

UNIVERSITY OF BRADFORD  
DISASTER RESEARCH UNIT

TOWARDS AN EXPLANATION AND  
REDUCTION OF DISASTER PRONENESS

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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. Unit members are:

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This series of Occasional Papers will contain the results of the Unit's work. An index of the Occasional Papers is included on the inside back cover.

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## FOREWORD

The motive for the formation of the Disaster Research Unit was recognition of the need for predisaster planning in developing countries. One of the first things that had to be done, which in itself has taken some considerable time, was to define predisaster planning and specify the activities it comprised. This process has enlarged, broadened and made more comprehensive than before the approach to the predisaster planning process and placed many activities into the context of predisaster planning that had before been isolated and uncoordinated activity.

This paper goes further. It has exploded the context in which disasters occur to such a degree that the very processes of predisaster planning have become suspect or, in the least, self-defeating if the context for disaster occurrence which the paper analyses, is not recognised. With clear recognition a comprehensive programme of predisaster planning could conceivably become the catalyst for changes to the disaster context which would render current exacerbating procedures inoperative. Resulting reduction in losses of property, production and life would be maximum and be the product of a total comprehensive and encompassing strategy against natural disaster events. The alternative is for the processes within predisaster planning to be applied piecemeal or without recognition of the context within which disasters occur. In this case the effectiveness of predisaster planning will be severely reduced to that seen within the short term of recovery after each event. It will remain comparatively simple to reduce losses and to save lives each time a disaster occurs because it is assured that the probable magnitude of losses is on the increase. What this paper sets out to do is to demonstrate how the probable magnitude for events in the future can be reduced. If that

could be achieved, savings from the application of piecemeal predisaster planning will become increasingly difficult to achieve, and that will be a signal of success.

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TOWARDS AN EXPLANATION AND  
REDUCTION OF DISASTER PRONENESS



DEFINITIONS OF DISASTER

A hurricane in Honduras, an earthquake in Pakistan; the messages of death and disease, disruption and destruction speed around the world; plaintive demands for relief, rehabilitation and reconstruction; frenzied fund raising, a gesture of concern; normality seems to be restored but disaster continues; a drought in Honduras, a flood in Pakistan ... are these disastrous events really Acts of God? An Act of God is defined as the operation of largely uncontrollable natural forces but this is not the most important element of any disaster. If this definition alone does not adequately encompass the nature of disasters, then it is necessary to look more closely at the scope of definitions of disaster.

Disaster is one of the many amorphous concepts in the English language, but four different groups of meaning have been distinguished, namely,

1. Disaster often refers to the disaster agent, e.g. a hurricane, an earthquake, etc.
2. Disaster often refers to the physical impact which the agent has, e.g. damage to property, loss of life etc.
3. Disaster can mean the evaluation of the physical event: in other words, evidences of physical damage are evaluated as being disastrous.
4. Finally, disaster can mean the socio-economic disruption created by the physical event.

(Dynes et al, 1972)

In a practical context, the definition of disaster adopted will reflect the orientation of those involved in a disaster situation. Thus, at the Disaster Research Unit, in the University of Bradford, the orientation is towards identifying the socio-economic disruption created by the physical event and towards a philosophy of preplanning to minimise the effect of extreme natural hazards. Our definition of disaster contains both a recognition of the nature of extreme physical events and the state of human society including the preparations and adjustments that society makes to the possibility of disaster occurrence. We would strongly argue that disasters occur at the interface of extreme natural phenomena and vulnerable settlement patterns. The Act of God, the operation of largely uncontrollable forces, is, therefore, clearly seen as only one element of disaster events. The factor of paramount importance is population for without people there can be no disaster (White, 1974). For example, should a hurricane strike an uninhabited Caribbean Island one would not define the event as disastrous even if several valuable plant and animal species were destroyed. Disasters are about people and, if disaster research is to have any meaning, it should be focused on people. Current research, however, has a different emphasis; less than 10% of current research is people orientated (Lewis, 1975). Such a concentration of research effort and monies on technology rather than people is not acceptable; the concentration results from an emphasis on the extraordinary conditions that prevail during and after a disaster, extraordin-

ary conditions with which only advance technology can deal. A more valid approach to disaster research would be to see disaster as the extreme situation which is implicit in the everyday condition of the population. Drought for instance, is too little water and flood is too much water, but peasant farmers are trying to utilise the water regime for essential agricultural production; drought and flood are simply the extremes of this everyday condition. It is as important, therefore, to define the specific disaster situation as merely an extension of the everyday situation. Only with such an ecological definition, a definition that focuses on man within his environment, will we be able to produce effective predisaster planning.

The first important question we must ask is what type of hazard events would encourage disaster. Generally we are concerned with such events as avalanche, cyclone, drought, earthquake, flood, tsunami and volcano, although lesser phenomena such as hail etc. could be considered as well as man-made disasters like explosions. At some point in the future, it is hoped to produce an Atlas of Vulnerability but at the present moment it is sufficient to state that all these phenomena are distributed throughout the world. Drought, for example, can be measured as variation around a mean rainfall figure; it is apparent, therefore, that drought does not only occur in the Sahel, but throughout the world. If one takes such a global viewpoint of drought it is possible to reach general conclusions. Wisner summarised types of response to drought and stated his conclusions as follows:

1. There is a tendency to underestimate the importance of drought in the farming systems of the so-called 'temperate climates' and a related lack of awareness of the role which the strategies chosen by these temperate land farmers have played in setting patterns of adjustment to drought in underdeveloped, tropical lands.
2. There is a tendency to underestimate the depth of the small farmers' understanding of the vegetative, edaphic, economic, nutritional and sociological consequences of drought and the efficacy of the peasant adjustment of his productive system to such pressures (Wisner, 1973).

These two tendencies of underestimation of natural hazard and underestimation of the peasant adjustment system, observable in drought, are common features of the appraisal of other natural hazards. Although disasters occur on a worldwide basis, occurrences in the underdeveloped countries seem to predominate. This is partly due to their location in, for example, the more arid parts of the world or their situation along fault zones but, more importantly, it is because the underdeveloped countries are unable to withstand the burden of loss from extreme natural hazards by virtue of their very underdevelopment. What is extremely difficult to obtain, of course, is accurate global figures on disaster occurrence. The following paragraphs outline the main sources of material and the shortcomings and biases within the data.

## DATA SOURCES

Data sources for disaster material are fivefold, namely, International Agencies, National Governments, Non-governmental Organisations, Academic Research Institutions and Private Insurance Companies. These sources have been reviewed with particular reference to the years 1968 - 1972 although not all figures are comparable.

### International Organisations

The major international organisations that are concerned with disaster are focused in the United Nations. UNESCO provide an annual summary of information on natural disasters but according to their definition of disaster, there is a distinction between the disaster event and its destructive power. Thus, they record, for 1969, a total of 759 disasters although data only covers the natural hazards of earthquake, tsunami, storm surge and volcanoes (Table 1 and 2.) This total exceeds any other figure encountered in this analysis. The regional groupings indicate that the UNESCO totals include ocean and arctic areas where, by our definition of disaster, there could be no disaster. In fact, the predominance of earthquake measurements reflects the heavy physical science bias of the data. Disasters which affect the population or infrastructure are listed as destructive phenomena; only twelve such events are recorded, all earthquakes, but no details are given of losses. The magnitude of these twelve destructive earthquakes is registered as M on the Pasadena Scale which is determined from the amplitude of surface waves (Table 3). It is worth noting that none of these destructive earthquakes resulted in a major disaster appeal. Although the UNESCO annual summary of information on natural disasters is the most comprehensive coverage available, it contains three major shortcomings. First, it is not actually concerned with disaster events, but rather with the scientific recordings of extreme physical phenomena. Secondly, the range of phenomena covered is not the full range of those associated with disaster events. Thirdly, the annual summary is only available from 1966.

A second international source for disaster occurrence is the United Nations Economic and Social Council reports. In 1971, a manuscript was produced by this source of disaster occurrence between 1961-70. The basis of the data was the number of occasions on which the League of Red Cross Societies had made a major appeal. The figures reflect more accurately the nature of disaster. Asia predominates in the statistics of regions; flood predominates in typology of events (Table 4). The major criticism of this data source is that it is derived from secondary material; such derivation hides the anomalies inherent within the League of Red Cross Societies towards a declaration of a disaster situation. Secondly, the run of data is not adequate only covering the years from 1961 to 1970. Finally, the data is poor because it does not contain loss information on either population or physical infrastructure.

The last international source is the United Nations Disaster Relief Office (UNDRO). The Office of the Disaster Relief Coordinator was created by General Assembly Resolution 2816 (XXVI) of the 14th December 1971. The Office came into being when the Disaster Relief Coordinator assumed his functions in March 1972 and during that year the Office was slowly built up. During 1972, a tentative analysis of recorded major disasters was prepared by Stanissis. The analysis covers

TABLE 1NUMBER OF DISASTERS BY TYPE 1969

Earthquake	722
Tsunami	5
Storm Surge	7
Volcanoes	<u>25</u>
	Σ <u>759</u>

Source: UNESCO. Annual Summary of Information on  
Natural Disasters, 1969.

TABLE 2NUMBER OF DISASTERS BY REGION

Pacific	467
Atlantic	68
Mediterranean	67
Continental Africa, Indian Ocean, Australia	63
Asiatic Ranges	61
Continental Europe	17
Antarctica	1
Other	<u>15</u>
	Σ <u>759</u>

Source: UNESCO. Annual Summary of Information on  
Natural Disasters, 1969.

TABLE 3PRINCIPAL DESTRUCTIVE EARTHQUAKES 1969

<u>Region</u>	<u>Magnitude (M)</u>
Gibraltar	8.0
Yugoslavia	6.4
Albania	5.7
Turkey	6.5
Iran	5.6
Chile	7.6
China	6.2
Celebes	7.3
Peru	6.4
Red Sea	7.0
Ethiopia	6.3
South Africa	6.5

SOURCE: UNESCO. Annual Summary of Information  
on Natural Disasters, 1969

TABLE 4

NATURAL DISASTERS OCCASIONING A MAJOR APPEAL ON  
THE PART OF THE LEAGUE OF RED CROSS SOCIETIES  
DURING 1961 - 70.

DISASTER BY REGION 1961/70

Asia	46
Africa	22
Middle East	20
Europe	13
Americas	<u>11</u>
TOTAL	⋈ <u>112</u>

DISASTER BY TYPE 1961/70

Hurricane	18
Flood	58
Earthquake	19
Volcanic Eruption	3
Drought/Famine	8
Epidemic	<u>6</u>
	⋈ <u>112</u>

SOURCE: UN Economic and Social Council 1971.

the years between 1919 and 1971 focusing on the disasters in which assistance was necessary and provided by the international community; natural disasters were analysed as well as disasters arising from 'the advancement of civilisation and man-made situations'. For the purpose of this discussion, only natural disasters are analysed; they account for 69 per cent of the observations between 1968-72. What is interesting about this analysis is that if one considers the total 52 year time span, Asia experiences most disasters, but Europe and the Americas have second and third ranking respectively. If, however, one considers a 21 year period, 1951-71, or a 4 year period 1968-71, the disaster experience of Europe and the Americas decrease significantly (Table 5)\*. This decrease in disaster experience is important because it indicates that Europe and the Americas are dealing more successfully with hazard experience; this data compares with other figures which will be discussed later. Similarly, the implications of the decrease in disaster proneness of the developed world and an increase of disaster proneness in the underdeveloped world, will also be considered from the UNDR0 data and compared with the UN Economic and Social Council's work. With the UNDR0 data, the same ranking of disaster type by occurrence appears namely flood, earthquake, hurricane and drought respectively (Table 6). A similar grouping appears between these two data sources for areas affected, i.e. Asia, Africa and the Middle East, Europe and the Americas. Several criticisms can be levelled at this data source. First, it is only a tentative analysis although the terms of reference are clearly stated; the disasters recorded are those for which assistance was necessary and provided by the international community. Secondly, it does not contain calculations of loss of either population or infrastructure, but it does contain a brief analysis of institutional preparedness for disaster. However, what must be weighed against these criticisms is the fact that, with the creation of a specialist disaster unit within the United Nations, it is hoped that reliable information on disaster occurrence will eventually be available. The accuracy of the information that UNDR0 has already produced is reflected in the parallels with data from the UN Economic and Social Council discussed earlier even though the latter data source was based on the pragmatic appraisal by the League of Red Cross Societies.

#### National Organisations

The largest data source available at this moment comes from the United States AID programme. The Agency for International Development publishes case reports on each disaster with which it is involved. Every year, since 1960, the Agency for International Development has published an annual summary of Foreign Disaster Emergency Relief. The data is useful for it not only gives a description of the disaster strike but also contains information on numbers killed, estimated victims, total United States Assistance, reported assistance from other nations and reported assistance from within the host country. There is no tabular evidence of the cost of the disaster, but this can often be gleaned from the text. If one considers Table 7, the number of disasters by region, one is immediately struck by the predominance of Latin America in the disaster prone areas. This predominance does not correlate with figures available from the United Nations and therefore strongly suggests that the data available from the United States AID sources is biased. This bias reflects the penetration of American capital into the underdeveloped countries of Latin America and is paralleled by the regional

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\* The mean for disasters in underdeveloped regions is 3 and 11 disasters per annum for the 51 and 4 year periods respectively.

TABLE 5DISASTERS RANKED ACCORDING TO REGION

a)	<u>Areas</u>	<u>1919-1971</u>	
	Asia	89	
	Europe	49	
	Americas	42	
	Middle East	38	
	Africa	<u>33</u>	
		$\Sigma$ <u>251</u>	M = 4.8
b)	<u>Areas</u>	<u>1951-1971</u>	
	Asia	77	
	Middle East	38	
	Americas	35	
	Europe	35	
	Africa	<u>29</u>	
		$\Sigma$ <u>214</u>	M = 10.0
c)	<u>Areas</u>	<u>1968-1971</u>	
	Asia	24	
	Middle East	10	
	Africa	9	
	Americas	6	
	Europe	<u>3</u>	
		$\Sigma$ <u>52</u>	M = 13

Source: UNDR0, 1972



TABLE 6NUMBER OF DISASTERS BY TYPE 1968-1971

<u>Type</u>	<u>Number</u>
Flood	27
Earthquakes	8
Hurricanes	7
Drought	5
Epidemics	2
Famine	2
Volcanic Eruptions	<u>1</u>
TOTAL	⋈ <u>52</u>

Source: UNDR0, 1972

TABLE 7NUMBER OF DISASTERS BY REGION 1968-1971

<u>Region</u>	<u>Number</u>
Asia	68*
Latin America	64
Africa	55
Europe	<u>7</u>
TOTAL	Σ <u>194</u>

\* Includes Middle East

Source: AID. Foreign Disaster Emergency Relief, 11th Report, 1972.

distribution of foreign aid for situations other than those concerned with disaster. Diagram I illustrates the United States Aid programme by region for the financial year 1970 and emphasises, despite the existence of the Vietnam War, the heavy commitment of development funds to Latin America; 38.7 per cent of all American development assistance goes to Latin America. In fact, the area of Central and South America exports 40% of its resources to the USA and 51% of its imports come from the USA (Oxford Econ. Atlas, 1971).

The development assistance programmes have been adequately explained, as a mechanism for preserving inequality (Hayter 1971; Amin 1974; Payer 1975). Aid as a mechanism for preserving inequality operates in the following manner; aid is investigated in underdeveloped areas where developed countries already have significant commercial interests; aid is used to encourage the underdeveloped country to enter into further commercial and governmental agreements with a specific developed country; this mechanism exacerbates the current relationship between the developed and underdeveloped world in which, in 1970, developed countries exported only 22.9 per cent of their primary commodities and 75.4 per cent of their manufactures, while the underdeveloped countries exported 75.9 per cent and 23.4 per cent respectively, will be maintained (World Bank, 1973). Disaster relief can merely reinforce the status quo because it is used as an insurance for the preservation of the interests of the developed world: the data from USAID would seem to support this contention.

Besides the annual report and individual case reports, the United States AID also have a disaster file computer print out. Unfortunately the data contained in the file does not correlate with the formal annual report mentioned earlier; there is no internal consistency. Thus, the number of disasters recorded for the 1968-1971 period in the 11th Report on Foreign Disaster Emergency Relief is 194 while, in the disaster file of computer output, the total is 104. It is worth noting, however, that a similar ranking of disaster prone areas occurs, i.e. Latin America is ranked first. However, a similar ranking to the United Nations sources occurs in respect of disaster type, namely flood, hurricane, earthquakes and drought (Table 8). USAID have a disaster scale which ranks death, injury and dollar damage for each disaster. However, USAID staff members do not always agree on disaster rankings which adds confusion to the bias already apparent within the data (USAID, 1974). A more accurate, objective method of analysis is necessary.

The major criticism of this data source is that it is heavily biased towards American influence overseas, especially in Latin America. Secondly, subsidiary data given in the test analyses American disaster contribution in depth but sums all other contributions under a single heading. Thirdly, it is concerned with foreign disaster and it does not record the disasters that occur within the United States. Lastly, as it is not a reliable source of material, accurate disaster accounting will depend on summarising the United Nations Social and Economic reports on particular disasters. Until such a summary is available, however, this is the only large body of data available.

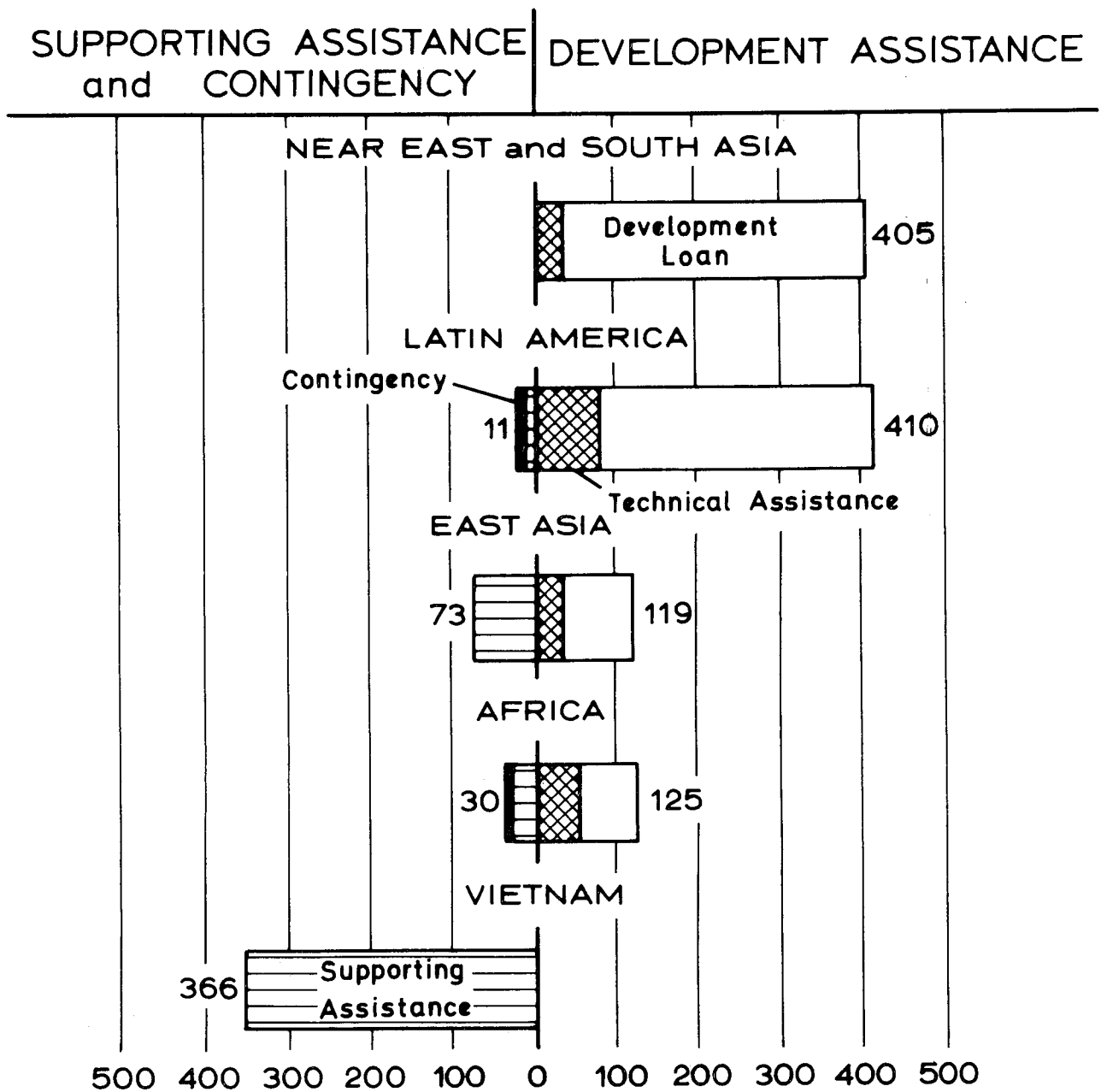
The British Government has no equivalent disaster accounting system. With the formation of the Disaster Unit within the Overseas Development Ministry, it is possible to envisage such publications in the future, although the task is more difficult because of the division of responsibility in disasters between the Foreign and Commonwealth Office and the Overseas Development Ministry. Since its formation in August 1974, the Overseas Development Ministry's Disaster Unit has supervised the distribution of £250,000 relief aid to disaster situations. The figures for region and

DIAGRAM I

FY 1970 AID PROGRAMME BY REGION

(Millions of Dollars)

**FY 1970 AID PROGRAM BY REGION**  
(Millions of Dollars)



SOURCE: USAID, 1973

TABLE 8NUMBER OF DISASTERS BY REGION 1968-1971

<u>Region</u>	<u>Number</u>
Americas	41
Asia	32
Africa	19
Europe	7
Middle East	<u>5</u>
TOTAL	Σ <u>104</u>

NUMBER OF DISASTERS BY TYPE 1968-1971

<u>Type</u>	<u>Number</u>
Floods	41
Hurricanes	24
Earthquake	19
Drought/Famine	18
Volcanic Eruption	<u>2</u>
TOTAL	Σ <u>104</u>

Source: Disaster File Computer Printout, 1974.

disaster type are given in Table 9. More accurate data is not immediately accessible because there are separate files for Foreign and Commonwealth Office and the Overseas Development Ministry aid and because, in both cases, disaster reference material is contained within general area files. With the orientation of the Overseas Development Ministry's aid programme towards the 25 least developed countries, it is to be hoped that the Disaster Unit will adopt a more positive role in rehabilitation and reconstruction work as well as in predisaster planning.

#### Academic Sources of Information

The academic sources of information are various. A continual monitoring system of the environment is provided by the Smithsonian Institution for Short-Lived Phenomena. By definition, however, they are not concerned with such disasters as drought or famine. Table 10 analyses their listings for the period 1968-1971. Like UNESCO the classifications emphasise earthquake shocks, although few are disastrous. The major criticisms to be levelled at this data source are that it is predominantly American observations and the rest of the events are largely recorded in anglophone countries (O'Keefe, 1974). Secondly, little data is available on the impact of the phenomena. Thirdly, it excludes important phenomena such as drought.

The best source of material from academic sources is that provided by the Natural Hazard Research Group in the United States (Hewitt and Sheehan, 1969; Dworkin, 1974). In order to follow trends from 1947-73 the methodology was created to be consistent. Disasters are defined as a situation which satisfies the following operational conditions, namely:

1. At least \$1,000,000 damage,
2. At least 100 dead,
3. At least 100 injured.

Disasters were categorised as large area or small area - large area disasters are defined as exceeding a  $10^{\circ}$  (latitude by longitude) area. The disaster listing was a result of a compilation from various sources such as the New York Times Index, Encyclopedia Britannica Yearbook, Collier's Encyclopedia Yearbook, The American People's Encyclopedia Yearbook, Keesing's Contemporary Archives etc. There is, therefore, as in all the other data sources, an underreporting of material for the Eastern Bloc and China. This notwithstanding the data presented in these articles is the best available material. Table 11 contains an analysis of large scale disasters from 1968 - 1971. Again, the figures diverge from other material presented; hurricane, flood and earthquake still predominate in disaster types, but, because of the bias contained within the data source, which originates from American media coverage, the United States predominates in regional rankings. The number of occurrences which actually decreases from 1968 - 1971, is not indicative of the general trend shown in Diagram II. This diagram clearly indicates an increase in large scale disasters, an increase in the number of deaths per year per million population, but a decrease in the total number of disasters. The implicit reasons behind these data summaries could be:

1. That the developed world has managed to ameliorate many of

TABLE 9DISASTER BY REGION AND TYPE: AUG. 1974 - MAR. 1975

Africa	6
Asia	5
Americas	1
Europe	<u>1</u>
	$\Sigma$ <u>13</u>

Flood	5
Hurricane	3
Drought	2
Earthquake	1
Other	<u>2</u>
	$\Sigma$ <u>13</u>

Source: ODM, April, 1975

TABLE 10SHORT-LIVED PHENOMENA 1968-1971

Volcanic Eruptions	71
Major Earthquakes	86
Major Floods etc.	<u>11</u>
TOTAL	$\Sigma$ <u>168</u>

Source: Smithsonian Institution for  
Short-Lived Phenomena. Annual  
Report, 1971.



TABLE 11NUMBER OF DISASTERS 1968-1971

<u>Year</u>	<u>Disasters</u>	<u>Large Area Disasters</u> *
1968	38	10
1969	25	8
1970	24	7
1971	<u>26</u>	<u>5</u>
TOTAL	Σ <u>113</u>	Σ <u>30</u>
GRAND TOTAL		143

NUMBER OF LARGE AREA DISASTERS BY TYPE 1968- 1971

Earthquake	3
Flood	9
Hurricane, Typhoon, Cyclone	10
Tornado	3
Heatwave	1
Rainstorm	3
Snowstorm	<u>1</u>
TOTAL	Σ <u>30</u>

NUMBER OF LARGE AREA DISASTERS BY REGION

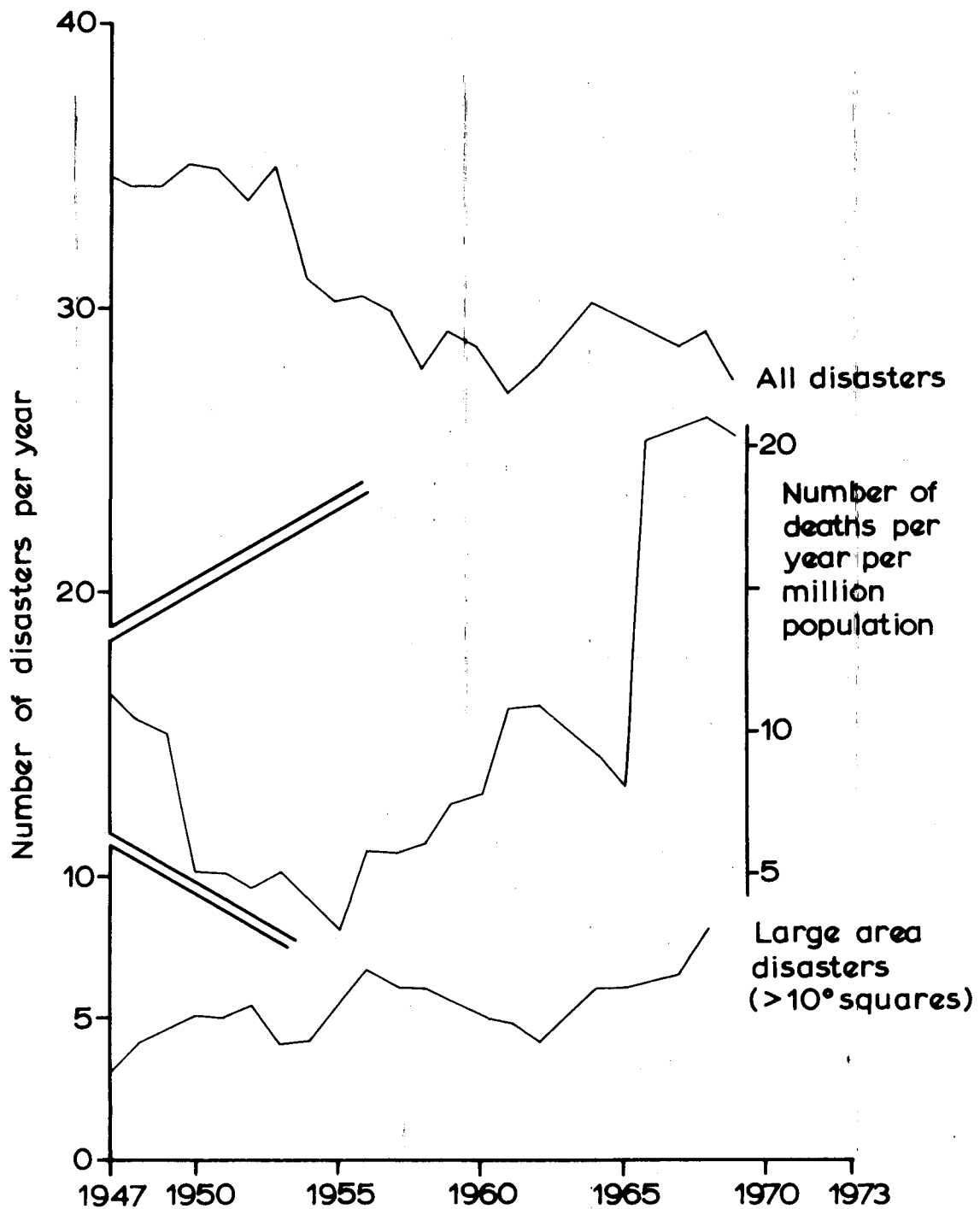
USA	11
Asia	12
Latin America	4
Africa	1
Europe	1
Australia	<u>1</u>
TOTAL	Σ <u>30</u>

\* >10<sup>0</sup> square

Source: Dworkin, Global Trends in Natural Disasters.  
NHR No. 26., 1974

DIAGRAM II

**GLOBAL DISASTERS 1947-1973**  
5-year moving average



SOURCE: Dworkin, 1974

the disaster tendencies in its environment and thus has reduced the number of catastrophic occurrences, or that there actually has been a decrease in disaster occurrence (Table 5).

2. That the underdeveloped world has increased in its vulnerability to natural hazard events. Table 12 clearly demonstrates a correlation between underdevelopment and loss of life. The mean loss of life per disaster impact is 1,065, 1,216, 348 and 302 for Asia, Africa, South America and Central America-Caribbean respectively.

This data again contains no cost accounting of disaster impact, but that does not detract from its present value as good baseline data. The limitations of the data set have already been mentioned, but the implications of the data will be discussed later.

#### Non-Governmental Organisations

The definitions that non-governmental organisations utilise for disaster situations is like that of the United Nations Disaster Relief Office, a situation in which assistance is necessary and is requested. Table 13 shows the number of disasters by region and type in which either the Catholic Relief Services, the League of Red Cross, the Lutheran World Federation, Oxfam or the World Council of Churches provided assistance. (In major disasters the inclusion of Oxfam indicates the inclusion of the British Red Cross, Save the Children, Christian Aid and War on Want, because all five charities are members of the Disaster Emergency Committee.) The figures for the two year run are higher than any others for disaster situations, implying that the general tendency observed in Diagram II that the total number of disasters are decreasing is a misconception; these organisations tend to have a more 'grass root' base than either international, governmental or academic concerns, and the large numbers of disasters recorded more accurately describes the current situation. The recording of disaster strike by regions reflects the predominance of Asia and the type of disaster parallels closely the other sources of data. The inclusion of the League of Red Cross in the analysis probably balances the tendency for too large a concentration in the Christian underdeveloped countries, although this is impossible to calculate. Again there are no estimates of damage suffered or costs of relief, rehabilitation and reconstruction except for the individual disbursements of the Charities.

An alternative source of material from the non-governmental organisations is the appeals of the Disaster Emergency Committee. Table 14 contains a list of the disasters for which the DEC made an appeal ranked according to region and type. Since 1970, the DEC has only made one appeal each year so that their figures do not represent an accurate analysis of actual disaster occurrence. The purpose of the DEC is to raise money so it is not surprising that the number of disasters with which it is concerned are few. Several individual appeals have raised more than £1 million but over-exposure would lead to a decrease in revenue. The need for an attractive, humanitarian platform on which to base the disaster appeal means that the orientation is towards such phenomena as earthquake and conflict rather than long-term hazards such as drought.

TABLE 12AVERAGE LOSS OF LIFE PER DISASTER IMPACT BY CONTINENT

<u>Continent</u>	<u>Lives Lost</u>	<u>Disasters</u>	<u>Average Loss of Life per Disaster Impact.</u>
North America	7,965	210	37
Central America and Caribbean	14,820	49	302
South America	15,670	45	348
Africa	18,105	17	1,065
Europe (Excl. USSR)	19,575	85	230
Asia (Excl. USSR)	361,410	297	1,216
Australasia	4,310	13	332

Source: Sheehan and Hewitt, 1969

TABLE 13DISASTER BY REGION 1970-1972

<u>Region</u>	<u>Number</u>
Asia	45
Latin America	31
Africa	31
Europe	<u>3</u>
TOTAL	Σ <u>110</u>

DISASTER BY TYPE 1970-1972

<u>Type</u>	<u>Number</u>
Flood	51
Drought	34
Hurricane	15
Earthquake	7
Volcanic Eruption	<u>3</u>
TOTAL	Σ <u>110</u>

Source; Catholic Relief Services Summary of Activity, 1974.

TABLE 14DEC APPEALS: 1966 - 1974

Earthquake	6
Conflict	4
Floods	2
Cyclone	2
Drought	<u>1</u>
	≤ <u>15</u>

Middle East	4
Asia	3
Americas	3
Africa	3
Europe	<u>2</u>
	≤ <u>15</u>

## Commercial Organisations

The final source of global data is reinsurance companies. It would be possible to examine the total local, regional and national insurance returns for individual countries. It has not, however, been possible to gather this information at the current time. This reinsurance data used in the following analysis is therefore inadequate, but is the only global summary currently available. Table 15 shows disasters by region and type. This analysis does not bear any relationship to the figures that have been previously produced and clearly shows that investment in financial insurance is a western adjustment to hazard. Cyclones predominate as disaster events because the United States predominates as a region. Only one event, an earthquake, falls outside of North America or Europe. As a data source for natural hazards and disasters, its use is minimal.

## Summary of Data Analysis

Several conclusions can be drawn from this brief survey of data sources. First, there is no common definition of disaster, no universal scale of disaster measurement and consequently little compatibility between the data. Secondly, there is no accounting for disaster losses except in individual appraisals of a specific disaster situation\*. Thirdly, most data contains a bias which results from its specific viewpoint on disaster. Fourthly, at the present moment the best data is available from UNDR0 and the Natural Hazard Research Group. The USAID provide the most information but the internal and external consistency of the data is much in question. Hopefully, UNDR0 will be able to fill this very important gap in data sources in the future.

## TRENDS OBSERVABLE IN THE DATA

The most striking trends observable in the data were discussed with reference to Diagram II. There it was briefly stated that there was an increase in large scale disasters and an increase in the number of deaths per year per million population but a decrease in the overall number of disasters. Although it was stated that the reason behind these figures could be a greater amelioration of extreme environmental conditions in the developed world, this appears not to be the case when we consider the data in Table 13. Sheehan and Hewitt (1969) and Dworkin (1974) have all stressed that they were employing secondary sources which contained a pro-American academic bias. It is not surprising, therefore, that they do not record many of the smaller practical situations of disaster which are not necessarily newsworthy, but which do occur. The implications of Table 13 are that disasters are occurring as much as before rather than decreasing in total numbers. More importantly, Table 13, the 'situational' table, does not contradict the most striking conclusion of Diagram II, that there is an increase in serious disaster situations. These conclusions can be backed by a brief analysis of the UNDR0 figures, the other reliable data source. Table 16 contains average disaster occurrences per annum for periods namely 1919-1971 and 1968-1971; both sets of means are derived from the same disaster population. In every case there is a substantial percentage increase in disaster occurrence, despite the probability of the physical event remaining constant. Drought, cyclones and flood are the disaster types with the greatest increase. (Volcanic eruptions provide a false picture because the small sample of occurrences provides an unjustifiably high ranking.) Table 17 simply lists disaster types by percentage increase.

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\* An attempt to cost disaster follows: vide 26-28.

TABLE 15DISASTER BY TYPE 1968-1971

<u>Type</u>	<u>Number</u>
Cyclone	7
Flood	1
Storm/Hail	4
Earthquake	<u>2</u>
TOTAL	Σ <u>14</u>

DISASTER BY REGION 1968-1971

<u>Region</u>	<u>Number</u>
USA	9
Central America	1
Europe	<u>4</u>
TOTAL	Σ <u>14</u>

Source: Swiss Reinsurance Quarterly Review,  
April 1973.



TABLE 16DISASTER AVERAGE BY TYPE PER ANNUM

<u>Type</u>	<u>1968-1971</u>	<u>1919-1971</u>	<u>% Increase</u>
Cyclone etc.	1.75	0.62	182.26
Drought	1.25	0.13	861.5
Earthquakes	2.0	1.3	53.8
Epidemics	0.5	0.19	163.6
Flood	6.75	2.7	150.0
Volcanic Eruptions	0.25	0.06	316.6
Famine	0.5	0.25	100.0

TABLE 17DISASTER RANKINGS BY PERCENTAGE INCREASE

1. Drought
2. Volcanic Eruptions\*
3. Cyclone etc.
4. Epidemic
5. Flood
6. Famine
7. Earthquake

\* Small sample produces high ranking for volcanic eruptions.

Despite the unreliability of the data, there does seem to be a general increase in disaster occurrence particularly when we consider that the probability of the physical event is constant. (It is possible to say that the probability of the physical event is constant because although little current data is available on the probability of natural hazards, it is possible to logically conclude that because there have been no major changes in geophysical activity, nor major changes in climatic conditions, the probability of the physical event occurring is constant.) Thus there are several tendencies which must be explained because they underline a tendency to increasing disaster proneness. These tendencies are:

1. An increased disaster occurrence over a 4 year period as compared with a 52 year period (Table 5);
2. An increase in large scale disasters (Diagram II), although it can not be seen that there is a tendency for an actual decrease in the number of disasters (Table 13);
3. An increase of every disaster type (Table 16);
4. A greater increase in the disaster phenomenon concerned with long term ecological phenomenon such as drought (Table 17);
5. An increasing vulnerability in underdeveloped regions (Table 5), and a greater loss of life per disaster impact (Table 12).

Is it possible to explain these tendencies? Is there a coherent explanation of these tendencies that would adequately explain the process? More importantly, is it possible to provide sufficient practical suggestions from an explanation of such a process to provide guidelines for effective predisaster planning?

#### THE COST OF DISASTER

At this point, however, it is worth examining the cost of disaster to see the level of expenditure in post disaster situations. The difficulties of costing disaster in any general fashion are obvious; the data is unreliable, average figures are meaningless and firm conclusions negligible. The only source of data in a comprehensive form is USAID but the criticisms of this source discussed earlier, must be borne in mind. The data analysis which follows is from 1966-1973 the last year of comprehensive data available at the moment.

Fiftyone 'new' disasters occurred in 1971, in which 522,212 persons were reported killed and 68,089,760 persons were affected. (This figure includes the Bangladesh Civil Strife.) In contrast, 25 'new' disasters occurred in 1973, in which 111,641 persons were killed and 215,240,489 persons were affected. The value of damage is not given but the total value of assistance is detailed. Table 18 details this assistance; the most important fact to note is that in the currently available statistics on relief assistance from 1965-1973, the following conclusions are apparent:

1. Total US Government Aid exceeds that of the International Community, i.e. the world excluding the United States, in 5 of the 9 years (Table 18).
2. Total US Government Aid sometimes exceeds total country self-help.
3. Most importantly, total assistance for the 9 year period of in-country self-help more than doubled the amount of

TABLE 18

NINE-YEAR TOTALS REPORTED FOREIGN DISASTER STATISTICS AND  
EMERGENCY RELIEF COSTS

Year	Total new Disasters	Number Killed	Total number people report- ed affected	Value of Assistance in Millions of Dollars				Total in- country self help
				Total USG Aid	Total by Volags.	Total from the I.C.**	Total in- country self help	
1973	25	111,641	215,240,489	301.4	15.5*	158.9*	658.1	
1972	30	115,331	37,022,517	314.9	12.0*	582.2*	81.0*	
1971	51	522,212	68,069,760	189.0	16.7*	266.6*	744.8*	
1970	51	72,915	11,743,040	48.7	12.2*	59.5*	96.6*	
1969	36	1,018,534	32,482,216	102.6	12.2*	95.5	131.0*	
1968	55	4,103	5,455,602	32.6	7.9*	16.5*	607.1*	
1967	62	1,517,547***	14,223,092	81.4	12.2*	173.2*	2,964.7*	
1966	48	7,086	4,139,646	25.4	1.6*	9.6*	*	
1965	50	47,089	5,504,173	46.3	3.8*	3.6*	*	
9 Year Total	408	3,416,458	393,880,535	1,142.3	94.1*	1,365.6*	5,283.3	

Key: \* Incomplete or not reported.

\*\* I.C. - International Community - not including the US.

\*\*\* Note substantial increase in deaths over previously reported totals for year 1967. The reason for this is that at the time the report on the India Famine was written the number of deaths was not available. It has since been estimated there were from 1.5 million to 4 million deaths and the lower figure has been used and added to other deaths previously reported for other disasters.

external assistance provided.

The total value of resources diverted to assist disaster stricken areas was 7884.7 million dollars over the 9 year period. This, however, is not necessarily the total cost of disaster. The mean expenditure over the 9 year period for a disaster hit area was 19.3 million dollars according to these USAID figures but the concept of average cost of assistance per disaster or even per type of disaster or region is meaningless. It is sufficient to say that 1133.9 million dollars were spent on disaster assistance in 1973; 96 countries of the world had less than this amount of resource capital as GNP during 1973 (World Bank, 1973).

The central problem remains, however, that at the moment there is insufficient data to account for the actual cost of disasters on a global scale. Any average figure becomes meaningless. For example, the Barbados floods of October 1970 produced an estimated dollar damage of 500,000, the floods of Italy in October, 1970 cost 120 million dollars in damage, floods in Malayasia during December 1970 did 37 million dollars worth of damage and floods in Brazil during April 1971 did 75 million dollars damage (USAID, 1972). Similarly regional estimates are impossible to calculate. Some surrogate variable, such as loss of life, could be utilised or some composite function of life lost, injuries received and capital destroyed. Even with such estimates, data should be treated with caution, but it would seem imperative that some statistical index should be evolved. With the current growth of UNDR0, it is to be hoped that such data will be forthcoming.

Costings are available for the 3 major world disasters, excluding the Nicaraguan earthquake, which took place in the early 1970s. The greatest loss of life occurred in the Bangladesh Cyclone - 300,000 people died, 100,000 more than during the Bangladesh Civil Strife, but dollar damage was low, \$86.4 million, because of the underdeveloped agrarian nature of the economy. The Philippines Flood, however, 'only' killed 653 people, but did US\$220 million worth of damage, while the Peru earthquake resulted in 66,794 deaths and destruction costing \$530 million. Even if exact costings are not available, the enormity of a disaster strike can be appreciated.

#### TOWARDS AN EXPLANATION OF DISASTER PRONENESS

Disaster has already been defined as an interface between extreme natural phenomena and vulnerable settlement but the extreme natural phenomena must be seen as the limiting situation implicit in the everyday situation of people. In essence, therefore, the definition is ecological. To understand the tendency towards an increase of disasters, particularly in underdeveloped situations, we must examine the process of development.

True development is an ecological process in which a 'society' increases its capacity for dealing with the environment including extreme environmental conditions which produce disaster. This capacity for dealing with the environment depends on the extent to which society understands the laws of nature (science), on the extent to which 'society' puts that understanding into practice (technology) and on the manner in which 'society' is organised (Rodney, 1972). This

definition would suggest that if a society is dependent on external science or technology, if the elite is organised towards a dominant foreign metropole, then it is not developing; dependency means that a society does not have the control of its own resources. The overall effect of this dependency relationship is that, while development continues in the rich countries, a concomitant, negative process of underdevelopment occurs in the Third World (Amin, 1974; Brookfield, 1975). For continued development in the Western World, it requires the rich countries to control the resources, the raw materials, from the Third World and force it into the dynamic, negative condition, the development of underdevelopment (Frank, 1971). The result of such a process is that the underdeveloped population is isolated from the traditional indigenous resource base (O'Keefe, 1974b, 1975). As the underdeveloped population attempts to discover alternative strategies of production on the edges of the imposed system that has controlled the traditional indigenous resource base, it is forced to accept strategies that contain fewer insurance or adoptive mechanisms for survival. The new strategies leave the underdeveloped population more vulnerable, more disaster prone to the vagaries of the environment; they have been forced into marginal economies because of the penetration and control by developed economies of the underdeveloped countries resource base. Marginalisation is the process which leaves the underdeveloped population more vulnerable than it was earlier to the vagaries of the environment. As a process marginalisation allows an explanation of the trend observed earlier that there is an increase of natural disasters in underdeveloped countries despite the fact that the probability of the natural hazards has not increased. Several examples, which follows, emphasise that the process of marginality adequately explains the nature of disaster proneness.

#### EXAMPLE I - HONDURAS

The Atlantic coast of Honduras lies directly in the path normally followed by the tropical storms and hurricanes in the Caribbean. Between the 18th and 20th of September 1974, a hurricane, 'Fifi', hit this coastline registering winds of up to 250 km/hr and rainfall of 400 millimetres. At the time the hurricane struck, Honduras was in the middle of its rainy season; the net result of such rainfall was that the river rapidly overflowed, and flooded the valleys of the Sula Lean and Aguan. The winds caused trees to fall, impeding the flow of water and therefore aggravating the existing conditions; severe erosion of hills and mountains occurred so that, to an observer, the valley sides seemed as if they were scored and scratched by some giant animal.

The major damage caused by Hurricane Fifi consisted in the high loss of life (8,000), in the number of people injured (130,000) and in the severe disruption of the economic structure; in terms of capital infrastructure alone, damage was estimated as \$154 million. Table 19 shows estimated losses by sectors; the major production losses were in agriculture, particularly on the banana plantations, while the major loss in infrastructure was to the transport networks. Total damage was estimated as \$450 million. The projected growth for 1974-76 as a result of the hurricane is estimated at -6 per cent (United Nations Social and Economic Council, 1974).

A deep analysis of the Honduran situation would require that one

TABLE 19

HONDURAS: ESTIMATED LOSS OF NATIONAL ASSETS

	<u>Millions of Dollars</u>
<u>Total Losses</u>	<u>154.0</u>
Sectors producing goods	<u>92.5</u>
Agriculture	69.5
Plantations and crops	57.0
Bananas	52.0 (a)
Other	5.0
Animal husbandry	12.5
Pasturage and fields	2.0
Stock	10.5
Cattle	9.0 (b)
Poultry	1.0
Pigs	0.5
Industry (plant)	8.0
Other sectors	15.0
Basic services	<u>61.5</u>
Infrastructure	38.0
Roads and other basic means of transport (c)	22.1
Ports and airports (d)	2.2
Telecommunications and electrification	4.4
Water supply and sewers	3.8
Urban and other thoroughfares	5.5
Houses and furniture	23.5

- Key: (a) on the basis of a unit replacement cost of \$3,000 per hectare for 10,000 hectares, plus the cost of replacing drains.
- (b) the replacement cost of 60,000 cattle at \$150 per head.
- (c) includes automotive and railway equipment.
- (d) includes the cost of some ships.

Source: Technical Secretariat of the Higher Council for Economic Planning and ECLA estimates.

examines the socio-economic condition of the peasantry in Honduras. The 2 million peasants ('campesinos'), make up 70 per cent of the population. Over two-thirds are illiterate and over 70 per cent of the children suffer from malnutrition. The estimated annual income per person is \$25 for a rural worker, but 63 per cent of the farmers have only 5.9 per cent of the land and over 30 per cent of the rural population do not possess any land. The North, the area affected by Hurricane Fifi, has 850,000 inhabitants of whom 500,000 are peasants. The fertile land is occupied by large landowners, amongst whom two American banana companies occupy 110,000 hectares in the most productive valleys (Sula Aguan and in Atlantida). This land, however, has just recently come under their control. By turning the land into banana plantations the companies have forced the peasant farmers up the mountain slopes, out of the valley bottom land where the peasant farmers have practised agriculture for many years. The mountain slopes were, however, heavily forested. To find areas for production, the peasant farmers had to remove that vegetation cover; the removal of the vegetation cover disturbed the ecological equilibrium of the area and with the heavy rainfall produced the landslides which caused so much destruction. The removal of vegetation was a result of population movement up the mountain slopes; the population movement was a direct result of the control and exploitation of the valley bottom lands, the traditional peasant resource base, by the expatriate companies; the result of such control and exploitation was marginalisation, a more vulnerable position for the Honduran peasantry, that turned a natural hazard into a disaster (O'Keefe, 1975b).

The effects of Hurricane Fifi contrast sharply with those of the tropical storm that struck Darwin, Australia, on the 24th December, 1974. Cyclone Tracy had a similar windspeed to Hurricane Fifi, between 230 and 250 km/hr, but the loss of life in disaster impact was much less than that of Hurricane Fifi, 49 and 8,000 persons respectively. Both areas are in major tropical storm zones, and both possess adequate warning facilities; both areas received similar extensive damage and early eyewitness reports from the two areas estimated that 80 per cent of the impact zones were severely disrupted. Why, with such parallel conditions, was the impact so more serious in Honduras than Australia? The answer lies in the degree of vulnerability of the two societies, in the degree of marginalisation.

#### EXAMPLE II - NICARAGUA

The earthquake in Managua, the capital city of Nicaragua, on December 23rd, 1972, damaged some 27 square kilometres of the city's total area of 33 square kilometres. Approximately 14 square kilometres of the central area was totally destroyed. An estimated 6,000 to 8,000 persons were killed and about 20,000 people received substantial injuries. The most extensive physical losses were in housing where about 45 per cent of the total housing units were destroyed. By contrast, large scale industry and infrastructure outside the central district suffered little damage.

The most interesting perspective on the Managuan earthquake can be gained from looking at the primacy of the capital city in terms of the rest of the country. 25 per cent of the Nicaraguan population

lived in Managua at the time of the earthquake. Prior to the earthquake, urban migration into Managua resulted in the population growing from 170,000 in 1963 to a total of 430,000 in 1972, an increase over a decade of almost 253 per cent. Such a population pressure produced a housing crisis - one result of this rapid urbanisation was that there was an estimated housing deficit of 80,000 units prior to the earthquake (Davis, 1975). The economic predominance of Managua is equally striking; product per capita in 1972 for Nicaragua was US\$507, but the product per capita in Managua was US\$925.

The process of marginalisation was not so obvious in Nicaragua as it was in Honduras. The control of land pushed peasants not up the mountainsides to seek alternative sources of livelihood ... a classic case of rural-urban migration began during the late 1950s. The situation of Managua and the political climate encouraged foreign industrial investment, although the site of the city was hazardous because it was located on the Pacific seismic belt. The low wages offered by the industrial entrepreneurs forced peasants, who had rural households and ties to land even if they were actually landless, to begin to sever their rural linkages because the cost of supporting two households, one in the rural areas and one in the urban areas, was too great. Without the security of a food production system behind them, the peasants were vulnerable to the economic condition in which they found themselves. They were isolated within an underdeveloped economy controlled by foreign interests; a fall in demand for the industrial products of that economy resulted in a classic market adjustment, the growth of unemployment. This vulnerability to market adjustments of unemployment restricted demands for minimum wage levels. The lack of a minimum wage meant that disposable personal income was not sufficient to cover adjustment to the earthquake hazard. Few buildings were built to the specified requirements and little life or material was insured. The peasants of Nicaragua were marginalised in an urban area, located in a seismic zone, which had a long earthquake history. One of the revealing results of the disaster was that all rural-urban ties had not been ruptured; the extended family system coped with 95 per cent of all refugees, over 200,000 people (Davis, 1975).

#### EXAMPLE III - THE SAHEL

The Sahel drought has been described in a previous occasional paper from the Disaster Research Unit (O'Keefe, 1975c). What is more interesting is to examine the way in which the population were marginalised.

Claude Meillasoux specifies three ways in which vulnerability is increased in the course of 'constant degradation of the conditions of agricultural production' in the areas of family subsistence production which largely cover the Sahel.

1. '... the head tax levied immediately after harvesting forces the peasant to sell his produce which causes shortages of foodstuffs both for storage and consumption. He is then forced to buy back provisions during a time of need at higher prices and on credit'.



2. 'The promotion of commercial cultivation and the disinterest of the authorities in subsistence agriculture has caused peasants to over-exploit the land in an attempt to maintain both types of production ... allocating an ever increasing proportion of the land to (the cash) sector and thus a proportionately decreasing amount remains available for subsistence farming'.
3. 'The peasant then finds himself dependent on the market for his supply of food ... This dependence means that the peasant is left totally at the mercy of the availability of provisions and price fluctuations'. (Meillassoux, 1974).

Meillassoux summarises the process of increasing vulnerability as follows:

'With less land set aside for food production and decreasing returns from the soil, the subsistence market becomes increasingly disorganised. With seasonal taxes causing grain speculation at the expense of farmers reserves the agricultural economy is reduced to a fragile state and vulnerable to the first climatic accident'.

Wisner (1974) has confirmed this pattern and added several other factors which further increase the vulnerability of the peasantry, namely, land accumulation by the elite, administrative blockages to effective cooperation of poor peasants in marginal areas and the control of transport and distribution by investors and managers outside the marginal zones. These kind of economic processes forced the peasantry into less productive, more vulnerable agricultural areas where the vagaries of the climate are extreme. They were marginalised into increasingly arid areas, in turn displacing pastoral nomads, even further toward the true desert.

These three brief examples are not isolated events. Throughout the underdeveloped world, it is possible to find parallel situations of land accumulation by agribusiness as in Honduras, the demise of pastoralism and dry farming is in the Sahel and the rural-urban migration process as in Nicaragua. These processes lead to the creation of rural and urban poverty. The constraints imposed on such populations limits their choice of alternative livelihood and makes them increasingly vulnerable to the vagaries of the environment.

#### A SUMMARY OF THE MARGINALISATION PROCESS

Several points emerge from this discussion that need emphasising. First, the process of underdevelopment is intimately linked with the control and exploitation of indigenous resources by the governing elite and outside interests; the alternative way in which to define this is that dependence is imperialism seen from the point of view of underdevelopment (Cockcroft, 1974). The management of surplus required to maintain the flexibility of the peasant economy is incompatible with the expropriation of surplus value, which is the real cause of underdevelopment (Wisner, 1974). Secondly, the underdevelopment process forces the peasantry into a more vulnerable economic position which, in turn, directs them to look for another source of livelihood in areas where

security is less and hazard more severe; they are marginalised. Thirdly, with the increasing disparity between rich and poor countries as a result of the development of underdevelopment this process of marginalisation will increase rather than decrease as populations become more concentrated in hazardous areas; the result of this population concentration will be that the people will become more disaster prone, that the actual number of disasters will increase. This reasoning provides an explanation for the tendency noted in Diagram III.

The process of marginalisation and its relationship to disaster is shown in Diagram III. Basically, this diagram describes a movement towards vulnerable settlement patterns because of marginalisation which results from the development of underdevelopment. After the disaster occurrence, relief aid is brought into the afflicted area; the relief aid is correlated with the amount of international aid and this reflects its trade relationship in developed countries (vide pages 7 - 11 above), a relationship that leads to the development of underdevelopment. In such cases, relief merely reinforces the status quo, produces further marginalisation and greater disaster proneness; relief is actually hindering peasant adjustment to future natural hazards and encouraging an increased vulnerability when it is seen within the context of aid and underdevelopment.

#### NATURAL HAZARD MODELS

The perspective of marginalisation does not necessarily conflict with earlier attempts to explain changing trends of hazard frequency, losses, injuries and deaths. One important earlier attempt at such explanation has produced the following typology of societal response to hazards, summarised by White (1974).

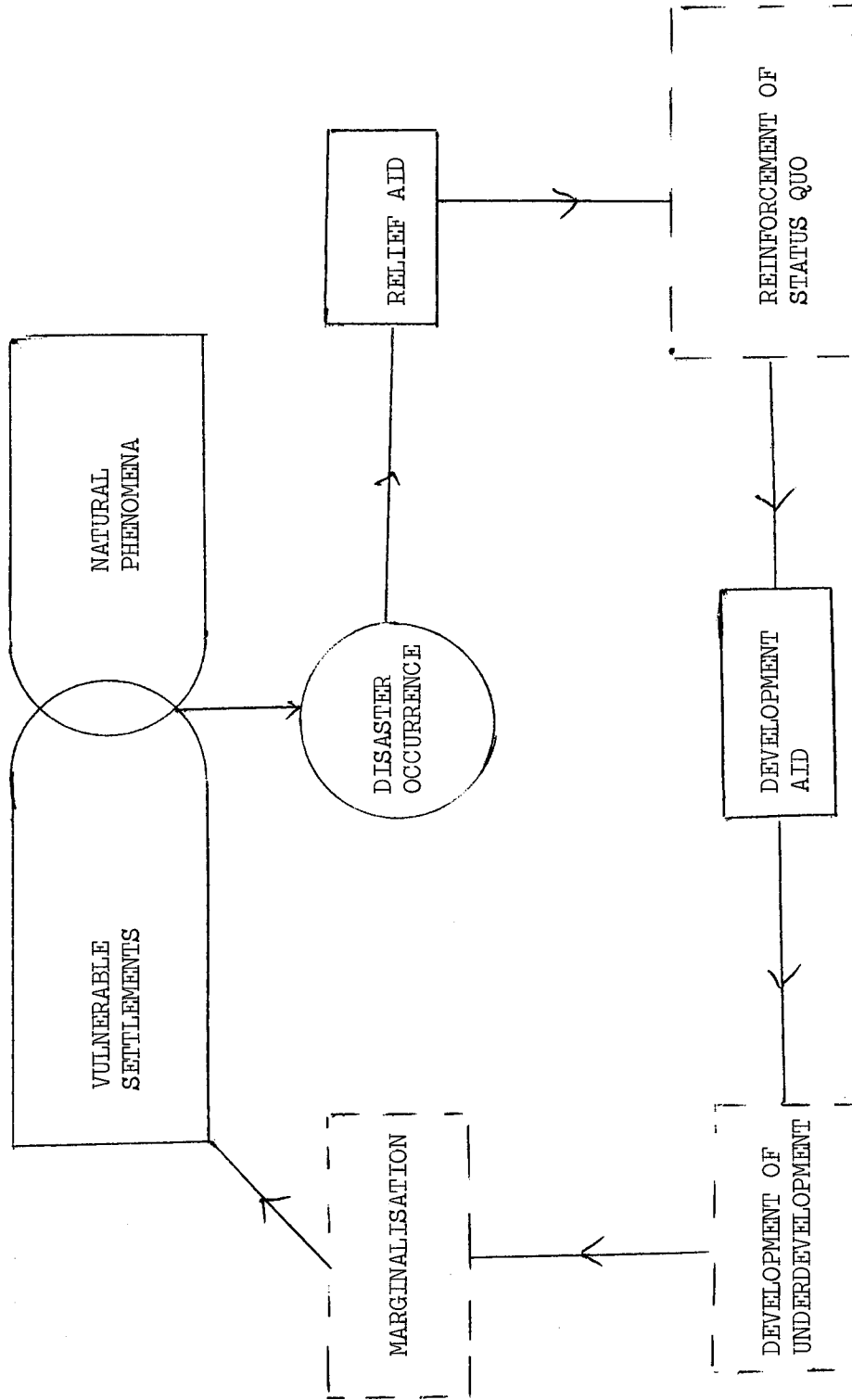
1. Folk, or pre-industrial, adjustments which involve a wide range of adjustments requiring more modifications in behaviour in harmony with nature than control of nature, are flexible and easily abandoned, are low in capital requirements, require action only by individual or small groups and can vary drastically over short distances.
2. Modern technological, or industrial, adjustments which involve a more limited range of technological actions emphasising control of nature, are flexible and difficult to change, are high in capital requirements, require interlocking and interdependent social organisation and tend to be uniform.
3. Comprehensive or post-industrial, adjustments which combine features of both earlier stages so as to involve a larger range of adjustments, greater flexibility and variety of capital and organisational requirements.

One of White's colleagues, Kates (1971, 439-440) makes the relationship between 'techno-social' stage of response and the relative sizes of economic losses, deaths and disaster frequency. According to Kates, under a regime of folk adjustments,

'Damage-causing natural events appear to be frequent; the average loss per event is low; but the ratio of deaths-to-damage is high'.

A system of modern adjustments tends to produce a situation where

DIAGRAM III: THE TENDENCY TOWARDS INCREASING DISASTER PRONENESS



'events become less frequent; death rates diminish; and average damage losses per event decrease by up to half the maximum potential damage'.

Insofar as these ideal types actually exist, they tend to co-exist in mixtures in actual human societies. This is obviously true in underdeveloped countries where, typically, the capital and other major cities as well as the plantation or other large scale capitalist agricultural sectors tend to be provided with the most modern of warning systems and have access to modern adjustments. This is in juxtaposition to the mass of peasant farmers, pastoralists, fishermen, villagers, residents of the sprawling bidonvilles etc. who continue to rely on folk adjustments. But do they? This is the important thing about marginalisation. The interaction of the modern and folk sectors of the society and economy (and they are never absolutely separate as many attacks on the dogma of economic 'dualism' have shown) in fact tends to destroy folk adjustments for the reasons and in the ways specified above. In underdeveloped countries the tripartite model of response must have at least one more distinctive type of response. A 'underdeveloped' response to hazard appears which has lost touch with folk adjustments but has not the capital or organisational resources to provide modern adjustment to more than a tiny minority. 'Underdeveloped' adjustments share with 'modern' adjustments the ability to reduce the frequency of hazard events but not the ability to trade increased economic loss potential for human life. When the hazard event does come (recall Honduras, Nicaragua, the Sahel), it comes with killing magnitude. This goes a long way in explaining the most striking trend observable in disaster data (vide page 23 above), viz. an increase in large scale disasters and an increase in the number of deaths per million population. Such a trend and explanation have profound implications for policy and practice, especially for pre-disaster planning.

#### POSSIBLE CRITICISMS OF THE MARGINALISATION THEORY

The first possible criticism of the marginalisation theory is that it simply does not take into account the increasingly important role of the media, particularly television, in cutting time-distance barriers and communicating information to the world's attention. This criticism can not possibly be true of the increasing number of smallscale disasters for as we have shown, most sources under-record the number of small scale disasters. Large scale disasters, those covering more than a 10 degree square, have always been recorded in various parts of the world - one only needs to look at the oral traditions retold in the Bible and the Koran. It does not seem, therefore, that this tendency to increasing disaster proneness is simply a facet of media coverage.

Another possible criticism of marginalisation is to place emphasis on overpopulation as the cause rather than a symptom of increasing disaster proneness. At the present moment the world population is increasing by more than 75 million persons per year and this population is largely located within the underdeveloped world. It has been shown that the world can, in fact, feed 10 to 13 times the present world population yet arguments still abound that would wish to show overpopulation as a cause of underdevelopment, of marginalisation. Overpopulation, however, must be seen as a logical insurance policy, a provision for security that an underdeveloped population will make because of the very

nature of underdevelopment. It is worth stressing that China has in fact introduced one of the most successful birth control programmes in the world but only after she gained control of her own resources.

The last and most irrelevant criticism of marginalisation theory is to accept marginalisation as a cause of increasing disaster proneness but then to argue that advanced technology can ameliorate this situation. Such a dependency on advanced technology from the developed world does not decrease, but rather increases vulnerability to extreme phenomena. The lessons of the so-called 'Green Revolution' are a parallel example when the transfer of technology from the developed to the under-developed world hindered rather than helped development; similar transfers of disaster technology can have the same effect.

#### THE CONTEXT FOR PREDISASTER PLANNING

The tendency towards an increase in disaster occurrence and scale and the substantial capital costs for assistance in relief, rehabilitation and reconstruction has encouraged much thought about predisaster planning at the Disaster Research Unit in Bradford. The Unit is preparing a 'Predisaster Planning Manual' and has produced a comprehensive predisaster plan for the Commonwealth of the Bahamas. Lewis (1974) indicated the importance of orientating such a philosophy towards the underdeveloped countries when he wrote:

'The totals killed in natural disasters over a twentythree year period (1947-70) were 56,500 in the twentyfive most developed countries and 843,000 in the twentyfive least developed countries; a ratio of something like 1:15'.

Such a situation should tend to lead to extensive predisaster planning in underdeveloped countries but this is not the actuality. Table 20 indicates that in 67 different countries no information is available about the existence of predisaster plans. The underdeveloped countries are poorly represented compared with, for example, Europe. The lack of predisaster plans is confirmed by Table 21 where it is shown that only 13 national predisaster plans exist in underdeveloped countries that have experienced disaster. The reasons for such a paucity of planning are twofold, namely, the inexperience of the indigenous administration to deal with predisaster planning and the inadequacy of financial support for such measures. Even the International Organisations suffer from severe financial constraints. The League of Red Cross Societies is primarily orientated towards relief work and funds are, therefore, primarily tied to this activity rather than to predisaster planning. UNDR0 has suffered from a lack of adequate funding. Under the terms of the United Nations Resolution 3152 (XVIII of 14th December 1973, the Secretary General authorised that US\$60,000 was available from the Working Capital Fund for National Governments to make preparations for natural hazards. Although the Office of the United Nations Disaster Relief Coordinator is a relatively new administrative unit, the total amount of relief mobilised by UNDR0 between March 1972 and April 1974 was US\$2,546,789; this excludes Sahelian relief. The figure for predisaster planning, 2.35 per cent of this relief total, would seem to indicate that the major emphasis is still placed on relief activities rather than predisaster planning which should mitigate relief expenditure.

TABLE 20RESPONDENTS TO RED CROSS QUESTIONNAIRE ON THE  
EXISTENCE OF PREDISASTER PLANS.

<u>Region</u>	<u>Government Plans</u>
Europe	20
Africa	8
Latin America	8
Asia	7
Caribbean	4
Oceania	4
Middle East	2
North America	2
No Information	67

Source: Red Cross Review of Predisaster Planning,  
September, 1974

TABLE 21PREPLANNING BY COUNTRIES WHICH HAVE EXPERIENCED  
DISASTER

<u>Region</u>	<u>Involved Central Authority</u>	<u>NGO Participation</u>	<u>National Plan</u>
Africa	2	1	3
Asia	11	11	7
Americas	10	4	7

Source: UNDRO, 1972

The need for predisaster planning can not be overemphasised, particularly when relief costs are considered against preplanning expenditure. What is necessary, however, is to consider the scope of predisaster planning.

#### THE SCOPE OF PREDISASTER PLANNING

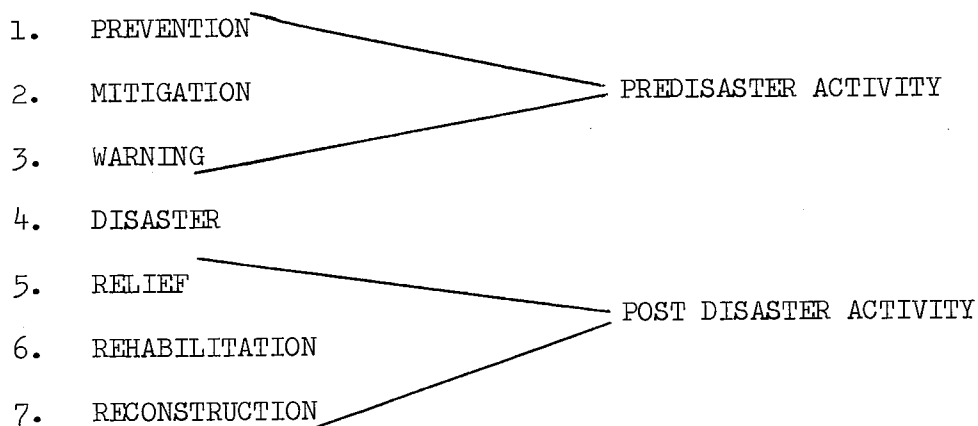
A paper which was first produced in 1973 and which has now been published with some amendment as 'Proposals for a Working Method of Indigenous Resource Coordination as Part of a Predisaster Plan' (Lewis 1975b), described a procedure for elementary predisaster planning as a first step in the practical application of comprehensive preplanning on a national, regional or local scale. By its nature this proposal deals with the short and medium term aspects of predisaster planning and it is necessary to now consider the longer term implications of predisaster planning of which the proposals form a part.

For any predisaster planning to be successful, it must be practised within the following guidelines:

1. Planning must be seen as a continuous process.
2. Planning must attempt to reduce the unknowns in a problematical situation.
3. Planning aims at evoking appropriate actions.
4. Planning should focus on probability.
5. Planning must be based on knowledge.
6. Planning is partly an educational activity.

With these guidelines as principles, one can look more closely at predisaster planning.

Disasters must be seen as occurring within a system of activity which may be listed as



Diagrams IV and V show these activities in different ways, but both imply a linear causation. Diagram VI, however, distinguishes between the activity flow and the information flows from and to these events; it is the inter-relationships of information flows that are important in the context of predisaster planning. Thus, short term rehabilitation is



DIAGRAM IV: DISASTER OCCURRENCE WITHIN AN ACTIVITY SYSTEM OVER TIME (a)

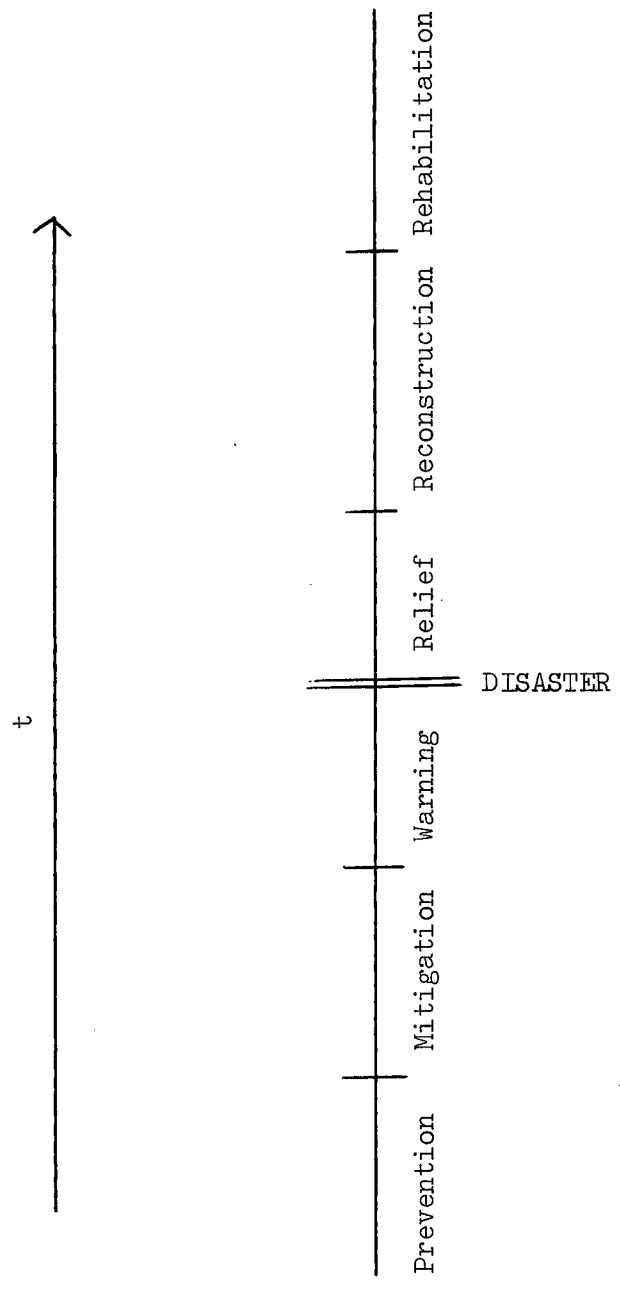


DIAGRAM V: DISASTER OCCURRENCE WITHIN AN ACTIVITY SYSTEM OVER TIME (b)

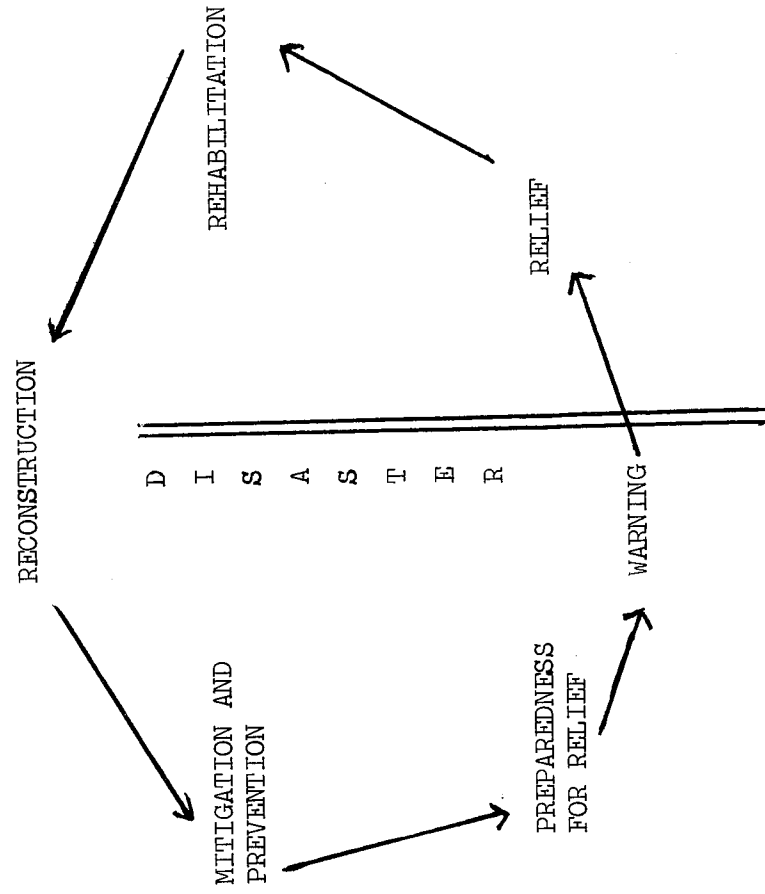
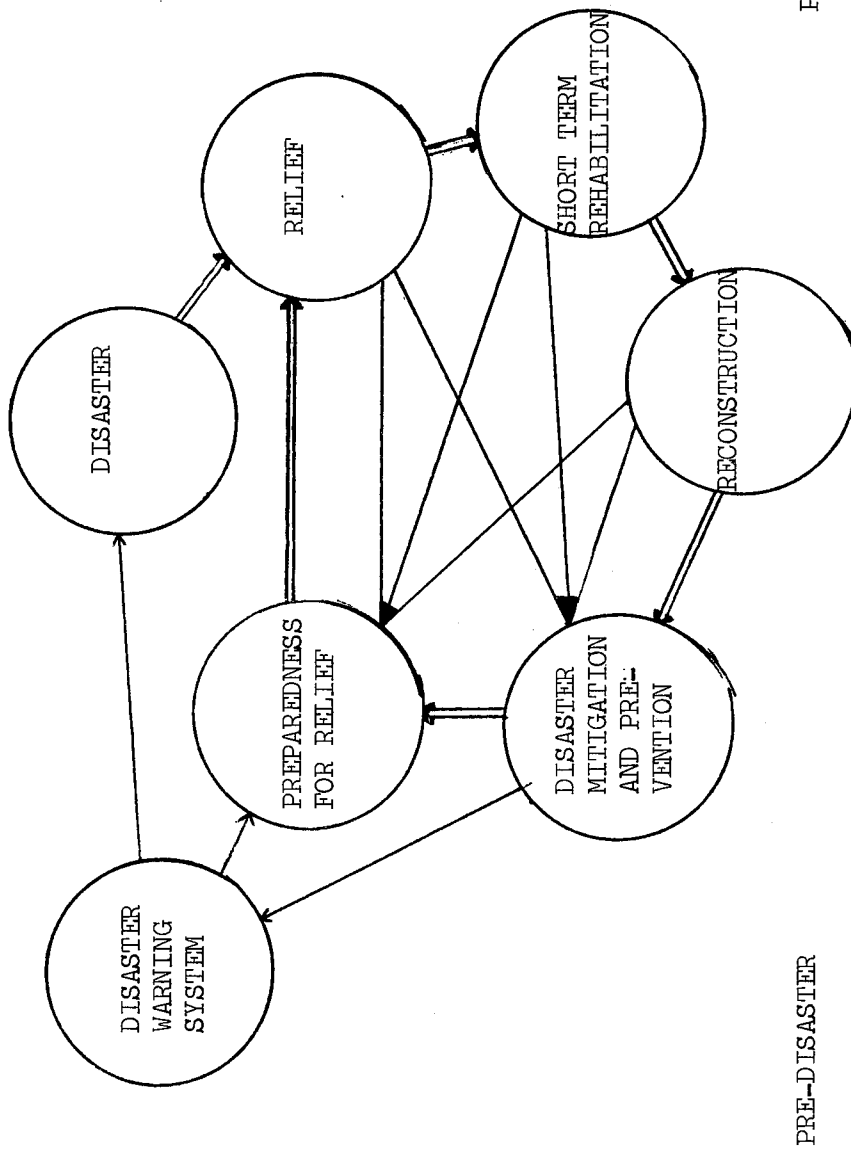


DIAGRAM VI: ACTIVITY AND INFORMATION FLOWS SURROUNDING AND INCLUDING DISASTER OCCURRENCE, SHOWING THEIR INTER-RELATIONSHIP



POST-DISASTER

PRE-DISASTER

Key:   
 ⇔ Activity flows   
 → Information flows

linked with disaster mitigation and prevention and preparedness for relief, as well as to reconstruction. The relationships depicted in Diagram VI are those of a closed system of disaster-related activities because they do not relate disasters to the environment in which they occur. To achieve successful predisaster planning, however, it is necessary also to plan within the context of the environment.

Diagram III indicated that it was possible to envisage circumstances in which relief activity directly contributed to reinforcing the status quo within which disasters occur. The status quo would be equally reinforced by any attempt to respond to disaster that relied on highly technical inputs from developed countries; successful predisaster planning must utilise the indigenous resources of the society (Lewis, 1975). In the same way predisaster planning that does not take into account the process of increasing vulnerability, the process of increasing vulnerability, the process of increasing disaster proneness, the process of marginalisation will tend to reinforce the disaster potential of an area rather than to decrease it. Thus, any predisaster plan for Honduras that simply accepts the marginal position of the peasants on the hillsides, that accepts the unequal distribution of land, that accepts the erosion of the subsistence base and the export orientation of agricultural production, will ultimately only reinforce the vulnerability of the area and increase its disaster proneness. Reinforcement of the status quo and increasing vulnerability creates a more disaster prone situation. To avoid this contradiction of planning and relief increasing disaster proneness, it is preferable to conceptualise predisaster planning as an insurance mechanism within the overall strategy of development planning, to focus on long term goals and then delimit immediate and medium term plans that will enable the long term goals to be achieved.

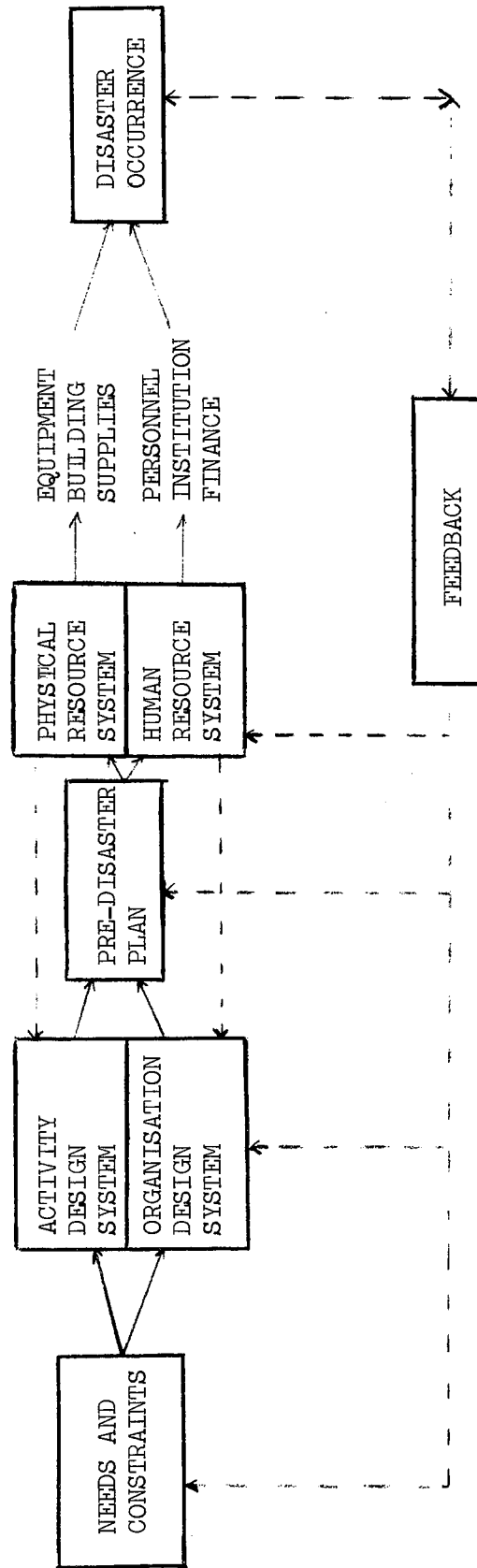
#### A SYSTEMS APPROACH TO PREDISASTER PLANNING

Any plan must clearly delimit an activity cycle of identification, preparation, appraisal, implementation and evaluation. Although these stages are necessarily interlinked, it is more useful to separate the activities so that one is not trying to prepare what one has not identified, not appraising what one has not prepared, not implementing what one has not appraised and not evaluating what one has not implemented.

Diagram VII illustrates a systems model for the stages of a predisaster plan. It indicates the various planning stages and their relationships from the identification of a need for a predisaster plan through to its application. The major stages in the planning process are shown as subsystems of the whole; the identification of the needs for a plan and the constraints of the environment; the two inter-related design systems for the plans proposed activities and their organisation; the plan document resulting from the design system; the inter-related systems for procurement and preparation of the requisite physical and human resources and, finally, the application of the plans resources to a disaster situation which is the desired output of the planning system. These planning stages are as applicable to a local self-help level of planning as to the national planning level; what may differ is the method of expression and the degree of complexity required.

In addition to these planning stages, there must also be a continuous review system of the real purpose of the plan. The system must be flexible enough to respond to changes in the environment. A feedback

DIAGRAM VII: A SYSTEMS MODEL FOR THE STAGES OF A PRE-DISASTER PLAN



mechanism is extremely important to store information, process it and if necessary recommend remedial action. Insufficient attention is often given to the crucial issue of how the plan will be applied by the existing administrative and organisational structure, with the result that plans are either abandoned or fail to be successfully integrated into government and non-government activities and institutions. Activities should be arranged in such a way as to facilitate their application by the relevant agencies. Diagram VII, illustrates a planning approach which gives equal attention to identifying the required activities and their organisation and plans them simultaneously. It is essential that the plan be both vertically and horizontally integrated for only in this way can it be successfully implemented (Diagram VIII). Horizontal co-ordination and downward vertical co-ordination are usually apparent in existing planning. What is often missing, but is critical to any successful predisaster planning, is the grassroots awareness of vulnerability and existing grassroots adjustment to natural hazard; this awareness and adjustment must be the focus of predisaster planning if it is to enjoy any success and not simply reinforce the status quo. Upward vertical co-ordination is also essential to make grassroots adjustment the basis of the plan.

#### PRACTICAL APPLICATION OF A SYSTEMS APPROACH AT GRASSROOTS LEVEL

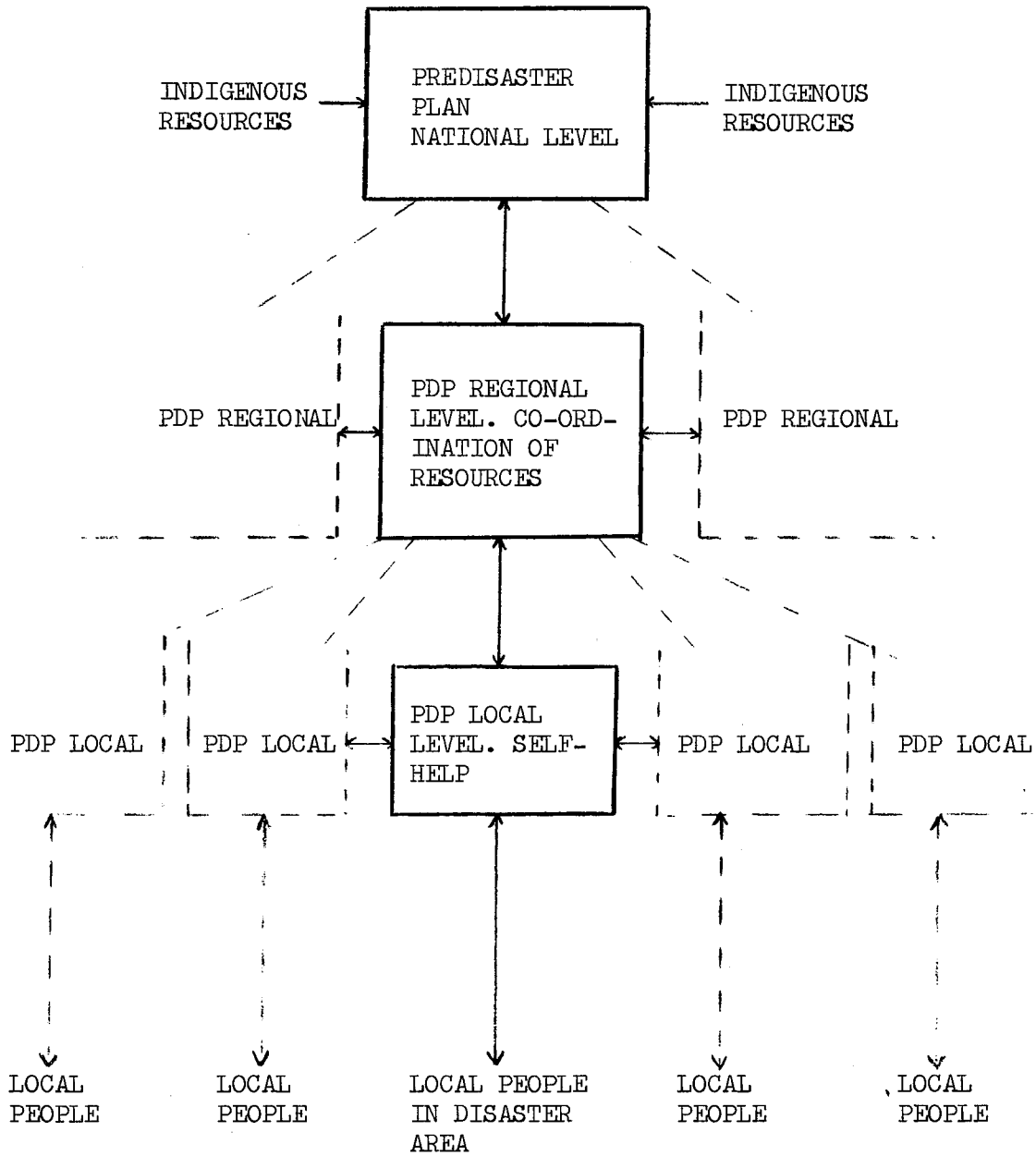
There is recent historical and present-day evidence that a degree of popular participation in pre-disaster planning can be developed which drastically deprofessionalises and decentralises the response to disaster, making communities less dependent on centralised early warning and relief. The examples tend, not surprisingly, to come from the wartime experience of North Vietnam, the Chinese countryside, and recent attempts by liberation forces and peasants in Mozambique to deal with food shortage (Wisner, 1975).

In all these cases the key to mass participation in self-help activities both before and after the disaster (digging bomb shelters, cultivating collective reserve crops, switching to root crops which are less vulnerable to attack etc.) is the close relationship which is developed over time between the local political cadre and the peasant. This relationship educates and mobilises the peasant who comes to see the survival value of cooperation. The cadre studies carefully local folk adjustments to various hazards and attempts (with the peasants, not for them) to combine these with whatever modern adjustments might be available. Hence good use is made of indigenous resources.

The examples are many. The recent withdrawal of the Portuguese from northern Mozambique left about one million peasants stranded in Portuguese camps like the 'strategic hamlets' developed by the USA in Vietnam. These peasants had not been allowed agricultural tools because of Portuguese fears that they could be used as weapons; seed was short. This situation might have become a desperate famine if FRELIMO, the liberation party, had not been able to establish the kind of mobilising relationship described with these peasants. By head-portage techniques, developed for wartime transportation of military supplies, seed and tools were supplied. The seed must be repaid to a revolving fund which will, in future years, be used to finance further agricultural development in the communities (Wisner, 1975). Likewise, Chinese response to drought has in recent years centred around massive mobilisation of labour to hand-irrigate, to build water conservation works which go

DIAGRAM VIII

A SYSTEMS MODEL FOR THE IMPLEMENTATION OF A  
PRE-DISASTER PLAN



beyond the immediate disaster to reduce future disaster proneness (Greenhill, 1973). The creative energy and imagination of people have been tapped in many ways including such startling examples as village level flood proofing in the face of bombardment of the Red River dykes of North Vietnam (Lacoste, 1972) to the local production of skyrockets to be used in cloud seeding over a Chinese commune! (Crook, 1966).

This mass approach functions best at the third level of planning shown in Diagram VIII; that is to say at the local level in a decentralised way. Its dependence on information from the centre, including 'early warning', is minimal; which, in underdeveloped countries where information flows are limited and slowed down by poor communications, is a virtue. The mass approach generates large amounts of feedback information which can not only be used to reassess local planning for mass participation in self-help, but can also be used to establish regional and national plans as required. The emphasis in underdeveloped countries should be very much at the local level; the importance of national planning should be limited to co-ordinating and supplying inputs which are not available at local levels, such as the supply of seeds and tools by FRELIMO to those peasants stranded in camps. 'Upward planning' should be the basis for all activities. This can best be appreciated by reading Diagram VIII from the bottom up.

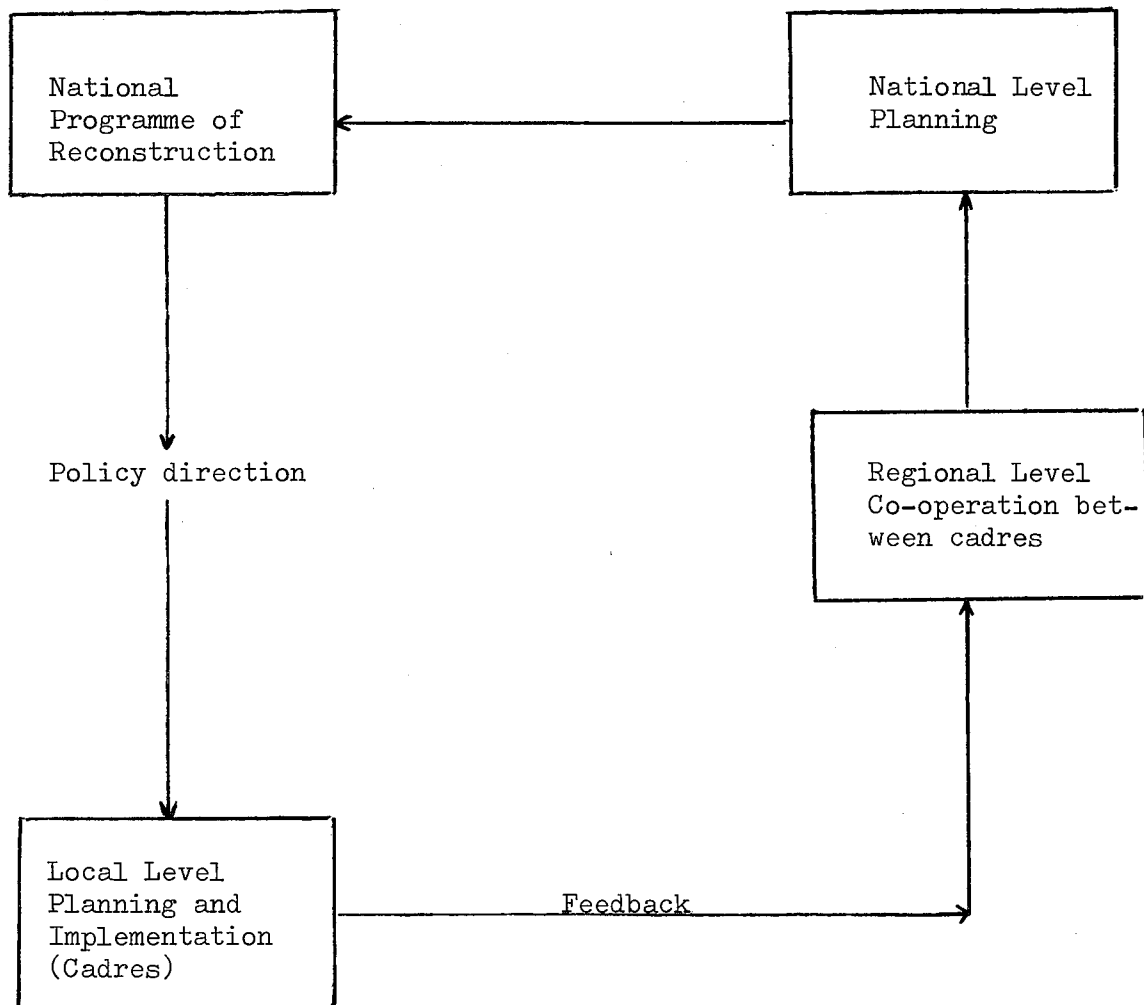
At the local levels the systems model illustrated in Diagram VII is equally applicable. Needs and constraints are identified by the political cadre working with the people; the activities which are organised are of a practical, self-help nature which contribute towards decreasing disaster proneness; the pre-disaster plan may or may not be written or formalised - whether or not this is the case a plan will exist to the extent of a logical utilisation of the communities resources both physical and human. The preparation and utilisation of these resources are the basis for dealing with the disaster if, and when, it occurs.

Under the mass approach relief, rehabilitation, reconstruction and prevention tend to be combined into an overall 'national reconstruction' programme which utilises the labour and adjustment systems of the peasants on an on-going basis to build and rebuild in a way which tends to decrease future proneness to both man-made and natural hazards. The general direction of this programme from the national level is dependent on the feedback received from the local cadres in their practical implementation as shown in Diagram IX. Development and the diminution of disaster proneness, through the avoidance of marginalisation, become a part of the same process.

## CONCLUSIONS

Several points of varying importance emerge from this discussion. First, despite the lack of data and a bias contained within existing data, there is a recognisable tendency towards an increase in disaster occurrence. The areas of the world more often affected are the less developed countries; the most frequent disaster types are flood, earthquake and typhoon, although the occurrence of drought appears to be on the increase. Second, the cost of disaster is high, in fact 'expressed as a percentage of GNP, the damage is often greater than the real rate of growth in these countries' (UN 1974).



DIAGRAM IXNATIONAL LEVEL DIRECTION AND LOCAL LEVEL FEEDBACK IN  
PRE-DISASTER PLANNING

The tendency towards increased disaster proneness can be analysed and is seen as the direct result of the increased vulnerability of increased marginalisation.

Conclusions so far serve to underline the salient necessity for a form of predisaster planning which will coordinate all relevant indigenous resources and which will recognise as a principle resource the value of grassroots involvement and self-help procedures. Any programme of predisaster planning must be comprehensive and coordinated and as such will achieve considerable reductions in losses of property, production and life each time a disaster occurs. Any such programme is clearly worth implementing in any disaster prone society and environment. If however, long term reductions in disaster proneness are to be achieved it will be necessary to achieve a reduction in the rate of the marginalisation process. To be totally effective, predisaster planning must include an analysis of the existing socio-economic condition of the population. This argument does not detract from the advances in the study and application of predisaster planning that have been made in very recent years, but seeks to ensure recognition of the context in which they continue to take place. The processes of increasing marginalisation, the basic cause of disaster, will not be reversed by any technical methodology. The processes of 'development' must first become enlightened with regard to disaster probability and recognise their capacity for a most dangerous role in disaster cause and exacerbation. Next, predisaster planning must be incorporated into development planning if it is to have any lasting value; for if as a process it is applied in isolation it will become merely a palliative dealing with the symptoms and not the causes of disaster.

## BIBLIOGRAPHY

- AMIN, S. (1974). Accumulation on a world scale - a critique of the theory of underdevelopment. Monthly Review Press, 2 Vols.
- COCKCROFT, J.D. et al (1972). Underdevelopment: Latin America's Political Economy. Doubleday, New York.
- CROOK, I. and CROOK, D. (1966). The First Years of the Yangyi Commune. Routledge and Kegan Paul, London.
- DAVIS, I. (1975). 'Disaster Housing: a Case Study in Managua'. Architectural Design Vol. XLV.1.
- DWORKIN, J. (1974). 'Global Trends in Natural Disasters 1947-1973'. Natural Hazard Research Working Paper No. 26, University of Colorado, Dept. of Behavioural Science, Boulder.
- DYNES et al. (1972). 'A Perspective on Disaster Planning'. Disaster Research Center Report Series No. 11, The Ohio State University, Columbus, June.
- FRANK, A.G. (1971). Capitalism and Underdevelopment in Latin America. Penguin, London.
- GREENHILL, R. (1973). 'Coping'. New Internationalist, No. 5, July.
- HAYTER, T. (1971). Aid as Imperialism. Penguin, London.
- KATES, R. (1971). 'Natural Hazard in Human Ecological Perspective: Hypotheses and Models'. Economic Geography, Vol. 47, No. 3.
- LACOSTE, Y. (1972). 'An Illustration of Geographical Warfare: Bombing the Dikes on the Red River, North Vietnam'. The Nation, Oct. 9th.
- LEWIS, J. (1974). 'The Disaster Research Unit'. Newsletter No. 3, Project Planning Centre for Developing Countries, University of Bradford, July.
- LEWIS, J. (1975). 'Disaster Management with Special Reference to Pre-disaster Planning'. DRU Research Papers No. 2.
- LEWIS, J. (1975b). 'Proposals for a Working Method of Indigenous Resource Coordination as part of a Pre-disaster Plan'. DRU Research Papers No. 3.
- MEILLASSOUX, C. (1974). 'Development or Exploitation: is the Sahel Famine good business?'. Review of African Political Economy No. 1.
- O'KEEFE, P. (1974). 'Environmental Remote Sensing. The Smithsonian Institute'. International African Institute. Mimeo.

- O'KEEFE, P. (1974b). 'Gakarara - A Study in the Development of Underdevelopment'. DRU Research Papers No. 6.
- O'KEEFE, P. and WISNER, B. (1975). 'East Africa - A Case Study in Underdevelopment'. African Environment No. 3.
- O'KEEFE, P. and CHERRETT, I. (1975b). 'Hurricane in Honduras: An Analysis of a Disaster'. DRU Research Paper. Forthcoming.
- O'KEEFE, P. (1975c). 'African Drought - A Review'. DRU Research Papers No. 8.
- OXFORD ECONOMIC ATLAS (1971). OUP London.
- PAYER, C. (1975). The Debt Trap. Penguin, London.
- RODNEY, W. (1972). How Europe Underdeveloped Africa. Tanzanian Publishing House, Dar-es-Salaam.
- SHEEHAN, L. and HEWITT, K. (1960). 'A Pilot Survey of Global Natural Disasters of the Past Twenty Years'. Natural Hazard Research Working Paper No. 11, University of Colorado, Dept. of Behavioural Science, Boulder.
- UN ECONOMIC AND SOCIAL COUNCIL (1974). 'Report on the damage inflicted on the Honduran Economy by Hurricane Fifi and its repercussion. E/CEPAL/AC.67/2.
- UNITED NATIONS (1974). Annual Report from the United Nations Disaster Disaster Relief Office.
- USAID (1974). Internal Mimeograph. Washington.
- WHITE, G. (1974). Natural Hazards. OUP, London.
- WORLD BANK (1973). World Bank Atlas. International Bank for Reconstruction and Development, Paris.
- WISNER, B. (1973). 'Global Interdependence of Drought Response and the Struggle for Liberation'. Geographical Journal; Special Issue of Food Shortages. Dar-es-Salaam.
- WISNER, B. (1974). 'Rethinking the geography of famine'. Mimeo. Dar-es-Salaam.
- WISNER, B. (1975). 'Famine Relief and People's War in Africa'. Review of African Political Economy, No. 3.