterious effects overtime. Relief comes to be regarded as a form of compensation that can usually be taken for granted. As a result, individuals are not discouraged from locating vulnerable areas. As noted;

B. The Federal policy frequently rewards the gambler at the expense of the prudent or cautious individual. Special Disaster policies, . . , tend to encourage economic actions that an individual would most likely consider unsound under normal circumstances. . .

C. The most disturbing aspect of Federal relief is that it does nothing to discourage individuals from moving into disaster prone regions (e.g.,flood plains), thus perpetuating the need for more loans and grants in the future.<sup>17</sup> Described above were some of the socio-economic variables that determine land use patterns in various societies. Considering that such practices accentuate rather than relieve vulnerability, difficulties are experienced by decision-makers in formulating a policy that alleviates these problems in an effective manner. However this is not to suggest that all policies are selfdefeating. The above descriptions were brought in to highlight and enumerate the inadvertent consequences that tend to accompany administrative policy; and need to be guarded against.

In concluding this section it may be stated that several factors contribute to limitations experienced by policy makers and managers of natural disasters. These can be broadly divided into two categories. Those associated with the larger element of uncertainty, and those with socio-economic factors. Needless to say, these are not mutually exclusive, and operate simultaneously, making the task that much more challenging.

#### FOCUSING ON AN INTEGRATED APPROACH

While reviewing various options available for preparing against natural disasters, it is important to recognize the integrated and multi-dimensional character of the discipline. It is only through such an approach that any level of efficiency can hope to be achieved. Therefore it is proposed to identify some of the main patterns of interrelationships that need to be incorporated in a disaster management system. There are several such sets of interrelationships and dependencies, of which the most important ones are outlined below. Among these the most significant is the inter-sectoral feature of the discipline. In fact this is a descriptive umbrella under which other relationships can also be analyzed.

# **INTERDISCIPLINARY APPROACH**

The current social, political, and economic "state of the world" is characterized by increasing complexities. The chief elements that induce this are the interrelatedness between various aspects of human activity on the one hand, and the dynamic nexus between human activity and the physical environment on the other. Due to the interdependence and inherent linkages between the various social, political, and economic systems around the world (as also within regions and countries), activity in one sector has repercussions and implications for another. This is particularly with reference so to natural disasters. In a world marked by depleting natural resources and increasing population pressures, human interface with sensitive eco-systems has sharply increased vulnerability to natural calamities. This trend is particularly steep and significant in the poorer regions of the world. For instance in a bid to increase agricultural yields, modern techniques of farming were introduced, which required, among other inputs, a stable supply of water. In order to ensure the availability of water, irrigation projects were implemented. However, in times to come, such projects proved to be counter-productive since they increased the levels of salinization in the irrigated lands. For.

The best irrigation water from rivers still contains 200-500 milligrams per liter (mg/l) of salts. Supplying 10,000 cubic meters of water deposits in the soil anywhere from two to five tons of salt per hectare of land. After 10-20 years of irrigation the salt land becomes enormous, amounting to dozens and even hundreds of tons per hectare, rendering the land unfit for agricultural production.<sup>18</sup>

The implications of such linkages may be felt in a relatively short period of time. However, in the context of natural hazards, the impact is normally "hidden" and manifests itself in a longer time frame with graver implications. It is reported for instance that;

In the Soviet Union, Kremlin planners desperately seek water to recharge the Caspian sea, which is drying up partly because too much of the water in its tributaries has been diverted for irrigation projects. Some experts have warned that too much diversion could damage the Arctic ice cap and provoke regional and even global climatic changes.<sup>19</sup>

Considering the nature of such linkages, in order to be effective, it is incumbent upon policy to recognize inter-sectoral character of the causal agents of the natural disasters. Similarly, it is necessary that efforts which seek to mitigate or effectively reduce the impact of also extreme natural phenomena need be interto disciplinary in approach. In keeping with this argument, the various aspects discussed in the main body of the study are analyzed in a perspective that seeks to capture the interdisciplinary nature of the field. Mitigation for instance is reviewed within the framework of a matrix that inter-sectoral variables. involves Alternatives are outlined that draw upon the inputs of various disciplines such as; architecture, designing, and engineering on the one hand, and meteorology, hydrology and geology on the other. A third set of variables includes the fields of spatial planning and regulation, finance and taxation. The implications of such alternatives however are not only analyzed in terms of the efficiency criterion, but also with reference to relevant legal, political and administrative issues. Such an approach enables focusing upon the concerned options in a more integrated and realistic manner.

#### LINKAGE BETWEEN CONCEPTS AND POLICY

It has been consistently emphasized so far that effectiveness of policy formulation is substantially enhanced if it is based on conceptual foundations. That is, concepts which are defined by empirical research and theoretical models. Such a "disciplinary" approach provides the necessary direction and strength to the effort. Conversely, in the absence of relevant concepts, policy is observed to have faltered. For instance, while deciding on issues of resource appropriations, societies usually utilize managerial instruments of cost-benefit analysis to assess priorities. However disaster mitigation and preparedness programs are unable to effectively compete with other demands since no theoretical model is available that adequately assesses the returns of risk protection measures.

On the other hand, where available, relevant concepts can be meaningfully utilized for support and guidance in identifying means and objectives. For instance, theoretical principles are extensively used while identifying a format for training schedule. Similarly, conceptual frames of reference are brought to bear upon the problems that planning mechanisms must confront. Thus horizontal and vertical factors are identified to provide

the necessary format. In fact, planning is itself "seen as a conceptual tool, used for rationalizing organizational output in an uncertain environment".

Finally, it should be recognized that emergencies bring together a varied number of social groups such as families, government agencies, private groups and community organizations. They come from different backgrounds and mandates, and the resulting interaction introduces a highly dimension dynamic to the situation. The social. psychological, and administrative variables which emerge during such interaction, determine in large measure the nature and quality of overall response. Therefore, the insights provided by theoretical models on such aspects of sociological behavior, based on empirical research must be given cognizance and taken advantage of in order to strengthen administrative action.

#### PHASES OF DISASTER MANAGEMENT

Analytically, the series of activities and policy options pertaining to disaster management are divided into four main phases. These are mitigation, preparedness, response, and recovery. In a descriptive sense these phases represent the sequential order of activities and highlight the thrust of effort in each phase. In fact it has been

#### demonstrated that;

. the relationship between mitigation, preparedness, response, and recovery is not even some preparedness activities Rather, linear. officials) (like educating government could really have mitigation effects; and some recovery activities mitigate against future disasters (like using housing loans to relocate residences out of a flood plain). The functions and effects least cyclical experts hypothesized at а relationship among these four phases of disaster activity.20

Such a typology is essential not just within a conceptual context, but has relevant and meaningful implications for policy. First of all, it provides an overview of the total effort required to cope with natural hazards. Secondly, it gives insights into various inputs and their linkages and interdependencies. Understanding of "phases" also helps assessment of overall the possibilities. And in this sense, it enables identification of the tasks to be performed, the organizations to be involved, and the nature of resources likely to be required. In essence the typology provides the parameters within which all disaster related activity must rest. It is the underlying format of the framework, and provides the essential "rationality" and "logic" of approach.
## ORGANIZATION AND THE COMMUNITY

levels Several types and of organizations participate in the various tasks related to disaster Traditionally agencies intervened management. only to extend relief to victims, and therefore their relationship with the local population was brief, and characterized by a patronizing donor-recipient outlook. There was in effect, little understanding and appreciation of local systems and values. Consequently relief efforts were limited and at times misdirected. This is adequately demonstrated by the examples of supplying locally irrelevant relief materials.

In as much as the scope of organizational involvement with disaster related activities has increased manifold, the "misdirection" of effort would be magnified considerably, if traditional intervention behavior were to sustain. Therefore, it needs to be emphasized that in order to be effective and meaningful, organizational activity must incorporate awareness of local social, political, and economic patterns of behavior. Thus for instance it is advocated that, "planners must adjust their disaster plans to people, rather than expecting people to change their behavior in order to conform with emergency plans."<sup>21</sup>

Similarly, local values and behavioral patterns

must be understood and taken cognizance of before a warning system can be made operational in an effective manner. Accordingly, it was emphasized that the content of warning messages should be tailored towards the community they address. Otherwise the effect falls short of its mark, and largely apathetic. Local community reaction will be cultural, socio-psychological, economic, and geographic variables have all to be taken count of before any locally relevant policy is adopted. Further, as a corollary, agencies must work with and through the local community, impose themselves. rather than This enables greater understanding and acceptance of the agency's role by the community, and facilitates sensitivity to mutual needs and objectives.

These then were some of the salient elements that emphasize the need to recognize and adopt an integrated and inter-sectoral approach while formulating a policy for managing natural disasters.

### COMPREHENSIVE EMERGENCY MANAGEMENT

Several principles and conceptual models are highlighted in the study to provide an appropriate framework for the management of natural disasters. It has now come to be recognized that these principles can also effectively be utilized for understanding and organizing overall response to other types of hazards as well. In view of this, the framework discussed so far can be extended to include other forms of disaster, thereby assuming an enhanced, and comprehensive function. In fact during recent years, such an extended framework has been conceptualized afresh as Comprehensive Emergency Management, and ;

refers to a state's responsibility and unique capability to manage all types of disasters by coordinating wide-ranging actions of numerous agencies. (The term "emergency and "disaster" are used interchangeably herein). The "comprehensive" aspect of CEM. includes all four phases of disaster activity: mitigation, preparedness, response, and recovery for all risks -- .<sup>22</sup>

The relevance and utility of such an approach can be recognized by evaluating the fact that numerous other types of hazards threaten societies. Chemical and nuclear accidents, derailment of trains and overturned trucks carrying hazardous material, are few examples of other forms of disaster. Further with recent incidents at Bhopal (India), Chernobyl (USSR.), and Three Mile Island (USA.), greater concern and alarm has been expressed with reference to consequences of such hazards and current state of preparedness in this regard. These incidents in fact brought into sharp relief the extent and scope of negative externalities that accompany "modernization". Technological advancement has in fact added yet another dimension to the state of vulnerability that society must contend itself with.

While there are several distinctive features that characterize such "man made disasters", closer examination the issues reveals that there of are a number of similarities between them and "natural" disasters. Given this. it became the endeavor of social-scientists and practitioners to formulate a management system that addressed such common elements in a comprehensive manner. It was recognized that greater efficiency could be achieved by introducing a multi-hazard approach to disaster planning and preparedness.

Differences chemical in and nonchemical disasters exist especially in the risks they This requires different preparations for pose. However, chemical emergencies. many similar response tasks are necessary in both kinds of disasters and disaster all phases. Actual responses in chemical emergencies also differ somewhat from what occurs in natural disasters. the similarities between both are Nonetheless, more important than the differences. Therefore, a generic rather than agent-specific approach to preparedness and response seems warranted.23

One of the principal advantages that such a "generic" approach provides is that the findings and conclusions of earlier research with reference to natural calamities can also be appropriately applied to such "modern" day disasters. One such common factor is sociopsychological behavior patterns that tend to generally surface during periods of stress. Therefore applications from earlier research can be effectively made on the other types of emergencies as well.

In the last two decades, social scientists, especially sociologists, have increasingly brought their models, concepts, hypotheses, and methodologies to bear on the question of how people and groups behave in, and react to natural disasters. . . the research undertaken has led to considerable understanding of human behavior and organized social action under extreme stress (Quarentelli situations and Dynes 1977). Consequently, when we launched our study of chemical disasters, it seemed appropriate to continue to draw from the general social science literature.<sup>24</sup>

Similarly, theoretical concepts formulated for understanding natural disasters can also be applied to other types of disasters. Thus implications can be drawn from concepts such as agent characteristics, temporal, spatial factors etc., to conceive administrative strategies. Planning, warning, training, and response mechanisms can effectively utilize the strengths offered by existing conceptual models. Thus,

Despite obvious differences in the demand structures generated by such large-scale emergencies, research studies completed during the last two decades have validated the utility of a generalized approach. Initially referred to dual-use orientation, а the concept of as Comprehensive Emergency Management (CEM) has emerged as a partial response to a longrecognized need -- improved hazard and disaster management, including emergency responses.<sup>25</sup>

Such an all-encompassing approach to managing disasters offers several advantages. Resources of the community are efficiently utilized, since redundancy and duplication of effort is minimized. The experience and knowledge of earlier research can be appropriately brought to bear on situations arising out of other disasters. In the context of overall public safety, a more comprehensive perspective is gained. Considering such favorable factors, the framework described in the study can be applied with sufficient adequacy to other types of disasters, thereby enlarging the scope and relevance of its own possibilities.

Described above were some of the essential features that have an overriding influence on the discipline. These issues in effect provide a larger perspective to the subject, and form the necessary and relevant backdrop to any analysis of natural disasters. As may be observed, these are important factors, and their implications need to be incorporated while assessing policy options.

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# C H A P T E R E L E V E N

CONCLUSION

## CONCLUSION

The purpose of this study is to outline a frame of for the effective management reference of natural disasters. The ultimate objective being to enable formulation of a "rationalized" policy structure as opposed to traditional "ad-hocism". The underlying argument here being that by adopting a systematic approach, greater efficiency is achieved in establishing coping mechanisms, in overall response, and in resource utilization. There are three main features that characterize such a disciplinary approach. First, the integrated nature of the various elements involved in managing natural disasters is recognized and incorporated. Second, it is based on conceptual foundations, which provide direction and steadfastness to the effort. And finally, it is supported and reinforced by evidence gathered through empirical research in the concerned social sciences. Together these three factors comprise the source of strength for the framework that is outlined in the preceding chapters.

Older than history, the occurrence of natural

disasters is a phenomenon that every society has had to contend with. However, due to pressures of population and accompanying demands, overall vulnerability in most parts of the world appears to have increased significantly. As a result greater concern has been expressed regarding management of natural disasters. On  $\mathsf{the}$ other hand traditional "ad-hoc" systems are no longer relevant, and fail to comprehensively address the issues which surface as result of modern complexities. Therefore, a more systematic "rational" approach is required.

Over the last two decades, social-scientists have focused their attention and concerns upon natural disasters. Inputs from various disciplines came forth, as a result of which a "disciplinary" and conceptual frame of reference was provided to the field. Through such studies, which were based on empirical observations, greater insights were afforded into the technological, social, psychological, political, legal, economic, and administrative aspects of disasters. It has been generally recognized, that by application of such conceptual models, greater efficiency can be achieved in managing natural calamities.

In keeping with this background, the discussion has sought to outline a framework, based upon which effective

policies in this regard can be formulated. The major components of the framework are presented in their sequential order, so as to highlight their interrelatedness and dependencies. Inputs and implications from relevant disciplines have been brought to bear on each issue, so as to conform to the highly inter-sectoral character of the subject. And this, it may be emphasized forms the key element to the whole exercise.

At the outset, some of the basic factors associated with this study were described. These covered issues such as examining the need for an effective disaster management policy, and the development and growth of the discipline. In as much as emphasis is continually laid on conceptual models, the discussion was initiated by outlining the relevant theoretical frames of reference. To begin with, a working definition of natural disasters was attempted. Other theoretical aspects described related to characteristics of disaster causing agents, and the phases of disaster management. Similarly, certain relevant features of organizations associated with natural calamities were examined. Mainly, organizational functioning was viewed as a critical determinant of response patterns. In turn it was seen that agency intervention was determined by its mandates, resources, and

jurisdictional levels of operations.

In terms of the activities described, the essential format is in keeping with the phases of disaster management; mitigation, preparedness, response, and recovery. Of these, mitigation has more long-term effects. Mitigation measures are analyzed within the context of a matrix that involved variables such as structural and nonstructural measures on the one hand, and geological and meteorological aspects on the other. Through their relationship, various types of activities that lead to mitigation are described.

Following this, the focus of attention is turned towards those set of activities that are preparatory in Of these, planning, training, and warnings are nature. considered as the most essential elements of preparedness. Accordingly each of these is discussed and analyzed at greater length. While examining the issues related to planning, a framework is developed with reference to vertical and horizontal factors. Further, the principles upon which planning must rest, and the types of demands that planning must address are examined in greater detail. Overall, it is emphasized that planning is an effort that helps cope with the uncertainty associated with natural hazards. And further. in view of inherent such

uncertainties, it is necessary to recognize the exploratory and continual nature of the planning exercise.

the most important activities that helps One of prepare communities to cope with disasters is training of personnel. In the relevant chapter, basic issues are examined within the context of theoretical references. On the basis of this, a framework is developed to provide guidance for formulation of training schedules. This framework is based on relating organizational factors, such levels of jurisdiction with types as and nature of activities performed during disasters.

Warnings and their communication is again a vital preparatory task. The details of an integrated warning system are described. Its main features being evaluation of the threat, the dissemination of the warning and the dynamics of response patterns associated with warnings. It is observed that technical, administrative, and sociopsychological variables are intrinsically involved in this phase of disaster management. Further, it needs to be recognized that the communication of warnings and response thereto is the last formal measure performed by the community prior impact. Therefore, depending on its effectiveness, the nature of subsequent post-impact response and recovery activities are determined in large.

Response to impact involves the largest number of personnel and organizations in disasters in a concentrated period of time. This phase is marked by a high degree of uncertainty. As a result, resources and energy are frequently spent inefficiently. The response process is usually initiated by local unorganized groups of individuals. However, with time, the effort is taken over by organized, response-related agencies. Thus, the types of organizations that are typically involved in response and their common characteristics described. Further. are certain constraints usually surface during such crisis, and the nature of such limitations is also examined.

Before all response activity is concluded, shortterm recovery measures begin to be taken up. Restoration of disrupted public utilities etc., are typical examples of such activities. Normally, when impact has been of significant proportions, certain long-term recovery measures also need to be introduced. Three such measures are described which relate to; opening of relief works, provision of input subsidy, and repair and reconstruction of damaged houses. Appropriately, this last effort relating to housing at times results in mitigation against future disasters. Thus highlighting the cyclical relationship between the four phases of disaster management.

nature and scope of the subject Considering the there are certain features and described in this study, principles overall relevance to the that have an discipline. The study would have been incomplete if these factors were to remain unaddressed. Such common elements refer to the overall constraints that relate to the subject, and the inter-disciplinary and integrated nature of the field. While these are referred to in relation to individual elements in the course of the discussion, their overall significance was left unattended. Therefore, these issues are focused upon towards the end, so that before concluding, their significance could be brought in to provide an overall perspective to the subject. Finally, reference to Comprehensive Disaster Management is made to indicate the scope of expanding and relating the described framework to other types and forms of disasters.

While mitigation and preparedness are the essentials of an organized response effort, it needs to be recognized that, despite their respective strengths and merits, certain severe constraints limit the scope of their adoption. These constraints emanate from the uncertainties associated with natural phenomena, as well as from socioeconomic factors. As a result, the options available to organizations and decision-makers at times are severely

restricted. And in meeting such constraints lies the essential challenge that policy makers and administrators must jointly confront.

On the other hand, there appears to be substantive scope in extending the application of the format described. Other types of disasters, chemical, industrial, nuclear, etc., all carry certain characteristics that at times are fairly similar to natural hazards. Thus, the principles identified for coping with the latter can be effectively applied to the former through measures that lie within the scope of Comprehensive Emergency Management.

The grim record of increasing annual losses due to natural disasters (particularly in the less developed countries), reinforces the urgent need for adopting an integrated and concerted administrative policy in this regard. And till such time as urgent action is initiated to effectively confront the related issues, the magnitude of disasters is very likely to increase. In recognition of this, an integrated framework is outlined in the foregoing analysis. Expectantly, through an understanding of the related issues, concerned public administrators will raise the level of social preparedness, and effectively confront the challenge posed by natural disasters.

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