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SOME ASPECTS OF DISASTER RESEARCH

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Earthquakes, volcanic eruptions, tsunamis, hurricanes and typhoons, floods, fire and drought have taken part in the shaping of physical and human nature since prehistory. With the exception, however, of some vividly described events by travellers and raconteurs, detailed attention to their causes and effects has, until comparatively recently, been absent. The Lisbon earthquake of 1755, the cataclysmic eruption of Krakatoa in 1883, the eruption of Mont Pelée and the destruction of St. Pierre in Martinique in 1902 and the San Francisco earthquake of 1906 have all been described in their various ways by travellers, journalists, sea captains and diarists. Disasters were described but they were not analysed[2,1].

Gradually there emerged an attention by scientists. Scientific research into the origins of the earth and its surface formations naturally included study of volcanic and seismic activity, and specialists in vulcanology and seismicity identified themselves and have developed detailed analyses of the mechanism of these actions. As the science of weather analysis and forecasting emerged, this naturally included attention to the formation of depressions and other manifestations of extreme weather conditions. Study by meteorologists of the origins and behaviour of cyclonic formations and tropical cyclones, called either hurricanes or typhoons, likewise emerged as another specialist pursuit. Many valuable analyses and many valuable experiments have been undertaken and much valuable data has been collected. Our knowledge of the origins and causes of earthquake, volcano and tropical cyclone is the richer as a result. The work of two eminent seismologists, Gutenberg and Richter[3], was outstanding when they produced a work on seismicity covering earthquakes and volcanic occurrences throughout the world, made possible by the development of remote seismic sensing established in 1889. Richter's name is now given to his scale of earthquake intensity. Many other works have, of course, been produced on these and other phenomena in various parts of the world but Gutenberg and Richter were unique in applying their subject to a world coverage. Taken in total, however, all other works combined give essentially a world coverage and it can be said therefore that work by scientists in their various subjects has not, collectively, been constrained geographically.

It has, however, been restricted conceptually to within each scientific discipline. Attention has been given to tropical cyclones or earthquakes or volcano in any particular place, by scientists of separate disciplines. Attention to these events has been given by scientists to the cause of each event and rarely to its effects. Little interest has been shown in the victim and the combined effect of several kinds of disaster on one place has escaped attention. Works in geography and in atlases still produce maps showing areas of tropical cyclone activity or areas where earthquakes are likely – but superimposition of these areas is not attempted. Scientific study and research into disasters has been essentially mono-disciplinary and this has led to disasters being commonly regarded as isolated events and as being regarded totally as a result of natural phenomena.

Gutenberg and Richter's work was produced and published in the U.S.A. and was possible only because the remote sensing of earthquakes in one country by apparatus in another had been developed since its inception in 1889. Whilst this made the recording of all earthquakes possible, by the same token it made assessment of the effects of each or any earthquake impossible. Selection of particularly damaging earthquakes from that publication is not possible and reliance on intensity grading is insufficient as a low intensity earthquake in a vulnerable situation can do more damage than a high intensity earthquake in a location where there are no buildings and no people.

In contrast, information on the occurrences of tropical cyclone is more comprehensive per event, relying as it has had to do on direct experience for knowledge of the event. Records of observations on land or ships at sea, which have had direct contact with the event, have often been rich in their analysis of the event itself and its effects. Thus, unless the experience was undergone by people with the responsibility or the desire to record what happened, tropical cyclones went unrecorded and where they were recorded in one place it was some considerable time before the complete track of the cyclone could be established by collecting other reports and by inference. A report by Governor Rawson[16] of the "calamitous visitation which swept the greater part of the Bahama Islands" in October 1866 was not finally fully reported until March 1868 after information had been separately collected and assessed from 34 sources on land and at sea. The remote monitoring of cyclonic formations

now made possible by satellite observation may lead to depersonalised data similar to that for earthquake occurrence.

Whilst it has been said that, collectively, scientific attention to natural phenomena causing disaster has not been geographically constrained, it is obvious that some areas of the world have received more attention than others. In countries where reasearch is a normal and predominant activity, attention by researchers to disaster has been greater than in countries where research is less predominant or non-existent. Exceptions are those countries which, whilst not initiating research activity themselves, have become grounds for field research by outsiders. Such areas are, for instance, parts of the Caribbean and Pacific Ocean and outsiders have gone into these areas from such countries as New Zealand, Australia, the United Kingdom and the United States, each usually to where his own country had some political responsibility or relationship.

The United States, and the North American continent as a whole, has been responsible for by far the greatest volume of disaster research. Not only is research a predominant activity but disaster occurrence in the form of earthquake, hurricane, flood and drought is regular and of considerable impact. But it was as a result of war that the first analytical work of the effects of a disaster was produced. In 1917 two ships, one of them heavily loaded with explosives, collided in Halifax harbour, Nova Scotia. The explosion which followed, then "the greatest single explosion in the history of the world", left 2000 dead, 6000 injured, 10,000 homeless and 300 acres of land and property destroyed. A sociologist, Samuel Prince, produced the first systematic study of a disaster event and examined "the place of catastrophe in social change"[15]. Nine socio-psychological factors of disaster were documented and some of the earliest comments which could be directed towards precaution for possible subsequent and similar events were produced. Prince was a social scientist and a pioneer in the application of his subject of sociology to disaster research.

Natural disaster occurrences in the U.S.A. include the effects of earthquake, hurricane, fire, flood, drought, frost, hail and snow. The great floods of 1927 and 1929 in the Mississippi and Ohio valleys were countered by the Corps of Engineers with a technological response which was later to be criticised for its lack of comprehension of the overall and complex food problem, and for the carrying out of flood protection works whether "economical" or not[21]. Controversy ensued between engineers and the geographers at the Chicago School of Geography. The Tennessee Valley Authority progra programme of the 1930's which developed navigation, flood control and hydro-electric power production for the promotion of economic and social welfare of the region signified the considerable success of the comprehensive approach promoted by the geographers and other social scientists, but the differences of attitude between them and the contained technological approach of engineering continues today. Additionally, the combined effects of drought and wind erosion in the "dustbowl" of the 1930's eventually "led to the recognition that disaster could be offset by the comprehension of a need for the harmonious relationship vis-a-vis man and his environment and the relative technical requirements needed to promote this harmony"[21].

But the results of war continued to provide a research need and research material, and Prince in Halifax in 1917 was followed by American psychologist's studies of bombing and evacuation in Germany and Japan in the 1940's, studies into behaviour under stress[5] and the effects of war, revolution and famine on human behaviour, social organisation and culture[19] were supported by the involvement of the National Academy of Sciences. A committee on disaster studies was established by the National Research Council in 1953 as part of the response to the "cold war" and an attention to the possibility of nuclear attack and its aftermath. Parallels between natural disaster agents, particularly hurricanes, and the probable effects of nuclear bombing were examined. During the same period the National Opinion Research Council of Chicago undertook field studies and produced a basic methodology for disaster research, which developed away from individual response to that of community and group response, and analysis of response within defined time phases of a disaster process. The National Academy of Sciences had conferred a respectability on disaster as a research subject which expanded as a result[21]. The Disaster Research Center at Ohio was established in 1963 to undertake studies of organisational and community response. Separate and collaborative programmes continued and are continuing at Chicago, Clarke, Boulder and Toronto, and include geographers, psychologists, sociologists, engineers, hydrologists, urban planners and economists.

Although now inter-disciplinary, the constraint was geographical and research was contained within the North American continent. Whereas collective scientific mono-disciplinary research was world-wide, inter-disciplinary research initiated by the social sciences in North America was principally concerned with flood as a disaster agent. An outstanding exception was a study by two geographers at the University of Toronto[4] which examined the incidence and probability of all "hazards" at one particular place, being London, Ontario. In its examination of all hazard possibilities at one place it was significant, but is an approach that has not been developed since by the natural hazard research groups working within North America.

Some cross-cultural research, initiated in 1974 between developed country cultures (U.S.A., Japan and Italy)[14] began to break geographical boundaries, and an extension of the flood hazard programme to other geophysical hazards "to investigate the interaction of social and natural systems in a variety of environments and cultures beyond those that had thus far been covered in North America"[22] developed at much the same time. Applying a methodology developed within the North American programmes, interviews to elicit information concerning the hazard, attitudes, decisions and adjustments in a social context displayed by age/sex structures and social and economic status were undertaken in a variety of situations, basically applying the same method in each situation but with

some modification to take account of local conditions[22] Mexico, the Virgin Islands (U.S.A.) and Nicaragua have been principal research locations.

The value of this work within North America and that of the Natural Hazard Group and Disaster Research Center in particular, cannot be over estimated. It has led the way to a comprehensive and integrated approach to disaster assessment and response and has shown that technological methods to overcome disaster are not enough. (In a 15 year period of intense technological activity to overcome flooding, losses actually increased as a result[22].) Disasters have been recognised not as isolated and single events but as a continuing process of extreme manifestation of the day to day situation. However, any assumptions that methods and results applied and produced within North America can be taken to be equally valid in other parts of the world has to be regarded with extreme circumspection[7]. There is an apparent rigidity with regard to the problems of less-developed countries within the natural hazard research of North America, which is undergoing some criticism for its continued attachment to economic and social concepts that are inapplicable to situations in less-developed and under-developed countries. These concepts assume that societies will develop within a programme of growth which will naturally cause them to move up a scale from being purely "folk societies" to "industrial" and "fully developed" societies. This in itself is open to concern and doubt, and there is increasing opinion and evidence that this is not the case[21,1].

Recognising this and recognising also that the greatest losses in terms of life caused by natural disaster are in "developing countries"[9] the aims of the Disaster Research Unit at the University of Bradford were significant and a major step in the continuation and application of disater research in a world context. The need for research to be orientated towards communities of assessed vulnerability was recognised[8] and a concept of planning as a response to natural disaster was initiated[11,13] Long term strategies to reduce vulnerability of future populations[1] has been a significant product of the Unit's work and is paralleled by attention to contingency planning and social and physical precautions that can be initiated by established communities and populations[13]. Based on the premise that "without people there can be no disaster"[22] it has been recognised that the social and economic condition of a community can contribute as much as the natural phenomena towards the total impact of disaster, and that moreover, losses are increasing due to the exacerbation of the socio-economic condition. Recognising this, socio-economic analysis is a parallel prerequisite to physical vulnerability analysis for the commencement of precautionary planning.

Studies and applications in specific locations, of precautionary planning principles developed by the Unit have drawn heavily on scientific papers relevant to natural hazards and on the background of research within the social sciences described. Following on logically from the work of the chroniclers and the early analysts and the enormous volume of socio-psychological-geographical analysis, this work can be called a strategic synthesis in its attempts to put together its own concepts of precautions against disasters of many kinds and in many locations and situations. This synthesis and its application is not geographically constrained and has already been applied in the Caribbean and the South Pacific, but there is emphasis on less developed countries. It is, above all, broadly inter-disciplinary.

The programme undertook an examination of past and current research and a theoretical analysis of the disaster process in developing countries. Within the theoretical framework, the socio-economic condition was analysed and an assessment made of the total disaster context, including man-made additions to natural disaster. In two recent projects[12,13], disaster context has included hurricane, drought, flood, earthquake, volcanic eruption, tsunami, epidemic, aviation accident, maritime accident, fire, industrial explosion[20], toxic spillage, food shortage and combinations of these. When combined with social, psychological, anthropological, geographical, historical, climatological, economic and financial assessment and analysis, the range of inter-disciplinary application approaches the maximum. Furthermore, strategic planning and administrative application involves management, business science and systems analysis.

Some additional sectoral activities represented within this already considerable range of expertise and understanding, required for the strategic synthesis of precautionary planning, are continuing. For example, the London Technical Group, with a desire to improve relief of conditions following the occurrence of disaster, have undertaken nutritional studies[18]; the School of Epidemiology at the University of Louvain have for some time contributed significantly to research in health aspects during and after disaster situations[6]; and an architect, Ian Davies, at Oxford Polytechnic is developing strategies for emergency shelter for application in disaster situations[2]. All these activities are informally, but personally and conceptually related. Their fusion and integration could be improved, but capacity for and effectiveness of inter-disciplinary research, study and application can be questioned. It is important that whatever research is undertaken must recognise the continuing ecological process of disaster and the total framework for research that has evolved[10].

The danger is that traditional intellectual rivalries will prevent inter-disciplinary co-operation[17]. Inter-disciplinary working is not easy. Its obvious and simple role is for it to produce related results from a variety of juxtaposed disciplines. To draw relationships between conclusions of research undertaken by those disciplines, is a primary and comparatively elementary undertaking. For there to be a complete fusion of ideas, for a metamorphosis of motive and for the generation of energy from a total fusion of elements, for the ultimate product to be so much more than an accretion of separate parts, there has to be marriage of personalities, attitudes and ideologies as well.

Requirements from future research will be to move towards more successful and productive fusion of disciplines, and towards greater inter-disciplinary co-operation so that a permanent fusion of attention to disasters can result, so that

liaisons between different and hitherto separate interests, motives and disciplines can be easily formed The current sharp distinction between precautionary planning and relief must be resolved and sectoral aspects represented by the professions, for instance, must recognise their role within the total concept of disaster response. Ultimately as a result, popular and official response will adjust, and losses from natural disaster will cease to increase and will demonstrably reduce.

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