

RADIO COMMUNICATIONS AND DISASTER MANAGEMENT

Human life is beset by dangers, as we are reminded each time we open a newspaper or turn on the television. These dangers arise from a contrasting range of hazards, natural and unnatural, some unsought others inherent in the activities involved. But all the dangerous situations need not end in a way so as to evoke horror. In fact those caught up in dangerous situations should so act that they are admired for their reaction.

During World War II after the fall of France, French resistance groups were involved in a most dangerous situation in World War II - the situation has been well satirized in the current television series "Allo Allo" - yet the resistance groups performed yeoman service to the cause of allies and liberation of France from Nazi yoke. These operations were made possible only by radio communications between the resistance groups and with a central control in London.

That is why the National Emergency Management Agency strives to work in close co-operation with the Radio Clubs of the country. After all nothing is more binding than the friendship of companions-in-arms. In fact, I will go a step ahead and paraphrase what Voltaire said of battles and 18th Century British Soldiers "If you want to go into emergency management have a radio operator at your right hand and another at your left and two immediately in front and two close behind".

"You do not educate a man by telling him what he knows not", wrote John Ruskin, "but by making him what he was not". Having spent twenty (20) years in the Army I knew more about disaster creation rather than disaster management. But when I got in the business of Disaster Management I realized that emergency response only does not constitute Disaster Management as most people tend to think. Rather most of the activities in Disaster Management pertain to pre-disaster and post-disaster periods and only a few pertain to emergency response.

Amateur Radio Operators are uniquely placed to help in all aspects of Disaster Management for the simple reason that each of them have at least two fields of action. One is the vocation by which they earn your livelihood and the other is radio communications. There are two kinds of work that can affect the course of any Disaster Management Operations: work to carry accurate information and work in search and rescue, being the first on the scene of disaster.

At Prevention and Mitigation stage - a stage which is open for actions all the year round - in fact the 1990's have been declared as the International Decade for Natural Disaster Reduction - REACT members can help greatly in evolvement of National Plan for disaster mitigation. We have already mapped out vulnerable areas in each county on which we are super-imposing the houses and buildings which will have to be evacuated in the event of an impending disaster. I will like these plans to be verified by the REACT members in their respective territories and communicate to us if they accurate. The seven (7) CB Task Force Co-ordinators now located at Diego Martin, Valsayn, California, San Fernando, Mayaro, Siparia and Arima will have to spread their net and ensure that the members are available in the interior of the county to cover all the vulnerable areas in each County/Borough. This analysis is but one step, a highly important one, in meeting the objectives of disaster prevention. With this knowledge the disasters can be averted if human activities take place in areas having the most favourable conditions, that is, in those sites least exposed to disasters. And you can spread the message within your region that there is always a choice between a dangerous site and a less dangerous one.

The prevention and mitigation of disaster comprises actions designed to prevent natural phenomenon from resulting in disasters or at least to limit their catastrophic consequences. A late start in this direction is a matter for regret but not for despair. What is needed at this stage is full cooperation from groups like yours. Radio operators with their communication network can help in spreading word for promoting disaster awareness in the people of your area. Disaster prevention is not merely the preserve of technical sectors such as public works and public utilities and settlements - but of all interested groups like yours.

By evaluating the risk to which our country is liable in the case of hurricanes, or its potential for disasters, it becomes practicable to plan and implement the means of protection in an economical manner. In the past the National Emergency Management Agency (NEMA) sent technical teams from the university of the West Indies (UWI) to California and Montserrat to assess the damage done there by an earthquake and hurricane 'Hugo' respectively. These teams have recommended adoption of CUBIC (Caribbean Uniform Building Code) and assessment of critical facilities in the country. Radio operators can help by spreading the word that CUBIC should be followed for any construction work and help in the assessment of critical facilities in your respective regions and conveying your comments to NEMA.

Damage from floods can be reduced by construction of dams which can also serve as sources of water. This point was recently highlighted when I was called to inspect damages to a school by Oropouche River on Toco Road. A proposal is now being pursued to dam this river to prevent flooding and at the same time enhancing water supply for WASA. You as members of REACT can act all the time as Fire Watchers did in London during Battle of Britain. Observe anything which you notice need attention from Disaster Mitigation point of view and pass the information to either your county co-ordinator or NEMA.

It is accepted that it is a practical impossibility to impose a total ban on construction of any type in a flood plain. The purpose of building codes is therefore to reduce losses of lives and material damage to the minimum possible consistent with the tolerance of a certain amount of buildings. Hence the importance of adopting CUBIC and following it scrupulously in the country.

Thus you can see that there are two categories of pre-disaster activities - one is of a permanent nature known as prevention and includes a structural component - dams, reservoirs etc. and a non-structural component - land use zoning building codes etc. The other category, known as preparedness, consists of emergency measures, which, however, must also be planned well in advance.

NEMA Task Force is the organization in the country which is concerned with the planning and implementation of programmed for dealing with a disaster emergency. The long term actions involved in disaster prevention fall within the jurisdiction of a Technical Task Force which is presided by the Permanent Secretary to the Prime Minister.

Disaster preparedness involves almost every sector of the community and much of the work is delegated to Task Groups which are assigned specific tasks. Resources of Fire Service, Police Service, Defence Force, Ministries of Works, Health, Education, Industry, Energy, Public Utilities and Settlements and non-government organizations headed by the Red Cross are utilized to constitute these task groups. But this plan will work only if the general public is sufficiently well informed to participate actively and effectively. In emergencies there will arise a host of unforeseen contingencies in which individual members of the public will need to exercise initiative and display their resilience and resourcefulness. In such circumstances, people like you, who understand the objectives and procedures of disaster

preparedness and who have means of communications with both the communities concerned and Disaster Managers, can be of great service to the nation. Recent events following Hurricane 'Hugo' have clearly brought out that there is everything to gain by encouraging all who can do so, to send out damage assessment reports whether on a professional or a voluntary basis. Next to damage assessment Disaster Management Staffs need to know about locations: electrical sub-stations, gas lines, WASA installations, Health facilities - all these are memorable and reportable.

The heart of Disaster Preparedness will be Emergency Operations Centre (EOC) which has been established at the NEMA Office and which will be duplicated at Wallerfield. Hurricane warnings would be given by the Meteorological Service at the receipt of which the national and regional EOC's would be brought to the highest state of readiness. The EOC's would be brought to the highest state of readiness. The EOC's will supervise warning systems, keep the population informed, decide on whether or when to evacuate threatened areas, direct and control relief workers and keep the media in the picture. This is the phase at which I would like to see Radio Operators serving in numbers both at Regional EOC's and in the danger zones to ensure that the population is kept informed by first hand information. Positive thinking may be a good thing for achieving most goals in the world; but for disaster preparedness a case can be made out for negative thinking and as Voltaire said once "it's attendant virtues of challenge, self-doubt, mutual acceptance and toleration". These virtues you can transmit to and from your respective areas.

Emergency response activities are those carried out during the actual emergency or immediately prior to it. This may involve evacuation of threatened communities, emergency assistance during the disaster, and actions taken in the immediate aftermath of the disaster. Because emergency period is both dramatic and traumatic, most attention by the press and international community is focussed here. Yet in most disasters the emergency passes rather quickly and, in reality, only accounts for a very small percentage of the total picture. But it is in this period that REACT members can perform services which cannot be performed by anyone else. The information which you pass as "fire watchers", initial survey reports that you can relay to the EOC's and the guidance that you can give to Search and Rescue teams can make all the difference in saving lives and protecting of property. Being among the first people to reach a Disaster Site you may even help in rendering first aid and opening escape routes.

Emergency response actually begins with a warning before the actual event. This is done by the Meteorological Service at Piarco. They issue warnings of dangerous winds, high storm surges, torrential rains and river flooding simultaneously to Media, Police Control Room and NEMA. Police Control Room then disseminates information to all the Task Groups and Regional Co-ordinators. Undoubtedly Radio Operators can play a big role in the dissemination which should reach the general public as early as possible.

In almost any national disaster, certainly one which is associated with a tropical cyclone, it becomes necessary to move people from a dangerous area to one that is safe or at least relatively so. We are already in the process of finalizing the plans for evacuation from dangerous areas in each county to comparatively safe shelters. This involves preparation of maps

showing areas to be evacuated, buildings to be used as shelters, assembly points and routes to be used in moving people. The plans would also cover transport arrangements, traffic control and health care. Red Cross has been given the task of food and clothing for the evacuees while shelters would be managed by School Principals. And the Radio Operators can provide invaluable communications for smoothening move of the evacuees and management of the shelters. After all in World War II a Radio Operator helped in kidnapping German Military Governor of occupied Crete and moving him to Cairo.

Other activities which will take place during this stage are survey and damage assessment, search and rescue, traffic control, road clearance and providing emergency assistance in terms of food, clothing and medical care. In order for Radio Operators to be effective in these operations it is vital that they reach out in all the areas of their respective counties/boroughs. If they can't find members in some regions then they must have volunteers who would move away to disaster areas in emergencies. In Jamaica after Gilbert was noted a surprising reluctance on the part of the volunteers to move away from their bases even for short periods of time even when their homes appeared to be secure. Must the old fashioned virtues of courage, loyalty, character, determination, become empty words? It will not only be necessary for them to transmit appropriate information but also to withhold any exaggerated descriptions of disaster. Having been caught myself many times in disaster situations alone I can tell you that if alone you may find yourself exceedingly lonely in such situations. To get anything done you have to have a companion.

Post-disaster activities can be subdivided into two phases. The first begins at the end of the emergency phase. It is a transitorial phase when people and community systems try to re-establish a semblance of normalcy. This period is usually characterized by such activities as business re-opening in damaged

structures, farmers returning to reclaim and clear their land and resumption of basic infrastructure services such as water, electricity, sanitation and telephone services. Radio Operators can do their bit in this phase by providing information to Disaster Managers regarding the assistance needed by the affected people to pick up threads of their lives.

The reconstruction phase is marked by large-scale efforts to replace damaged buildings, revitalize economies or restore agricultural systems to their full pre-disaster production capacity. In fact the opportunity can be utilized to carry out development projects for creating better infrastructure. An example of this is the Claude Noel Highway in Tobago which was planned to be built after that Island had been devastated by Hurricane 'Flora'. Radio Operators can be helpful in this phase too by providing control information for the Managers to determine if "actual results" are meeting 'planned - for - results'.

It may appear from my talk that I am trying to find a role for Radio Operators in Disaster Management Plan of the country. But it is not so. What I want to state categorically at this stage is that Radio Operators are indispensable for the disaster management at the regional level. Leading from in front at the rare moments of action, it is expected that they will provide guidance, hope and above all vital information in the dangerous as well as quieter spells of disasters. Emergency associated contacts do not only require radio communications, but also integrity and value for things of flesh and blood and the dignity of human beings.

MAPS IN ACTION FOR DISASTER MANAGEMENT

An American President is on record for having said: "We live in the midst of alarms; anxiety beclouds the future; we expect some new disaster with each newspaper we read." If that President were George Bush we would be anxious about our future but fortunately these words were uttered by Abraham Lincoln about 130 years ago. And during these years Americans have put their Civil War behind them, made lasting peace with their neighbours, forged friendship with both West and East Europe and built a country which can withstand natural disasters. We therefore need not accept disasters as punishment from God. In fact we can certainly reduce the impact of disasters when they do occur.

Unlike many other countries of Europe, Asia, Africa, and Latin America we are lucky not to be plagued with either civil wars or conflicts with our neighbours. All that we have to do is to minimize the adverse consequences of natural as well as man-made disasters.

In recent years it has been proved that the emergency plans of many countries do not work satisfactorily because these plans consist of volumes of theoretical knowledge and general allocation of duties. When a crisis situation develops those involved in managing the crisis either do not have time to consult the plan or simply find it unworkable and start formulating new plans resulting in loss of precious time.

But the philosophy of disaster management should be "tackle any difficulty at first sight, for the longer you gaze at it the bigger it grows."

Make no mistake about it. Those responsible for providing help and aid in times of natural disasters or major man-made accidents are frequently faced with a difficult task, in conditions of great uncertainty. In such circumstances, if

timely assistance and access to relevant and accurate information is not available, the process of arriving at a correct decision becomes a matter of chance. This is where Maps in Action for Disaster Management fit in.

Frequently, NEMA and local authorities are faced with a crisis to tackle which they need to retrieve relevant information from a mass of files under stress conditions. On the basis of this information rapid decisions have to be made which may sometimes be the difference between life and death.

Once a Disaster Co-ordinator has instantaneous access to the right information, he should be able to bring sufficient resources to bear on the incident to maximum effect at the right time and in the right place.

Disaster Response Maps provide such facilities to all those who have to deal with crisis situations. Actually, there is nothing new about this concept. Maps have been used from time immemorial to plan and fight battles. A visitor to London can still see the large maps of the world covering underground cabinet war rooms from where Churchill and his colleagues directed operations during World War II.

The Disaster Response maps that we have produced display hostile areas as well as deployment of friendly forces in jurisdiction of each local government authority.

Hostile areas are those which are prone to flooding, landslides and contain environmental hazards. Friendly forces are locations of shelters, hospitals, health centres, police stations, fire stations, WASA, T&TEC installations and evacuation routes.

In emergencies one of the first items of information required will be the exact scene of the incident. Without scene location being accurately pinpointed, help and assistance could be sent to wrong locations thus leading to unnecessary suffering or casualties, perhaps just to frustrating delays.

In order to avoid occurrences of this nature, incident location can be pinpointed on Disaster Response Maps which are based on the National Survey. The advantages are obvious: with visual information as roads, rivers, communities, factories, the decision maker can offer advice as to the best route to take to the scene taking into account any last minute diversion.

It is vital that means or resources available with which to meet an emergency situation are also readily accessible to the Disaster Operations Officer. That is why response resources are marked prominently on the response maps. Note that at national and county level precise tasks will be assigned to the response agencies. Actual allocation of equipment/vehicles will be done by the response agencies concerned who will maintain an up-to-date inventory of their resources.

Of great value will these maps be in case of chemical accidents. With the Disaster source as a centre, a probable area can be immediately marked on the map to show the vulnerability of population bearing in mind the types of chemical involved and the wind speed and direction. Evacuation options and the routes for response agencies can then be quickly considered and decided upon.

Permit me to utilize this opportunity to clarify roles of Incident Commanders, County Disaster Co-ordinators and NEMA Operation Centre during disasters.

The senior fire officer at the scene of a major incident or a major disaster becomes the Incident Commander. Should the incident involve majority input from police or army then the command would be assumed by the senior police or army officer as the case may be.

Both the County Co-ordinators as well as Incident Commanders will report to NEMA Operations Room the damages as well as requirement of additional resources. NEMA will then mobilize whatever national or international resources are required to bring situation in control.

The primary aim of any co-ordinator in a major disaster or major incident is to return the situation to normality. The Telecommunications and Disaster Maps exist purely to enable the co-ordinator to manoeuvre available resources, both human and technical, in order to achieve this aim.

Maps in action will facilitate in five (5) vital areas of Disaster Management. Firstly, we expect that each citizen of the country will have a Disaster Response map of his country or borough available to him or her at his or her residence. The citizens will then be able to understand and follow warnings and instructions for their relief much better and thus minimizing adverse effects of disasters.

Secondly, the fourstroke information management system of information, information assessment, decision making and information and decisions out, would work faster.

Thirdly, as soon as survey and assessment reports come, identification can be done of what the particular disaster has done to us and therefore, definition of what we need to do by way of response and recovery.

Fourthly, our plan already denigrates tasks to those organizations which have parallel responsibilities in non-disaster times, for medical area, the communication system, road clearance etc. However, some aspects would present difficulties like that of emergency feeding, shelter and evacuation. Again our response maps will be extremely valuable in making decision on these aspects.

Fifthly, effectively co-ordination is a big issue for dealing with disaster situation. Our response maps will be able to point immediately to the agencies whose activities have to be co-ordinated for dealing with a particular disaster situation.

The Disaster Co-ordinator will then be able to say what once Winston Churchill said from the map-pinned walls of his war time cabinet room "We must confront our perils and trials with that national unity which cannot be broken, and a national force which is inexhaustible."

RISK EVALUATION

There was a time when natural disaster were imputed to KISMUT 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 minimized by proper measures, the cost of which, however high it may sometimes appear, is from one-tenth to one hundredth of the cost, both direct and social, that would result from the same disaster if it is passively endured.

NEMA was created in May, 1989 with a view to taking a comprehensive approach to hazard management in the country. Last year NEMA concentrated on preparedness, prediction and warnings aspects of natural disaster management. 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.

This year, we are embarking on the mitigation and prevention aspect of natural disaster management.

First step in mitigation has been to incorporate Disaster preparedness and management in all development planning and land use.

Second step has been to constitute a high-powered committee of engineers drawn from the University of the West Indies, private sector and government departments to examine all the critical facilities whose failure would affect population dams, pipelines, refineries, chemical processing plants, hospitals, airports, harbours, schools and fire stations would fall in this category.

It is hoped that the committee's findings would constitute a sort of a pre-feasibility study for projects to be undertaken for retrofitting of the facilities.

Thirdly, a pilot study has commenced for natural hazard risk assessment and mitigation for Tobago. This project is being carried out with technical assistance from the Organization of American States. Project would be followed by disseminating what is learnt, to other areas of the country. Vulnerability analysis constitutes the most important part of this risk assessment.

By evaluating the risk to which an organization or a region is liable for disaster, it become practicable to plan and implement the means of protection in an economical manner. Considerations of locations are of equal importance. Vulnerability analysis will reveal that some are of equal importance. Vulnerability analysis will reveal that some zones are less vulnerable than others, and will therefore provide valuable guidance in the planning of residential, business or industrial areas.

The evaluation of risk and the investigation of disaster potential could generally be done in four stages.

Firstly, assessment. In this stage, physical characteristics of the natural hazards that affect the region are established. This includes information on intensity or frequency and points of impact. Hazards which should be taken into account in Trinidad and Tobago are hurricanes, floods, landslips, storm surges, earthquakes, Tsunamia, coastal erosion and wild fires. These studies should lead to drawing of hazard maps with an indication of susceptible and probable hazard occurrence at a given intensity.

Second stage involves making out inventory of elements at risk. The inventory should include all the lifeline networks (that is, water, electricity, telecommunication and sewerage), public facilities, housing, essential services, settlement areas and areas of economic activity (that is, tourism, manufacture and

agriculture). This study should result in drawing of maps of the region with location of all elements. The stage is now set to carry out vulnerability analysis of elements at risk. At this stage the structural integrity as well as the functional capabilities of the various elements should be reviewed in relation to the potential impact of the identified hazards.

Activities should be carried out in two phases. In the first instance, potential hazard impact on elements at risk should be determined through a systematic overlay of the hazard maps on the inventory maps. In the second phase, an analysis of the likely consequences of the impact should be prepared. This study should lead to estimate of expected damage and interruption of lifeline networks, critical facilities, housing areas and economic activities.

At the final stage of the assessment, mitigation strategy is formulated and projects identified to reduce vulnerability of the identified critical elements.

Two important elements of WASA which are themselves not only at risk but failure of which could cause further disasters are dams and pipelines.

The four large dams belonging to WASA in the country can be cause of inundation and flooding which is associated with dam failures. In fact a fair weather dam break can cause more loss of life than during adverse weather. It is therefore important that these dams are inspected periodically and emergency action plans made out both for taking preventative action on the dams and to prevent loss of life and property in the flood plain. These plans should include six basic elements which are identification of emergency, preventive action, notification and co-ordination, hazard are delineation, evacuation and termination.

It is much better to have inquiries on the status of dams before a disaster rather than after the disaster. A classic

example of failure to follow this principle was the breach of the Vaiont Dam in the north-eastern corner of Italy in 1963. A series of cracks were observed on the dam two years before its failure but they were just reinforced with concrete. As a direct result of the inquiry after the disaster the dam was closed down. All the damage to life and property which the disaster caused could have been avoided had the vulnerability analysis been carried out as a routine measure before the disaster occurred.

The water pipelines which are buried by the side of roads in landslide zones invariably create a catch 22 situation. Landslides cause damage to the water pipes. When the damaged pipes leak, the water cause further landslides. It is therefore important to carry out vulnerability analysis of all the pipes laid in potential landslide area in conjunction with the road engineers. A classic example of such failure was near Castara in Tobago where the landslides were stopped in 1984 just with the relocation of the water pipes.

In conclusion, it seems important to emphasize that not only separate but also composite vulnerable analysis should now be regarded as a vital activity to avoid disasters. The cost of carrying out vulnerable analysis could form a negligible fraction of the total cost of the facilities. The benefits to be derived in terms of life saved and damage avoided by the utilization of the findings of vulnerable analysis would be out of all proportion to the cost of such studies.

PREPARING FOR EARTHQUAKES AND HURRICANES

Though the Crimean War of 1854 is more famous for the Charge of The Light Brigade by Lord Cardigan on the wrong guns, from that war also emerged a unique figure who introduced a new mode for caring of casualties. Florence Nightingale had been sent out in an official capacity by the War Minister of England. She arrived in Crimea on the day before the Battle of Inkerman, and there organized the first base hospital of modern times. With a few nurses and scanty equipment she reduced the death rate from 42 per hundred to 22 per thousand men. Her influence and example were far reaching. The Red Cross movement which started with Geneva Convention of 1869 was the outcome of her work, as were great administrative reforms in civilian hospitals.

The days of cavalry charges have slipped into history, nevertheless more injuries to human beings are now inflicted by natural hazards through the collapse of buildings and structures. It is time that Florence Nightingales emerged from the engineering profession to provide mitigation as well as proper response to destruction of structures caused by forces of nature.

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 an event is called a natural hazard.

4. 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.

8. Both Tokyo, Japan and Managua, Nicaragua are prone to earthquakes. But the people of Tokyo are far less vulnerable to injury by earthquake

because Tokyo has strictly enforced building codes, zoning regulations, earthquake training and communication systems. In Managua there are still many people in top-heavy mud houses on hillsides. They are vulnerable.

9. A vast majority of deaths in the last three decades occurred in just two catastrophic events, the 1970 Bangladesh cyclone killing nearly 1 million and the Tangshan-China earthquake in 1976 killing 1,400,000 people.

10. Rapid population growth, urban migration, inequitable patterns of land ownership, lack of education, etc. lead to vulnerable conditions such as unsafe siting of buildings. The poor are the most vulnerable.

11. 'Something must be done for the less fortunate who bear the greatest risks and who are the least well endowed to meet them'. Said the then Prince of Wales during the last great world depression.

12. 'Something must be done'. But what? 'Something', in our country has been given the name of Emergency Management. When I was asked to take over the post of Director of the National Emergency Management Agency in May last year, Head of a Senior Service remarked why waste an engineer in this capacity because disasters do not happen in Trinidad and in any event only when earthquakes and hurricanes actually strike then a Disaster Manager is required.

13. He was off the mark on both counts. Firstly, our country can experience major industrial accidents, or accidents of sea and air transport.

Nor are we safe from deliberate actions which produce the same results as do accidents. And we are all conversant with the damage that can be inflicted by earthquakes, hurricanes, landslides, tsunamis, floods and wildfire. Whether accidental or deliberate, these events commonly produce many casualties, local communication failure, confusion if not chaos, and possibly, needs for evacuation, sheltering, feeding and so on - quite apart from the general disruption of ordinary life and the direct and indirect economic effects.

Secondly, Disaster Management encompasses both routine and crisis situations. Routine management relates to those activities which occur during non-crisis periods such as disaster mitigation and disaster reconstruction. Crisis management applies to emergency operations and covers both the preparedness phases and the immediate post-disaster periods. The harder part of Disaster Management is really during routine situations.

Hurricanes are among the most awesome events that nature can produce. They pose a major threat to lives and property. Every year these sudden, unpredictable, violent storms bring widespread devastation to the Caribbean. A windstorm's destructive work is done by the high wind, flood producing rains and associated storm surges.

Two basic strategies that we are evolving to decrease the impact of this hazard are avoidance and mitigation. A long-term avoidance strategy is land use planning in which construction on low coastal areas is being restricted. On another level, a short-term avoidance strategy is a 12 to 24 hour evacuation notice aimed primarily at protecting lives. Long term mitigation measures include adoption of Building Code called CUBIC by Trinidad and Tobago for improving practices for improved construction and training of the building inspectors.

An earthquake - a sudden motion of the earth caused by an abrupt release of slowly accumulating stress - is another most dangerous and destructive form

of natural hazard. Dangers associated with earthquakes include the phenomenon of ground shaking, surface faulting, ground failures and storm surges. Earthquakes can reduce buildings to a pile of rubble in seconds, killing and injuring their inhabitants.

24. The main goal of earthquake hazard reduction programmes in our country is to preserve lives through the economical rehabilitation of existing structures and the construction of safe new structures. Plans are underway to evaluate safety of existing critical facilities in Trinidad. A pilot project is also planned to evaluate safety of all existing structures in Tobago.

25. A lot of people tend to regard an Earthquake as an "act of God" and most Caribbean people tend to believe that God is Trinidadian. But the hard fact is that Trinidad and Tobago lies in the path of a major seismic belt of the world. Recently, Australia suffered a major earthquake even though it is quite far from any major seismic belt of the world. It is time for us to get rid of myths and implement programmes that will avoid human and property losses from earthquakes and to minimize their impact when they do strike.

26. Once we understand the engineering aspects of these two hazards we can look at the ways to mitigate the disasters should we ever become their victims.

27. Relevant to us is what Emerson said a hundred and twenty-five (125) years back, I quote "War and Peace resolve themselves into a mercury of the state of cultivation. At a certain stage of his progress the man fights if

he be of a sound body and mind. At a certain higher stage he makes no offensive demonstration but is alert to repel injury and is of an unconquerable heart. At a still higher stage he comes into the region of holiness as one engaged throughout his being no longer to the service of an individual but to the common soul of all men". As we approach the end of the 20th century we find that people in America and Eastern Europe are still at the first stage of cultivation. But in Trinidad and Tobago we are in a position to strive to be at the second stage. Let us together be alert to repel injury caused by disasters.