# NEMA

# DEVELOPING

# DISASTER MANAGEMENT

# IN

# TRINIDAD AND TOBAGO

CONTENTS

# FOREWORD

As we enter the second year of the International Decade of Natural Disaster Reduction we are greeted with the grim news that the ozone layer has been damaged to a greater extent than it was earlier thought to have been. Therefore, at this stage one can be excused if one seems to be "more afraid of what man will do with nature than of what nature will do with man".

Nonetheless, in recent years the human and economic consequences of major disasters in the Caribbean and of the several lesser disasters that occur here annually have increasingly come to be recognized as a matter of vital national concern. It is, therefore, not unrealistic to hope that measures of prevention, preparedness, prediction, relief and recovery incident to natural disasters might be organized and co-ordinated in a way that would contribute significantly to our ability to cope with the disasters both at local and national level.

The intent of this book on Disaster Management is to increase understanding and sharpen thinking by bringing together a series of papers which the Director, National Emergency Management Agency has presented since August 1989. These papers give a broad review of the physical characteristics and the human and physical consequences of disasters and the nature and scope of the far-reaching, complex and co-ordinated efforts of government, and non-government organizations and individual citizens in preparation, avoidance, relief and recovery measures.

To me the most important single fact about this book is that it shows the extent to which thought and action are being directed at many levels, by many agencies and persons, and in a wide variety of ways to minimizing the human suffering and material loss that are the inescapable aftermath of a natural disaster.

Russell Huggins
Minister of National Security

FEBRUARY 26, 1992

## Introduction

Disaster Management has been in this world ever since human beings started inhabiting this planet. Almost 2400 years ago Plato gave a lesson in Disaster Preparedness when he visualized an ideal state whose guardians "shall provide against the rains doing harm instead of good to the land..... and shall keep them back by works and ditches, and make" irrigation "streams furnish even to the dry places plenty of water."

Results of Disaster Management have seen some extremes. A whole continent "Atlantis" was written off when it was swallowed by sea in the aftermath of an earthquake in antiquity. Whereas Japan has rebuilt itself from the catastrophe of suffering atomic attacks to be a world beater in international Trade in modern times.

The application of new scientific methods to prepare for and respond to Disasters is a comparatively new practice. In Trinidad and Tobago requirement for Disaster Preparedness was finally recognized with the creation of the National Emergency Management Agency (NEMA) on May 1, 1989.

Soon various organizations started calling NEMA for talks on different aspects of Disaster Management. Most of the times preparation for these talks involved carrying out research and writing papers for presentation.

Twenty-five (25) of these papers are being now presented to the public to give the readers an idea on development of Disaster Management in Trinidad and Tobago.

Mahendra Mathur (Colonel)
Director
National Emergency Management Agency

FEBRUARY 26, 1992

# PREPAREDNESS FOR NATURAL AND MAN-MADE DISASTERS AND NATIONAL STRUCTURES FOR EMERGENCY

"Bad times have a scientific value. These are occasions a good learner would not miss", said Ralph Emerson.

Though luckily we in Trinidad and Tobago have not had many disasters to learn from we can and we must learn from natural and man-made disasters that keep occurring around the world almost daily. For make no mistake about it, every man, woman and child in Trinidad and Tobago lives under a disaster-edged sword of Damocles, hanging by the slenderest of threads, capable of being cut at any moment by accident or a natural phenomenon. Let us therefore create an attitude of Disaster Preparedness.

Within nature nothing is constant. Indeed, nature is typified by continued changes, in some cases by predictable evolution or the normal sequences of cyclical events as in seasonal weather. Much of nature, though is unpredictable. When unpredictable natural events become extreme in their occurrence, they may constitute a danger to humans and to environment. Such as event is called a natural hazard.

Various forms of natural hazards are coastal erosion, flood, landslide, lightning, hurricane, tornado, volcano and wind.

5. Earthquakes and Hurricanes spring to mind when the word disaster is mentioned. But a disaster should be defined on the basis of its human consequences, not on the phenomenon that caused it. An earthquake, for example, is simply an event in nature. Even a very strong one is not a disaster unless it causes injury or destroys property. Thus an earthquake occurring in an uninhabited area, as do scores of tremors each month, is only of scientific interest and is not considered a disaster.

6. When a natural event does affect a human settlement, the result may still not be a major disaster. Consider the earthquake that struck Northern California on October 17, 1989. The quake registered 7.1 on the Richter scale. Yet the region suffered only 58 deaths. One year earlier, though, an earthquake of a magnitude of 7 struck North-Western Armenia and reduced three towns and 48 villages to rubble, killing an estimated 25,000 people.

7. A disaster can be more precisely defined as an occurrence of widespread severe damages, injury or loss of life or property with which a community cannot cope and during which the society undergoes severe disruption. Most natural disasters can be classed into one of three main groups; those of the solid earth, those of the fluid earth and those disasters associated with the biosphere. However, some disasters cut across such boundaries, while others spawn secondary effects which may fall into another group.

8. (a) An earthquake - a sudden motion of the earth caused by an abrupt release of slowly accumulating stress - is an example of a solid-earth type of disaster; a volcanic eruption is another. Volcanic activity is confined spatially to well-defined geological zones that are related to the unstable margins of the world's crustal plates, and this is where the majority of the more severe earthquakes occur. Landslides are much more widespread than either earthquakes or volcanoes, but they have a variety of causes that puts them on the boundary between the first two of the main groups of disasters. Heavy rain, melting snow and ice and associated floods together with earthquakes, volcanic eruptions and building and construction works are amongst the main reasons for landslides.

Landslides occurring on the ocean bottom along with earthquakes or volcanic eruptions can cause tsunamis, large ocean waves which become destructive as they approach the shallow waters along coasts. Flooding, wave damage to structures and coastal erosion result with countries on the Pacific rim being particularly affected;

(b) The disasters of the fluid earth - the atmosphere and the hydrosphere - know no boundaries. They can occur anywhere. The most destructive of weather systems, the hurricane, brings winds exceeding 120 Kh[1], rainfall over 1000 mm in the space of a few days and storm surges of up to eight metres or more;

(c) Tornadoes, whirlwinds and thunderstorms are usually very localized compared to tropical or extra-tropical cyclones, but tornadoes can generate windspeeds of up to 500 kph, and thunderstorms often produce hail and torrential rain. Coastal areas are also vulnerable to flooding from tidal waves and to storm surges, the latter resulting from a sea-level rise due to the "suction" produced by low barometric pressure and the associated winds piling up seawater and creating high waves. In November 1970, some 200,000 people were drowned in Bangladesh due to this effect which can also occur in more enclosed seas;

(d) Floods are one of the most widespread and savage of natural disasters. They can be produced by the heavy rain from tropical and extra-tropical cyclones and their frontal systems, from rapid snowmelt, from a dam failure, from ice jams and in several other ways. On a large river system a flood may take several weeks or a month or more to subside, but in headwater regions and in small river systems a flood may last for only a few hours. These are flash floods which are common in mountainous areas and regions. The combination of storm surge and river floods is particularly hazardous for low-lying countries, such as Bangladesh. For years 1980 - 1985, more than 160 major floods were recorded around the world killing and injuring more than 120,000 people, destroying the homes of nearly 20 million and causing $100,000 worth of damage. Because of

deforestation in many headwater regions and the greater and more rapid runoff that ensues, the flood hazard has grown and will continue to grow over much of the world. Likewise, the spread of urbanization increases the volume and rate of runoff, increasing further the flood hazard;

(e) Droughts are different from other natural disasters in that they are caused by something not occurring, namely rainfall, and its absence over a long period rather than by some rapidly occurring phenomenon. A drought is usually extensive in space and time. Its start cannot be readily identified and, in most cases, neither can its termination. In addition, although it may be said that droughts themselves do not usually cause death, they are the direct cause of famine which can kill hundreds of thousands of people and disrupt the society and livelihood of millions of the most vulnerable of the world's inhabitants. Even in industrialized countries, drought can cause considerable problems. For example, the prolonged Sahel drought of the 1970s and early 1980s killed many people, displaced more and disrupted the lives of millions, while the more recent droughts in Ethiopia and the 1989 drought in the Middle West of the USA have been calamitous for many. Droughts are, of course, linked to desertification and some see the incidence of drought increasing, because of the spread of deserts, and also because of climate change. Droughts provide the best conditions for bush and forest fires to start and spread. Such wildfires can engulf vast areas, endangering lives, destroying property, disrupting wildlife habitats and protective cover and also lessening scenic values. Some are started by thunderstorms but many more are due to arson and accidents, such as those from campfires. Removal of the vegetation induces more rapid runoff from the burned areas, soil erosion and landslides. The largest recorded wildfire occurred in China in May 1987, covering 10 000 $km^2$, killing nearly 200 people, destroying 12,000 homes and displacing 56,000 inhabitants.

9. The plagues of locusts that are prevalent in northern Africa and the Arabian peninsula are the best known and most serious of the insect and other infestations that destroy crops and endanger livelihoods. They depend on the correct combination of climatic conditions to breed, develop and migrate to find food before moving to new areas. The devastation of crops by locusts is a serious problem over much of northern Africa but similar pests are equally serious in other parts of the world. Bush fires and insect pests fall into the category of disasters associated with the biosphere, while drought straddles the fluid earth and biosphere categories.

10. Natural disasters affect countries large and small, rich or poor, whatever their political persuasion. You'll surely agree that the toll exacted by natural calamities each year drains the human and economic resources of every country of the world and stands as one of the formidable barriers to national, regional and world development.

11. For millennia we have had little effective response to this common threat of volcanoes, earthquakes, floods, landslides, severe storms, wildfires, and the many other hazards wrought by nature's more violent forces. But that is changing now as new technology extends our human reach.

12. This does not mean that we will control these natural events in the near future, though some dream of influencing the weather and perhaps even diminishing the severity of earthquakes. But we can certainly control our vulnerability to these hazards by predicting them more accurately and by taking countermeasures to reduce their impact. That will translate immediately into fewer lives lost, less property destroyed, and less social disruption.

13. This ability to respond to nature's challenge is relatively new to us, and is still imperfect, to be sure. In fact, the notion of any response to such disasters other than resignation and fear is quite at odds with our history. Disasters have traditionally been seen as something to be accepted, an unavoidable part of the mysteries of nature and far beyond mortal control. In recent times floods have been called acts of God in Trinidad, Earthquakes as punishment by God in Iran.

14. But what exactly does hazard readiness consist of? Its most critical feature is the commitment to anticipate the impacts of hazards rather than to simply accept them passively. This commitment gives rise to several distinct steps in what we can label as the hazard reduction process. The first step is hazard risk assessment. This involves the determination of the types of hazards likely to occur in a community, their characteristics, and the community's vulnerability to them. For instance, a hazard map is being drawn up that incorporates the expected frequency and intensity of hazards in Tobago. The hazard map can then be used by local authorities for the next step in hazard reduction - that is, disaster preparedness.

15. Disaster preparedness is the detailed planning for prompt and efficient response once a hazard strikes. It involves public education and awareness campaigns, provisions for issuing warnings, development of evacuation plans, and preparations for providing food and shelter to those evacuated.

16. While these efforts are often very effective in reducing deaths and injuries when a natural hazard occurs, they do nothing to prevent property damage and the disruption it causes. This is where hazard mitigation comes in, a third and key step in the hazard reduction process.

17. Mitigation measures attempt one of three things. Some are intended to prevent or modify the occurrence of a hazard. Building dams and levees to minimize floods are good examples of this. On the other hand, some measures seek to avoid the hazard by siting the structure out of harm's way. For instance, land use guidelines, such as those restricting growth in flood plains or on unstable slopes, can be a very effective method of avoiding hazard losses. Finally, some measures seek to strengthen a structure to reduce the damage a hazard might cause. For example, enacting CUBIC and adopting construction standards are obvious ways to increase a building's resistance to earthquakes or wind damage. The combination of these techniques that will be most effective for a community depends on its goals and resources, as well as the precise nature of the hazards it faces.

18. The process of hazard reduction does not rely solely on the clever use of technology. Rather, at its heart lies an attitude of hazard consciousness, that is, the awareness of hazard risk and a willingness to act on this awareness, both in personal life and in public policy.

19. Increasing Awareness of Hazards and Mitigation Measures

Information dissemination is essential for creating this attitude of disaster preparedness. The public (including those in government agencies) periodically must be made aware of the dangers of natural hazards - the areas affected, the damage that can be expected, and the measures available to respond to the hazard. Without this information, the public cannot make informed decisions and support appropriate mitigation actions. Education of affected property owners and the general public regarding natural hazards is an important element in any damage mitigation effort. A public awareness program has been directed by NEMA to all persons and institutions affected: government agencies, private sector professionals (planners, architects, engineers, and developers); financial institutions; and occupants of hazardous areas.

20. Public awareness efforts need not be directed toward gaining support for large-scale, expensive projects. These efforts can focus on a wide range of practical opportunities to reduce future damages. Homeowners have been given basic information on low-cost projects that they can carry out on their own. For example, residents have been informed of simple ways to reduce damage from minor earthquakes (e.g. tying down hot water heaters, turning off gas and electricity, checking for cracks in walls of chimneys, fastening heavy equipment or furniture against the walls, etc.). Similar measures for floodprone areas include moving appliances and other equipment and furniture easily damaged by floods from the lower, floodprone levels of their homes.

21. Achieving Legislative Support

Legislative support is often needed, not only to provide funding for mitigation, but also to provide authority needed by state agencies and local governments to undertake specific mitigation actions. A number of Draft Regulations has been drafted by NEMA for backing up Regulations under Paragraph 4 of Chap. 16:50 of the Disaster Measures Act of Trinidad and Tobago.

22. Distribute Brochures and Pamphlets

A number of ways to distribute information to a wide audience with minimal effort have been utilized through local school systems, civic associations, telephone directory and pamphlets published by NEMA, to name a few ways.

23. Organize and Conduct Workshops

When time and funds permit, workshops can be a very effective means of involving the public in mitigation, training school teachers, and reaching local businesses. Workshops can range from technical presentations for targeted audiences to general information about mitigational workshops for homeowners. Dissemination of information about mitigation to special groups (professional societies, teachers organizations, for example) may be accomplished through technical presentations at seminars, lecture series, conferences, etc. An example is this Seminar.

24. Involve the Public Media

Hazard information has also been conveyed through television, radio and newspaper reports. TTT has been showing clips for Disaster Preparedness and also NEMA Quiz in prime time. Both the radio stations have been periodically carrying out live programmes on Disaster Management with NEMA officials answering questions from the public. And our plans and instructions have been regularly published by both the daily newspapers. Cultivating the interest of the local media has been an important way to increase public awareness of mitigation.

25. Organize Disaster Reduction Day

Disaster Reduction Days can be an effective, relatively inexpensive method of promoting hazard mitigation, particularly with regard to such hazards as earthquakes and hurricanes which have the potential for large-scale impacts. On October 10, 1990 NEMA organized a Seminar at Port of Spain City Hall at which Private and Public Sectors, UWI Professors and Government Ministers were present. Also an exhibition of various components of NEMA was organized at San Fernando.

26. Emphasize the Risk

Several workshops organized by NEMA began with a visual presentation of the degree of hazard threat (i.e. slides or pictures of damages from a recent event, shoreline maps depicting changes in shoreline composition, risk and vulnerability maps, etc.). However, it is to be ensured that the material is not too technical or too threatening.

> "Highly technical presentations lose audiences. Don't try to impress people with technical terms; try to involve them by conveying mitigation concepts in clear, understandable terms".
>
> "Provide data that clearly demonstrates the need for mitigation, but put it in laymen's terms. A disaster scenario can be a useful tool".
>
> "Don't go overboard on the level of threat. It's important to convey a sense of urgency if, indeed, the situation is urgent. If it's not, don't exaggerate, or you'll lose their interest".

Man-Made Disasters

27. One of the seven issues agreed in a 1967 Symposium in the USA by three philosophers, two historians, one journalist and one senator was that reliance upon local administration of public affairs was preferable to reliance upon a big Government.

28. Reliance on local administration of disaster management has been the main plank of NEMA right from its inception last year. Twelve (12) local authority plans covering the whole country have been finalized by the local authorities themselves and given wide publicity.

29. Recent chlorine gas leak in North Trinidad and consequent damage done to health and property of the local residents has now brought out the necessity of enlarging these local plans so that a co-ordinated response can be made to man-made technological disasters. My recent discussions with the Industrial Inspection Supervisor from the Ministry of Labour have revealed that there are hundreds of industries scattered around the country which are not fully prepared for emergencies. Worse, the communities close by, which can be vulnerable to disasters in these industries, are not even aware of the dangers to which they are exposed.

30. That is why NEMA is now asking the industries to get involved in APELL, that is, Awareness and Preparedness for Emergencies at Local Level.

31. WHAT ARE THE OBJECTIVES OF APELL?

APELL's overall goals are to prevent loss of life or damage to health and social well-being, to avoid property damage, and to ensure environmental safety in the local community. Its specific objectives are:

- Provide information to the concerned members of the community on the hazards involved in industrial operations in its neighbourhood, and the measures to reduce these risks.
- Review, update, or establish emergency response plans in the local area.
- Increase local industry involvement in community awareness and emergency response planning.

- Integrate industry emergency plans with local emergency response plans into one overall plan for the community to handle all types of emergencies.

- Involve members of the local community in the development, testing and implementation of the overall emergency response plan.

33. IMPLEMENTING THE EMERGENCY RESPONSE PLAN

The plan developed through the APELL Process will be effective only if it is "tested" from time to time and the skills required are continually exercised by training. One way of assuring that this training is being done is to establish a formal review for the plan on an annual basis.

If the planning work is done well, the community should be prepared. If unfortunately the plan has to be implemented, it is important to review how the plan worked after the event is under control and returned to normal.

Throughout this planning process, the Co-ordinated Group should bear in mind that the plan will not necessarily involve the Group as active participants in an emergency response. The group will in most cases not be responsible for emergency response, but will develop the plan for other groups and individuals through the community to resolve a hazardous situation. And heroes in this operation will not be any disaster managers but they would rather be like the little Dutch boy who saved the dyke. They would only need a finger and the chance of happening by at the right moment.

34. NATIONAL STRUCTURES

You may well ask what organizational structures have been set up in our country to deal with various aspects of disaster management. First, there is the National Emergency Management Agency (NEMA) Task Force under the Director to deal with Preparedness, Prediction, Warning and Response. This Task Force comprises of Meteorological Service, Fire Service, Defence Force, Police Service, Information and Communication Divisions in the Office of the Prime Minister, Red Cross, Private Sector, Ministries of Public Utilities, Education, Energy, External Affairs, Health, Works, Infrastructure and Decentralization. As you will notice this Task Force has been drawn from various private and public agencies to form a homogeneous team.

35. Second structure is a Technical Task Force under the Chairmanship of the Permanent Secretary to the Prime Minister to deal with Hazard Analysis, Vulnerability Analysis, Mitigation, Prevention, Legislative Matter and Recovery. Members of this Task Force are drawn from the University of the West Indies, Water Resources Authority, Ministries of Food Production, Works, Infrastructure and Decentralization, Planning and Mobilization, Meteorological Department and the Industrial Inspection Supervisor.

36. The Policy decisions concerning Emergency Management are taken by the National Emergency Management Board which is presided by the Prime Minister and has Ministers of Works, Health, National Security, Food Production, Planning and Mobilization, Environment and National Service and Settlements and Public Utilities as its members.

37. 1990's have been designated as an International Decade of Natural Disaster Reduction by the United Nations General Assembly. This country was requested to form a National Committee for the decade to reduce risks and losses caused by the violent forces of nature. The National Emergency Management (NEM) Board decided to constitute such a Committee which has members from the Chamber of Commerce, Insurance Industry, Bureau of Standards, Association of Professional Engineers, Town and Country Planning Division and Ministry of Works. At present it is directing its efforts to inspection of critical facilities in the country, standing orders for various hazards, compulsory insurance of low-income dwellings and identification of areas exposed to various hazards.

38. These organizations were tested to a certain extent during Hurricane Hugo in 1989 and Tropical Storm Fran this year. I am very pleased to report that the organizations as well as several other agencies reacted marvelously to provide assistance to the hurricane struck victims.

39. The duties of these organizations can be best described in the words of Admiral Mahan who said at the turn of the last century. 'Much is required of those to whom much is given. So viewed, the ability speedily to put forth nations' power ... is one of the clear duties involved in the word "watchfulness" - readiness for the call thay may come, whether unexpectedly or not."

40. The Scottish scientist J.B.S. Haldance once said that the people who can make a positive contribution to human progress are few, that most of us have to be satisfied with merely staving off the inroads of chaos. That is a hard enough job - especially in these times, when those inroads are more threatening than they have been for a long time past. But if we can stave off the ever threatening disasters we would have done our bit for our country.

41. However, I must end this talk by asking you to be of good cheer for the misfortunes hardest to bear are those which never come.

# DISASTER PLANNING FOR HURRICANES AND FLOODS

1. There was a time when natural disasters were imputed to KISMET or Will of God. Worse, nothing was done to protect the population against the disasters on the pretext that they were not only unpredictable but also unstoppable. Not any longer. Science and technology now make it possible to predict most cases of natural disasters. Moreover, most of them can be very definitely minimised by proper measures.

2. NEMA was created in May, 1989 with a view to taking a comprehensive approach to hazard management in the country. So far main activities of NEMA have been concentrated on preparedness, prediction and warning aspects of natural disaster management and I dare say that our predictions and warnings are entirely based on the forecasts emanating from the Meteorological Office and Seismic Research Unit. Men wiser and more learned that I have discerned in history a rhythm and have categorically stated that because of historical rhythm, or lack of it, no hurricane or earthquake is likely to strike in Trinidad. I personally tend to leave the future for what it is, Unforeseen.

3. The purpose of emergency planning is to establish a framework for the efficient operation of all disaster related activities during pre-emergency, emergency and post emergency phases. The role of the disaster manager is to establish the framework and to see that it is effective in all phases. The secret is to provide the framework in which individuals initiative and their skills could flourish, providing the authority, the impact and the encouragement that disaster manager intervenes as little as possible.

4. In short, he delegates. Disaster planning is a tool of disaster management and a plan is a means to an end. It is the beginning of an on-going process and not an end in itself.

5. In disaster situations events never occur exactly according to the plan. No plan can provide all the answers to all the problems, but the mental discipline entailed in preparing and practising a plan gives a planner a far better grasp of the issues involved and enables him to cope much more effectively when the events unfold.

6. Disaster planning much take place at different levels. A national disaster plan sets out the overall framework within which national disaster activities take place. At the county level plans are tailored to much more specific contingencies.

7. Contingency plans concentrate on the response phase of disaster operations. It is not practicable to plan in detail for reconstruction though general policies may be determined.

8. The plans should he invariably prepared by the people who will be responsible for their implementation so that they have a commitment to them. Since effective response will involve most if not all sectors of the community, they should also be involved in the planning process. County plans should permeate through to every household.

9. In formulating the National Emergency Plan we have taken into account certain planning principles and now I will endeavour to demonstrate how these principles have been imbibed in the Plan.

10. The first principle is clarity. Aim must be positive, clear and precise and that is what our mission is, which is, preservation of life and protection of property within the territorial limits of the country.

11. Second principle is flexibility. The plan allows for the unexpected. It is not rigid nor do we expect it to be followed slavishly in implementation. The purpose of the plan is to facilitate decision making during a disaster. That is why general tasks have been given to the various task groups in the national planning.

12. Third principle is information. Good information is fundamental to sound planning and effective response. That is why a survey and investigation group is earmarked for collecting, analyzing, storing and disseminating information. A standard form has been made out for reports by this group.

13. Fourth principle of planning is continuity. This principle employs adherance to existing organizational infrastructure. Procedures have been streamlined to ensure that the organizations work during a disaster situation without any necessity of any rearrangement.

14. Fifth principle is to make maximum use of all resources. At the planning stage we asked the question ourselves. Who is good at carrying out what tasks and then proceeded to utilize existing expertise in the country. The result was formation of various groups as given in the Appendix of the Outline Emergency Plan.

15. Sixth principle is planning in packets. In assessing the anticipated impact of a disaster think in sound numbers. That is how you organize medical teams to treat victims or shelters to house evacuees.

16. Seventh principle is maintaining reserves. Always create and maintain reserves for the unexpected. Private sector, voluntary Organizations and external agencies constitute our reserve. Also resources of the neighbouring unaffected counties could be utilized as reserves.

17. The last principle of planning is co-ordination. The system for collecting information, making decision and recording actions taken must be clear and known to all. These activities will be co-ordinated at the emergency operations centre which will either be set up at Whitehall Annexe or Wallerfield. If collective action is to be fully effective it must be co-ordinated. That is why all the co-ordinators of the task groups are expected to be in touch with the EOC to ensure that information is passed to the people who need it and to facilitate initiatives at a lower level, not to impose detailed control.

18. Bearing above the principles in mind, a national plan was made out involving various government agencies, private sector and voluntary organizations for providing immediate response to any natural disaster.

This plan has now been published and distributed widely in booklet form. Components of the organizations involved in this plan have been moulded to form a homogenous task force which was tested when hurricane 'Hugo' hit some of the Caribbean Islands last year.

19. 1,000 booklets of the national plan which were initially printed at the Government Press has already been distributed to interested groups and now arrangements have been finalized with a couple of private sector companies for these booklets to be sponsored by advertisers and distributed to general public. This booklet also carries instructions for safeguarding against hurricanes, floods and earthquakes.

20. On May 31, 1990, we finalized county/borough plans and plotted them on maps. These twelve (12) maps are now being published by the Express for the information of the public. It is now possible for citizens of this country to know exactly what to do in case they are caught up in a disaster in any part of the country. But for this to happen it is vital that citizens make themselves aware of both the local and national emergency plans and make careful note of the instructions given in the NEMA booklet "Instructions for Safeguarding against Disasters". We expect some comments to arise on these plans and maps - these will be freely heard, deeply considered and speedily acted upon.

21. We are now in the process of mounting a campaign to make the public aware of our preparedness and response plans. This campaign has been simultaneously mounted on following fronts:

(a) Television - short clippings on disaster preparedness will be shown on TTT during prime time;

(b) Both Radio 610 and 730 will carry instructions to citizens for safeguarding their lives and property in case of disaster as well as interviews and call-in programmes with the Director of NEMA;

(c) Instructive articles would be published on a regular basis in both the daily newspapers;

(d) The next telephone directory will carry NEMA's message to all homes for taking appropriate action before and after disasters;

(e) A NEMA Newsletter is being brought out regularly.

Aim of this campaign is to make sure that we are not overtaken by any disaster in a state of unpreparedness.

22. Nonetheless, should a hazardous event occur or seem imminent we will have to make a specific plan based on the Outline Emergency Plan to deal with that hazardous event.

23. Perhaps at this stage I should explain the planning sequences for formulating this plan.

24. First step would be to identify the threat. This would be done either on the basis of information received from Meteorological Department or from the scene of the disaster; but we will have to identify what type of disaster it is - a hurricane, an earthquake or an accident.

25. Second step would be to estimate the affects. Probable impact area, population living there and the infrastructure would have to be taken into consideration. The requirement will have to be qualified in terms of the number of people likely to need evacuation, shelter, food, clothing and medical assistance. Needs will have to be assessed in terms of percentage, that is, X per cent of the people will need help in evacuation, Y per cent will need assistance with shelters and Z percent will have to be provided with food etc.

26. Third step will be to assess needs. A preliminary list will have to be made of everything that will have to be done and priorities assigned. Actions in all the three phases, that is, before, during and after the

disaster will have to be thought out. Generally, following headings are considered for response operations:- evacuation, health care, food, water, clothing, shelters, clearing roads, restoring electricity and sanitation.

27. Fourth step in the plan is to discuss the needs that have been identified with the other members of the task force. This will involve the whole task force in the planning process. Invariably, the other members think of things which I may overlook.

28. Fifth step is to determine policies and concepts of operations with the National Emergency Management Board, and get the framework of the plan approved by the Board. A plan which seeks to control everybody and everything from one central point is a bad plan and it will almost certainly fail as was demonstrated in Jamaica after Hurricane Gilbert.

29. At this stage the answers to the following questions should begin to emerge:-

(a) What is to be done

(b) Who can best do it

(c) When must it be done.

The task group co-ordinator is left to work out HOW to do it, drawing upon his own initiative and special expertise but is encouraged to discuss his intentions beforehand.

30. Sixth step is to make an inventory of resources in terms of manpower materials, transport, special equipment, money and managers. If additional resources are required, appeal for assistance from non-government organizations and other citizens.

31. Seventh step is to tabulate needs and resources and at the same time have a reserve. Needs are balanced against resources.

32. Eighth step is to identify critical areas where the response will be under most strain. These areas will have to be strengthened and monitored closely.

33. In the ninth step priorities are confirmed. Priorities will include needs and allocation of resources.

34. The stage is now set to finalize the plan. The plan would follow the following format:

(a) Situation - A brief description of the threat and its lifeline

(b) Aim - A clear and concise statement of the matter of the plan

(c) Concept of Operation - A brief description of the overall policies and framework of the plan

(d) Allocation of Responsibility

(e) Allocation of Resources

(f) Co-ordination - Includes reporting procedures, channels of communications and arrangements for establishing and effecting co-ordination.

# H A Z A R D  A S S E S S M E N T

We cannot eliminate hazards. Hazard management then must be set within the context of an overall social economic and environmental management. It is within the latter constraints that the objective of hazard management of minimizing the likelihood and consequences of a disaster is set. We have to live with hazards: The question for hazard management is, how great a threat must be endured given other objectives, and the available strategies for reducing the threat.

"We stand on the edge of a new frontier, the frontier of the 1960's the frontier of unknown opportunity and perils - a frontier of unfulfilled hopes and opportunities", said John Kennedy on July 13, 1960 accepting Presidential nomination.

Today as we stand on the frontier of the 1990's - the decade which has been designated as International Decade for Natural Disaster Reduction (IDNDR), we can repeat Kennedy's words and say that we are at the frontier of unknown opportunity and perils. We in Trinidad and Tobago are trying to utilize opportunities of the IDNDR in the following ways:

(a) The university of the West Indies has been asked to establish a disaster management centre in the Faculty of Engineering.

(b) The Ministry of Education has been requested to include disaster management subjects in the primary and secondary schools syllabi. Relevant literature has also been sent to the Director of Curricula in the Ministry.

(c) It has been proposed that Royal bank, Trinidad Guardian and NEMA get together to sponsor an inter-school competition on disaster management.

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(d) "Government has no other end but the preservation of property" said John Locke, 17th Century English philosopher. That is why both the National Planning Divisions have been advised that for all future projects NEMA should be consulted for inclusion of disaster management mechanism in all their proposed projects. Hopefully unsafe sitting of buildings would be then avoided.

(e) Because it is vital that damage to critical facilities by any disaster does not aggravate consequences of the disaster, a committee has been set up to examine all the critical facilities of the country. This committee which is headed by Dr. Myron Chin of the University of the West Indies will examine critical facilities like hospitals, shelters and utilities to determine if any strengthening of these facilities should be done now.

(f) A couple of multi-disciplinary projects involving WASA and Drainage Division of the Ministry of Works are being supported by NEMA. These are on Caparo and Oropouche Rivers.

(g) Hazard Assessment of Tobago - A team has been set up from NEMA, Ministry of Planning and Mobilization, Institute of Marine Affairs, Water and Sewerage Authority, Meteorological Services and the Tobago House of Assembly to carry out natural hazard risk assessment and mitigation for Tobago. By the end of the year it is expected it will submit its report regarding mitigation measures to be taken to reduce vulnerability of the critical elements in Tobago. Lessons learnt from the study of Tobago will be incorporated in further studies

> which will be carried out for the remaining country during the subsequent years. This way we shall be following the advice given by James I. King of Scotland and England in 1616 on mending highways and bridges, I quote "that is done today with a penny, that will not be done hereafter with a hundred pounds, and that will be mended now in a day, which hereafter will not be mended in a year; and that in a year, which will not be done in our time."

The Organization of American States (OAS) has agreed to assist NEMA in formulation of the project to assess natural hazard risk in Tobago and to identify measures to mitigate this risk. Tobago was chosen as the location of the pilot project because Town and Country Planning Division has already embarked on the preparation of regional development plan for Tobago and simultaneous evaluation of how Tobago's existing and planned development can be affected by natural hazards would help the plan. One Critical issue identified by the OAS is the relationship between coastal zone management and vulnerability.

Coastal natural resources such as shores, beaches, vegetation and mangrove sometimes protect the inner land from inundation, wave impact on structures and coastal erosion. Proper management of this natural buffer zone is essential for maintaining these protective services, while at the same time offering attractive amenities essential to the tourism industry.

The "greenhouse effect" will increase the likelihood of tidal waves and storm surges. The medium term effects and climatic changes are best understood in so far as these affect sea level rises: An 18" level rise is the baseline projection for the average rise in sea levels by the year 2035. The effect of this rise will be to increase the frequency of extremely high tides and the consequent risk of flooding. generally, it is considered that

climates will become more extreme and events such as hurricanes will become both more likely and more sever.

It is also possible that the extraction of oil in Trinidad may also result in land sinking.

Therefore, there is an urgent need for the introduction and effective enforcement of a development policy that sets standards with respect to set back from the high water mark, constraint of beach protection, removal of vegetation, discharge of waste waters and disposal of hazard waste and land use of the coastal areas in general.

## GUARDING AGAINST DISASTER - THE IMPORTANCE OF PLANNING

Sometime in 70 A.D., city fathers of the Roman Town of Pompeii decided to ignore Priests from the local temple when they warned of imminent disaster and urged that the town be evacuated. The citizens of Pompeii were rationalists and reckoned that with business only just recovering from a disastrous earthquake, the last thing they needed was this kind of scary story. The Priests, however, followed their own advice and left town. They were the only survivors when, next day, Mount Vesurius erupted and buried Pompeii under a tine (10) foot layer of ash.

In the centuries that have gone by since then natural disasters have been causing death and devastation all over the world with great frequency and people have been accepting them with fatalism. Even recent disasters like earthquake in America and Hurricane 'Gilbert' in Jamaica caused avoidable loss of lives. But this need not remain so. It is time that people realize emergency management comes into play not only after a disaster strikes but it is an all the year round activity.

Routine management relates to those activities that occur during non-crisis periods, such as Hazard analysis, vulnerability analysis, Mitigation and Planning, Preparedness, Predication and Warning and disaster reconstruction. Crisis management applies to emergency operations and covers both the preparedness phase and the immediate post-disasters periods.

To neutralize the confusion of the emergency periods we place heavy emphasis on advance planning which is what preparedness is all about. This planning has resulted in creation of three (3) organizations in this country. First is the National Emergency Management Agency Task Force. It is headed by the Director, of NEMA, and constitutes Task Groups drawn from Government Ministries, volunteer groups and private sector. The mission of this Task Force is the preservation of life and protection of property whenever the country is threatened or stricken by an emergency. The tasks allotted to the various groups are to

provide radio communications, survey and investigation, search and rescue, medical services, traffic control and law enforcement, shelters, food and clothing, public utilities, transport, road clearance, counter industrial - disaster actions, public information, early warning and external aid.

The second organisation created to carry out planning for mitigation and prevention of disasters is the National Emergency Task Force which is headed by the Permanent Secretary to the Prime Minister and has its membership drawn from the University of the West Indies, Ministries of Works, Agriculture, Planning, Water Resources Authority and the Director of N.E.M.A. This Task Force assesses requirements and priorities for the strengthening of disaster prevention.

In order to plan a high degree of co-ordination during emergencies and implement mitigation and prevention activities between emergencies, an Emergency Management Board has been established. The Chairman of this Board is the Prime Minister and its members are the Ministers of Works, Infrastructure and Decentralization; Food Production and Marine Exploitation; Planning and Mobilization; Justice National Security; and Public Utilities nd Resettlement. The Permanent Secretary to the Prime Minister also attends the Board Meetings, and the Director of N.E.M.A., is the Secretary to the Board.

Guarding against all forms of disaster can be greatly improved through detailed planning for providing assistance. Planning is important to ensure that all aspects of the programme are thoroughly considered, objectives clearly defined and tasks properly sequenced. The planning function includes all managerial activities which determine the programme's objectives and the appropriate means to achieve these objectives. This planning is carried out in the following inter-related steps:-

(a) The NEMA Board decides how and where the agency should provide assistance. The Board also formulates policies which would direct activities towards the desired objectives.

(b) NEMA collects all relevant information, established goals and objectives and puts them in order of priority.

(c) The objects are quantified to determine how much assistance is provided and how many beneficiaries will be there.

(d) Strategies and approaches for implementation are determined.

(e) Plans are made operational by marshalling appropriate resources and allocating them to the desired disaster areas. This is done by activating the NEMA Task Groups.

Three (3) most important ingredients of this planning are: communication, co-ordination and keeping the public informed through the media.

Good communications are important to obtain damage assessment and requirement of assistance needed. In the Caribbean we particularly need to remain in touch with each other to mount international assistance, for there is hardly any Caribbean country that is capable of taking care of itself if struck by a major disaster.

It is amazing that how many resources surface to meet any emergency; the greatest of which is a country's citizenry which includes the victims themselves. The Private Sector and several Voluntary Agencies are prepared to give a helping hand. Even much maligned government departments drop their bureaucratic ways when they see any emergency situation. Under these circumstances a very high and efficient degree of co-ordination can provide a remarkable healing touch to any disaster area.

One may tend to think that at the planning stage, the media can only be used to disseminate information to the public. Not so. Representatives of the media can also be used to let the citizens know the requirements of a disaster area. Appeals can be made to the public to bring specific disaster relief items to specially set up centres. And once the media is kept in confidence it will amaze the planners how many good and workable suggestions emanate from their members who are quite often hounded out of disaster areas.

But to preserve libraries your planning need not remain confined to guarding against disasters. I know archives of our own country are housed in a shed at Chaguaramas which leaks profusely during rains, and causes direct and indirect damage to the records there, which are eventually destroyed. First step for librarians in disaster planning would be to inspect their buildings jointly with a technical team. The building will remain safe both in normal time and in disasters.

Second, cause of damage to previous books in libraries is not natural disasters but lack of inspection books. Often does one come across several out-of-print books in our old libraries. Alas, invariably they are attacked by fungus and attack only non-human book worms. Second step for librarians is to ensured that the books are properly stacked in appropriate shelves, periodically inspected and sprayed with insecticide, if necessary.

In concluding, I have no hesitation in declearing that it is only by planning that we can avoid disaster assistance itself becoming another disaster in a disaster area. Planning can help transform victims into resources and reduce organizational problems so that the response pattern can be more effective and efficient. But if disaster planning is to have appropriate effects, it must be appropriate planning, that is, it must be based on full knowledge of the affected area and must follow a step-by-step process based on sound principles. Planning which does not incorporate these ideas is worse than no planning at all.