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DISASTER RESEARCH UNIT

Occasional paper No. 13

A Primer of Precautionary Planning for Natural Disaster

James Lewis

February 1977

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A PRIMER OF PRECAUTIONARY PLANNING FOR NATURAL DISASTER

James Lewis

Occasional Paper No. 13.

February 1977

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PREFACE

The Disaster Research Unit was formed in December 1973 and is a research group within the Project Planning Centre for Developing Countries at the University of Bradford. Members of the Unit are:

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An index of the series of Occasional Papers, on which this Manual has been based and is a part, is included on the end paper.

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ACKNOWLEDGEMENT

The production of this Primer has been assisted by the League of Red Cross Societies by generous support for which the Disaster Research Unit is deeply grateful.

The Primer is partly a product of an earlier assignment carried out by the Disaster Research Unit in association with the League of Red Cross Societies which led to the publication in June 1975 of 'A Study in Predisaster Planning'.* Many of the acknowledgements given in that publication are applicable therefore to this. Additional contributions are by:

Philip O'Keefe BA (Hons) Ph.D., Disaster Research Unit who prepared material for the section on 'Insurance' (7.4.) and 'Economics of Predisaster Planning' (Section 8).

Lt. Col. George Ritchie, Honorary Fellow, Department of Administrative Studies, University of Manchester, who prepared the section on 'Preparedness Training' (Section 7.1).

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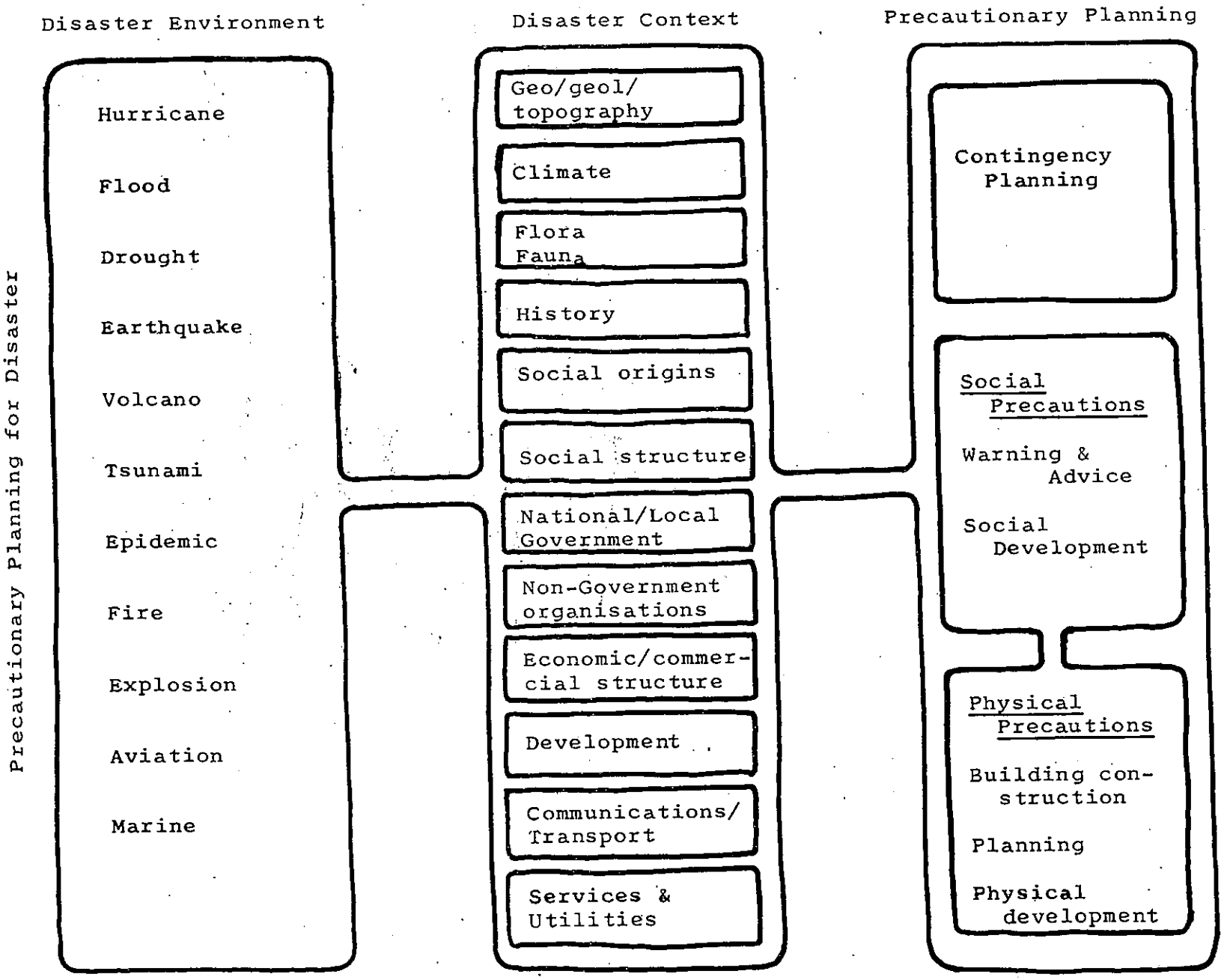
* LEWIS, J. 'A Study in Predisaster Planning' Occasional Paper No. 10, Disaster Research Unit, University of Bradford/League of Red Cross Societies.


Disaster Environment
Disaster Context
Precautionary Planning
Precautionary Planning for Disaster
Hurricane
Flood
Drought
Earthquake
Volcano
Tsunami
Epidemic
Fire
Explosion
Aviation
Marine
Geo/geol/ topography
Climate
Flora Fauna
History
Social origins
Social structure
National/Local Government
Non-Government organisations
Economic/commercial structure
Development
Communications/ Transport
Services & Utilities
Contingency Planning
Social Precautions
Warning & Advice
Social Development
Physical Precautions
Building construction
Planning
Physical development

1. INTRODUCTION

1.1. Following the formation of the Disaster Research Unit in December 1973, the League of Red Cross Societies initiated a Study in Predisaster Planning in 1974 based in the Bahama Islands. The Report for that study, 'A Study in Predisaster Planning', has been published jointly by the League of Red Cross Societies and the Disaster Research Unit, and was based on an outline manual for predisaster planning that was produced within the Disaster Research Unit in the Summer of 1974.

1.2. This Primer is a result of the continuing Bahamas Study and subsequent assignments for other organisations in the Windward Islands, Honduras and in the South Pacific. In draft form it has received considerable theoretical and practical testing and its purpose is to provide a methodology for a comprehensive programme of precautionary planning to be undertaken in whole or in part in a specific location, assumed to be within the developing countries of the world. It will also provide one of the first detailed definitions of 'precautionary planning', description of the context for planning and analyses of the activities precautionary planning comprises, as in order to arrive at a methodology for application the subject itself has first of all been defined.

1.3. Although, as a result of the process of analysis, the disaster process and response have been separated and subdivided under headings related to time phases etc., it is

not intended that activities under these sub-headings should be undertaken separately. Boundaries between each are diffuse and co-ordination is in any case the key to a comprehensive precautionary planning programme. The important thing is that any and all sectoral activity should be aware of the total framework of the disaster process in which it is a part and to which it relates.

1.4. As one result of three years of thought and discussion and of successful overseas assignments and research and other experience, this Manual does have to domonstrate results of an exploration of the nature of its subject so far, at the same time as laying down principles for application. In so doing, it will have considerable inadequacies from the different and varied points of view of many of its readers. By publication it is not intended to declare an expert and definitive study, but to make generally available what progress we feel has been made in an area long left far behind as expertise in other parallel areas of study has advanced, and so provide the opportunity for an exchange of views and criticism on its contents.

1.5. The Primer aims at a comprehensive demonstration of the framework for the total precautionary planning process. It cannot be comprehensive in its subject matter, but makes reference instead to many contributions to aspects of the planning process by other authors. These are referenced at the end of each section and in the Bibliography.

REFERENCE: LEWIS, J. 'A Study in Predisaster Planning', Occasional Paper No. 10, Disaster Research Unit/ League of Red Cross Societies, 1975.

2. A PHILOSOPHY FOR PRECAUTIONARY PLANNING

2.1 The applied science of precautionary planning has been developed to answer the need for the creation of a precautionary strategy against the results of disaster events, the possibility of which is known. It takes as its basis the premise that a government has a responsibility to do all in its power to protect life and property of its people, to safeguard their health and welfare and to provide public services essential to the national well-being and commensurate to the nation's capacity. It is towards a fulfilment of that responsibility within the context of prevailing national conditions that a precautionary planning methodology has been developed by the Disaster Research Unit.

2.2. The Primer is, for the main part, directed towards the decisions required within a programme of precautionary planning, but clearly the decision that will come before all others is that which initiates and establishes the programme of precautionary planning itself. For this first decision there will be the need for a knowledge of disaster events which are likely to occur and of the degree of vulnerability or proneness to them on the one hand, and on the other an awareness of the likely risk involved. Some attempt has been made to show how disaster vulnerability can be assessed in 'Disaster Analysis' (Section 5), and the section on 'Economics of Predisaster Planning' (Section 7) discusses the relationship between disaster probability and precautionary planning.

2.3. An essential factor is, however, that the cost of precautionary planning is negligible. Many of the processes involved are present in any case, requiring co-ordination to achieve greater effectiveness - essentially an administrative role requiring little capital outlay, and an attempt has been made (Section 6) to show how by the adoption of 'another hat' most activities can be undertaken by existing administrative roles.

2.4. As in most forms of planning the spectrum for its application has to be recognised and defined at the outset. The component parts of the total planning operation have to be related and co-ordinated if activity by one part is not to contradict or be out of step with activity in other parts. For co-ordinated planning to be successful therefore, early recognition of what the parts are or must be is essential. Awareness of the total spectrum is essential therefore, whether or not the undertaking of precautionary planning is done comprehensively at one time or in a succession of parts. (Ref. Section 4).

2.5. Next, recognition and co-ordination of the component parts is not in itself sufficient without an examination of the context in which the total planning process takes place. Its relationship to other allied activity in particular in this context, with development policy and development planning, and its relationship with ecological constraints and activities and with social and economic activity of a society are all parts of the environmental

relationship for the processes of precautionary planning. This may go some way towards an explanation of some headings, but a particularly important aspect for brief discussion here is that of development policy. It is within an examination of development policy that the difference between losses due to disaster events and proneness to disaster events themselves can be discussed. (Ref. Section 4).

2.6. Clearly it is the aim of precautionary planning to reduce losses in disaster events. With a constant occurrence of loss the efficacy of precautionary planning could be assessed from what might reasonably be expected to be a gradual and constant reduction in losses. But if occurrence of loss is not constant, if losses with or without the application of a precautionary planning programme continue to rise then examination of the reasons for those increasing losses may lead to a reassessment of proneness. If proneness increases at the same time as precautionary planning programmes are applied, no results of precautionary planning will be seen in terms of loss reduction. Increased proneness may come about because of the movement of communities and populations into areas of increased vulnerability. Clearly if population within a vulnerable area increases so does the proneness of that population to loss. It is apparent, therefore, that if attention to precautionary planning is to have any real and lasting success it should commence within the application of development and precautionary planning itself should be contained within development planning. This relationship is referred to again in Section 6 (6.1.6).

2.7. Without this recognition of context for precautionary planning, invisible savings of losses can be made <u>each time</u> there is a disaster occurrence and the facility for achieving savings will increase where proneness increases. Only where proneness is reduced and reductions in losses become more difficult to achieve will it be possible to show any <u>real</u> success for precautionary planning.

2.8. It is occasionally suggested that precautionary plans should be prepared per disaster type but it is important at the outset to point out the illogicality of that approach. From a practical point of view the effect on victims of death, injury and deprivation is much the same as the result of a variety of disaster types. Furthermore, one kind of disaster event may develop out of another (e.g. epidemic and flood out of hurricane) with extreme confusion between personnel whilst changing from one document to another. If co-ordination is the key role for precautionary planning, one document to cover all disaster types is a pre-requisite and one format of plan from all authorities and organisations involved in planning is essential. It is in any case the aim of this Manual to produce a planning methodology which will be appropriate to all disaster types and all organisations involved.

2.9. A more practical consideration of disaster is to separately consider those which occur infrequently but with high impact, that is, low risk high intensity disaster types such as earthquake or hurricane; and those which occur frequently but with

lesser single impact, that is, high risk low intensity disaster types (storms, some floods, short drought etc.). It has been shown that accrued losses from the larger number of smaller events can be larger than losses from single high intensity disasters.

2.10. Once this approach is established disaster is clearly a continuous process and not dependent on erratic, nor even seasonal, or single occurrences. If, furthermore, 'man made' disasters are included in the 'disaster matrix', (and precautionary planning can, and perhaps should, prepare for disaster of all kinds) the continuity of disaster manifestation becomes apparent.

2.11. Some definitions of terms used in the Primer are necessary at this stage. They are as follows.

(a) Disaster Event. The manifestation of an interaction between extreme physical or natural phenomena and a vulnerable human group. The manifestation results in general disruption and destruction, loss of life and livelihood and injury.

(b) Disaster context. The sum total of the possibilities, probabilities and frequencies of the occurrence of various disaster events, including previous disaster histories, in any given location, which render the location vulnerable.

(c) Disaster environment. The combination of the disaster context and the social, political and economic conditions prevailing within any given location.

(d) Disaster process. The dynamic operation over time of the distinctive elements contained within the disaster environment and their interrelationship.

(e) Vulnerability. The degree to which a community is at risk from the occurrence of extreme physical or natural phenomena where risk refers to the perjorative probability of occurrence, and the degree to which socio-economic and socio-political factors affect the community's capacity to absorb and recover from extreme phenomena. The term should be applied to the disaster context, the disaster environment and the disaster process.

REFERENCES:

WESTGATE, K.N., O'KEEFE, P. 'Some Definitions of Disaster', Occasional Paper No. 4, Disaster Research Unit, University of Bradford, June 1976.

LEWIS, J., O'KEEFE, P., WESTGATE, K.N. 'A Philosophy of Planning', Occasional Paper No. 5, Disaster Research Unit, University of Bradford, June 1976.

BAIRD, A. et.al 'Towards an Explanation and Reduction of Disaster Proneness', Occasional Paper No. 11, Disaster Research Unit, University of Bradford, August 1975.

3. APPLICATION

3.1. This Primer is addressed principally to Governments of countries prone to disaster, but also to individuals, groups and organisations who may become involved in the precautionary planning process. Its aim is to describe a methodology for a comprehensive programme of precautionary planning. The result of its application will, preferably, be a Precautionary Plan incorporating a similar breadth of activity and administrative structure as that proposed in the methodology.

3.2. Necessarily, in an attempt to cover as great a variety of situations as possible there will be some aspects included which will not all be equally applicable to a specific location.

3.3. The format of the Primer and its methodology are based on the principle that it is necessary to carry out an analysis of the 'everyday' situation - the environment for planning; paralleled by an examination of disaster possibility and probability which may include 'man-made' disaster as well as 'natural' disaster events. The results of these two programmes are then merged to show how the resources of the 'everyday' situation may deal with the situation of disaster possibility and what improved resources must be recommended.

3.4. There will be frequent statements of what will appear to many readers as obvious or simple, but this is in the nature

of the exercise. The separate activities within pre-disaster planning are very often simple, often so simple as to defy analysis, but whether simple activities or not their description and co-ordination must be understood if they are to be successfully implemented. It is hoped that this Primer will be above all a practical document.

3.5. Disasters themselves are not new and to commence consideration of phenomena which have been taken for granted is in itself a difficult process. Much recent thinking concerning an approach to disasters and to taking precautions against them is, however, quite new. Once this approach, which is based on an understanding of the total all-inclusive process of disaster within its social and economic context, is understood, then precautionary planning can proceed. Understanding then is the first stage of any implementation and implementation must begin by steps towards an understanding and an assimulation of the local disaster environment. Consequently some of the administrative stages of implementation are also very simple. (7.2.1.)

3.6. The production of a Primer of this kind will assist precautionary planning to be undertaken from within each area, region or country designated for planning, whether actually undertaken by indigenous personnel or by assistance from external sources.

4. THE ENVIRONMENT FOR PLANNING

4.1. Definition of the area and sub-areas for planning

4.1.1. The principle for application of this Primer is that the same methodology will apply to whatever area is selected for precautionary planning whether that area is a country (e.g. land locked or an island or group of islands) or a region of provincial authority, but clearly the 'level' of influence will vary and not all sections of the Primer will apply to the same degree.

4.1.2. First and foremost, the overall area for preplanning has to be defined and definition should make use of existing geographical, topographical and administrative boundaries.

4.1.3. Second, sub-regions within the overall areas must be defined.

4.2 Location

4.2.1. Having defined the areas for planning (4.1) the location of each area must be examined. The overall area must be placed in its own context of whereabouts in the world, its principal neighbouring land masses and oceans.

4.2.2. It is important to recognise that whilst administrative and natural boundaries (4.1) may be convenient to define an area for planning, natural disaster events have no respect for such boundaries. Co-ordination of plans between adjacent areas, whether inter or intra-national and the context of the area for planning is therefore a necessary part of the planning study.

4.3 Geography : Geology : Topography

4.3.1. A physical study of the area itself can now be undertaken. Its geography can be considered in terms of its size, coastline, principal centres of population, sizes of major cities and ports, and principal products.

4.3.2. Geological study will consider origins and nature of land formations, describe significant aspects, compare similar and dissimilar areas.

4.3.3. Topographical study will examine the 'lie of the land' and describe particular features such as low or high ground, major river basins etc.

4.3.4. Maps in a variety of scales will be required for all of these studies and a rapid initial overview of the nature of the area for planning may be obtained from the air.

4.4. Climate

4.4.1. An overview of the normal climatic pattern will include temperature and rainfall data, prevailing wind direction and speeds and include accounts of minor normal seasonal occurrences such as winds, snow, dry periods, monsoon periods, thunderstorms, high tides etc. This background will provide the context for major atmospheric occurrences which may cause disaster events.

4.4.2. It will be necessary to make an assessment of the capacity for weather stations and observatories to forecast and to monitor natural phenomena of tropical cyclone, earthquake, volcano, tsunami and heavy rainfall etc. Liaison between these stations and others in neighbouring countries and international networks must be established to achieve the longest possible warnings of disaster areas.

4.4.3. The relationship between this scientific aspect of warning and monitoring and system for promulgating public information and advice must be established, and times, methods and the content of warning and advice must be agreed. (7.3)

4.5. Flora and Fauna

4.5.1. A review of natural ground coverage and animal/bird population serves as the context for agricultural analysis under Economic Structure (4.11.)

4.6. History

4.6.1. A brief historical review will provide the basis for an analysis of Social Origins (4.7.). It is not intended that this should be a history of disaster events except where these themselves have contributed to the shaping of history itself.

4.7. Social and Cultural Origins

4.7.1. This survey will be an extension of 'History' (4.6) and will describe the origins of the social pattern, differences,

similarities and the degree of separation between social groups and in particular, current expressions of social origins in religious or social behaviour, activity and belief that may have a bearing on attitude or response to natural disaster and therefore a bearing on precautionary planning (section 6), on response to warnings and also in the construction and arrangement of dwellings (section 7).

4.8. Social Structure

4.8.1. This will be an analysis of population to expose its composition, perhaps regionally, based on age, sex, births, deaths, expectation of life, settlement pattern (statistical and physical) and evidence of migration - concentration or depletion. It will very probably draw upon 'Social and Cultural Origins' (4.7.) particularly in respect of minority groups.

4.8.2. An assessment of physical settlement patterns will involve an analysis of dwelling forms and their distribution: what proportion are urban dwellers and the proportion of these in permanent houses and/or flats and what proportion in temporary dwellings (squatter or shanty dwellings): what proportion are rural community dwellers and whether they are contiguous or isolated.

4.9. Government : national and local

4.9.1. For the successful implementation of a programme of precautionary planning its activities have to be allocated to administrative roles ('Precautionary Planning: section 6)

and for practical purposes it is preferable that roles for preplanning equate to existing posts.

4.9.2. Therefore the method of and structure for governmental administration at all 'levels' and for national, regional and local purposes must be identified in detail. Areas of control must be identified and administrative boundaries defined on the ground and between Ministries and Departments.

4.9.3. Within Government there may be sectors of activity identifiable as having a separate role in predisaster planning, i.e. hospitals. These will deserve consideration under Sectoral Plans - Government.

4.10. Non-Government Organisations

4.10.1. Having looked at Government organisation, the presence and capacity of non-government organisations where they are relevant to precautionary planning activities (section 6), is a logical extension. These will be any or all of the following, for example:

Red Cross

Salvation Army

Rotary

Boy Scouts/Girl Guides

Consideration must be taken of whether these are full time or part time, national or international, and of the capacity of premises, funding and staff.

4.10.2. Sectors of society identifiable as such and as having particular responsibility for groups of people or activity may deserve special consideration in precautionary planning activity as Sectoral - non-government, e.g. Hotels.

4.10.3. Particularly important in this context will be the presence by governments of other countries in a diplomatic or military capacity.

4.11. Economic Structure

4.11.1. The first of three parts comprising 'life-support systems', economic activity within the area for planning, will need to be assessed according to industry, commerce, agriculture and fishing. Non-marketing activity for self-consumption must also be included as must small industries as well as major concentrations. 'Invisible' activities of insurance and tourism must also be considered.

4.11.2. National budgeting over recent years must be analysed towards an assessment of the capacity of a country to undertake precautionary planning activity.

4.11.3. This part of the planning context will reveal much of the area's capacity for dealing with disasters when related to the planning process of identification and co-ordination of Indigenous Resources (section 7). But it will also reveal the potential capacity of an area for creating 'man-made' disaster events of industrial accident and explosion for instance.

4.12. Economic Development

4.12.1. Plans for future economic activity and expansion must be looked into if proposals for a programme of precautionary planning are to be realistic, as such activity will be the catalyst for movements of population leading to the establishment of new settlements and communities, the design and construction of which must recognise the needs of precaution against disaster events - one aspect of precautionary planning. For development to take place regardless of the probability of disaster events is to enjoy a fool's paradise.

4.12.2. Development as it takes place must also recognise its powerfully dangerous potential for exacerbating disaster events by encouraging a chain of reactions which may lead to, for instance, the erosion and depletion of land caused by and in turn exacerbating migration to centres of new industrial, commercial or merely urban activity which may itself be centred in an area of high proneness to disaster events. Many established towns and cities are situated in areas of high vulnerability.

4.13. Communications

4.13.1. Existing methods of communication included as transportation will be particularly important components for facilitating any form of Contingency Planning (section 6) as part of a programme of precautionary planning. Audio communication will constitute a comparatively vital part of social precautions in warnings and associated advice, and communications generally constitute the second part of 'life support systems'.

4.13.2. Examination of communications systems comprises an assessment of air, sea and land transportation to provide information on capacity and their own vulnerability to disaster events. Cargo handling facilities and capacities must also be included under each of these main headings - air, sea and land. Public transportation, commercial carriers and trucking companies must be similarly assessed.

4.13.3. Other forms of communications must be similarly examined:

Telephone

Radiotelephone

Commercial radio and television

Newspapers

4.14. Services and Utilities

4.14.1. The three constituents of a 'life support system infrastructure' are now

Economic structure

Communications

Services and Utilities

This heading will include an assessment of services such as fire and ambulance, police, civil defence, hospital emergency services, and utilities of water supply, sewage treatment and disposal, electricity supply, gas supply and fuel supplies.

4.14.2. How does each of these components meet the demands placed upon it in normal times and what is the capacity of each to (a) withstand disaster and (b) to respond to additional demands placed upon it in the aftermath of a disaster event?

REFERENCES: The UNDP Country Programme

The National Development Plan.

BAIRD, A. et.al. 'Towards an Explanation and Reduction of Disaster Proneness', Occasional Paper No. 11, Disaster Research Unit, University of Bradford, August 1975.

5. DISASTER VULNERABILITY AND RESPONSE ANALYSIS

5.1. This Primer for Precautionary Planning does not include scientific analysis of natural phenomena. In order to successfully apply a programme of precautionary planning it is necessary for there to be some foreknowledge of disaster likelihood for a particular place but it is not yet realistic to expect an exact forecast of the natural phenomena which cause disaster. The principal disaster events likely to occur must be known and probable effects must be understood.

5.2. It is also important for there to be some understanding of the nature of the events themselves, particularly where there may be the likelihood of some constant variability in the nature of disaster which will make zoning of intensity and probable losses relevant. Analysis of this kind, where it is possible, will be of particular importance to the efficiency of precautionary planning.

5.3. It is not necessary for the purposes of the Primer to define what is meant by disaster as long as awareness to disaster possibility is sufficient to promote the initiation of precautionary planning. Awareness must be initiated by Government and transmitted in the form of information and advisory procedures to the public at large and to government and public organisations and establishments where these have a responsibility for groups of people or activities. It will be necessary to collate data on previous disaster

events of all kinds from historical records, accounts and administrative files, not only of the nature of each event but of its effect.

5.4. Disasters generated by natural phenomena will be, for instance:

Tropical cyclone: Hurricane or Typhoon

Earthquake

Tsunami

Flood

Volcanic eruption

Drought

Epidemic

5.5. Disaster events produced from within the man-made life support system, infrastructure of economic structure (4.11), communication (4.13), and utilities (4.14) will be, for instance:

Epidemic

Aviation accident

Maritime accident

Fire (community or bush)

Industrial explosion

Toxic spillage

Epidemic may belong to either group and food shortage may be the result of any one event or occur independently from a variety of causes.

5.6. It will be necessary to define where these disaster events might occur and, where relevant and possible, to indicate a degree of vulnerability. This will be most effectively done by cartographic methods considering each possible event.

5.7. Tropical Cyclone

5.7.1. Bearing in mind that a Tropical Cyclone may be as much as 500 miles in diameter, there will be many situations where an attempt to grade vulnerability would be out of the question. Groups of small islands with little or no variation in ground levels will be one such situation. It will be important to go further however and to assess the range of probability between islands within a group based on records of past events.

5.7.2. Large land masses will be able to more easily distinguish by zoning methods between coastal areas subject to the initial impact and inland areas defined by high and low ground levels subject to similar or lesser disaster forces.

5.8. Flood

5.8.1. Areas subject to flood will be defined by topography whether the flood source is riverine or coastal. Within these areas it will be possible to indicate extreme or lesser vulnerability to regular or to less frequent and more extreme events.

5.8.2. Where records of past events are available over an adequately long period of time, it will be possible to assess 'return periods' for defined magnitudes of flood, and areas subject to flood in each case indicated accordingly.

5.9. Man-made disaster events will normally cover a much smaller area than natural disaster events, which it will be possible to indicate according to proximity of the likely source: e.g. industrial complex or airport.

5.10. To summarise procedures for disaster analysis:

1. Define possible disaster events.
2. Define vulnerable areas for each type of event.
3. Indicate within each area, degrees of vulnerability
   a. simply by topographical definition
   b. in detail by reference to statistical analysis and return periods.

5.11. Response: an assessment of existing disaster plans

5.11.1. If there are no disaster plans in existence then the problem will be that of initiating awareness of the need for preplanning (ref. 'Economics of Precautionary Planning' (Section 8) and 'A Philosophy of Planning', (Section 2)).

5.11.2. If there do exist some disaster plans, which is perhaps the more likely situation, then this is in the least an expression of awareness to the hazard and the necessity of precautionary planning. It will then be necessary to assess the quality and effectiveness of preplanning as it exists.

5.11.3. Plans may be either national, regional or local and may emanate from sectoral sources such as public service, utility and commercial organisation or governmental or voluntary sources.

5.11.4. There will be one essential difference between those concerned for the safe and efficient functioning of a particular installation or organisation and those concerned with the safety and welfare of the public at large.

5.11.5. Each should define its role, its area of applicability, and refer to definite stages of a disaster event.

5.11.6. It will clearly not be sufficient for each plan to concern itself only with its own field of competence; each must relate to a central co-ordinating plan and those responsible for the functioning of each plan must relate to a central co-ordinating and planning body.

5.11.7. As well as defining roles and activities, plans must give details for the operation of those roles and activities, of administrative machinery required for carrying them out and for their co-ordination.

5.11.8. Attention should also be included towards medium and long term planning concerning land use zoning, building construction, insurance of property and rehabilitation procedures after a disaster event.

REFERENCE: vide 'Precautionary Planning' (Section 6).

6. PRECAUTIONARY PLANNING

6.1. A Theory of Precautionary Planning

6.1.1. The following can be said to be the phases of the pre-planning process grouped on either side of a line representing the disaster event itself; the first three phases applying to time before the event and the last three phases to periods of time after the event. (Because pre-planning for a single disaster event can, by its nature, only take place before that event, the opportunity to pre-plan for subsequent events will be provided in the last two phases after the single event.)

Prevention.

Precautions for mitigation - physical precautions within building and planning/land use zoning.

Precautions for warning - social precautions - warnings and associated advice.

Emergency - during and immediately after the disaster event.

Rehabilitation - emergency housing and provision of food and water.

Reconstruction - rebuilding and reconnection of utilities and services.

6.1.2. The purpose of precautionary planning at a practical level accepts that a disaster is likely to occur and in any case the total prevention of disaster calls for the prevention of the causative natural phenomena or the removal of

places of habitation from known vulnerability calling upon expertise, technology and resource beyond the capacity of the majority of disaster prone countries. The term 'prevention' is sometimes applied to cover the other two headings for precaution, analogous with 'preventive medicine', whereas 'mitigation' might be a more appropriate description of the effects of those activities.

6.1.3. Pre-planning for reconstruction might appear to be an exercise beyond the scope of this report except that clearly the provision of permanent building and supporting services and utilities must take account of the possibility of a future disaster. In fact, processes belonging to reconstruction will take place whether or not there has been a disaster and the needs of precautionary planning must be incorporated. These activities belong to what is generally called 'development' and it is illogical for the processes of development to ignore probable damaging effects of disaster.

6.1.4. The essences of precautionary planning therefore in any practical context are the phases of:

Precautions - physical and social

Emergency

Rehabilitation

Of these three phases the latter two depend entirely on what happens during the disaster itself and can be covered in short term precautionary planning only by contingency planning - the identification and preparation of a range of aids to decision-making during and immediately after the disaster event. Long term precautionary planning will be incorporated in the rehabilitation phase.

6.1.5. The disaster event itself may, in the extent or severity of its impact, be:

National or

Regional or

Local

Here we are not referring to administrative concern, involvement or action, but to the comparative extent or severity of destruction and losses in the overall context of the country in which the event has occurred. Variations in the degree of severity may be due to variations in size or intensity of one type of event, the area of territory affected by an event or smaller and localised disaster events. Variation of these kinds may affect communities by depriving people of their immediate bodily needs such as potable water and edible food or of less immediate but equally essential needs of social organisation such as simple shelter, warmth and sanitation. A third category may be affected by the more violent of disaster events where the physical infrastructure of a community on which life has come to depend is disrupted causing loss of permanent housing, services and utilities (water, gas, electricity) and transportation; and the more complex life support systems within an industrial infrastructure. (7.1.)

6.1.6. Precautions themselves can now be expanded and considered in <u>either</u> the:

Short term	:	social precautions - warnings
Medium term	:	physical precautions - land use zoning and construction
Long term	:	development

depending on resources and expertise available, but all precautions being taken as those actions which are possible at a given time for application for a future span of time from that point. In other words, these are not phases for future action. Through their application in development, long term precautions should automatically involve 'reconstruction' after a disaster event. Contingency plans and precautionary plans may be prepared at a number of 'levels' such as government and non-government (and sectoral plans within each of these) and each of these plans will examine disaster with the same kind of analysis and with the same kind of division and tabulation. They will be co-ordinated by the 'highest' level, i.e. government, within the national disaster plan.

6.1.7. The preceding paragraphs may be summed up thus: the disaster phases for pre-planning applications are:

1. Prevention)
2. Precaution:physical) ⟶ DISASTER ⟶ (4. Emergency
3. Precaution: social) (5. Rehabilitation
(6. Reconstruction

These phases can be distilled for immediate purposes to:

1. Precautions: physical and social

---

2. Emergency
3. Rehabilitation

Of these the latter two depend on the disaster event itself and can be dealt with in part before the event by contingency planning.

The disaster event itself may be

National or

Regional or

Local

and in terms of the effect of the disaster on people may affect their

Immediate bodily needs

Social organisation, or

Physical infrastructure.

'Precautions' may be expanded and considered in the

Short term : social: warnings

Medium term : physical: land use zoning and construction

Long term : development

and contingency and precautionary plans may be prepared at a number of levels such as

National

Regional

Local and

Governmental

Non-Governmental

6.1.8. There are therefore two principle headings for activity within the precautionary planning process:

Precautions and

Contingency planning

Note that the line denoting the disaster event has now been omitted as these are now activity headings within the precautionary planning process itself which is an integrated

simultaneous process and the time sequence on which the original disaster phases were based (from which the precautionary planning activities took their description) become irrelevant.

6.1.9. Contingency planning is required to predetermine a group of actions and activities of unknown number, sequence and magnitude, but all of known likelihood in a disaster event. These activities can be broken down into the following area of application:

National, regional and local areas of application.

Government and non-governmental areas of responsibility.

All, or almost all, contingency planning activities will apply to all areas of application (national and local), the area of effect being the principle difference between them.

6.1.10. Governmental and non-governmental areas of responsibility produce the essential and most significant classification in practice, but as it is likely that within their respective area of responsibility both sectors will follow a similar activity pattern, it is useful to consider further sub-classification. For this purpose a re-examination of the origins of the contingency planning heading is useful and reveals the dual source of 'emergency' and 'rehabilitation'.

6.1.11. For even further ease of identification and definition the 'emergency' phase has been divided into 'emergency' and 'relief' phases to produce now the headings for contingency planning activity of

ILT LIBRARY

Emergency

Relief

Rehabilitation

where 'emergency' is the period immediately before the disaster event if any warning has been possible (for practical purposes in this context the disaster commences on receipt of warning), during the disaster event and immediately afterwards; and where relief is the period of easing the state of suffering and distress, and rehabilitation is the reconnection of dislocated services, utilities and shelter.

These headings could be alternatively and simply, short, medium and long term contingencies.

6.1.12. The other of the two principal headings for the precautionary planning process is 'precautions', which has already had its first or primary classification on the basis of mitigation and warning or 'physical precautions' and 'social precautions'.

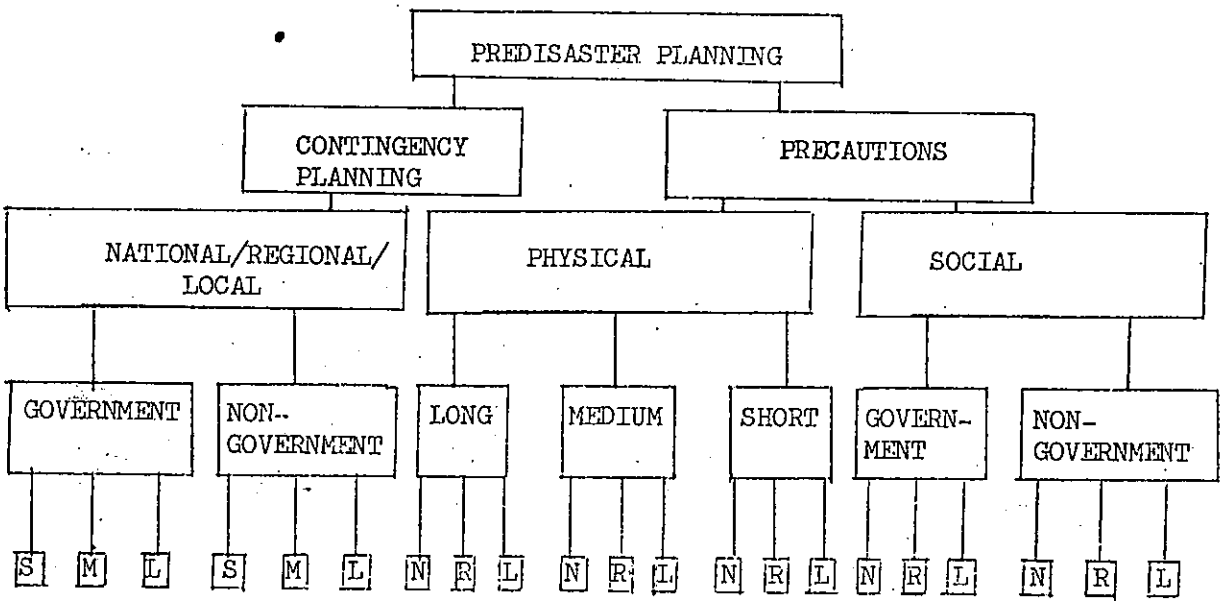
These two sub-headings can be taken separately and further sub-divided for practical purposes.

6.1.13. Actual physical precautions themselves against natural disaster or encouragement for the application of physical precautions by individuals are seen to belong totally to the government sector. There is therefore no practical purpose to be achieved by applying the government/non-government classification. On the other hand this is the heading under

which there may be precautions involving considerable expense and therefore the differences of time scale are seen as being the most significant activity division. Long, medium and short term precautions may then be identified by or allocated to national, regional or local competence.

6.1.14. Social precautions are based on 'warning' and clearly any warning system must only emanate from a single controlling source. The resources and responsibility for that source are governmental and the governmental/non-governmental division becomes the most significant classification, some of the related activities belonging to the non-governmental area of responsibility. Warnings themselves will be given on a national basis even where they may be regional or local in effect and by their nature are short term, but again some of the related activities may be classified into national, regional or local areas of competence.

6.1.15. This analysis of activities can be shown graphically thus:



6.1.16. In conclusion, therefore, precautions which can be taken before a disaster event occurs can be divided to relate to the two periods of time of before and after the event. Those events which occur during the period of time after the disaster has occurred are referred to as 'Contingencies' because what happens during that time after a disaster is determined by the disaster itself. They cannot be known before except as a range of likely situations (contingencies). Precautions can be taken up to a point before which details of magnitude, numbers and location of damage and needs become known. The making of arrangements for the carrying out of recognised activities to deal with these contingencies is called 'Contingency Planning'. Contingency Planning can itself be further divided to relate to two merging time phases and corresponding sequences of events relating to an 'emergency period' and to 'rehabilitation'. The emergency

period is usually referred to as that period immediately following a disaster during which urgent action has to be taken to relieve suffering such as rescue and first aid. The period of rehabilitation which follows contains those activities necessary to provide shelter, warmth and food to those rendered homeless and hungry. However, contingencies of the emergency period can be sub-divided because it must be recognised that where a warning has been possible of an imminent disaster event, the actual 'emergency' begins on receipt of that warning and not at the point of the disaster event itself. So the emergency period has been sub-divided into 'emergency' first and 'relief' second followed by the 'rehabilitation' period.

Those precautions which relate to the period of time before the disaster event can clearly play a part in mitigating the effects of the disaster occurrence and can be called precautions for mitigation, whilst contingency planning accepts the likely aftermath of disaster and contains precautions for relief. Precautions for mitigation can also be divided into two groups. Those precautions relating to the adequacy of building construction and consideration of the location for building and development purposes are called 'Physical Precautions'. Those further precautions relating to warning, transmission and dissemination of warnings and the preparation of associated advice to accompany warnings to individuals, groups, neighbourhoods and communities are called 'Social Precautions'. Thus, there have now been

identified two principal groups of precaution and each group has been sub-divided. Each of those sub-groups can now be divided between those precautionary activities best suited to Government action and those which might be best suited or assigned to civil or voluntary activity. The following diagram might be used to summarise the foregoing paragraphs.

	Government Activity	Non-Government Activity
Physical Precautions		
Social Precautions		
WARNING		
DISASTER EVENT		
Emergency		
Relief		
Rehabilitation		

Activities to be contained in a programme of precautionary planning can be identified (6.2) and sub-divided under principal and secondary headings. Thus, by carrying out this process of definition and by analysing the constituent activities of precautionary planning and grouping them under previously defined headings the following advantages emerge. First, the total range of pre-planning activity can be seen at a glance by either national, regional or local authorities but does not become overwhelming due to its sub-division. Secondly, by applying such a process of theoretical analysis rather than approaching it from the point of view of the

resources available, the total role for precautionary planning can be seen and not just those parts which are undertaken because either

a. they have been recognized as a requirement;

b. resources are available.

In this way any gap appearing between theory and application will lead to recognition of the need for additional resources and personnel in order to carry out a full precautionary planning programme, and appeals can then be related to specific needs. Thirdly, groups of related activity can be more easily and efficiently assigned to personnel.

6.2. Classification of Activities

6.2.1. Precautionary planning activities can now be classified under their principal sub-headings as follows:

CONTINGENCY PLANNING

Emergency (Short term) Contingencies

	Government	Non-Government
Appoint disaster co-ordinator (annually)	*	*
Appoint deputy disaster co-ordinator	*	*
Define roles, appoint staff, obtain and store equipment	*	*
Definition of the means of receiving and transmitting news of a disaster event	*	*

	Government	Non-Government
Definition of recipients (F.I. Commissioner/Police HQ/Local Government Minister/Cabinet Office/Prime Minister)	*	*
Established responsibility for method of information control and relationships with press/media; national/international (Disaster Co-ordinator)	*	
Definition of the form of primary communication	*	*
Definition of the form for secondary communication	*	*
Action to delineate area(s) involved	*	*
Relief (Medium term) Contingencies		
Assessment of requirements after receipt of statements of immediate needs	*	*
Identification of those requirements which are available/those not immediately available	*	*
Identification of likely needs and type of material to be stored	*	
Preparation of national sources of relief material (stockpiling)	*	
Identification of external sources; national and international	*	

	Govern-ment	Non-Govern-ment
Negotiations with possible external (international) sources of relief materials on availability of likely requirements	*	
Form of preparation of requests for assistance for transmission to external sources and by whom	*	*
Definition of form of communication with external (international) sources of relief material	*	
Identification of national (Indigenous) resources	*	*
Assessment of quantity/number likely to be available	*	*
Negotiations with owners/controllers on availability, communications and method of payment	*	*
Identification of means of transportation - one of the indigenous resources - for		
a. local resources	*	*
b. national and regional (centralised) resources	*	
c. international aid supplies	*	
Co-ordination of offers of local assistance		*

	Government	Non-Government
Define procedures for dealing with		
ambulatory casualties		*
immobile injured	*	*
dead (including registration and burial)	*	
homeless	*	
distressed		*
dead animals	*	
Define responsibilities for		
general health surveillance during relief period	*	
identification of contaminated water supplies	*	
distribution of alternative potable water supplies	*	
Define responsibility for and establish methods of customs clearance for international relief supplies	*	
Define responsibility and methods of distribution of relief supplies to those in need	*	*
Feeding arrangements at temporary shelters (for a prolonged emergency)	*	*

	Government	Non-Government
Rehabilitation (Long term) Contingencies		
Define responsibilities for:		
reconnection of damaged utilities (electricity, water, sewage, telephone)	*	
control of contaminated water supplies	*	
temporary rehousing of homeless	*	
management and maintenance of long term emergency care	*	
Define responsibility for and method of preparation for:		
Sub-plans for these activities and integration into major plan	*	
Co-ordination of national, regional and local plans	*	
Define responsibility for and establish method of financial aspects of precautionary planning - budgetary controls, aid, loans and grants. Maintenance of law and order	*	

PHYSICAL PRECAUTIONS

Precautions at National Level	Long term	Medium term	Short term
Identification of areas of vulnerability, disaster types and identification of degree of risk	*	*	
Definition of methods of countering the risk in the form and construction of buildings	*		
Definition of area of high risk where building and building development is to be discouraged or prevented	*		
Preparation of legislation to secure appropriate building design and construction	*		
Preparation of legislation to secure appropriate building guidelines		*	
Preparation of legislation to secure appropriate land use zoning	*		
Preparation of legislation to secure appropriate guidelines for land use zoning		*	
Preparation of explanatory advice related to the above for the design/building professions and dissemination of information	*	*	

	Long term	Medium term	Short term
Preparation of a phased programme for the development of a 'precautionary planning infrastructure'	*	*	*
Precautions at Regional Level			
Preparation of explanatory advice related to above for individuals	*		*
Precautions at Local Level			
Identification of areas of vulnerability, disaster types and identification of degree of risk	*	*	

SOCIAL PRECAUTIONS

Precautions at National Level	Government	Non-Government
The preparation of a framework for disaster warnings (statements) and associated advice to individuals on what to do by way of response; and preparation of dissemination	*	
The designation of public shelters for use in disaster	*	
The provision of new and improved shelters	*	
The identification of area requiring special warning (long distance		

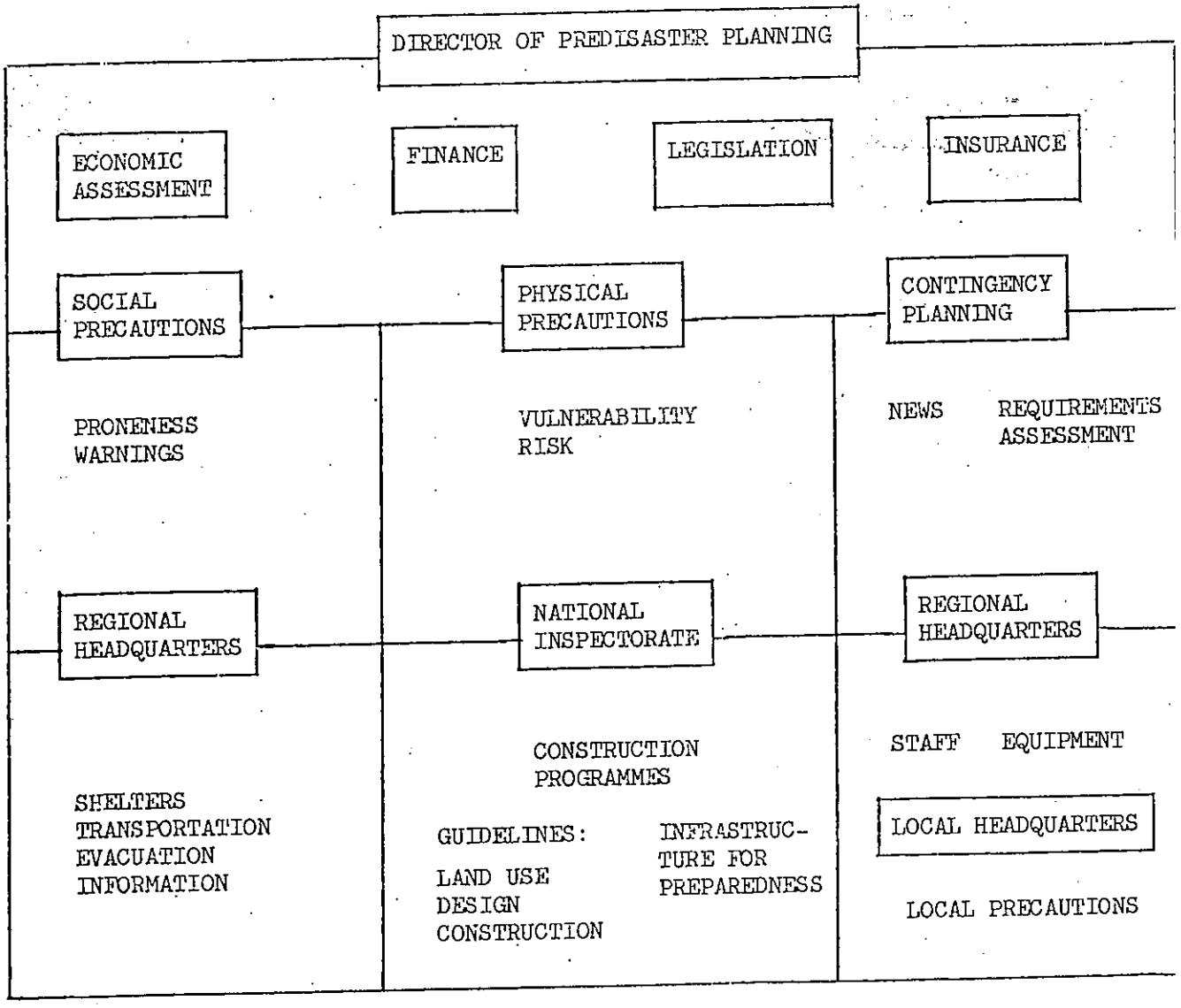
	Govern-ment	Non-Govern-ment
evacuation over vulnerable routes, inland areas subject to flood, areas seen to be vulnerable to sea surge)	*	
The identification of particularly prone communities: in specific instances	*	
The preparation of public information programmes and dissemination	*	
The preparation of schools information programmes	*	
Precautions at Regional Level		
The designation of public shelters for use in disaster	*	
The identification of areas requiring special warning (long distance evacuation to shelter, evacuation over vulnerable routes, inland areas subject to flood, areas seen to be vulnerable to sea surge)	*	
The identification of particularly prone communities: every time	*	
The mass evacuation of particularly prone communities	*	
Precautions at Local Level		
The designation of public shelters for use in disaster	*	

	Govern-ment	Non-Govern-ment
The identification of areas requiring special warning (long distance evacuation to shelter, inland areas subject to flood, areas seen to be vulnerable to sea surge)		*
Checking on the receipt of warnings by groups or individuals in particularly vulnerable situations, or who are particularly vulnerable due to their condition (elderly and infirm)		*
Provision of transportation for individuals requiring communal shelter but who are unable to reach it		*
The identification of particularly prone communities: every time		*
The mass evacuation of particularly prone communities		*

6.3. Definitions of an Organisation Structure

6.3.1. Having now identified and grouped (6.2) the activities occurring within the process of precautionary planning, an attempt can be made to define an organisational structure of corresponding roles to administer them. In the main part this will be a governmental structure assigning within it certain non-governmental activities which, it is suggested, will be the

role of a principal voluntary organisation to administer and co-ordinate. Furthermore, the structure can be made to incorporate those additional activities not in themselves direct precautions but which maintain precautions as they have been defined. These additional activities are therefore the 'maintenance functions' of economic assessment, finance, legislation and insurance. All these groups of activity can be shown related to an administrative structure in the following diagram of management fuctions:



The diagram has been drawn to show the relationship between grouped activities rather than an administrative hierarchy or 'organisation chart'. Each box represents a group of activities with the box as a boundary across which "transactions" take place. The relationship of each group of activities provides a system for achieving the operation of a programme of precautionary planning. The boxes contained by larger boundary boxes subscribe to the description of the overall activity of the larger box. The 'floating' unconnected boxes represent either regulation functions required for the internal control of relations between the provision of activity groups (e.g. finance) or maintenance functions for the provision of everything required for the system's operation such as equipment and staff (training etc.).

6.3.2. A description of the roles of management functions for the administration of a precautionary planning programme, following those shown in the preceding diagram (6.3.1.) is as follows:

<u>Boundary Control</u>

1. Director of Predisaster Planning

2.a. Social Precautions

b. Physical Precautions

c. Contingency Planning

3.a. Regional Planning Level

b. National Inspectorate

c. Regional Planning Level

4. Local Level Planning

Regulation/Maintenance Functions

1.a. Economic Assessment - economic effects of disasters on the economy in general and on development: long, medium and short term. Proposals for the mitigation of disaster effects on the economy where economic planning and disaster planning come together.

b. Finance - monetary considerations of all parts of the precautionary planning programme and relationship with overall financial planning and the establishment of a financial system for receiving monetary aid and dispersing it rapidly.

c. Legislation - for the assumption of overall authority in emergency situations and delegation of sectoral responsibility according to scale and nature of events.

d. National disaster insurance scheme proposals aimed at those who cannot afford commercial policies. Could be used as a means of disseminating information concerning disaster situations.

2.a. Assessment of Proneness and Warnings - establishment and operation of a common warning system as a basis for social precautions.

b. Assessment of Vulnerability and Risk - as a basis for physical precautions. The drafting or passing of legislation and the implementation of laws.

c. News - the establishment of a system for the dissemination and receiving of news, communications and emergency networks: as a basis for contingency

planning and its operation. Assessment of aid in requirements:

- identification of courses of aid; procedures for requests, collection and distribution.

3. Staff - procedures;
   - co-ordination;
   - co-ordination of government offices involved in relief work.

Equipment

Management/Command Boundaries - Roles

1. Director of precautionary planning

   i. Internally - co-ordination of:
   Social Precautions
   Physical Precautions
   Contingency Planning
   with long term Insurance and Economic assessment and financial functions.
   - policy planning decisions

   ii. Externally - Liaison with the Prime Minister or his equivalent and with senior members of government, for arrangements of international aid requirement and delivery.

2.a. Social Precautions

   i. Internally - co-ordination of regional plans with assessments of proneness and warnings.

- policy planning decisions.

ii. Externally - liaison with Director of Precautionary Planning

- Physical Precautions

- Contingency Planning

2.b. Physical Precautions

i. Internally - co-ordination of the Inspectorate with vulnerability and risk assessment and legislation.

- policy planning decisions.

ii. Externally - liaison with Director of Precautionary Planning

- Social Precautions

- Contingency Planning

2.c. Contingency Planning (Disaster Co-ordinator)

i. Internally - co-ordination of regional plans with news, dissemination system and assessment activities.

- policy planning decisions.

ii. Externally - liaison with Director of Precautionary Planning

- Social Precautions

- Physical Precautions

- Other bodies, e.g. Red Cross, and initiation and vetting of Sectoral Plans.

3.a. Regional Planning Level (Social Precautions)

i. Internally - to plan and co-ordinate social

precautions such as: shelters
transport
evacuation

- the provision of such information as these activities require to the general public, National Government Officers etc.

ii. Externally - liaison with Head of Social Precautions and other regions where necessary.

- attention to proneness and warning information.

3.b. National Inspectorate (Physical Precautions)

i. Internally - prepare guidelines for construction, land-use zoning, design

- supervise and inspect their application

- prepare guidelines for disaster infrastructure: warehouses
hangars
hospitals
shelters

- supervise their application and inspect.

ii. Externally - In the light of vulnerability and risk assessment and legislation the Inspectorate should instigate the functions outlined above.

3.c. Regional Planning Level (Contingency Planning)

i. Internally - to co-ordinate local planning committees
- to provide staff and equipment at a regional level

ii. Externally - to liaise where necessary with other regions
- to liaise with the Head of Contingency Planning
- to become familiar with the processes of assessment and of the dissemination of news.

4.a. Local Level Planning (Contingency Planning)

i. Internally - In the light of social and physical precautions to plan for the continuing emergency operation or repair of public utilities and to organise local level relief operations on a community self-help basis.

ii. Externally - to inform Regional Headquarters of any necessities for contingency planning which cannot be provided locally
- to liaise where necessary with other local committees.

Local Committees should include:

The Commissioner or his equivalent

Representatives of large firms

Representatives of public utilities

District Engineer

Red Cross

Police

Medical profession

Other concerned bodies

6.3.3. The Disaster Co-ordinator (2.c.) will probably be one of several eligible for the post appointed annually and he may be the Chief of Contingency Planning himself. He will require a deputy and assistants, transportation of his own including access to an aircraft and radio and telephone communications. His duties will continue for several days and nights and temporary sleeping accommodation and toilet facilities will be required.

6.3.4. In the event of a disaster occurrence which may cause damage to a number of regions, the overall co-ordinating function of the national disaster co-ordinator will be of particular importance in deploying relief and inter-regional resources whether or not the location of Central Government has been hit. But even in cases where only one region or community has been hit, it is envisaged that the national disaster co-ordinator will have an important role of liaison between the disaster area, national and international relief supplies and central government. This latter instance would

be the case if a major disaster of any kind were to occur including aviation or industrial accident involving one or two settlements. It is envisaged that the plan will operate similarly in localised disaster events such as these with equal effectiveness, requirements of each particular event 'slotting into' the plan at the discretion of the Disaster Co-ordinator.

6.3.5. The Disaster Co-ordinator will be directly responsible for the activities, as they are required and as they take place, defined as 'short term' (emergency) and the majority of 'medium term' (relief), whilst liaising with other sectors of the precautionary planning programming for 'long term' activities (rehabilitation).

6.3.6. A Board of Precautionary Planning is recommended having sub-committees representing the three principal activities of Contingency Planning, Physical Precautions and Social Precautions. Membership of these sub-committees will be essentially of existing government officers from existing administrative departments, but with considerable attention being given to the appointment of Chairman of the Sub-committee of Contingency Planning if this role is made to cover that of Disaster Co-ordinator as well. Representation by principal government ministries and departments may include the following, for instance, or their equivalents:

Contingency Planning

Secretary to the Cabinet or other Senior Co-ordinator

Permanent Secretary, Ministry of Works

Director, Department of Local Government

Permanent Secretary, Ministry of Labour and National Insurance

Commissioner of Police

Permanent Secretary, Ministry of Education and Culture

Permanent Secretary, Ministry of Health

Director of Civil Aviation

Director, Meteorological Department

General Manager, National Radio

Director, Red Cross

General Manager, Electricity Corporation

Director, Air Sea Rescue

General Manager, Telecommunications Corporation

Department of External Affairs (sources international relief aid)

Ministry of Health (environmental health)

Government Information Bureau

Ministry of Finance

<u>Physical Precautions</u>

Department of Physical/Regional Planning

Ministry of Development

Department of Lands and Surveys

Building Controls Office

Ministry of Works

Government Information Bureau

Ministry of Health (Hospitals)

Department of Civil Aviation

National Airlines

Ministry of Transport

Meteorological Office

Commissioner of Police

Telecommunications

Social Precautions

Ministry of Education

Government Information Bureau

Meteorological Office

Ministry of Tourism

The Red Cross

6.3.7. Those non-government activities proposed for execution and/or co-ordination by a principal voluntary organisation (6.2.1.) are as follows:

Contingency Planning

Definition of means of receipt and transmission of information of disaster occurrence and subsequent situations.

Definition of conveyance of information after receipt.

Action to delineate area(s) involved.

Assessment of requirements after receipt of information on immediate needs.

Identification of relief supplies available/not available.

Preparation of requests for assistance.

Co-ordination of offers of local assistance.

Identification of non-government indigenous resources and assessments of availability.

Negotiations with owners/controllers on availability, transportation and method of payment.

Identification of means of transportation for other local relief supplies.

Appointment of disaster sub-co-ordinator.

Appointment of deputy disaster sub-co-ordinator.

Definition of roles, obtaining equipment, etc.

Define procedures for dealing with ambulatory casualties, immobile injured and distress cases.

Define method of distribution of relief supplies.

Define methods of emergency feeding at temporary shelters (for prolonged emergency).

Social Precautions

Checking on the receipt of warnings by groups and individuals in vulnerable situations, or who are aged or incapacitated.

Provision of transportation for individuals requiring communal shelter, but who are unable to reach it.

6.3.8. It is apparent that, on the one hand, the majority of governmental functions are already present in departments and offices of a current administrative structure. Only the titles of senior members of the precautionary planning organisation may be new, but these may be assumed as a 'second hat' for existing government officers. In any case the larger number of available officers for work within a programme of precautionary planning makes for considerable flexibility in implementing the precautionary aspects of the programme. On the other hand, it may be more difficult for a voluntary organisation with fewer personnel already over committed to undertake the additional work of a programme of precautionary

planning. It is suggested, however, that simple divisions of labour under the general heading of 'Precautions' between Contingency Planning and Social Precautions, for instance, and between Co-ordination (static at H.Q.) and Logistics (mobile and often away from H.Q.) in the Emergency period, may facilitate an easier handling of what may appear to be a large work load. The table which follows shows a final further breakdown of activity headings for this purpose.

PRECAUTIONS	
CONTINGENCY PLANNING -	SOCIAL -
Activity	Activity
Identification of non-government indigenous resources and assessments of availability	Define procedures for dealing with: ambulatory casualties,
Negotiations with owners/ controllers on availability	immobile injured,
Transport	distress cases.
Method of payment	Define methods of emergency feeding at temporary shelters (for prolonged emergency)
Define method of distribution of relief supplies	Definition on recipients for checking receipt of warnings
Definition of means of receipt and transmission of information of disaster occurrence and subsequent situations	Define method of checking on receipt of warnings
Definition of means of conveyance of information after receipt	

PRECAUTIONS	
CONTINGENCY PLANNING -	SOCIAL -
Activity	Activity
Maintenance functions Appointment of disaster sub-co-ordinator Appointment of deputy disaster sub-co-ordinator Definition of roles Obtaining equipment	

EMERGENCY PERIOD	
Co-ordinator -	Logistics Officer -
Activity	Activity
Receipt and transmission of information of disaster occurrence and subsequent situations Conveyance of information after receipt Action to delineate area(s) involved Preparation of requests for assistance Preparation of requests for supplies Co-ordination of offers of local assistance Preparation of an appeal Relationships with press Liaison with Government Disaster Co-ordinator	Assessment of requirements after receipt of information on immediate needs Identification of relief supplies available Not available Identification of means of transportation for other local relief supplies Checking on the receipt of warnings by groups and individuals in vulnerable situations, or who are aged or incapacitated Provision of transportation for individuals requiring communal shelter, but who are unable to reach it

6.3.9. A procedural framework for the formation of a programme for precautionary planning is proposed as follows:

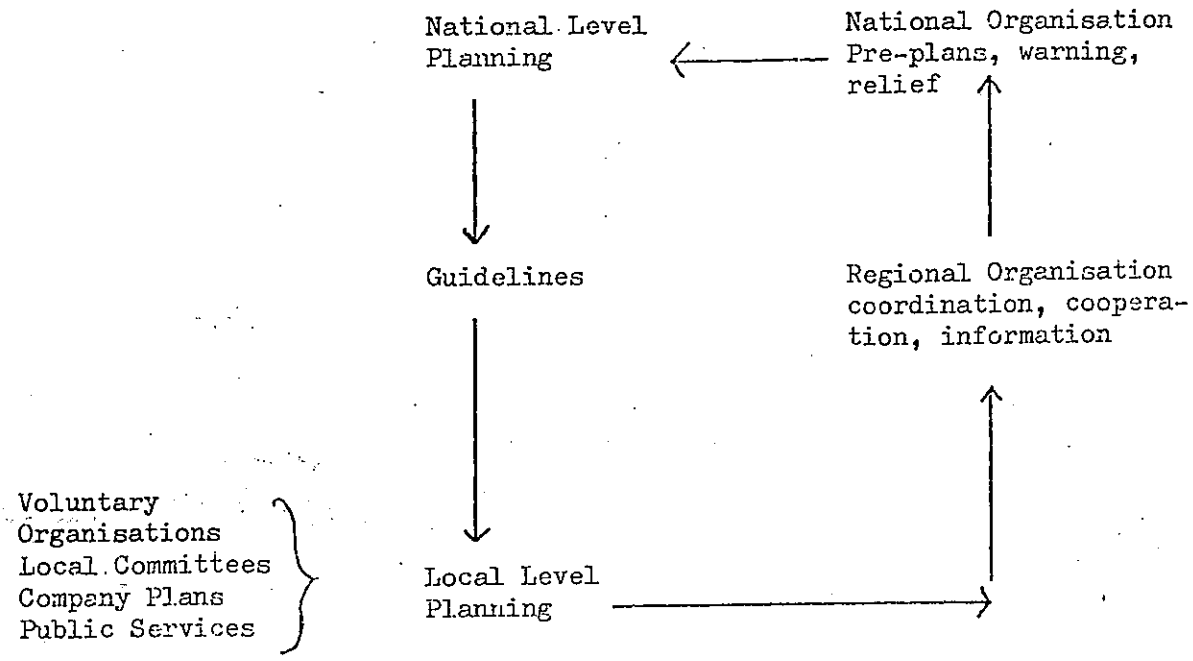
a. Guidelines from the Board of Precautionary Planning provide the outline, or framework, for local planning.

b. Organisations existing at local level use the framework to prepare local plans within their specific competence.

c. Commissioners or District Officers who must play a large part in the convening of local committees and dissemination and interpretation of the guidelines, must then decide on an organisation to co-ordinate these plans.

d. National organisation for pre-planning, warning and relief should be constructed based on the regional plans. The feedback from this process should enable adjustments to be made in national planning if necessary.

This process is illustrated by the following diagram:



6.4. Training of Precautionary Planning Personnel

6.4.1. Research into the provision of relief in disaster situations shows clearly that the effectiveness of relief relates directly to the adequacy of available resources and the efficiency of resource management. This statement remains true whether relief of an erosive disaster such as drought and famine, or a catastrophic cyclone, is being considered. Examples such as the relief operations in Somalia and in Darwin illustrate how efficient management of the available resources greatly mitigate the effect upon the victims.

Although it is both difficult and expensive to lay aside and keep ready resources intended principally for disaster situations, it is within the capability of any country to improve ability to manage its own indigenous resources and those sent in relief by foreign national and international

agencies. Precautionary planning is the best way of making the most efficient use of all available resources including manpower. Training, which ensures that all those involved are ready and able to carry out their task, is an essential element of precautionary planning.

6.4.2. Training can be considered under headings as follows:

a. Appreciation Education which aims at developing an awareness and understanding of the implications of disaster situations and how these affect people and organisations, socially, economically and operationally.

b. Co-ordinator Training. If Appreciation Education has been effective, senior officials in government and in the administration will be made responsible for a country's state of disaster preparedness and for the proper co-ordination of plans and resources for disaster relief operations.

c. Specialist Training. Appreciation Education and Co-ordinator Training should result in the preparation of precautionary plans and the establishment of the organisation to implement these. But to ensure the smooth and effective implementation of the Plan those involved must be trained and practised. This pattern of individual training and team practice we shall refer to as Specialist Training.

6.4.3. Appreciation Education

The education and training described briefly above are in general terms and will be affected by differing criteria. Planning training programmes must relate to the probable threat and to the society for whom they are intended.

6.4.4. Appreciation Education will generate and stimulate an understanding and concern from which all further action will originate. To be effective it should be aimed at as wide an audience as possible and should be extended through universities and training colleges of all kinds throughout the world. By this means it will reach those with responsibility in the public service. Those in government, the public service and the press have particular responsibility in promoting precautionary planning. They have the power and influence to create the public interest and concern which in turn will provide the capability through acquiescence for a voluntary service which makes disaster preparedness a reality. This is particularly true in developing countries where resources are not plentiful and where the effects of disaster are of great significance in social and economic terms.

6.4.5. Co-ordinator Training

When funds are limited or where talents are in greater demand than their availability it is improbable that the co-ordinator of a programme of precautionary planning will have this as his sole responsibility. It is nevertheless important that those nominated for such posts should be selected for their

powers of leadership, their standing in the community in terms of respect and freedom from prejudice and their assessed or proven ability in disaster situations.

6.4.6. It is equally important that the precautionary planning organisation and its channel of management and communication should follow and be within the normal administrative structure and machinery. This ensures that the transition from 'normal' to 'disaster' creates the least possible upheaval. This is a dilemma equally relevant in both developed and developing countries for which there is no generalised solution. In some circumstances the 'normal' administrator can be seen as the ideal 'disaster' co-ordinator, in other circumstances he may be seen as the excellent 'normal' disaster planner suited best as the chief executive to the Co-ordinator. The problem of nominating the Co-ordinator must be considered however because disaster situations bring special strains and make heavy demands upon those in authority who must have the special qualities which such situations require.

6.4.7. These particular qualities are required at all levels because delegated authority must be passed to subordinate co-ordinators down through the administrative structure. In some degree, leadership, imperturbability and self-reliance become increasingly important the further down the chain of command and the closer to the scene of disaster one approaches. The training of senior co-ordinators at the national, regional or local level is probably most economically and effectively

done in regional seminars (e.g. Caribbean, South East Asian). For the larger countries however national requirements may determine the groupings, although if possible, representation from neighbouring countries should be invited. Such a policy will enable problems to be discussed against a common threat (earthquake, flood, drought etc.) and in relation to similar ethnic and social backgrounds. Regional training of senior co-ordinators also has the advantage that it will encourage co-operation, engender an awareness of common problems and develop an understanding of how mutual assistance in disaster is likely to provide the most rapid and effective aid. Co-operation in the study of problems and in developing and training for their solution in this regional way will make the provision of funds and specialist advice both more economical and easier to arrange.

6.4.8. Besides the general study of the threat and the problems of disaster situations and of the requirements and methods of disaster preparedness the curriculum for co-ordinators would include studies of the organisation role and operating methods of the many national, international and United Nations organisations available not only to provide aid in disaster and rehabilitation but also to provide advice and assistance in precautionary planning. Other important studies relate to the information from which the scale and type of aid required can be determined. This subject embraces the collection of the relevant data, its collation and dissemination to those who require it.

6.4.9. Some information, particularly that relating to dock, airfield and railway capacities which is important in disaster relief operations may be considered to have national security implications. This requires particular examination both at national and at regional level particularly when access to an area prone to natural catastrophe may be through a neighbouring country over cross-border railways or may involve over-flying a neighbouring country to introduce aid.

6.4.10. Collection of information concerning many different types of national resource (from nurses to warehouse storage facilities) requires examination in relation to how these resources should be mobilised and organised for a disaster relief role and how they can be best controlled and co-ordinated to ensure their deployment effectively where and when they are required.

6.4.11. Persons selected for the role of senior co-ordinator are likely to be well aware of the organisation and methods of the normal administrative machine. Study is necessary to appreciate how this normal administrative organisation becomes severely overloaded in disaster situations and to determine how preparatory action and precautions can prevent it breaking down completely in these circumstances. Such precautionary measures will not only prevent failure but will help maintain its normal capacity and improve its speed of reaction. These problems are probably most effectively studied using the techniques of simulation exercises in which groups are actually faced with the sort of situations which disaster will bring and are required to make their decisions in the

time-frame and based upon the sort of information which is likely to be available in disaster situations.

6.4.12 All the studies mentioned concern techniques of management and relate particularly to the collection and collation of information and to methods of consultation, co-ordination and communication by which plans and decisions are rapidly translated into effective action. Co-ordinators nominated to senior positions within their countries will have responsibility for building up the expertise and skills within their national organisations. Training and practice ensures the fitness of these organisations for the roles which they will undertake in times of disaster. Some of this training too can probably usefully take place on a regional basis. Problems relating to immigration and health, customs and air traffic procedures for example are probably best studied on a regional basis in relation to disaster in order to ensure compatibility of national working methods and requirements. In some cases the training of particular technicians or specialists, although a national requirement, may be more economically carried out on a regional basis. Training in the use of foreign water purification equipment or mass vaccination techniques may be examples. These reasons and advantages for training senior co-ordinators on a regional basis are therefore that problems of a common nature can be examined and the necessity for and advantages of co-operation can be explored and developed.

6.4.13 Specialist Training

One of the principal responsibilities of co-ordinators in appointments at all levels will be the preparation of the plan which mobilises, co-ordinates and deploys national resources in relief work in time of disaster. A central plan will co-ordinate the activities of a number of organisations, all of which have particular responsibilities and roles and all of which are fulfilling their particular part of the central plan. Implementation of all the various elements of this central plan is ultimately dependent however upon the ability of individuals and groups of people to carry out their allotted task. This requires a full understanding of what this task is, training for the task and practice at it.

6.4.14. In order to provide the clear objectives upon which this training is based there are strong arguments for the training of national disaster relief organisations to be based upon the roles and responsibilities laid down in a national precautionary plan. For example, first aid workers and paramedicals can be trained either as individuals or as members of a group, but until they are an element of an overall plan which ensures that they go to where they are most needed and can get there, that the victims whom they treat can be evacuated to a hospital or centre ready to receive them, then the training of these first aid workers is unlikely to reach full potential. Once the national precautionary plan exists, however, all training can be based upon realistic objectives and ceases to be open-ended. Those involved will know where they

fit into the overall organisation and plan and what is required of them.

6.4.15. Specialist Training for disaster should take place 'in-country' and as far as possible within the organisation and group in which the individual will operate. Such methods will develop the team spirit upon which successful operations in difficult circumstances depend so much. It will also ensure that those involved are aware of the conditions in which they will have to operate and of the limitations of themselves, the other members of their team and the available equipment.

6.4.16. Training and exercises should be as realistic as possible. This is expensive in imagination but not necessarily in money. They should be aimed at illustrating the unusual and the need for initiative. For example, co-ordinators and their staffs and those who work as members of operational teams must develop the organisation and working methods which enable them to work for twentyfour hours a day for extended periods. All concerned must learn the importance of passing information not only down the chain of command but up it and laterally too, so those working with them in the same operation are aware of the situation in adjoining areas and have warning of developing situations. Realistic exercises, besides developing an understanding of where one's own piece fits into the pattern and how each element of the whole is dependent upon the others, also illustrate the importance of this passage of information. They also test the various parts

of the plan and reveal those parts of it which require modification and improvement. Exercises should be held at planned intervals so that new personnel can be trained as opportunities arise to remedy past errors and to test modifications and improved solutions.

6.4.17. In-country Specialist Training should also provide individual training in specialist skills such as; rescue in urban areas, para-medical and first aid training, water purification duties, air cargo handling and dropping techniques, helicopter handling, drivers, mechanics, emergency food and vaccination centres, small boat handling and a great variety of other individual skills. Much of this training can be provided on a voluntary basis through schools and universities and voluntary organisations such as the Red Cross and Red Crescent, Boy Scouts, the Churches and political organisations.

7. PLANNING PROCESSES

7.1. Contingency Planning

7.1.1. Administrative arrangements

It is proposed that, in order to reach a comprehensive understanding and assimulation of a local disaster environment there should, first of all, be a Disaster Committee established at high administrative level, possibly as part of the Prime Minister's Office, or its equivalent. The Chairman should have authority to co-ordinate government ministries who will be represented in the Committee as well as representatives of voluntary organisations etc.

7.1.1.1. Proposed Committee Membership will be by, for instance, ministries or departments for:

Public Works
Local Government
Labour
Police/Fire
Education
Health
Civil Aviation
Meteorology
Radio
Telephones
Electricity
Water
Housing
External Affairs
Information
Finance
Planning
Transport
Survey
Seismic Monitoring
Red Cross
Rescue

7.1.1.2. Within a Committee of this membership should then be set up working groups to examine the potential for each possible disaster type such as follows:

Hurricane:

Public Works
Meteorology
Health
Local Government

Earthquake:	Public Works
	Seismic Monitoring
	Local Government
Volcanic Eruption:	Public Works
	Seismic Monitoring
	Local Government
Flood:	Public Works
	Water
	Local Government
	Survey
Tsunami:	Public Works
	Local Government
	Seismic Monitoring
	Survey
Epidemic:	Health
	Police/Fire
	Local Government
Aviation Accident:	Civil Aviation
	Police/Fire
	Health
Marine:	Port Authority
	Police/Fire
	Health

Industrial Explosion: Police/Fire
Health
Local Government
Labour

7.1.1.3. Terms of reference for each working group should be to consider the possibility and probability of disaster occurrence of a particular type, to consider its area of impact, its likely effects, needs of victims and resources likely to be required to answer those needs. Steps to be taken to mitigate or prevent an occurrence of disaster should also be considered.

7.1.1.4. In reporting back by the Working Groups to the Disaster Committee the total disaster environment can be assessed and a comprehensive programme of precautionary planning, as contained in this Manual, be commenced.

7.1.2. Financial arrangements

7.1.2.1. The cost of much of the content of precautionary planning has been said to be negligible, but consideration should be given to the requirement for available money in the period of disaster itself. Whilst it can be assumed that relief aid will be available from international sources, it cannot be so readily assumed that relief aid will arrive at the right time and in the right amount. If there is a lapse of time, as is usually the case, the rehabilitation period of the disaster may become extended by its non-availability. How much better, therefore, to have money locally,

nationally (or regionally) available for immediate commitment, and by its presence, be able to determine the length of time required for the rehabilitative process following disaster.

7.1.2.2. Money in a Disaster Fund held readily available for commitment by a Disaster Committee (7.1.1.) should be regarded as an indigenous resource (7.1.3.). By its presence and immediate availability it will become the 'oil for the machinery' for the deployment of other indigenous resources. It will generate self-help and interdependence within a nation or region.

7.1.2.3. Such a Disaster Fund would facilitate the implementation of immediate reconnaissance of a disaster area for an assessment of needs, the immediate transport of medical supplies, medical teams and the injured, and the distribution of food and water supplies.

REFERENCE: LEWIS, J. 'A Report to Establish Guidelines for the Management of a Regional Fund to Provide Insurance for Natural Disaster', Disaster Research Unit/Commonwealth Secretariat, 1976.

7.1.3. Assessment of needs (6.1.5.)

7.1.3.1. Victims of disaster events may be deprived of

a. Immediate bodily needs

b. Social organisation

c. Physical infrastructure

7.1.3.2. Items which, it can be expected, will be required urgently under these three headings and which will, therefore, require

contingency provision, are as follows:

a. Immediate bodily needs

Drinking water

Emergency food supplies

First aid

Blood transfusion

Blankets and clothing

Fire fighting facilities

b. Social organisation

Emergency shelter

Sanitation

Emergency hospitals and medical treatment

Provision of cooked food (NB utensils)

Street clearing

c. Physical infrastructure

Permanent housing

Power supplies

Fuel supplies of

public transport

Radio and telephone services

Air fields and landing strips

Dock and wharf facilities

Fire Services

Ambulance services

Freight transport, boats, earth-moving equipment, planes, helicopters

7.1.4. Indigenous resource co-ordination

7.1.4.1. Having identified the activities of contingency planning, grouped them and clarified corresponding roles, the process of plan formulation can be commenced.

7.1.4.2. One particular group of activities belongs to the process of what has been called 'identification of indigenous resources'. A major contributor to dealing with disaster situations will be the resources of the area. These resources will be ineffective if not co-ordinated. Precautionary planning must therefore take account of the need to integrate and co-ordinate indigenous services, materials and manpower - the indigenous resources - if emergency rescue work and relief is not to be carried out piecemeal. This activity will be made more difficult by the possible breakdown of communications, especially within an island group, for instance. The pre-planning of indigenous resources is seen as a first step towards comprehensive pre-planning and as a major step towards the provision of immediately available relief after a disaster occurrence.

7.1.4.3. This stage of pre-planning is based on the premise that in any situation there are resources which are a product of either the government administration or civil and domestic activity which for want of co-ordination and pre-planning will form the source of immediate relief requirements. It is seen as unlikely that all these functions in a given area will be totally wiped out by the disaster event and that the

first step is to determine and record what has gone and what remains. The basis of the recording is to be done on maps and examples of such resources or 'strategic elements' will be as follows, categorised under their respective 'level' of co-ordination:

a. Government:
- Police Stations
- Fire Stations
- Ambulance Stations
- Harbour facilities
- Airports
- Construction plant and materials
- Fuel tanks
- Utility supply stations: electricity, water
- Radio telephone stations
- Clinics and hospitals
- Boundaries of Commissioners postings
- Settlements
- Designated hurricane shelters
- Foreign government facilities (where these can be of any practical assistance)

b. Non-Government:
- Commercial vehicle owners
- Construction plan and materials
- Fuel tanks
- Drug stores, supermarkets and food-stores
- Voluntary agencies headquarters and leaders

7.1.4.4. These can either be labelled or symbolled on the map with an accompanying dossier of key personnel with job description, home and office addresses and telephone numbers and the alert system to be followed. The dossier will also contain an alphabetical cross-referenced index of all possible headings for speed of reference to, for example, aircraft, beds, blankets, boats, first aid equipment, tents, walkie-talkies, water purification and similar sub-headings not possible to be shown in graphic form. Under each section, as appropriate, will be information on quantities and types of equipment, manpower etc. An important aspect of this support information will be the whereabouts of available expertise if they are not part of a voluntary organisation plan.

7.1.4.5. As this first step is so significant, the method of preplanning in this aspect is all important. The purpose is to enable a nation, a region or a community to quickly assess what has happened to what and to where and to compare overall relief requirements with what is readily available. It is recommended that as much information as possible should be shown in graphic form using maps and symbols with the simplest legend. In a disaster emergency, time spent making reference to a bulky and lengthy document can be saved by quick reference to a plan on the wall of an operations room to plot onto it the geographical extent and location and the effects of disaster, essential services rendered inoperative and the whereabouts and nature of those required to assist relief operations. If kept constantly up-to-date as reports are received, this graphic portrayal will give a rapid and total picture of the situation.

7.1.4.6. As has been previously discussed in both governmental and non-governmental contexts, pre-planning must first of all be on a national basis but, in addition, regional plans are recommended. This regional grouping should be explored alongside any proposals there may be for economic development grouping. The government national plan must include means of communication with neighbouring nations, the Resident Representative for the United Nations Development Programme (for liaison with the United Nations Disaster Relief Office, Geneva) and Embassies of principal donor governments. Each government regional plan must include means of communication with central government and other regional disaster co-ordinators.

REFERENCE: LEWIS, J. 'Proposals for a Working Method of Indigenous Resource Co-ordination as Part of a Predisaster Plan', Occasional Paper No. 3, Disaster Research Unit, University of Bradford, 1975.

7.1.5. Emergency shelter

An element of contingency planning will be to take steps to assess the likelihood for emergency shelter for families displaced by the collapse or disintegration of their dwellings. Areas where this is likely to occur and to what extent, can be assessed, and an estimation made of emergency shelter needs.

7.1.5.1. Some policy decisions will be necessary with regard to the type of temporary shelter required, whether these should in fact be temporary or whether with the forethought at this

stage they could be permanent if siting, layout, utilities and suitable building types could be identified and pre-planned as part of contingency planning.

REFERENCE: DAVIS, I. 'Guatamala: Shelter and Housing Policy' 1976.

INTERTECT. 'Relief Operations Guidebook' Section 3, Housing.

7.2. Physical Precautions

7.2.1. Infrastructure for preparedness

An aspect of Physical Precautions must next be considered, that of an infrastructure for preparedness. Precautionary planning begins with the situation 'as found'. What is the disaster vulnerability, what are existing resources of administration and materials and manpower that may be deployed in a programme of precautionary planning? Are any being deployed in current plans? Are any which are to be found not being taken full advantage of in current pre-planning? It would be impractical to make extravagant recommendations for the improvement of facilities and services without making an assessment of the situation without them. These assessments will produce a knowledge of an infrastructure for preparedness, much of the content of which will be commensurate or compatible with the level of development to be found generally, and which will produce a base level of competence. But some requirements may be found to be inadequate or not to be present at all; the level of competence may not be evenly laid. It may be therefore, where this situation is the case, that in assessing priorities for a range of

physical precautions the aim of an even plateau of competence may result in a more efficient infrastructure for preparedness and therefore more efficient pre-planning and more efficient execution in the disaster event.

7.2.2. For example, it may be found or considered when the total and comprehensive structure of a precautionary planning programme is assembled, that ambulance facilities are inadequate or transport facilities for international relief supplies by air, by rail or by road may be inadequate for the anticipated influx of relief supplies; either because of a scarcity of vehicles or because of an inadequacy of landing strips, track or road systems. The capacity of hospitals and clinics to deal with sudden large numbers of casualties must be examined and the provision, enlargement or improvement of accident bays provided for if found to be necessary. Provisions for the storage of blood supplies and facilities for the storage of bodies must also be taken into account.

7.2.3. These are examples of physical precautions which relate immediately to demands on a programme of development. It may be that an assessment of priorities for such a programme based on precautionary planning for disaster is an appropriate way of establishing these priorities, but it must be stressed that much can be done by the implementation of relatively inexpensive measures to immediately improve the efficacy of precautions and to commence a programme for a precautionary planning infrastructure.

7.2.4. Land use zoning and building construction

Having defined areas of disaster possibility (Section 5) and given some attention to an assessment of probability in cartographic form, it is a logical step then, as a first precaution, to guide development away from the areas of highest vulnerability.

7.2.5. It is recognised that there will be other reasons why development should take place in a particular location and it may be only possible to establish degrees of avoidance according to degrees of vulnerability. In any case there will be other precautions which may compensate.

7.2.6. However, if zoning procedures can be established to take account of disaster vulnerability, then it may be possible to integrate and to similarly categorise precautions in building construction.

7.2.7. At present, where building codes exist, they are not usually graded in terms of construction according to siting of a building. But if siting can be modified according to natural forces to be expected in a disaster event then the degree of constructed 'proofness' can be correspondingly modified.

7.2.8. Another area for attention is the design stage for buildings, where the form of a building may be modified according to disaster vulnerability.

7.2.9. A crucial aspect for attention is the ability of administration to ensure adequate application of building codes.

7.2.10. Attention in building activity must be given not only to major building programmes which may automatically be subjected to scrutiny within procedures for the application of building codes; but also to 'self built' dwellings and those which are the product of local builders in which the majority of a suburban or rural population may live. The availability of standard construction drawings for typical dwellings in typical materials will go a considerable way towards the improvement of building standards where a weighty and (to the layman) often incomprehensible document would not.

7.2.11. Civil engineering projects can similarly be modified according to an assessment of vulnerability, e.g. seismicity, or designed in accordance with an established 'return period'. The danger with the latter course, for instance in flood plain control techniques, is that when a higher flood than the highest designed for does occur, development will have taken place in areas protected from smaller floods by the control system. Losses will be far higher in these events than if no protection project had been initiated.

REFERENCE: BUILDING RESEARCH ESTABLISHMENT, 'Model Byelaws for Earthquake and Hurricane' and 'Overseas Building Notes'.

INTERTECT, 'Relief Operations Guidebook' Section 3, 'Housing'.

7.3. Social Precautions

7.3.1. Warnings and associated advice

The dissemination of a warning and associated advice about what action to take by way of response to the threat of disaster is a principal form of precaution.

7.3.2. Warning systems are possible more for some types of disaster event than for others. Warnings are not merely technical communications but rely on appropriate methods of dissemination 'on the ground' without which the technology is useless.

7.3.3. Having defined vulnerability to specific disaster events (Section 5), there must then be an assessment of warning methods which are available (i.e. not only those which are technically feasible).

What is their source?

How are they transmitted?

How are they received at a central point?

If warnings exist from certain sources (e.g. satellites) but for technical reasons they cannot be received, a subsequent assessment will be required:

How can warnings be received at a central point?

What technical facilities are required?

What part of government administration will be responsible for its maintenance and operation?

7.3.4. Having established methods for receipt of warnings at a central point the next step will be to consider aspects of dissemination; by radio, by television, by word of mouth etc.

7.3.5. The form that warnings take must then be considered for each disaster type for which warnings are available. It will be necessary to study warnings given in comparable situations in other countries and it will be important to achieve compatibility with neighbouring regions and countries.

7.3.6. With each warning and stage of warnings it will be necessary to give associated advice in order for people who receive warnings to know what to do and in order to achieve a desired response. It will be important in this respect to consider all 'lifestyles', developed and sophisticated, to subsistence and primitive, and to take into account a range of attitudes towards the natural phenomena producing the disaster event. These aspects will relate to studies of history and social origins (Section 4).

7.3.7. Simplified hurricane warning procedures and associated advice, both based on USA practice follows:
Phase 1 is 'Hurricane Alert' when hurricane conditions could be experienced within 60 hours and gives the position of the storm, its intensity and predicted movement. Phase 2 is 'Hurricane Watch' when hurricane conditions could be experienced within 36 hours with an indication of which areas are likely to be affected. Phase 3 is 'Hurricane Warning' when hurricane conditions are likely in a particular location within 24 hours. Phase 4, the 'all clear', is when hurricane conditions have passed. 'Hurricane conditions' are defined as winds of more than 63 knots or 74 mph and/or surge of the sea or exceptionally high waves. Each of these statement

phases is accompanied by advice on what precautions to take.

7.3.8. At the commencement of each hurrican season 'early in June' (to be defined according to location and where reference to a 'season' is not regarded as dangerously exclusive) each householder is advised to:

a. Check the house, secure loose shingles or tiles.
Repair window shutters as necessary.
Keep a supply of boards for boarding up unshuttered windows.

b. Check the surrounds: trim or remove dead or dying trees.
Anchor removable objects such as trash cans and lumber.
Remove any debris.

c. Keep on hand flashlights and spare batteries, candles, matches, a battery operated radio, a reserve supply of food especially of the kind which can be eaten without being cooked or with very little preparation and which does not require refrigeration, and containers for drinking water.

d. Keep the petrol tank of your car reasonably full. Do not wait until it is empty before refilling.

7.3.9. When the first Hurricane Statement is issued, each person is advised to:

a. Check the 'seasonal precautions' listed above.

b. If you will be away from your house, turn off the main electricity switch and cut off any gas supply.

In the area indicated as being likely to be affected by hurricane conditions each person is advised to:

a. Fix hurricane shutters to upper floor of multi-floored buildings and ensure that shutters for ground floor windows are immediately available. When you board up, use good lumber securely fastened, makeshift boarding may cause more damage.

b. Move boats to a safe harbour.

c. See that garbage cans, garden furniture, lumber etc. are well secured.

d. Take down TV and radio antennae.

e. Clean and fill bath tubs and spare containers with drinking water.

f. Check that you have adequate food supplies.

g. Listen for future hurricane Statements and follow any advice given on them.

7.3.10. When a 'Hurricane Warning' is issued each person is further advised to:

a. Check that all precautions mentioned above have been taken.

b. Fix hurricane shutters to all remaining windows;

not to delay this, as high winds may make it impossible later. Have strong bracing for outward doors.

c. Listen for all hurricane warnings and follow any advice on them. These will advise whether to abandon low lying areas and seek refuge in shelters, or advise whether to stay in your house.

d. People going to shelters should take food, water and a blanket with them.

e. Do not listen to rumours. Rely on the advice in the hurricane warnings or from responsible public officials.

f. Keep calm. Your ability to meet emergencies will help others.

7.3.11. For Phase 4, after the passing of hurricane conditions all persons are advised to:

a. Remain in shelter until advised by broadcast statements or responsible officials to go out.

b. Seek medical care at a Red Cross First Aid Post or similar Medical Centre for any person injured in the storm.

c. Avoid loose or dangling wires, and report them to the electricity company.

d. Report broken water mains to the water authority.

e. Check the food in your refrigerator. It may be spoiled if the power has been cut for some time.

f. Stay away from disaster areas unless you are particularly qualified to render assistance.

g. Do not drive unless you must; roads should be kept clear for emergency vehicles. Drive anyway with great care; there is likely to be debris on the roads and probably washaways.

h. Take down your shutters and save any lumber for the future.

i. There is a risk that water would be contaminated; so it should be boiled.

7.3.12. Precautions perhaps more appropriate to United States society are those concerning protection for the automobile and how to drive with care after the hurricane has passed, the sterilization of emergency water containers and what to do with refrigerators and swimming pools. But it should be remembered that there may be (perhaps relatively small in number) communities and households where 'lifestyle' is essentially that generally associated with the United States and other developed countries and that these communities have to take precautions appropriate to them. It is not sufficient to assume that because they are more sophisticated they have technological advantages which will protect them without the need for taking additional precautions. The very reliance on technology - refrigerators for instance - can and does create,

due to breakdown or power failure, a fragility comparable only to that of simple communities.

7.3.13. There are some aspects of advice concerning hurricane warning which are especially important:

> If the centre or 'eye' of the storm passes directly over, there will be a lull in the wind lasting from a few minutes to half an hour or more. Stay in a safe place. Make emergency repairs during the lull if necessary, but remember the wind may return suddenly from the opposite direction, frequently with even greater violence.

In particular, advice to keep one window or door <u>open</u> in the side of the building <u>away</u> from the approaching wind, and if the eye of the hurricane passes the area, to remember to close it when the wind recommences from the opposite direction and to open one on the other side. This is a device to reduce the pressure differential created by suction of air out of the building by storm conditions outside. If the pressure is significantly decreased the building is more likely to collapse inwards due to the force of external wind and in the event of a sudden window breakage to cause a relatively 'explosive' equalisation of pressure which can cause considerable damage itself. In high buildings this is particularly important, there having been experience in some parts of the world of the contents of apartments being sucked out of broken windows. It is because of this possibility of pressure differential that timber buildings have an inherent

advantage over masonry, having more appertures in construction and less likely to be unventilated as a result. (The principal disadvantage of timber buildings is their comparative lightness and ease by which smaller ones can be blown or floated off their foundations. Attention must be paid in construction to fixing down to concrete pads.)

7.3.14. Again concerning hurricane, it is essential to remember that tidal surge usually accompanies the strong winds and is a particularly dangerous aspect of hurricanes (although one which is often forgotten). Appropriate advice in this respect might be:

> If your house is up out of the danger of high tide, and is well built and securely anchored on the foundations with a good roof also securely fastened, then it is probably the best place to weather out the storm. However, it is imperative that all persons should evacuate from islands, beaches, and other locations which may be swept by high tides or storm waves. Evacuate to a previously recommended place of refuge. Remember that the highest tide occurs during the second half of the storm and that the rise of water may take place very rapidly immediately following the eye of the storm or the time of the lowest barometer. If your only passage to high ground is over a road subject to inundation, leave early, don't run the risk of being marooned or have to evacuate at the height of the storm amidst flying debris.

7.3.15. Other items to be included in advice associated with warnings for hurricane are:

To lighten heavy foliage from trees and to remove coconuts from palms near buildings.

Not to consume too much alcohol at 'hurricane parties'. A clear head is essential in emergencies.

The stages of warning at which public services will be or are likely to be interrupted.

After the hurricane has passed, to stay away from damaged areas and to desist from sightseeing.

7.3.16. By comparison with warning procedures based on USA practice, the following is taken from typhoon warnings and associated advice distributed in Hong Kong:

SIGNAL	MEANING OF THE SIGNAL	WHAT WILL HAPPEN AND WHAT YOU SHOULD DO
1 Standby	A tropical cyclone is centred within about 400 nautical miles of Hong Kong. The Colony is placed in a state of alert because the tropical cyclone is a potential threat and may cause destructive winds later.	Listen to broadcasts for the latest developments in the weather situation and advice concerning precautions.
3 Strong wind	Strong wind expected, with a sustained speed of 22-33 knots and gusts which may exceed 60 knots. The timing of the hoisting of this signal is aimed to give about 12 hours warning of a strong wind in Victoria Harbour.	Secure hoardings, scaffolding, temporary structures and all loose objects, particularly on balconies and roof tops. Clear gutters and drains. Take full precautions for the safety of boats. Ships in port normally leave for typhoon anchorages or buoys. When the wind becomes strong it may affect some ferry services, particularly if the piers are exposed to the wind.
8 NW'ly gale or storm 8 SW'ly gale or storm 8 NE'ly gale or storm 8 SE'ly gale or storm	Gale or storm expected, with a sustained wind speed of 34-63 knots from the quarter indicated and gusts which may exceed 100 knots. The timing of the replacement of the Strong Wind Signal, No. 3, by the appropriate one of these four signals is aimed to give about 12 hours warning of a gale in Victoria Harbour. Expected changes in the direction of the wind will be indicated by corresponding changes of these signals.	Full precautions must be completed as soon as possible. It is extremely dangerous to delay precautions until the hoisting of No. 9 or No. 10 signal as the latter are signals of great urgency. Windows and doors should be bolted and shuttered. As the winds increase, stay indoors to avoid flying debris but if you must go out keep well clear of overhead wires and hoardings. All schools and law courts close and ferries will probably stop running at short notice.

/cont...

SIGNAL	MEANING OF THE SIGNAL	WHAT WILL HAPPEN AND WHAT YOU SHOULD DO
9 Increasing gale or storm	Gale or storm expected to increase significantly in strength. This signal will be hoisted when the sustained wind speed is expected to increase and come within the range 48-63 knots during the next few hours.	These signals imply that the centre of a severe tropical storm or a typhoon will come close to the Colony. If the eye passes over there will be a lull lasting from a few minutes to some hours but be prepared for a sudden resumption of destructive winds from a different direction. The tide will probably be higher than normal particularly in narrow inlets. If this happens near the time of normal high tide then low lying areas may have to be evacuated very quickly. Heavy rain may cause flooding, dangerous rockfalls and mudslides.
10 Hurricane	Hurricane force wind expected, with sustained speed reaching upwards from 64 knots and with gusts that may exceed 120 knots. This signal is hoisted as soon as there are definite indications that the sustained wind speed anywhere near sea level in Hong Kong is likely to exceed 63 knots.	

7.4. Evacuation

7.4.1. Evacuation does not necessarily involve the removal of entire communities. The term may equally apply to the moving of isolated households or individuals who reside in particularly vulnerable situations or who are too old, infirm or incapacitated to look after themselves.

7.4.2. The identification of those liable to be in need of evacuation assistance is contained as inclusion in contingency planning (Section 6) and the recognition by inhabitants themselves that they are liable to require evacuation is part of public familiarisation.

7.4.3. Evacuation logistics will become a part of contingency planning and require consideration of availability and designation of personnel and vehicles.

7.4.4. Evacuation will be either to neighbours or to public communal shelters. The designation of public shelters will also be a matter for contingency planning (Section 6) and dissemination of information regarding the location of public shelters is part of public familiarisation (following).

7.4.5. Similarly, the designation of buildings, particularly in urban situations, which occupants will be obliged to evacuate due to structural weakness, will also be a matter for contingency planning.

7.4.6. Where buildings normally used for other 'everyday' purposes such as schools, are designated as public shelters, considerable care should be given to their choice based on their capacity to:

a. Withstand the disaster event due to superior construction or elevation etc.

b. Provide sanitary facilities for a greatly increased, if temporary, capacity.

c. Be in the charge of personnel who will be immediately available before, during and after a disaster event, and who are familiar with security and utility arrangements.

7.4.7. Preferably, new buildings for other 'everyday' purposes should be designed and constructed having in mind their occasional possible use as public shelters.

7.5. Public Familiarisation

7.5.1. The successful implementation of the provisions of precautionary planning will, in the event, depend upon public awareness of the risks and the precautions. This awareness will depend upon how well the public have been informed by information sources initiated by government.

7.5.2. The 'captive audience' of children in school is an obvious point at which to apply an education programme concerning the origin and nature of likely disaster events, likely results of a disaster strike and precautions which can be taken by

the individual and an account of what is being done by government.

7.5.3. The post-school population, the public at large, will require an information programme which will include origins, nature, history, behaviour and effect of possible disaster events and details of precautions to be taken by individuals, organisations and government.

7.5.4. This information can be disseminated in a variety of ways:

Films

Public lectures

Newspaper articles

Booklets

Hurricane tracking maps

Leaflets distributed free of charge

Posters

Information booths.

Publications which may normally be available such as telephone directories, tourist information, street maps and handbooks may be augmented with information on disaster events and response.

7.5.5. Many foregoing sections will contain aspects for public information programmes. Obviously warnings and associated advice (7.3.1.) and evacuation (7.4.).

7.6. Insurance

7.6.1. There is a need to develop a comprehensive disaster insurance

programme directly linked to measures for the reduction of loss. Disaster insurance has the potential for creating a high degree of disaster mitigation if it is linked to strong and enforcible mitigating features by establishing:

a. rate structures to accurately reflect local hazards

b. stringent eligibility requirement.

7.6.2. The premium calculation which follows goes some way towards fulfilling the first condition. The second condition is a matter for policy decision by government and commercial insurance bodies. If eligibility is considered not only as an outright qualification for insurance but also by degrees of inherent precaution related to reduced premiums then the risk that insurance will become the passport to rash actions on the part of property owners will be reduced or totally removed.

7.6.3. The problem for insurance is to determine the premium for a selected natural hazard when the lack or inadequacy of data results in an insufficient knowledge of risk. It is necessary to know the return period of the natural hazard and the loss expected from each disaster event that ensues.

7.6.4. <u>Model</u>

Suppose a building were to be insured against a hazard of intensity 'I'5 recurs every 100 years. Damage to a building due to one of these hazards of intensity 'I'5 is roughly estimated at £200,000.

7.6.5. Calculation

The annual premium (P) required to cover this risk - apart from loadings for inflation, profit etc. can be calculated as follows:

$$P = \frac{£200,000}{100} = £2,000 \text{ per annum}$$

This figure corresponds to the average loss expected per year; it is calculated on the basis of the two important variables outlined earlier. This figure is the average loss expected each year. Expressed as a formula it reads:

$$P = \left(\frac{LE}{RP}\right)_{'I'5} \qquad (a)$$

Where P = average loss expected per year

LE = loss expected from hazard of intensity 'I'

RP = return period in years.

7.6.6. Estimation of loss as a percentage of sum insured

It is possible to express the loss from the hazard, not in monetary terms (LE) but as a percentage of the sum insured (V), when written 1e, and also express the premium rate in per mille p, of the sum insured instead of the premium, P, in pound sterling.

Thus $$1e = \frac{LE}{V} \cdot 100 \qquad (b)$$

and $$P = \frac{P}{V} \cdot 100 \qquad (c)$$

Substituting equations (b) and (c) into (a), equation (a) now reads:

$$P = \left(\frac{1e}{RP}\right)_{'I'5} \cdot 10 \qquad (d)$$

7.6.7. The implications of the premium calculation

'P' is the annual premium rate per mille without loadings for inflation and profit for a building that is exposed once in the course of RP years to a natural hazard of intensity 'I'5 through which it suffers a loss of 'le'% of its new replacement value. This, however, implies a rather static situation. Normally there will not only be a hazard of intensity 'I'5 but also hazards of higher or lower intensity. In this model a range on intensity is accepted from 'I'I ... 'I'10. Equation (d) must now be rewritten to include this range. Thus

$$P = 10 \cdot \sum_{1='I'1}^{1='I'10} \left(\frac{le}{RP}\right) i \qquad (e)$$

7.6.8. The implications of the revised premium calculation

Equation (e) represents the average annual loss expected from natural hazards of varying intensity and would correspond to the risk premium. The basic calculations in the equation, i.e. the return period and the loss expected, are not definite.

7.6.9. Inclusion of uncertainty in revised premium calculation

Measurements necessary for the computation of return periods are not available before the start of this century; statistical material is relatively scarce. Therefore, the accuracy of the return periods ascertained empirically is limited because accurate probability of risk is unknown.

Similar remarks can be applied to losses expected in the event of hazard.

Such a situation means that the element of uncertainty must be included in the calculation. This uncertainty loading should be proportional to the possible deviation of the actual hazard losses from the expected value of losses. This uncertainty loading is indirectly dependent on fluctuations in both the return period and the loss expected.

7.6.10. Calculating uncertainty in revised premium calculation

From a mathematical viewpoint there are two concepts that can be applied in making loadings for fluctuations, namely:

a. The Standard Deviation

b. The Variance

If estimate of annual loss expected is very uncertain, the first, the standard deviation, should be used. Including both parameters mentioned the formula now reads:

$$P = 10. \sum_{i='I'1}^{i='I'10} \left(\frac{le}{RP}\right)_i + \alpha_1 \sigma + \alpha_2 \sigma^2 \qquad (f)$$

Where σ = standard deviation of hazards losses (in $^{o}/_{oo}$ of sum insured.)

α_1 α_2 = approximately ranging from 0.1 - 0.5.

Given the lack of data available it is suggested that the return period and loss expected be overestimated.

7.6.11. Revised Premium Calculation: An Example

The object to be rated, a large government office, lies in a region exposed to hurricanes which register up to 'I'6 on the

model range of intensity. The different return periods and losses to be expected respective to the various intensities of the hurricane hazard (including uncertainty loadings) are as follows:

I	le%	RP (years)
1	0	-
2	0	-
3	0	-
4	0.5	5
5	1	10
6	4	50

With the given values, the revised premium calculation is:

$$P = 10\left(\frac{0.5}{5} + \frac{1}{10} + \frac{4}{10}\right) = 2.8^{o}/oo$$

7.6.12. Other costs

The cost of commission, administration and required profit are not included in this calculation.

7.6.13. Notwithstanding the foregoing calculations of premium it is evident that certain principles are at stake in attempts to relate commercial insurance methods to the effects of natural disaster in developing countries. A summary of the reasons for this situation is as follows.

a. Most insurance policies and therefore the major activities of the industry are in covering anticipated losses to specific properties where loss will be confined essentially to individual events such as fire, motor vehicle

accident or accidental injury or death.

b. Natural disaster insurance differs from fire insurance in that a large volume of damage to many properties results all at once from severe events affecting a whole region. This is known in the industry as 'catastrophe potential'.

c. For fire, catastrophe potential is of lesser significance than the average annual loss which can now be simply based on previous events within each year. This annual average is incorporated into calculations to determine premiums.

d. Natural Disaster Insurance premiums have to be determined, on the other hand, on the basis of losses over a much longer period of time, say twenty-five years or longer, for each type of event - flood, tropical cyclone, earthquake, etc. and the catastrophe potential is the dominant concern, while average annual loss is much less significant.

e. Clearly an insurance or reinsurance company will find it easier to bear smaller expected annual losses than erratic major catastrophe losses. In fact, it appears that the insurance industry incorporates certain restrictive devices to protect itself against catastrophe losses. These protective devices are logical in an industry with prime responsibilities to its premium holders and share holders. They are:

i. To insure against natural disaster events only as an extension of fire insurance policies. In many

cases some forms of natural disaster event are classed as 'acts of God' and not eligible for insurance cover at all.

ii. To restrict the number of policies containing natural disaster cover to within a maximum for any particular region, community or neighbourhood.

iii. To restrict natural disaster cover to certain types of construction and to less susceptible locations. This might be modified within properties covered, according to methods of construction and whether or not building codes have been applied, and the premium scale adjusted accordingly.

f. Sophisticated methods of insurance assessment for natural disaster are hampered by the lack of reliable data on past disaster events upon which the average return period of future events and scale of losses may be determined.

g. Some attempt has been made in recent years by the insurance industry to meet the demand for cover for natural disaster events in a few major developed countries. In each case, in order that risks and premiums may be kept to within acceptable limits the governments of the country in question underwrites losses over a certain figure and/or natural disaster insurance is financed by a levy on other (e.g. fire) insurance policies. Not all the schemes are operating with total success.

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7.6.14. Insurance methods at present are designed essentially for developed countries where there is already a widespread activity in insurance for fire risks, and where property form and construction qualifies for insurance cover against natural disaster events. In countries where there is some insurance activity, but where that activity is not widespread and covers only a small proportion of property owners, there would immediately be the question when proposals for a levy were introduced of why those who are insured and who do already pay a premium should in effect subsidise those who are not insured and do not pay premiums, or more particularly, those who are not eligible for insurance cover and who are therefore excluded from the payment of a premium. Wider provision should be made by the insurance industry to cover this latter category.

REFERENCE: LEWIS, J. 'A Report to Establish Guidelines for the Management of a Regional Fund to Provide Insurance for Natural Disaster'. Disaster Research Unit/Commonwealth Secretariat, 1976.

8. ECONOMICS OF PRECAUTIONARY PLANNING

8.1. The relationship between the cost of precautions against natural disaster and consequent reductions in losses is an area of continuing research.

8.2. The work of the Unit has shown so far that:

a. The environment into which natural phenomena occur to produce disaster events is in many cases one which exacerbates proneness to disaster losses.

b. Until that environment changes through enlightened development processes increasing proneness to losses due to natural disaster are assured.

c. Within this context considerable reductions in losses will be relatively easy to achieve by establishing precautions.

d. Most precautions are simple and do not involve great expenditure.

e. Many precautions exist in one form or another but merely require co-ordination for greater effectiveness - an activity that involves little expenditure or is difficult to quantify.

f. On the other hand, losses from natural disaster events are difficult to assess in any totality of primary and secondary effect.

8.3. The similar relationship between probability of disaster events and losses therefrom and the need for precautionary planning is equally diffuse, but subject to continuing research. If past losses are difficult to assess, even where probability of future disasters is achieved, future losses from these events cannot be simply determined with any accuracy.

8.4. Estimates of losses from continued disaster events have shown that in poorer developing countries when expressed in terms of losses per capita these are greater than the GNP and 'development' is negative (UNDRO 1973).

8.5. At this stage it is clearly worthwhile on a commonsense basis to establish precautions in an attempt to reduce losses and clearly of greater priority to define precautions and ways for their implementation than to prolong debate about their effectiveness. This will follow.

8.6. Meanwhile, the following framework for an economic appraisal of the cost of a disaster event that has occurred is outlined below, with the premise that the crucial element of disaster events is the proneness of communities at the time of the disaster strike. It is therefore necessary, before any attempt to assess the effect of disaster strikes, to have knowledge of the social and economic conditions prevailing immediately before the disaster event occurred.

1. Discussions of the natural phenomenon

1.1. The strike of a hurricane, earthquake etc.

2. An analysis of population

2.1. Social and economic conditions.

2.2. A study in particular of that part of population directly affected by the disaster event.

2.3. An estimation of life loss, injuries suffered and numbers displaced.

2.4. An estimation of the cost of relief aid required for the replacement of immediate bodily needs of warmth, food and shelter.

3. An analysis of the agriculture sector

3.1. Subsistence/commercial agriculture

3.2. Factors affecting production of agriculture in the disaster area.

3.3. Principle damage to crops and livestock - commercial and subsistence.

3.4. Estimated volume and value of product losses.

4. An analysis of the Industrial sector

4.1. Direct material damage.

4.2. Damage to fixed assets and stocks.

4.3. Estimated volume and value of product losses.

5. An estimation of damage to infrastructure

5.1. Road transport: roads, bridges and motor vehicles.

5.2. Railway transport: railways, bridges and rolling stock.

5.3. Ports and Boats

5.4. Airports

5.5. Electricity

5.6. Telecommunications

5.7. Water supply and sewage disposal

6. Building

6.1. Housing

6.2. Public building

6.3. Commercial building

7. An analysis of the tertiary sector, e.g. Tourism

7.1. Direct material damage

7.2. An assessment of direct and indirect losses.

8. Summary

An overall costing of total damage

N.B. It is important that, for each item outlined, the replacement value be divided between public and private contri-

butions and that total replacement value is expressed as a percentage of the total value of the services at current prices.

To estimate the effect of a disaster event it is important to look at the economy in more general terms:

1. Background to any recent development in the economy.
2. An analysis of total supply and demand over time at constant prices.
3. An outline for gross domestic product by economic sector before and after the natural hazard.
4. An estimate of the effect on balance of payments before and after the natural hazard.
5. An outline of the central government financial accounts before and after the natural hazard.
6. The origin and use of private sector liquidity before and after the disaster.
7. A preliminary estimate of expenditures for social rehabilitation and physical reconstruction.
8. A general index of consumer prices for food, housing, clothing, health care and personal requisites.
9. Output targets for final crops by product and by region affected by the natural hazard.
10. Output targets for industrial production by product and by region affected by the natural hazard.
11. The status of foreign loans made to the central government before the disaster struck.

This framework will differ in emphasis depending upon the economy to which it is applied.

A third and concluding step after the assessment of losses and of the effect of these losses on the economy will be to examine the National Development Plan and UNDP country programme for instance as appropriate towards determining the following:

1. Which sector of society suffered most.
2. Which sector of infrastructure suffered most.
3. Reasons for the results of 1 and 2 above.
4. How development planning may have exacerbated these results.
5. What amendments are required to development plans to avoid similar exacerbations or to achieve reductions in losses in future disaster events.

8.7. As an alternative basis for an assessment of the relationship between the elements of precautionary planning and probable loss the following provide an example:

In an urban area of one square mile it was estimated that a total loss of buildings alone would be $50 million, but that a more realistic estimate would be a 25 per cent loss at $12½ million or a 10 per cent loss at $5 million, the least of which represented more than one per cent of the 1971 GNP.

It must be emphasised that the estimates of damage are for real estate property only with an impact of total destruction. Much of this central business district would be covered by insurance so the loss is not ultimately borne by individuals. However, these figures do not include vehicles, goods in buildings, crops, loss of trade and loss of business and

similarly, no attempt has been made to estimate the loss of life nor the economic effect of that loss of life.

Against this semi-hypothetical estimate were set the estimated losses from actual disaster events in comparable situations and time periods where total losses were:

1970	Bangladesh:	$86.40 million
1972	Gilbert and Ellice Islands	: $22½ million
1974	Nicaragua:	$154.00 million

8.8. Estimates of loss of this kind do not of course depend only on the occurrence of a single major event, the probability of which is much less than a number of smaller disaster events with an equal total loss.

If losses of the magnitude described from one event are set against probability for any one year or ten year period (for instance) for an event of this order then probable future losses can be estimated.

REFERENCE: BAIRD, A. et al 'Towards an Explanation and Reducti of Disaster Proneness' Occasional Paper No. 11, Disaster Research Unit, University of Bradford, 1975.

9. ADVICE AND ASSISTANCE

9.1. There are a number of national, international and United Nations agencies available to provide advice and assistance to government and national bodies in the formulation of pre cautionary plans and training. Of these the following are probably the most significant and capable either of acting directly or as an agent in providing the advice or assistance requested.

Commonwealth Secretariat, London.

Disaster Unit, Ministry of Overseas Development, London.

League of Red Cross Societies, Geneva.

Office of the UN Disaster Relief Co-ordinator (UNDRO), Geneva.

UN Development Programme, Resident Representative.

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