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The Efficacy of the Neo-Liberal Individual Choice Model for Encouraging Post-Disaster Change: Developments in the East Cape Region of New Zealand following Cyclone Bola (March 1988)

ARNOLD R. PARR

The government of New Zealand instituted a new policy of disaster response in an attempt to bring about change and development in the relatively remote agricultural region which was struck by a severe cyclone in March 1988. The new policy involved a change from payment for restoration to compensation for loss. This new policy was based on the neo-liberal position that individual choice should prevail in decision making and that significant change will result from this adherence to an individual decision making approach. The new policy did not accomplish any significant degree of change in the intended areas of land ownership and land use. Most of the farmers used the compensation funds to carry out on-farm restoration work which facilitated the resumption of pre-cyclone farming activities. It is argued that the efficacy of a neo-liberal individual choice model for accomplishing post-disaster change and development is limited and that a more institutionally and organisationally based approach would be much more effective and efficient.

The focus of this paper is an examination of the responsibility and involvement of government in disaster management. Specifically, the role of the central government is analysed in responding to a severe cyclone in a relatively remote and depressed agricultural region of New Zealand. This focus results in the critical appraisal of a neo-liberal approach to disaster response.

In New Zealand the development approach to disaster response is usually debated in terms of the interface between state and private sector risk management. There is the compulsory, state-operated, fifty-year-old Earthquake and War Damage Commission insurance programme which has provided disaster coverage for any property insured against fire.¹ This programme has always been piggy-backed onto fire insurance and crops, livestock, land and fences have been non-insurable under this programme. After each disaster there is debate about whether owners should bear the loss for the non-insured assets and

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thus be encouraged to take out private insurance. In the agricultural sector there has usually been major government intervention after each disaster with programmes aimed at the immediate restoration of assets to the pre-disaster situation.

In response to Cyclone Bola there was a drastic change in government policy and the resulting development approach to disaster response is analysed in this paper. On the basis of this analysis, practical and constructive recommendations are made for use by practitioners and policy makers in the field of disaster management.

IMPACT OF CYCLONE BOLA

From 6 to 9 March 1988 Cyclone Bola had disastrous effects in four regions of New Zealand, but its severity was greatest in the East Cape region as is revealed by the amount of government compensation paid out in each region: East Cape ($43.9m), Northland ($5.2m), Northern Hawkes Bay ($4.7m) and Taranaki ($2.5m) (Webber et al., 1992, p. 2).

Heavy rainfall during Cyclone Bola caused extensive flooding, erosion and silting in the East Cape region. The rainfall was in excess of a once in 50 years event; in only 72 hours up to 900 mm of rain fell. Three thousand people were evacuated. Two hundred and fifty homes were damaged or destroyed and some evacuees could not return to their homes for several months. Some farms were without electricity and telephone services and were inaccessible by road for up to one month.

In the East Cape region over half (55 per cent or 660 properties) of the hill country pastoral (sheep and beef) farms of 150 hectares or larger claimed assistance under the Cyclone Bola farm assistance programme. On the farms that qualified for assistance, the average loss of pasture due to slip erosion was 6 per cent, with loss rising to as high as 28 per cent. The total area of slip erosion was 30,800 hectares and 60 per cent of this area being loss to production permanently or at least for several years (Korte, 1989, p. 3).

About half the compensation ($20.6m) paid out by the Cyclone Bola farm assistance programme went to hill country farmers. The average payment was $54,600 for large properties (over 800 hectares) and $21,800 for small properties (from 150 to 800 hectares) (Korte, 1989, p. 52).

SIGNIFICANT CHARACTERISTICS OF THE EAST CAPE REGION

The East Cape region (Figure 1) is sparsely populated, with a population at the time of the disaster of approximately 53,000 persons (representing about 1.5 per cent of the total New Zealand population). Two thirds of the population live in Gisborne city, the only large urban area in the region. The ethnic Maori population of 38 per cent is large relative to the national proportion of 12 per cent. In parts of the East Cape region ethnic Maoris predominate as in Waiapu County where 76 per cent of the population is Maori.

The land formations range from coastal and river plains to very steep mountainous terrain. Landholding is a mixture of private ownership, Maori incorporations and incorporations owned by the government and local bodies. At the time of the disaster the East Cape was one of the most economically depressed regions in New Zealand. Incomes were below the national average and unemployment was well above the national average. Economically, the region depends largely on primary production in pastoral farming, horticulture and forestry.

The East Cape region is prone to flooding and land slippage and erosion damage. In this regard, the region has experienced previous cyclonic storms of similar severity, the most recent being in
FIGURE 1 New Zealand and the East Cape Region
1980 and 1982, and Korte points out that 'hill country erosion such as occurred on the East Coast during Cyclone Bola will occur again in the future' (Korte, 1989, p. 1). The specific vulnerability of the East Cape region to cyclonic-type disasters is well understood in New Zealand according to researchers who have evaluated the Cyclone Bola agricultural assistance programme. After extensive research in the East Cape region in 1988 and 1989, they report that farmers, local government officials and the general public as a whole were gravely concerned

with the continuing risk which the region now faces from further flooding. Continued erosion combined with silting and aggradation in the rivers, in the catchment areas and in the lower valleys suggest that the region is now more vulnerable to a Bola-type disaster than at any time in the recent past (Webber et al., 1992, p. 73).

Approximately 200,000 hectares of grazing land is at high risk from slippage, erosion and silting. The scale and severity of the problem is such that a soil conservation expert concludes that 'unless erosion control is implemented at the regional scale, the efforts of conscientious individuals may prove to be largely in vain' (Trotter, 1988, p. 15). It is in this context of continuing threat of disaster that the degree of change after Cyclone Bola to mitigate and prevent future damage is analysed.

A NEO-LIBERAL APPROACH TO DISASTER MANAGEMENT

The central government through the Ministry of Agriculture and Fisheries developed and implemented a new policy for responding to natural disasters when dealing with the effects of Cyclone Bola. The Ministry decided that farmers and growers would be compensated for loss of assets during the cyclone and for loss of revenue due to the cyclone. This involved a change in policy from payment for restoration to compensation for loss. The compensation was paid for 60 per cent of non-insured total losses after an initial deduction of $5,000. This radical change in policy was implemented through the Cyclone Bola farm assistance programme.

This policy was different and new because the government did not tie or specifically target the way in which the compensation was to be used. This new policy was based on the neo-liberal position that individual choice should prevail in decision making and that significant change will result from this adherence to an individual decision making approach. These underlying premises of the policy are clearly revealed in a report to Parliament about the disaster assistance programme.

The emphasis in the scheme is on compensation for loss rather than the traditional approach of payment for restoration. This allows farmers to choose how best to spend the money allocated to them - to restore the farming system, change it, or even leave the land and move elsewhere (Korte, 1989, p. 2, emphasis added).

The development approach to disaster response in the case of Cyclone Bola was clearly based on a model of individual choice. The disaster management programme for farming was devised to 'provide assistance in a form which minimised the chance of distorting whatever the prudent decision of the individual occupier for his/her future' (Korte, 1989, p. 2, emphasis added). The statement by evaluators of the Cyclone Bola farm assistance programme that 'there is little written information available which details the thinking underpinning the design of the scheme' reveals a failure to recognise the neo-liberal orientation of the programme and to take into account the pervasive influence of neo-liberalism in New Zea-
land society by the late 1980s (Webber et al., 1992, p. 5).

It needs to be recognised that the fostering of ownership restructuring and change in land management and use were only two of the major objectives of the Cyclone Bola farm assistance programme. The other objectives were to enable farmers to maintain existing viable operations and to maintain a sense of social cohesion in the region as a whole. It is not clear what priorities the formulators and backers of the programme placed on these various objectives. It is clear, however, that the objective of ownership restructuring was part of the neo-liberal agenda which had become very pervasive and strong in New Zealand society by 1988.4

DISASTERS AND CHANGE

In formulating development programmes for disaster management, is it appropriate to view disasters as sources of significant and pervasive changes? The existing disaster literature presents a mixed picture about disasters and change. Prince's classic disaster study found that there was extensive change after the 1917 munition ship explosion devastated the city of Halifax. The changes were both physical and social. Community attitudes changed. An appreciation of the individual as an essential part of the community developed. Civic groups were formed to help the government plan a new city. Zoning laws for industrial, commercial and residential areas were immediately passed. The public health programme was expanded to become the most complete public health organisation in Canada. The public was given access to telephone lines to major cities in Canada and the United States. For the first time in Canada, relief regulations and procedures were standardised and assigned to different organisations as post-disaster responsibilities (Prince, 1968 [1920], pp. 118–46).

After analysing recovery patterns from earthquakes in Skopje, Yugoslavia (1963) and Alaska (1964), Dacy and Kunreuther concluded that disasters may generate modernisation and technological innovation (1969, pp. 168–69). For example, the disaster destruction of old business establishments and homes permits rapid modernisation to replace what would normally be gradual renovations. Also, the normal process of technological change may be accelerated by the challenges faced during disaster recovery.

Geipel, through his study of reconstruction after the Friuli, Italy earthquakes of 1976, took a very qualified position about how much catastrophes can be regarded as an impetus to development in the area they affect. In the case of house reconstruction, he found that:

The ordinary people ... were pushed into the background while reconstruction of dwelling space was going on, so that, for them, the after-effects of the catastrophe have been getting worse instead. The previous property pattern and power structure came back all the stronger in the reconstruction phase, and a critic who claimed that 'an earthquake is a social class quake' may be wrong in the case of Friuli. This can be seen in the way better contacts and the possession of superior information permit influential entrepreneurs of the communes to commence reconstruction immediately, whereas the little man trying to rebuild his home on his own is put off with the claim that at the moment building capacity is completely tied up (1982, p. 98).

Cuny explored how a disaster presages possibilities for development. He reached the conclusion that 'the success ratio of ... attempts to use disasters as opportunities for change has been rather low, even in the more industrialised nations where more extensive resources exist' (1983, p. 101). He added that 'this poor showing does not mean that a number of opportunities for modest change are not
present. But usually these opportunities require a subtle approach, patience, and a long-term commitment on the part of the agency (loc. cit., emphasis added).

It is clear that one of the goals of the government farm assistance programme for Cyclone Bola was to bring about change. The Ministry of Agriculture and Fisheries contracted a team of researchers to carry out a review of the programme. The first of the five terms of reference for the review was to ‘evaluate the physical and financial effects of the assistance package at the individual, community and regional levels including changes in labour resources and land use’ (Webber et al., 1992, p. 3, emphasis added). This clearly reveals that the bringing about of change was one of the definite goals of the Cyclone Bola farm assistance programme.

The researchers responded to this particular term of reference by basing their evaluation of the assistance programme on the principle that ‘a successful compensation scheme should also contribute directly to changes in attitudes or management decisions which reduce the risk of losses, and expected costs to Government, from similar disasters in the future’ (Webber et al., 1992, pp. 4–5).

EFFECTS OF CYCLONE BOLA FARM ASSISTANCE PROGRAMME

The Cyclone Bola farm assistance programme did not bring about any significant degree of change in the East Cape region. Most of the recipients used the assistance to carry out on-farm restoration work which facilitated the resumption of pre-cyclone farming activities. The only break with this pattern was that 20 per cent of the recipients devoted half or more of the compensation payout to debt reduction (Webber et al., 1992, p. 37). This finding about debt reduction needs to be placed in the context that the prevailing interest rate at the time was 20 per cent or higher.

Changes in land use

Changes in land use were limited in the twelve months after Cyclone Bola. Of a sample of compensation recipients, 13 per cent reported change of some aspect of land use in questionnaire response, but oral enquiries revealed that these changes were not very extensive (Webber et al., 1992, p. 68). The main point that needs to be stressed is that the financial component of the Cyclone Bola farm assistance programme was not used to bring about immediate change in land use and production. In the first twelve months after the cyclone, most of the recipients used all of their compensation payouts and very little finance was devoted to afforestation or any other change in land use. The bulk of the compensation was used for restoration work or debt repayment.

Ownership restructuring

Cyclone Bola and the farm assistance programme did not result in an increase in the number of people leaving farming. In the twelve months after the cyclone, the number of farm sales in the East Cape was below the pre-cyclone average for that region (Webber et al., 1992, p. 39). In the case of horticulture, only a few growers ceased production because of extensive storm damage. These former growers have remained in the area and found alternative employment. ‘Only one claimant of compensation has left the country entirely’ (Brice, n.d., p. 10).

The Cyclone Bola farm assistance programme had the opposite effect to the intended effect of encouraging people to leave farming. Of a sample of recipients who received compensation, 39 per cent indicated that the compensation payment had an important influence on their
decision to carry on farming.

For many smaller farmers in particular it is apparent that, once over the initial shock of the damage caused by the Cyclone and informed of the general terms of the impending compensation, many embarked on restoration work irrespective of the viability of their farming situation (Webber et al., 1992, p. 35).

Some potential forced sales and considerations of having to sell economically non-viable units were put off or abandoned when compensation payouts were used for debt reduction.

Five factors have been proposed to explain why individuals did not leave farming after Cyclone Bola:

— the need to undertake some form of positive action aimed at restoring one’s livelihood;
— peer and extended family pressure to remain on the land and re-establish the farm operation as quickly as possible;
— the absence of any apparently viable alternative location or occupation for the farmer or family;
— acceptance, especially among Maori farmers, of the cyclone as simply one in a series of climatic events in a farming existence; and
— the belief that sales of farm property in the region, even where a buyer could be found, would only be at unacceptably low prices (Webber et al., 1992, p. 35).

ASSESSMENT OF THE CYCLONE BOLA FARM ASSISTANCE PROGRAMME

Adequacy of goal clarity and development

It is very clear that there was considerable lack of clarity and development of the goals of the Cyclone Bola farm assistance programme. Land aggregation was an implicit part of the objectives of ownership restructuring of farms and changes in land use in the East Cape. In fact, land aggregation was a crucial and essential desired outcome of the programme and as such it should have been systematically addressed and developed as a key objective. It is not surprising that land aggregation was not specifically addressed as this is a very sensitive topic politically in New Zealand society. The prevailing norm of the family farm is still very strong and highly valued in New Zealand society.

The objective of encouraging people to leave farming was very inadequately developed and presented. There may even have been the expectation on the part of those who formulated the policy that some individuals would actually abandon farming and simply walk off the land. It is more likely that there was the expectation that some farmers would sell their farms and take up some other form of livelihood. But again, this aspect of the policy was left undeveloped. The sale of a farm would accomplish little if the new owner simply carried on as the previous owner. Behind this notion of sale lies the belief that sales would accomplish amalgamation of adjoining farms and that larger units would facilitate changes in land use. This clearly involves joint decision making by multiple parties which is definitely not automatically facilitated or accomplished by individual farmers deciding to sell their farms.

Leaving farming would be viewed by many farmers as a very drastic step and one only of last resort. This is the case partly because of a long-standing association and commitment to the land and farming as a way of life. There are second and third generation non-Maori farm families in this region. These farmers are often expected to keep the farm in the family and economic factors do not fully prevail in decision making.

The programme seems to have been based on the premise that sale of farms would automatically and immediately
produce more efficient and effective management and use of land. This clearly need not be the case. A farm could be sold to another individual who may choose to farm in virtually the same way as the previous owner. This part of the programme needed to be developed more fully, with farm sales being tied in with a programme of farm amalgamation and targeted changes in land management and use. In other words, some form of regulation other than individual choice and decision making is essential if long-term goals of disaster mitigation are to be achieved.

Individual decision making was not a suitable basis on which to base the entire Cyclone Bola farm assistance programme because not all farms were individually owned. Besides Maori land corporations and multiple ownership of land, land in the region was also owned by other corporations with shareholders, such as the Gisborne Port Authority. The objective of encouraging farmers to leave farming is only feasible where farms are individually owned or leased. However, it does need to be acknowledged that in the case of a sample of compensation recipients, 73 per cent of the holdings were farmed by the owner. Many of these holdings would be relatively small and thus the total land area in individual ownership would not be this high. Many of the incorporated holdings are very large.

Although it has been claimed by Korte (1989, p. 2) that this change in policy was intended to assist the East Cape community as a whole, it is not clear how encouraging farmers and growers to leave the land and move elsewhere would assist the substantial rural servicing sector of the region. In this respect, the policy does not seem to have been systematically analysed in terms of its possible effects upon the East Cape region as a whole or the rest of New Zealand society. Due to the prolonged economic recession in New Zealand, there were few employment possibilities for people who might decide to leave the land and move elsewhere.

Competency of administration and implementation

The way in which a disaster development programme is administered and implemented will strongly influence its outcomes. In the case of the Cyclone Bola programme, some of the field administrators operated in terms of the more conventional approach of aiming the compensation at restoring the farmers and farms to the same condition as prior to the disaster. ‘Indeed, this is the understanding of the Bola package still held by a number of the field staff involved’ (Webber et al., 1992, p. 33).

The crucial importance of appropriate implementation advice and support is highlighted by the claim that ‘more advisory input (e.g. from the Catchment Board) to farmers following receipt of their compensation payment might have helped to improve land use’ in the case of the Cyclone Bola farm assistance programme (Webber et al., 1992, p. 46). If implementation is accompanied by undue urgency and speed, the objectives of the programme of disaster development can be jeopardised. In the case of the Cyclone Bola programme, ‘haste tended to hamper the achievement of other objectives, such as fairness, and ensuring that farmers had access to appropriate advice on how best to use their compensation payments’ (Webber et al., 1992, p. 60).

Need for a contextual approach

A development programme for disaster response needs to consider both the wider and local contexts. Of course, the local context and the area of impact should receive priority, but this often does not happen sufficiently or effectively. In the
case of Cyclone Bola, it has been claimed that 'the Bola experience emphasises the need for a substantial input of local knowledge in determining appropriate compensation calculations' (Webber et al., 1992, p. 72). This claim can be generalised to conclude that local knowledge input is crucial for all aspects of a development programme for disaster response. On the other hand, the international and national contexts must not be neglected.

It has been claimed that the Cyclone Bola farm assistance programme 'has not altered at all some significant and underlying problems of economic viability both at the farm level and in the regional economy' (Webber et al., 1992, p. v). This observation highlights the fact that a disaster development programme needs to take into consideration the broader context of developments at the national and international levels. In the case of New Zealand in the late 1980s, there was a very severe recession nationally and the trade position of New Zealand society was very vulnerable to unfavourable international developments. In this context, it is not surprising that a programme for change at the local level was not effective in changing underlying conditions that were probably a direct result of the prevailing conditions at the national and international levels.

Ethnicity

Ethnicity needs to be considered at all stages of the process of disaster development, including an examination of the philosophical underpinnings when the programme is being initially formulated. In the case of the Cyclone Bola farm assistance programme, premises of neoliberalism clashed with important attributes of Maori culture. For Maoris, non-economic values and beliefs about land have a strong influence on decision making. Claims to land on the basis of ancestral ties are a strong and viable part of Maori culture. The decision to sell or buy land individually is quite a foreign and offensive idea for many Maoris. Hence, the objective of leaving the land was culturally insensitive and probably unacceptable to many Maoris. Much Maori land has multiple ownership and thus one individual is not in a position to decide to sell the land or make a major change in its use, even when one individual may be leasing the land and qualify for compensation as an individual farmer.

The implementation of the Cyclone Bola farm assistance programme clearly reveals that ethnicity needs to be considered in a development approach to disaster response. 'Where compensation is likely to include farming activity on Maori land, it is essential that Maori land administrators are fully involved in the design and on-going implementation of the scheme' (Webber et al., 1992, p. 72).

Need for an institutional approach

As part of an institutional approach to disaster management, Korte proposes that a detailed land use capability classification be developed that would clearly define land unsuitable for agriculture and make such land ineligible for future disaster assistance. 'Such a policy would allow restriction of assistance to land with a sustainable future in agriculture, and encourage changes in land use' (Korte, 1989, p. 4, emphasis added). This approach to disaster management is very dependent upon major pre-disaster developments and preparations as there would not be sufficient trained staff or equipment to do the mapping quickly enough after a major disaster has occurred.

The East Cape Catchment Board is a specific institution with a major role to play in the development of a disaster response programme. Its subsidies to plant forest on land with high erosion potential need to be extended and seen as
part of a larger, more comprehensive approach to disaster management. The central government and local authorities could play a similar role, through tax incentives, in bringing about a long-term change in land use. The government, as a key institution in society, would play the very crucial and direct role of advising farmers which categories of hill land would and would not be considered for future disaster compensation.

Changes in land use may need to be accompanied by changes in ownership. To be economically viable in agriculture and forestry production, several small farm units may need to be amalgamated. To facilitate ownership reorganisation, institutional involvement may often be necessary. This could take the form of amalgamating several contiguous properties and thus obtaining sufficient acceptable low-risk grazing land for a viable economic unit and afforesting the remaining erosion potential land. The institutional involvement could range from outright purchase of the farms by a government agency to an institution such as the regional Catchment Board facilitating ownership reorganisation by doing the mapping and land use classification and making this information available to demonstrate the economic viability of consolidation to potential private owners of amalgamated blocks. It is thus institutions, rather than individual farmers, which are making and implementing crucial decisions about land use in the formulation of development programmes for disaster mitigation.

The fact that disaster response situations are more influenced by institutional and organisational policies than individual decisions is revealed through the part played by financial institutions in determining how compensation payouts were used after Cyclone Bola. There is evidence that some banks and finance companies encouraged farmers to use payouts for reducing long-term and current account debt. This reaction reflected concerns about their own levels of debt exposure as much as any concern about the best interests of the farmer (Webber et al., 1992, p. 37).

CONCLUSION

In the short term, the neo-liberal development response to Cyclone Bola did not result in a significant degree of change in the East Cape region. The Cyclone Bola farm assistance programme did not produce any major changes in farm ownership structure or land use and production. The Cyclone Bola farm assistance programme payouts were used cautiously and conservatively rather than innovatively and liberally by the recipients.

It cannot be argued that the level of compensation was so high that individuals chose to persist with a high-risk venture in anticipation that high compensation would again occur in a future disaster. On the contrary, Korte concludes that ‘relatively few farmers received over-generous assistance after Cyclone Bola’ (1989, p. 52).

The Cyclone Bola farm assistance programme’s objective of enabling farmers in less viable situations either to determine appropriate changes to their land use or to exit their farms with a degree of dignity was not accomplished. Allowing individual discretion over use of compensation may have worked against the objective of encouraging people to leave the land. In a substantial number of cases, the compensation funds were used for debt servicing and repayment. It is possible that the use of compensation for debt reduction was merely delaying the forced sale of some farms with high debts. It has been recognised that there were . . . a number of farmers for whom the untied terms of the package really provided no long-term advantages at all. On the contrary, these farmers would possibly
have been better to exit immediately post-Bola rather than endure a further one or two years of losses (Webber et al., 1992, p. 71).

The payout would need to be directly tied to, and conditional upon, leaving farming if the objective of reducing the number of farmers and farms is to be effectively accomplished. This cannot be left to a matter of individual discretion and choice in a society like New Zealand and a region like the East Cape.

The issue of what constitutes economic viability seems not to have been systematically considered during the development of policy for disaster response to Cyclone Bola. It is clear that the level of profitability of individual farms was the primary consideration. This is a limited and narrow approach, as the economic conditions in the rest of the New Zealand society and internationally are also directly relevant. With high unemployment in urban areas, some degree of self-sufficiency even on non-profitable farms is perhaps preferable to increasing unemployment in urban centres.

This neo-liberal approach to a programme of development and change for disasters does not take into account the various land ownership structures that exist in New Zealand. The Cyclone Bola programme for change was essentially geared toward individual, private ownership, whereas in the Waiapu County about 70 per cent of the land is Maori-owned and much of this would be in terms of a tribal and kinship-based system of multiple ownership.

The severity of the risk from a heavy rain-induced disaster in the East Cape region is very great. This severity of risk needs to be taken into consideration when a development approach to disaster response is formulated and implemented. The encouragement of individual farmers to leave farming is bound to be a very ineffective approach because the results will have only a very limited effect on the overall severity of the situation.

To be effective in accomplishing change after disasters, programmes of development and assistance need to be grounded in an institutional and organisational model, rather than a model of individual choice and decision making. Some of the farmers most severely affected by Cyclone Bola recognise that a neo-liberal development approach to prevent further disasters is ineffective and inappropriate.

Some farmers in the Tauwhareparae area suggested that Government purchase of their land, with the option of relocation to another farm, was probably the only mechanism for overcoming the obvious failure of the market to ensure a rational solution to this predicament. (Webber et al., 1992, p. 74, emphasis added)

A collective organisational approach is required for disaster management in the East Cape region because the risk has developed out of a social and organisational source. This is made evident by Trotter’s observation that 'Cyclone Bola brought into focus that the risks associated with inappropriate land use on the highly erodible East Coast of the North Island are ultimately public risks. Yet the responsibility for both land management and land use remains with private landowners' (Trotter, 1988, p. 13).

Other assessments of the Cyclone Bola farm assistance programme have not explicitly and critically examined the philosophical and theoretical basis of the programme. The following statement, however, implicitly reveals that a neo-liberal approach to accomplishing change in the disaster context is inappropriate: 'The option to exit farming under these conditions (i.e. without other advice and/or incentives) may therefore be more theoretical than real — regardless of the terms of compensation' (Webber et al., 1992, p. 36, emphasis added).
Finally, disasters may be merely the vehicle of change rather than the actual source of change. That is, as the vehicle of change a disaster may affect the rate or direction of change but not be the cause of the change. It can be argued that the limited changes in land use and production that occurred after Cyclone Bola were in fact due to the prolonged economic recession of the 1970s and 1980s and that the disaster only precipitated the changes. This position is adopted by a researcher from the Ministry of Agriculture and Fisheries. ‘The pastoral sector was experiencing difficult economic times in 1988, and some financial and physical restructuring was inevitable without the impact of Cyclone Bola’ (Korte, 1989, p. 2).

Notes

1. This programme is now being substantially changed, with coverage for commercial property being quickly phased out.
2. The region may also be called Gisborne-East or East Coast.
3. Most of the farmers are pastoralists and most of the growers are horticulturalists.
4. The pervasive development of neo-liberalism in New Zealand society in the 1980s is clearly documented in Ropers’ (1991) analysis of the rapid transition from the welfare state to the free market (see also Boston, 1987, and Perry, 1992). Neo-liberalism may also be referred to as neo-classicism, monetarism, public choice theory, the Austrian school, Reaganomics, and new right and supply-side economics.
5. ‘Short term’ refers to the two-year period after impact.
6. This claim about the cautious and conservative use of compensation is made in the context of analysing the limited trickle-down effect that the programme had on the rest of the community (Webber et al., 1992, p. 48).
7. An insistence on the necessity of the freedom of market forces is a key tenet of the neo-liberal approach.

References


Arnold R. Parr
Department of Sociology
University of Canterbury
Christchurch
New Zealand
An Examination of the 1990—91 Famine in Sudan

MAHESH PATEL

 Shortly before and during the harvest of 1990, a series of warnings were issued by concerned international and UN agencies that Sudan would experience a very poor harvest followed by an acute food shortage over the period 1990—91. The 1990 harvest was estimated to be similar to that obtained in 1984. After the very poor harvest in 1984, Sudan experienced a major famine during which deaths may have numbered in the hundreds of thousands. There were fears that this experience might be repeated in 1990—91. By the time of the subsequent 1991 harvest, it was clear to all that a severe food crisis had been experienced. There were severe shortages of water and food and very high malnutrition rates of children were noted by UNICEF across a wide range of areas. Despite these adverse indications, starvation deaths were probably numbered in thousands, rather than hundreds of thousands. Famine mortality, which may include deaths from famine associated disease, was similarly low. The initial predictions, it now seems, may have over-estimated famine mortality almost one hundred times. Several potential explanations of the over-estimate are examined. These include prediction errors, government and donor responses to the drought such as food aid and immunization, and traditional community and household level coping strategies in times of food shortage.

Periodic droughts and food shortages have been documented over the last hundred years in Sudan, but statistical data on production and consumption are available only for the last two decades. Cereal production and consumption over the period 1971—92 are illustrated in Figure 1. While output in an ‘average’ year should approximately match consumption requirements, ‘average’ years are increasingly rare. Trends over the last two decades depict an increasing instability in food production. This instability is due primarily to increasing variability of rainfall, which causes wild swings in the output of sorghum, the staple grain, which accounts for almost three-quarters of cereal output in an ‘average’ year. As shown by the figure, over the period 1971—79, grain production was generally close to consumption requirements.

From 1980 onwards, the wild swings developed that are now characteristic of the current situation. For the 1980s, a close match between cereal production and cereal consumption could be regarded as ‘abnormal’ rather than normal. Surplus production of about 50 per cent in 1982, 1986 and in 1989 was counter-balanced by serious deficits of similar magnitudes in
1985, 1988 and 1990. Limited capacity for storage and high exports in surplus years together diminished the potential for smoothing inter-temporal consumption by saving surpluses.

In deficit years, shortfalls were partly met by imports and food aid. But despite this, major variations in consumption still occurred. Isolated years of shortfalls could be managed by reduced consumption and the use of stored grain. The situation became more serious whenever several successive years of drought followed each other. Once stocks were consumed, the options available were more constrained and reduced consumption became more important. The famine in 1984/85 was such an event.

As additional complications, the vast size of the country and the limited transportation infrastructure effectively partition production and consumption into a series of regional markets in which transient and localized deficiencies may result in acute shortages. Darfur State, for example, is prone to drought and conflict, is the size of France and has only 300 km of paved roads. During times of most acute need, especially immediately preceding harvests, it is often inaccessible. Unpaved roads become unmanageable once rainfall starts and transportation of food is then extremely difficult. The integration of Darfur with the national food market is only partial.

PREDICTIONS OF FOOD SHORTAGE FOR 1990–91

In early 1990, an extended dry season gave rise to concern that a period of drought, harvest failure and even famine might ensue. A range of agencies, using several different methodologies, all arrived at...
roughly similar predictions and measurements of the extent of the food shortage over the period 1990–91. Chronologically, in June 1990 the Famine Early Warning System (FEWS) noted that the previous harvest (in 1989) had been poor, that production was declining on trend and that national stocks were low. It warned that as many as 4 million people were highly vulnerable to famine.

In August 1990, remote sensing satellite images showed that vegetation was generally poor when compared to ten year averages and similar to the same period in 1984. Rainfall monitoring stations confirmed that rains were late, by over one month, in many critical parts of the country. Figure 2 compares rainfall in the 1984 and 1990 droughts. In 1984, Sudan had one of its most serious famines to date, resulting in an estimated one hundred thousand deaths in Darfur State alone. Regression analysis of rainfall against crop production yielded an estimated shortfall of about 1.14 million metric tons, or about one-third of subsistence level ‘average’ output. A harvest forecast based on rainfall patterns and produced by the FEWS predicted a shortfall of 1.2 million metric tons, similar to 1984. In September 1990, the FEWS predicted that Sudan was likely to have a 1984 magnitude food emergency, or perhaps worse, with about 9 million persons affected. During the harvest in November 1990, a crop assessment survey mission conducted by the United Nations Food and Agricultural Organization (FAO) predicted a cereal deficit of 1.2 million metric tons. Finally, the United Nations World Food Programme (WFP) conducted a Food Aid Assessment in December 1990, and concluded that 1.1 million tons would be needed in 1991.

Analysis of lead times required for food aid arrivals and transportation to
distribution sites indicated that international agencies would be hard pressed to provide the quantities of grain needed to avert a large-scale disaster. Intensive efforts were made to mobilize the Government of Sudan and donors to prepare for this anticipated emergency. Between 7.7 million (FAO) and 10 million (FEWS) people were expected to be 'seriously affected'.

By the end of 1990, it was generally accepted by international organizations, non-governmental organizations (NGOs) and donors that an extremely acute food shortage, perhaps a famine resulting in numbers of deaths similar to those experienced in 1984, perhaps hundreds of thousands, was a real possibility. Due to the logistical difficulties of transportation in Sudan, it was not believed that enough grain could be transported to make good the overall structural shortage of 1.1 to 1.4 million metric tons.

The full quantity of grain was not required immediately. Rural populations normally maintain some stocks of grain, as do the government and grain merchants. A World Bank analysis of the stocks and consumption requirements predicted that stocks would not be exhausted until June 1991, as shown in Figure 3. Thereafter, deliveries of about 250,000 tons per month would be required, through to October 1991. This allowed time for lagged donor responses and delivery by ship to Port Sudan. While this time would be needed, even then the problem of distribution would remain.

As a measure of the logistical difficulties facing distribution, the return journey from Port Sudan, the off-loading port for grain shipments, to the capital city and primary distribution point of Khartoum, takes a ten ton lorry about a week, with breakdowns. Onward transportation from Khartoum to the drought affected areas,
across often unpaved roads and sandy desert, required smaller but similarly scarce four-wheel and six-wheel drive trucks. All transport was in short supply and poor condition.

DONOR RESPONSES

By June 1991, over 150,000 tons of grain had been landed at Port Sudan, of which about half had been distributed to final destinations. By September, arrivals totalled over 300,000 tons, of which about two-thirds was distributed. Programme staff within the country were acutely aware of, and frustrated by, delays and logistical difficulties of transportation. It is to their credit that actual total shipments to final destinations initially lagged behind total arrivals by only three months. This lag was later reduced to two months.

The schedule of grain arrivals and distribution is shown in Figure 4. It can be seen, by comparison with the previous figure, that the total projected deficit reached one million tons by September 1991 and that distribution to final destinations was, by that month, only 200,000 tons or only one-fifth of the cumulated deficit. While those distributions most certainly had a significant impact on hunger in affected areas, it is also clear that the major part of the impact of the food shortage was carried by the community who had, perforce, to resort to a range of traditional and non-traditional coping strategies, including reduced consumption, if this last can rightly be called a ‘coping strategy’.

MARKET PRICES OF GRAINS AND ANIMALS

Traditional coping strategies had some strange interactions with standard market mechanisms. The onset of a drought-based food shortage is typically marked by a rapid increase in the price of grain and a
corresponding decrease in the price of livestock. Animals are supposed to be sold as rapidly as possible, before their value decreases still further through malnutrition and weakness. Only the core herd, the animals kept for breeding to recreate the herd once good times return, is supposed to be retained. Grain is bought as rapidly as possible in anticipation of future price increases. These ‘panic sales’ of animals and ‘panic purchases’ of grain act to further exaggerate price movements and to exacerbate the worsening terms of trade between animals and grain.

Grain prices

Monthly changes in the price of dura (sorghum), the staple grain, in the major regional markets are presented in Figure 5. For 1984-85, prices are presented for El Obeid market only, as this was the only site for which monthly price data are available for that year. Prices for 1990-91 are presented for a range of regional grain markets. Fragmented by distance and the logistical difficulties of transportation, regional grain markets displayed quite varied price movements in 1990-91. The median monthly price trend for that period is included in the illustration.

Reassuringly, for this comparison between price movements in 1984-85 and 1990-91, the price of dura in El Obeid in 1990-91 tended to remain within the central range of regional market prices. It may be added that El Obeid, the capital of Kordofan State, was significantly affected by both droughts. In 1984, over the critical months of the pre- and post-harvest period of the drought cycle, August to November, dura prices did not show any sharp increase in the El Obeid market. Indeed, they peaked in October 1984, at a level 46 per cent higher than in August, and fell thereafter. In 1990, in sharp contrast, dura prices rose from August to November, increasing by 128 per cent, fell slightly at that point and then resumed...
their upward trend. At first glance, on the basis of initial price movements, the situation in 1990–91 would appear more serious than in 1984–85. A supplementary, more extended and useful period for analysis is the period from September to September the following year: from the failure of one harvest through to the period immediately prior to arrival of the next. In 1990–91, over this period, dura prices increased 209 per cent.\(^\text{12}\)

From the beginning to the end of the same period in 1984–85, dura prices actually fell by 21 per cent. This extremely disturbing piece of information, as regards our understanding of the process of the drought cycle, will be evaluated further below. The effects of the drought on grain prices might be expected to be highest at the end of the post-drought cycle, immediately prior to the next harvest. Again, in terms of increased grain prices, the crucial 1991 pre-harvest situation appears more serious than that in 1985.

### Livestock prices

Analysis of livestock prices provides additional insights. About 11 per cent of the population of Sudan is nomadic and many more are semi-nomadic or agro-pastoralists. In a ‘classical’ drought, as fodder disappears, livestock prices are supposed to plummet. The standard units of livestock in Sudan are the sheep, goat, cow and camel. Figure 6 provides information on movements in livestock prices in El Fasher, one of the areas that was severely affected in both 1984–85 and 1990–91, for all these four units.

In 1984–85, over the total illustrated period of 17 months, livestock prices displayed a significant decline. Over the same seasonally identical period in 1990–91, livestock prices were generally more stable, in nominal terms, showing lesser monthly variation and fewer trend reversals.\(^\text{13}\) Consumer prices almost doubled, however, over the full 17 month period and the relative stability of 1990–91 animal prices, in nominal terms, in El Fasher regional market must be seen in the overall context of this high rate of inflation.\(^\text{14}\) No price index is available for 1984–85, but it is generally accepted that inflation has accelerated continuously in Sudan. In real terms, the decline in animal prices may have been greater in 1990–91 than in 1984–85.

Curiously, consumer price inflation may have been higher in the periods preceding August 1990 and following November 1990, than it was during the critical three months during which it was realized that rainfall, and hence a large part of the harvest for that year, had failed. These critical three months were those in which relief workers moved from perceptions of possible or probable famine to

![Figure 6: Livestock prices in El Fasher](image-url)
beliefs in the actuality of that event. They should also have been the months in which grain traders seriously reviewed their expectations and decisions on selling now versus selling later.

Figure 7 shows the consumer price index (CPI) for lower income groups in the Greater Khartoum area, over the period January 1990–May 1991. This area housed the majority of the drought displaced population of the country. The CPI did not show any sharp upward movement over this central period. Regarding the evolution of livestock prices over the critical three months during which harvest failure was recognized, August to November, as identified by vertical lines in the figures, a somewhat different picture presents itself. Overall, in 1984–85 a high level of price instability is apparent. But over the critical three month period no consistent decline in animal prices is visible. There were declines in the prices of sheep, goats and camels immediately prior to this period, but all these prices bounced back rapidly by October–December. In 1990–91, in contrast, there were declines in prices of all livestock during this critical three month period. Livestock prices did not return to previous nominal levels until April the following year. Changes in animal prices would appear to have provided warning of approaching food shortages in both 1984–85 and 1990–91, but price changes in 1990–91 showed a more consistent decline, which should indicate a more severe approaching famine.

Livestock sales (quantities)

An additional indicator of approaching food shortage is the 'panic sale' of livestock. This is considered to be one of the driving forces behind the drop in livestock prices that is a prelude to a serious food shortage. Throughout the 1990–91 food shortage, panic sales of livestock were repeatedly reported by outposted staff.
returning to Khartoum from affected areas.

Data for numbers of livestock sold are presented in Figure 8 for the livestock markets in El Fasher and Omdurman for the years 1983—91. El Fasher is a regional market that was significantly affected by drought in both 1984—85 and 1990—91. Omdurman is the major national central clearing market. It is immediately apparent that any ‘panic sales’ were limited mostly to sales of sheep. Sheep are generally the first animals sold because they are less hardy than goats or camels. There were significant increases in the numbers of sheep sold in both markets in 1984—85, but only in 1990 in Omdurman and only in 1991 in El Fasher. In each of the latter cases, however, the adjacent year of the pair 1990 and 1991 showed corresponding lower than normal sales. In other words, sales over the 1990—91 period as a whole were about average in both Omdurman and El Fasher markets. This is a puzzling result. It contradicts numerous field reports, yet is based on a well-established market analysis system. Apart from two exceptions, the sales of cows and goats remained relatively stable. There was an increase in sales of goats in 1991 in Omdurman and in 1989 in El Fasher. Goats are hardier than sheep. The shift from sheep to goat sales in Omdurman might have been a reflection of herd depletion and increasing desperation on the part of sellers.

On the face of it, these data present a picture of quantity adjustments in 1984—85 and price adjustments in 1990—91. This is a confusing picture, as both prices and quantities should have been affected in both cases. This finding would seem to require a more thorough analysis than is possible here. While verbal reports from the field frequently emphasized panic sales and livestock mortality, own consumption of livestock was never reported. It may also be culturally preferable to say that an animal died than that it was slaughtered for own use. It is also
extremely puzzling that price movements in 1984–85 were less than in 1990–91. If 1984–85 was the more serious food shortage, as indicated by population mortality estimates, greater price decreases would have been expected during that period.\textsuperscript{16}

One possible explanation is that the Famine Early Warning System was better developed in 1990 than in 1984 and that the earlier, more rapid and widespread transmission of warnings that the harvest had failed, not just locally but over the country as a whole, resulted in greater price movements. To a certain extent, the FEWS itself could then have been partially responsible for the rapid movement of prices. This is not a negative perception of the role of the FEWS. Indeed, the smooth functioning of future markets may have been enhanced by this timely information, allowing households to adjust their resource and asset portfolios earlier in the crisis and thus better adapt to a changing situation. In theory, animals could be sold before they became malnourished. To the extent that they are, especially if exported, revenues would be higher. Available fodder would then be shared between a lesser number of livestock. Further, families could earlier reduce and better plan their daily consumption of food over the entire shortage period. Thus, the enhanced development of the Famine Early Warning System and its timely provision of information may well have resulted in a significant mitigation of the scale of the potential crisis. At the same time, the relatively recent shortage of 1984–85 may have been fresh in people’s minds, with the result that visually apparent rainfall and harvest signals resulted in more rapid adjustment of household production and consumption patterns.

The apparent insulation of lower income groups in Greater Khartoum from severe price movements is perhaps more easily explained. Rationed bread, purchased at a price fixed by government, played a significant role in food consumption of low income groups. A supplementary range of commodities that had administered prices that were enforced, mainly only in Khartoum during that period, included sugar (a significant source of calories in Sudan) and petrol.

Commercial imports of grain continued during this period and may have been as high as aid shipments. But it is generally considered that these imports were significantly lower and that these were mostly speculative and only gradually released to the market. Evidence for this belief is provided by the continued increase in grain prices. Release of significant quantities to the market would have depressed prices. Since 1990–91 grain prices increased significantly faster than the CPI, there was a strong commercial incentive for merchants to hold on to their stocks. More likely, commercial imports were not that significant. Certainly, private importers had little impact on drought affected rural grain markets. Grain merchants would have faced the same logistical constraints in transporting grain as did the aid agencies, with the added disadvantage of being unable to pay for transportation costs in foreign currency.

Finally, the previously presented and perturbing information that in 1984 dura prices actually fell over the period September through to September, must be reconsidered in the light of the information on livestock price movements. The most plausible explanation for the fall in grain prices is that purchasing power had failed so completely following several years of drought that grain market prices collapsed as well. In other words, the underlying situation may have been one of a failure of entitlements, as described by Sen (1981). If so, this phenomenon would have significant implications for Famine Early Warning Systems. These currently place significant emphasis on grain price
movements, as well as animal prices and movements in the terms of trade, as a means of identifying food crises.

GOVERNMENT POLICY RESPONSES
Throughout 1990 the Government of Sudan was reluctant to state that a famine existed or was likely. But it had quite a range of food policy instruments in operation. Production subsidies, as well as exchange rate and floor price mechanisms were applied for sorghum, wheat and sugar. Consumer subsidies were applied to wheat and sugar. Bread, produced with a mixture of wheat and dura, was subsidized and rationed for distribution to urban consumers.

Over the course of the year, prices and the rigour with which fixed price mechanisms were applied, varied. In early 1990, before the onset of the drought, overzealous implementation of low fixed producer prices led to a sharp decrease in the availability of food as producers ceased marketing their products. Within weeks these strong controls were relaxed. Over most of 1990–91 a two- or three-tier market existed. Rationed basic commodities were available to ration card holders at low prices, but in limited quantities. The same commodities were also available in markets at uncontrolled prices. While the price of the bread ration increased and the quantity fell, the ration was not abandoned. However, and this is the key to an assessment of the existence or non-existence of an overall food shortage, redistributive government subsidy mechanisms could only be expected to share the burden more equally. They could not, by definition, affect the total amount of the shortage.

The government did import significant quantities of grain. It faced the same logistical difficulties of transportation, however, as those faced by relief agencies, and the large part of these supplies were available only in urban centres, to those eligible for food rations. This excluded highly vulnerable displaced people in peri-urban areas and even long established ‘urban squatters’, who experienced severe hardship and some forced relocation.

TRADITIONAL HOUSEHOLD COPING STRATEGIES
In the face of food crises, a number of traditional coping mechanisms are normally brought into play. These vary according to the duration of the drought, as shown in Table 1. Typically, at an early stage in a drought, households respond by making the types of adjustment that might normally be made in response to seasonal variations in the availability of food. Subsequently, they would start to sell some assets held as longer term savings, including jewelry and non-essential livestock. In the subsequent stages of a prolonged drought, disinvestment would include productive resources, possibly in their entirety. Following destitution, distress migration would occur, with a probably permanent change of lifestyle. Finally, people die. Relief food aid tends to arrive late in this cycle of responses. Thus, it is the more wide-ranging, rapid and individualized household level responses that must play the primary role in mitigating the effects of a food shortage and ensuring the survival of households.

Consumption of wild foods available in the drought prone areas increases in famine years. In areas such as Darfur, foodstuffs ‘of last resort’ were used in 1990–91. These included wild foods that are poisonous if not carefully processed and even grain stored in ants nests, which requires a lot of labour for a small yield. Consumption of wild foods may have been quite high. Over 100 distinct types of wild food were identified at the University of Khartoum in the year following the 1990–91 drought. Some of these dis-
played counter-cyclical productivity. Wild plants in Sudan are adapted to arid conditions. Droughts affect them in unequal and complex ways. Some prefer lower than average levels of rainfall that damage competing vegetation more.

Most of the wild foods now formally described were consumed in pre-agricultural times. With the advent of agriculture, they were relatively ignored, or stigma-

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### TABLE 1
Timing of coping strategies in relation to drought

<table>
<thead>
<tr>
<th>Adjustment</th>
<th>Early</th>
<th>Intermediate</th>
<th>Late</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Production</strong></td>
<td>Change in cropping and Labour planting practices</td>
<td>Increased non-farm production</td>
<td>Zero</td>
</tr>
<tr>
<td><strong>Labour</strong></td>
<td>Migration in search of employment</td>
<td>Employment migration intensified with falling wage rate</td>
<td>Distress migration of whole families</td>
</tr>
<tr>
<td><strong>Assets and capital</strong></td>
<td>Sale of smaller livestock (liquid and easily reversible)</td>
<td>Sale of productive assets (livestock, tools, land) in a depressed market</td>
<td>Sale of core breeding herd and land</td>
</tr>
<tr>
<td></td>
<td>Sale of larger stock (non-essential)</td>
<td></td>
<td>Destitution</td>
</tr>
<tr>
<td><strong>Loans and transfers</strong></td>
<td>Use of inter-household transfers and loans</td>
<td>Credit from merchants and money lenders</td>
<td>Donations, relief assistance</td>
</tr>
<tr>
<td><strong>Consumption</strong></td>
<td>Reduction of current consumption (eat less often and less)</td>
<td>Reduction in consumption (greater dependence on market)</td>
<td>Only relief and wild foods consumed, if available</td>
</tr>
<tr>
<td></td>
<td>Adjustment in intra-household allocation to favor children</td>
<td>Migration of adult males to reduce food burden</td>
<td>Survival may be threatened, especially of infants and children</td>
</tr>
<tr>
<td></td>
<td>Shift in expenditures and diet composition including some wild foods</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Adapted from Teklu (1991)
tized, and used only by the very poorest families. In Sudan, with its vast areas of sparsely populated sub-agricultural but not necessarily barren land, it is quite possible that a substantial store of wild foods has developed following the emergence of agriculture and changes in tastes. While some wild foods are regularly consumed, especially by the poor, other types may be harvested only in famine years. Wild grasses were regularly sold in rural markets in 1990–91. Prices were significantly lower than for an equal weight of agricultural grain. Interestingly, for the types of wild foods consumed by the poor, property rights are often clearly defined at the local level, especially for hardy perennials and trees.

COMMUNITY COPING STRATEGIES
In some cases, community level responses can carry a significant part of the load, primarily through resource transfers between rich and poor within communities, through communal risk pooling arrangements and through transfers from wealthier households elsewhere that are linked to individual households within the community through kinship networks.

In Sudan, transfers of this type are often based on traditional Islamic behavioral modes and may include:

- Nafir, a work party initiated by a community member in need of extra labour;
- Zakat, which may be a direct cash payment or a transfer of goods, particularly grain or livestock;
- Karama, a communal feast;
- Ceremonial transfers, including those associated with births, circumcisions, marriages and funerals; and
- Expectations of support, including gifts and loans from extended family, access to wage labour opportunities and income generating activities in towns and other villages, and credit.

While the impact of these traditional community mechanisms is often significant, especially transfers of income from members of kinship networks employed in Gulf States, pure income transfers can only redistribute the effects of a food shortage between different members of a community and act to increase food prices still further. The total amount of food available remains unchanged, unless the cash injection results in additional food imports to the regional or national market. In other cases, such as transfers of grain from Darfuran migrant male labourers in Libya, the net effect was clearly positive.

The usefulness of some traditional modes of redistribution, including the Nafir, Zakat and Karama, are limited by a number of factors. Firstly, these are all essentially pro-cyclical phenomena. The onset of a drought decreases the utility of assistance from a team of community members willing to donate work (the Nafir). The yield of the traditional local Zakat tax decreases with the amount of grain harvested. Finally, the amount of food provided through the Karama, and the frequency of these feasts, declines in times of food shortage.

ECONOMIC CLASSIFICATION OF COPING STRATEGIES
In economic terms, coping strategies may be classified in two major groups, as shown in Table 2. The first group increases the amount of food actually available for consumption, mitigating the absolute production shortfall. The second group acts to redistribute food available within the country, diminishing the disproportionate reduction that the poor might otherwise suffer. But redistributive measures may, by definition, only increase consumption of one group by reducing that of another. And any increases in...
Strategies which increase food availability

- Consumption of animals saved for bad years
- Consumption of wild foods
- Relief food
- Food imports
- International emigrants remitting food from abroad
- International emigrant eating abroad

Strategies which improve food distribution

- Wage labour migrants returning cash
- Wage labour migrants (within country) remitting food
- Income transfers to poor
- Income generating activities (e.g. handicrafts, charcoal)
- Sales of assets
- Loans and credits
- Intra-household ethos (e.g. priority to feeding children)

Note: Reduced consumption is not listed here as it fits uneasily into this classification. While a certain amount of reduced consumption (below the subsistence level) could be classified as a coping strategy, at some point this becomes another name for hunger, famine or starvation.

Purchasing power through international or inter-regional transfers would, on their own, only serve to further increase the price of food, not to increase the overall quantity available.

Distinguishing between these two categories of activity is important. With an overall production shortfall of one-third, if the richest half of the population managed to maintain at least subsistence levels of calorie consumption (perhaps sometimes shifting to cheaper foods in response to price increases), which is a plausible assumption, the consumption of the poorer half would have been reduced to one-third of the subsistence level (from 2,000 to 670 calories per day). Consumption reductions of this level would have resulted in large-scale deaths — which did not occur.

Both categories of coping strategies must perforce have been in action. But it is worth emphasizing that the explanatory power required of coping strategies would appear high indeed — equivalent to two-thirds of the food expenditures of the poorest half of the population, a group that was already spending the majority of its income on food. These facts would indicate that some of the macro-estimates of the extent of the shortage might have been flawed or that other, totally different, explanations are required.

MALNUTRITION AND MORTALITY

It is not proposed to conduct at this stage any investigation of food stress related mortality. Field reports of food stress related deaths did arrive in Khartoum, but these generally concerned limited geographical areas and very limited numbers of individuals, and were normally only indirect verbal reports from outposted staff returning for briefings. It has been hypothesized that most of the deaths that occurred were unreported and occurred in remote areas. The relief network was generally best developed, however, in the areas that were most severely affected. Large-scale deaths were not reported. If large-scale deaths occurred, then they may...
appear in population pyramids in future years. There was a census in 1993 and this might provide some information.

This does not mean that the food shortage passed without evidence of extreme hardship, hunger and suffering. Societies and livelihoods were wiped out. Displacement did occur and entire villages were abandoned in some areas. In several cases, villages were reported in which there were no children aged younger than five years. Despite repeated investigation of this phenomenon, I was never able to ascertain whether this was due to the selective migration of children (who may, for example, have 'milk right' claims on distant relatives) or the deaths of all children in the village. If the latter, I would have expected a more definite response. Still, the evidence is inconclusive in those cases.\(^18\)

Children, as the most vulnerable group of the population, were severely affected, despite the tendency of most households to feed children first. Malnutrition data are not available for the country as a whole but, during the course of the drought, emergency nutrition surveys of children in affected areas were carried out on a repeated basis, as a justification for requests for donor funding and food aid.

Figure 9 shows the results of 23 surveys of malnutrition of children carried out during the drought. Mostly, these were performed by the Ministry of Health, often with UNICEF assistance. In the worst hit areas, the percentage of children below 80 per cent of normal weight for height reached levels as high as almost 40 per cent. Many of these surveys were taken in different places and at different times, and so do not permit easy analysis. But, with some exceptions, malnutrition rates of 20 per cent were clearly not unusual. The potential effects of these
high rates on child mortality may have been mitigated by the fact that UNICEF and a range of NGOs provided supplementary food to children in all these areas with high malnutrition rates. Districts with higher reported malnutrition rates also received preferential treatment in the general distribution of food aid. There were, passing through Khartoum during this period, quite a large number of journalists whose primary purpose in being there was to obtain photographs of starving children to take back to their editors. Their difficulties in finding adequately malnourished children provided a grim backdrop to relief efforts.

SUMMARY AND CONCLUSIONS

There was ample evidence of a production shortfall in 1990–91. Rainfall was similar in amount and distribution to the famine years of 1984–85. Satellite photographs showed a similar distribution of vegetation cover. Pre- and post-harvest crop estimates all yielded similar results. Finally, to clinch the argument, cereal price increases were significantly greater than those experienced in 1984–85. But despite this ample objective evidence of an acute food shortage, including anecdotal reports of difficulties from wide-ranging field office locations of international agencies and NGOs, no ‘killing’ famine of the expected scale, similar to that experienced in 1984–85, materialized in 1990–91.

The 1990–91 deficit was one-third of subsistence level output. If the richer half of the population maintained subsistence level calorie consumption, which appeared to be the case, the poorer half would have been reduced to one-third of subsistence intake. This did not appear to occur. Thus, the failure of widespread starvation to appear would seem to require a serious explanation. The food aid provided, though useful, was certainly not enough to avert disaster. The amount distributed prior to the subsequent harvest came to only one-sixth of the deficit. Food imports mostly did not seem to reach the market, as may be assessed by the continued increase of grain prices.

At the onset of harvest failure in 1990, it was asserted that food stocks were lower than usual, as the 1989 harvest had been slightly less than average. Following the failure of widespread starvation to appear, it was asserted that they must in fact have been higher than average, as the last but one year, 1988, had yielded a bumper harvest. This ex post assertion is not satisfactory. If significant stocks had indeed still been available at the time of the 1990 harvest, then they would inevitably have had an effect on prices. The price increases experienced should not, then, have been greater than those noted in 1984–85.

Consumption of wild foods, including grasses, berries and ants nests, may have diminished some part of the impact of the grain shortage. The amount of nutrition obtained in this manner is difficult to judge. Again, the scale against which the amounts of wild food collected must be measured is that of a harvest shortfall of 1.4 million metric tons — one-third of subsistence level output. If even half of the shortfall was covered this way, ignorance of this resource would have serious implications for harvest assessment and drought relief programmes in Sudan, and possibly elsewhere.

Curiously, own consumption of livestock was not reported from the field. This may reflect a cultural preference of those questioned to assign diminution of herd size to mortality and sales rather than own consumption. Market information does not support the hypothesis that sales were more frequent than in preceding years, though prices were certainly lower. Further in-depth study of the contribution of own livestock to averting malnutrition could be useful. At present, the conven-
tional wisdom that herds are ‘a useful repository of savings against hard years’ would seem to face a number of difficulties. The most prominent is the procyclical sale value of livestock which falls in bad years. Another, affecting quantities sold, is the loved-one relationship several tribes have with their animals, their measure of their own wealth by numbers of animals held rather than value, and their consequent reluctance to sell animals. An economically viable means of storing value against hard times should be countercyclical in sale value. It should increase in value in hard times as grain does, or at least be neutral and portable as gold or jewelry may be. Rather than a repository of tradeable value, livestock may perform a more vital role as a deposit of calories that can be drawn upon in hard times. Perhaps not all the crisis-related livestock mortality reported was unintentional!

Income transfers from abroad and from relatives in towns would serve to redistribute the effects of shortage in a more egalitarian manner, but could not diminish the overall impact of a shortage. Similarly, most income generating activities (other than collection and sale of wild foods) in no way affect total food availability. In both cases, the total amount of food would remain the same. Income transfers could serve only to bid up prices. Both transfers and income generation can serve at best a redistributive role. This role does not necessarily favour those most in need who may be, by definition, precisely those that lack such opportunities.

Reduced consumption in the face of sharply increased prices certainly occurred. Price increases were far greater than during the 1984 famine, and the causes and effects of this differential have yet to be explored. But reduced consumption in the face of increased prices could only delay the catastrophic impact of an overall shortage equivalent to one-third of subsistence level production — unless minimum levels of subsistence level consumption have been severely overestimated. Expressed in other words, ‘reduced consumption’ of the scale required might not really be a coping strategy; it would simply be another term, not for famine but for starvation.

It is possible that some combination of the above factors was sufficient to avert a dramatic famine and that initial prognoses were incorrect. Most information available to date, however, seems only to confirm the worst case scenarios of production shortages and market shortages. The full lessons to be learnt from this event may be uncovered in time as a result of painstaking research. The solutions used would provide useful information to concerned agencies in the design of future programmes of drought relief and disaster preparedness. At this point in time, it would seem that the true explanation does not lie in computer images and aggregate statistics. Nor can it be found in the heroic efforts of humanitarian agencies to import and distribute grain against seemingly insurmountable logistical obstacles.

It would seem that the major and immediate burden of the food shortage of 1990–91 was carried at the household level. From the child malnutrition rates observed, reduced consumption was clearly a common response. Since outright starvation was expected, however, and yet rare, it is probable that wild foods, and other as yet unobserved coping mechanisms, have a significant effect on population survival. It is urgent that humanitarian agencies study and understand these traditional mechanisms, in order to work with and support them, rather than focus mainly on food aid. Food aid, which absorbs the bulk of relief assistance, usually arrives too late and keeps on arriving through the next harvest, thus depressing prices and hence earnings of agriculturalists. Further, only about half of famine associated mortality is due to food
shortage. Non-food relief, including immunization, receives only a fraction of the funding, is probably more cost-effective in countering the effects of famine and offers lesser disruption to the economy.

Finally, there was a tension between anecdotal field reports and observable evidence. The anecdotal reports were more immediate, more apparently useful and tended to be actioned. The statistical evidence (data on livestock sales and prices) arrived significantly later and rarely attracted the same widespread interest. It was not timely enough, it was not location specific enough and it was not rich enough in detail and implications. Some similar problems may apply to human mortality. These tensions have implications for early warning systems. It is important to improve these systems. Prices and sales of food commodities show that consumers do adjust their portfolios of resources in order to survive as best they can. The warning does help.

Notes

The author was a Planning Officer for UNICEF in Sudan from early 1990 to 1993. The views expressed in this paper may not be construed as the views of that organization, and are purely personal.

1. The 1890—94 famine was named ‘Sanasita’, a reference to the year of onset in the Muslim calendar. The 1920—21 famine was called ‘Kurbajet’, referring to the Kurbay whip used by authorities to organize queues for famine rations. The 1940—41 famine was named ‘Fouliya’, a reference to the beans brought from Egypt to be used as an alternative to sorghum. The 1949—50 famine was named ‘Sirar Hoyokiya’, the name of a shooting star that appeared in that year. The 1970—73 famine was named ‘American’ and ‘Kiloiate’, referring to relief aid brought by the American government and distributed in kilograms. The 1984—85 famine was named ‘Khawada’ for the western people, ‘Khawadas’, who brought food aid. A consensus for naming the 1990—91 famine is not yet established, but some have referred to it as the ‘silent year’. This last information was obtained from a nomadic poet I hired to research the effects of the food shortage in drought affected rural areas. He fell off his camel, hurt his back and completed his mission one month late — but afforded me the interest of a wonderfully scribbled note on very crumpled paper, hand carried to Khartoum, informing me of his problem. This was the most original progress report on a project that I have ever received. He eventually submitted a lengthy ‘trip report’ that included some rather beautiful odes to his camel, and a nicely written blow by blow description of his journey through time and space.

2. All quantity and price data on sales of agricultural commodities was obtained from the Ministry of Agriculture, via the Famine Early Warning System. USAID systematized this information on easy-to-use computer diskette format and distributed it freely, and I should thank them for their fine work in that respect.

3. Relief agencies based in Khartoum were particularly sensitive to rainfall figures. Khartoum itself received only 2 mm of rainfall from early 1990 to mid-1991.

4. Source: FAO, Khartoum. There were 14 meteorological reporting sites in Sudan. This may seem a large number until the size of the country, about 2,000 kilometers north to south and 1,800 east to west, equal in area to the size of Germany, France and Spain combined, is considered.

5. Between June 1984 and December 1985, in Darfur alone, the drought caused surplus deaths of between 95,000 and 108,000 persons, mostly the young and the elderly (de Waal, 1989).


7. Most of the quantitative predictions of food shortages attempted to take account of food stocks, exports and imports, not just production shortfalls.

8. There was quite some confusion in the field about the meaning of the term ‘seriously affected’ as used by food relief agencies. It was certainly never intended to
be interpreted as a prediction of those numbers of deaths. There was a prevailing feeling amongst relief workers that the term meant something close to starvation, extreme hunger or absolute destitution.

13. Inflation was probably higher in 1990–91 than in 1984–85. The consumer price index for Greater Khartoum is presented here. No price index is available for El Fasher for this period.
14. Consumer price indices in Sudan are available only for the Greater Khartoum area. They were calculated by the IBRD mission. Three types of price index were provided. The first one was based on a bundle of basic commodities that would be consumed by higher income groups. The second was based on a middle income group bundle. The index used in this article was that calculated for lower income groups in the Greater Khartoum area. Other agencies have typically preferentially used the index calculated for middle income groups. I would contend that the index prepared for lower income groups more fairly represents the national situation. The commodities consumed in rural areas and towns probably more closely resemble those consumed by lower, rather than higher, income groups in Greater Khartoum.
16. Taking account of inflation would accentuate the difference and call for an even more powerful explanation of this anomaly.
17. In some cases, a three-tier price system applied in which the lowest tier was a ration price and the central tier had ‘limited availability’ at an official controlled price. The widely used black market was the third tier and often the only one in which commodities were actually available.
18. The government did not permit surveys that might show excess mortality. They did maintain, for the greater part of 1990, that there was no food emergency. Once they agreed that the emergency did exist, deliveries of relief food were greatly facilitated.
19. As grain prices increased sevenfold between January 1990 and May 1991, over which period the CPI increased only by 180 per cent, there were clearly massive windfall gains to be made in grain speculation. Grain purchased in January 1990 was worth, in real terms, 250 per cent of its purchase value in May 1991. At a time of high inflation and food shortage, purchases of grain were doubly attractive. Indeed, grain merchants emerged from the crisis as a major power group. This may be one reason private grain imports did not reach the market.
20. It would be most unfortunate to jump to this simplistic conclusion, as has been proposed by some agencies, in the absence of a thorough evaluation of all the evidence.

References


Mahesh Patel
Eastern and Southern Africa
Regional Office
UNICEF
P.O. Box 44145
Nairobi
Kenya
Save the Children Fund (UK) established a local food security monitoring project in the Mopti region of Mali, which was operational between 1987 and 1993. This article describes some of the lessons learnt from this experience of monitoring food security and coping strategies. It illustrates how coping strategies can be an important element in tracking vulnerability in the Sahel, but that interpretation is complex and there are limitations to their use. Secondly, consideration must be given to the institutional context in which information systems are set up. Information providers must be linked institutionally to response mechanisms, to ensure that data are fed systematically into the design, implementation and monitoring of appropriate response.

Since the late 1980s, awareness has grown that famine early warning systems, often characterised as centralised and monolithic (Downing, 1990), do not guarantee appropriate response to food crises. National early warning systems, tending to focus on supply factors and a food balance approach, may be necessary, but are not always sufficient to identify who is vulnerable to food crisis and where. A demand-side, or food entitlements approach, looking at how people gain access to food, is an essential element in poverty and vulnerability assessments.

Typologies of food information systems have challenged the famine orientation of conventional, national early warning systems (Davies et al., 1991; Downing, 1990). Local food information systems are more likely to focus on food entitlements and on sustainable improvements in livelihoods of vulnerable groups. Data collection methods also vary. Micro food monitoring systems adopt a more bottom-up approach, incorporating local perceptions and more qualitative data. This enables the latter model to provide information for development planning and not just crisis (Downing, 1990).

Save the Children Fund (SCF) established a local food security monitoring project in the Mopti region of Mali, which was operational between 1987 and 1993. This article describes some of the lessons learnt from this experience. It illustrates how coping strategies can be an important element in tracking vulnerability in the Sahel, but that they must be used with some caution. Secondly, consideration must be given to the institutional context.
in which information systems are set up, to ensure that information is fed systematically into the design, implementation and monitoring of appropriate interventions.

BACKGROUND TO FOOD SECURITY IN MALI AND IN THE 5TH REGION

Food insecurity in Mali can be attributed to extreme poverty, climatic fluctuations, with a series of dry years throughout the last twenty years, and macro-economic stagnation (Davies with Buchanan-Smith, 1992). Food production per capita has been declining since 1960. Inter-annual and inter-regional fluctuations in food production are considerable. The more productive south produces a cereal surplus, as well as important cash crops (cotton and groundnuts), but the north is a structurally deficit cereal area. Millet and sorghum are imported from the south and food aid is distributed every year in the Sahelian north. Wild foods are often an important way of filling the food gap between farm production and household food needs. Recent droughts, particularly those of 1973/4 and 1984/5, have led to widespread loss of livestock and productive assets in the north, and increasing pressure on the local resource base. Not only are the northern regions (Mopti, Tombuctou, Gao and part of Kayes) at risk of periodic drought crises, but a situation of chronic food insecurity developing seasonally into an acute problem, even during good years (Davies, 1993a). Within this context, SCF wanted to increase its understanding of the Sahelian rural food economy. In addition, the information was supposed to be used to alert decision makers not just to acute crises, but also to the underlying causes of food insecurity. Thus, as the project developed it became orientated towards information for the planning of long-term food security interventions.

HISTORY OF THE SCF PROJECT

In the last twenty years Mali has experienced a series of dry years, with serious drought and food crises in 1972/3, and again in 1984/5. SCF initially responded to a need identified by donors and government for better information and early warning of famine. By the end of 1986, however, SCF recognised that the major food security problem in Mali was not the threat of famine as such, but rather a situation of chronic food insecurity developing seasonally into an acute problem, even during good years (Davies, 1993a). Within this context, SCF wanted to increase its understanding of the Sahelian rural food economy. In addition, the information was supposed to be used to alert decision makers not just to acute crises, but also to the underlying causes of food insecurity. Thus, as the project developed it became orientated towards information for the planning of long-term food security interventions.

Thus, SCF’s local food security monitoring project, known as SADS (Suivi Alimentaire du Delta Seno), was set up in the drought prone 5th Region of Mali in 1987. Initially, this food information system, operating in the Inner Niger Delta and a particularly at-risk area of the Sahelian dry lands (the Seno), evolved with the collaboration of the International Union for the Conservation of Nature (IUCN) and OXFAM (UK).

In contrast to the national early warning system, SCF placed emphasis on monitoring food entitlements at the local level. This information system was to be geared not so much towards the detection of famine and targeting of food aid, but rather to an understanding of the causes of vulnerability and chronic food insecurity.
This would allow the identification of long-term interventions, appropriate in the prevention of famine and food crises.

In 1991, the SADS project became directly involved in appropriate interventions to improving food insecurity, with the development of a credit programme. The SADS Bulletin was the major information output of the project until 1993. During 1994, support will be given to the development of regional food security planning capacity in Mopti.

**METHODOLOGY**

The methodological objectives of the SADS were:

— to establish baseline information on the local food economy, which would enable future monitoring;
— to develop appropriate indicators to follow who was vulnerable, where, in what season and why; and
— to examine how rural people coped with chronic food insecurity and assured food access following on from production failures.

Regular food security assessments were reproduced in seasonal SADS Bulletins, in addition to one-off research reports. These Bulletins aimed to provide useful information to decision makers to signal food stress and suggest appropriate responses. Around 200 copies were distributed on a quarterly basis to local, regional and national government services, as well as to NGOs and international organisations.

The SADS methodology is distinguished by its emphasis on coping strategies, analysis by production system and the use of qualitative information gathered from rural people. The approach to data collection belongs loosely to those associated with rapid or participatory rural appraisal (RRA or PRA). Much of the information was collected using checklists developed by project staff and through semi-structured interviews. Information collection was carried out at village meetings as well as with key informants (traders, village elders, etc.). Oral histories were used to build up a picture of pre- and post-drought changes in vulnerability.

Initially, information collection was organised around 4 project bases or ‘listening posts’ based at district or sub-district level. These sentinel sites were chosen for their strategic position in order to gain an insight into larger areas and movements of producer groups. Important market or administrative centres were selected; one small but important town was chosen because of its strategic site in the heart of the Delta, through which all producer groups would pass at some season of the year.

Information was collected on agricultural and fish production; livestock conditions; on-farm stocks; off-farm employment; consumption; migration; and exchange. This was supplemented by secondary statistical information, particularly on rainfall and flood levels, and national regional production estimates. Initially, baseline work was done to collect and analyse existing information and to classify the different production systems. These were determined on the basis of agro-ecological systems, the mix of productive activities and use of diverse natural resources by different groups of people.

This having been done, the first year was spent identifying a set of season and production specific indicators (Table 1) and analysing the determinants of food access in order to establish a seasonal monitoring system. Seasonal calendars of food access, activities and coping strategies for different producer groups were drawn up. From this, seasonally specific monitoring indicators were tested for each zone and production system (Davies et al., 1990a, b, c, d). Field workers involved in data collection also took part in the analy-
TABLE 1
SADS seasonal monitoring indicators: information required to monitor food security during the rainy season (June—September) for two producer groups

Pastoralists

- Rainfall (amount and distribution both in time and space)
- Flood levels (levels and rate of rise)
- Division of herds for seasonal migration
- Patterns of livestock migration
- Political conflict (and effect on livestock movement/trade)
- Pasture availability and quality
- Water availability on the dry lands
- Levels of milk production
- Barter of milk for wild foods
- Availability and consumption of wild foods

Agro-pastoralists

- Rainfall (amount and distribution both in time and space)
- Flood levels (levels and rate of rise)
- Agricultural campaign (identification of constraints: seed, labour, traction animals, reseeding, area cultivated)
- Availability and price of cereals in markets
- Availability and demand for credit for cereals
- Reduction in number of meals
- Return of migrants for cultivation
- Sale of sheep and goats (and sex of those sold: sale of females is a sign of distress)
- Crop development and pest infestation
- Availability and consumption of wild foods

sis and production of the SADS Bulletin.

Monthly market surveys were carried out to monitor food prices, and market strategies of producers and traders in 10 rural markets and the regional capital of Mopti. Information was collected on staple food prices, terms of trade, wholesale and retail price differences, non-food products and levels of market activity. Key seasonal terms of trade were identified and analysed regularly in the SADS Bulletin.

A household survey was carried out aimed at quantifying and providing further analysis of critical constraints to food security. A number of one-off surveys aimed to deepen understanding of certain food security issues (such as displaced populations, exploitation of wild foods and livestock markets).

USE OF COPING STRATEGIES IN MONITORING

One of the features which distinguishes the SADS approach is its focus on how producers manage to feed themselves during periods of stress — in other words, on their coping strategies. Their relevance grew with the realisation that famine can occur even when some food is available (Sen, 1981) and food entitlements are critical in an analysis of food security.
Communities are not passive in the face of production failure, but respond in a variety of ways. Examples of such strategies include migration in search of employment, the collection of wild foods, reduction in consumption and the sale of possessions or productive assets.

Proponents of local food information systems (Campbell, 1990) have argued that identifying coping strategies leading up to a crisis can trigger an early warning and produce response to prevent the collapse of food entitlements — before it is too late. SCF’s SADS project attempted to incorporate coping strategies into food security monitoring and to test some of these assumptions. Monitoring of coping strategies has proved complex, however, and the limitations of such an approach must be recognised.

Problems of definition: coping with crisis or coping with change?

The term ‘coping strategies’, as adopted by the SADS project, has been used to describe all household strategies once the harvest (or principal production strategy) has failed. This broad definition has its limitations.

Firstly, the term is not dynamic and fails to encompass shifts in food strategies taking place in a context of rapid social and economic change in Sahelian environments. In the 5th Region of Mali, as elsewhere, what were once strategies to cope with a bad year are increasingly becoming ‘normal’ strategies in every year. Certain wild foods, for example, such as the berries of Boscia senegalensis, formerly gathered only in a difficult year, are now consumed by poor millet farmers in most years. Consumption of certain so-called ‘famine foods’ is thus no longer an indicator of unusual stress in a drought year.

Analysing changes in strategies which have occurred in the pre- and post-

Whose coping strategy?

Coping strategies in practice can be difficult to identify, in an area where diversification of activities is fundamental to livelihoods. In the Inner Niger Delta, for example, seasonal fishing may be undertaken by millet farmers in a bad year as a coping strategy, but amongst agro-fishers the same activity is simply a way of gaining a living. As Davies et al. (1991, p. 31) argue, ‘one person’s coping strategy is another’s livelihood’. This makes interpretation difficult and analysis by production system essential.

Need for baseline information and analysis

In order to interpret coping strategies correctly, good baseline information is needed to determine what is normal behaviour, and thus to interpret indicators of unusual food stress. Time is needed to establish baseline information (1–2 years). Good analytical skill and knowledge of the area is required; local institutions and capacities to collect and analyse the data need to be developed.

Partial indicators

Coping strategies have proved essential in understanding how rural people gain
access to food and incomes. Standard or production-based indicators give a very incomplete picture of food security. It is clear, however, that coping strategies, whilst necessary, are only partial indicators in the overall food security picture and must be used in combination with other types of information (cereal production, grazing conditions, livestock illness and pests, for example).

**Sequential adoption of coping strategies?**
Arguments for using coping strategies assume a clearly identifiable sequence of adoption of coping strategies in the run-up to a crisis (see Corbett, 1988). The SADS project has found, however, that in the 5th Region of Mali no clear sequence of uptake can be identified which can be extrapolated across districts or population groups. The implications for early warning are that, with no such sequence, coping strategy uptake cannot automatically be used to indicate a certain level of food security. This may be due to the complexity of production systems in the area — the analysis of responses to food deficit must be sensitive to seasonal, producer group and agro-ecological differences to be meaningful.

**The costs of coping**
Following on from the argument that monitoring uptake of strategies is insufficient, analysis is needed of the intensity, timing of and expected returns to strategies, as well as the motivations behind them. For example, the soudure (hungry season) in 1991 started unusually early for millet producers in certain dry land areas, as signalled by the intensification of certain strategies (wild food consumption, fishing activities and out-migration), the early appearance of others (reduction of the number of daily meals), as well as the adoption of ‘famine’ strategies (such as breaking open termite nests to find grain) (SADS Bulletin no. 15).

In fact, most coping strategies involve a high commitment of household resources to meet subsistence needs (e.g. time and energy to collect wild foods, migration to meet subsistence needs during labour-intensive moment of field preparation). Others may be associated with nutritional or health risks (consumption of certain leaves and berries, reduction of daily meals, wage labour in dangerous environments). They may bring very low returns to the time and effort (e.g. brick making after the harvest period, selling woven mats). Many strategies involve the drawing down of liquid and productive assets, and thus of long-term food security. Finally, the natural resource base of many coping strategies are being progressively exhausted, decreasing rural producers’ capacities to withstand stress (e.g. exhaustion of palm tree resources).

The contribution that these strategies make to food security can be appraised by certain ‘livelihood criteria’ — risk, returns, environmental sustainability, labour or capital requirements, gender use and health risk (Davies, 1993a, b). Further work has been done on the effectiveness of coping strategies, identifying shifts in uses of such strategies from the pre- and post-drought periods (ibid.).

**Challenging misconceptions**
A focus on coping strategies has led to an increased awareness in the Mopti region of demand rather than simply supply-side factors in food security. The constant emphasis of the SADS Bulletin on coping strategies has improved local and regional planners’ understanding of the complexity of post-harvest strategies. It has helped challenge the widespread misconception that food supply alone determines food security.

For example, following a poor millet harvest in the drylands, most farmers migrate to the Niger Delta in order to work on the rice harvest. In a good rice year,
payment in cash or kind can assure household food security for an extra two to three months. This is clearly critical to annual food security and yet is often disregarded by planners.

Analysis of information collected by the SADS project further demonstrates the importance of coping and adaptive strategies. It was shown that over 30 per cent of rice farmers' time is spent on coping/adaptive strategies, compared to 42 per cent on agricultural activities (Davies, 1993a, p. 365). For fisher-farmers, the importance of coping is even greater, and accounts for 39 per cent of their time.

Intervening to reinforce coping strategies?

In examining how rural people survive periodic food stress, it has been argued that one can identify ways of reinforcing these coping strategies and so strengthen people's resistance to external shocks. This would be a more effective response than food aid distributions, which arrive when the erosion of livelihoods has already started. The term 'coping', however, implies an overly optimistic view of people's ingenuity in surviving and an innate resilience on the part of traditional communities.

Thus, most coping strategies, whilst a rational response to poverty, only allow people to weather the crisis. This is often at the cost of longer term livelihood security, allowing no saving or investment. Whilst undermining coping strategies must be avoided, reinforcing them may only lock people into a cycle of subsistence and 'coping' (Davies, 1993b). This increases vulnerability, rather than allowing rural people to develop the productive base from which to secure a more sustainable livelihood. Interventions should focus on reducing rural people's need to resort to 'coping', by increasing consumption and productive opportunities and by

supporting diversification and accumulation strategies.

The information system identified the inadequacy of credit systems as a critical constraint on food security. Thus, SCF established a credit programme which aims to increase productive investment (loans for fishing equipment and rice seeds), support consumption and accumulation strategies (cereal banks), as well as encouraging some diversification of activities and income (income generation and petty commerce).

ANALYSIS BY PRODUCER GROUP

The SADS system covered the Inner Niger Delta and the surrounding dry lands of the Seno. The area contains several production groups (cultivators, agro-pastoralists, agro-fishers, transhumant fishers, pastoralists and displaced peoples). Production system was chosen as the appropriate tool of analysis (rather than geographical area or economic group), since vulnerability in the region is determined by the mix of entitlements offered by the production system. Membership of the production system and the ability to move temporarily into another one is a key determinant of food security in the region.

What are the limitations of this approach? Firstly, it must be remembered that it is only meant as a tool for analysis. In practice, it can be difficult to distinguish between groups. It may, therefore, hide differences within groups. For example, some agro-pastoralists are failed pastoralists and can be seen as successful farmers who have been able to invest in some livestock. Secondly, for practical planning purposes, there is no idea of absolute numbers of each producer group in the area, which limits the impact of vulnerability statements (Davies, 1993a). This has been recognised as a weakness in the design of the methodology from the outset. Thirdly, the targeting of interventions
by producer group is infrequent in the area. Thus, increasingly, information was presented in the Bulletin on a geographical basis as well as by production group, as that is the most commonly used planning unit. Finally, the producer group focus has distracted analysis from the examination of other possible vulnerable groups. Little understanding exists within the project of within-group differences in strategies of food entitlements (based on family size or gender, for example) or on more fundamental economic differences.

**USING LOCAL KNOWLEDGE**

Information was gathered directly from farmers, pastoralists and fishers, and their own assessments monitored. Rural producers make informed judgements on the situation and respond accordingly. This proved an efficient and feasible way of collecting information. Farmers' estimates of the level and duration of on-farm stocks were an essential element in post-harvest assessments.

Again, the principal problem was the reluctance of local officialdom to accept such indigenous information as credible. Doubts existed over potential information bias in a region where food aid is distributed in most years. Such bias can be controlled for by good supervision and the 'triangulation' of information sources. Persuading local planners to have confidence in, and act upon, information assessments based on local knowledge is one of the challenges to food information systems.

A second problem is that of information extraction from rural people. Rural producers will not continue to provide time and information without seeing any direct returns — survey fatigue is apparent in certain areas. Ensuring feedback to those who supply information is essential to the long-term sustainability of the system. Whilst rural people can be rich sources of information for 'outsiders', they too have partial knowledge and can benefit from information about, for example, harvests in other areas, employment opportunities and cereal markets.²

**SUSTAINABILITY**

In the initial stages of the project, a primary motive for SCF was to find out how the rural food economy in the Malian Sahel worked and to understand the nature of vulnerability in the area. Thus, issues to do with the sustainability of the monitoring system and institutional linkages were not initially raised.

The sustainability of such an NGO-operated system is questionable and was one of the reasons for which the food information system was finally stopped in 1993. Establishing such a system within local or regional government structures would be a more sustainable approach. This would not only ensure a more permanent institutional structure, but also allow the potential for integrating information collection activities with those of response. Integration into government structures of a similar information system would be possible in some contexts, particularly where information systems are weak. This was not possible in the Malian context, partly because of the national early warning system (the SAP) which covers most of the drought affected areas of the country and produces monthly Bulletins on food security down to the district level. Problems also arise from the costs of field monitors collecting a wide range of indicators, the time taken to set up the system and the need for people trained to a level able to analyse the information.

Questions of sustainability in relation to rural people as information providers have already been raised. Much depends on their perceptions of the use of the information they provide. Where local government services or development initiatives are weak, rural people see little
result from their input to information systems. It is clear that in order to sustain an information system based on local knowledge, some returns to the population must be assured, either in terms of visible development initiatives or the feedback of useful information.

LINKING INFORMATION TO RESPONSE

Who used the information and how?

The value of an information system stands or falls on the action that is taken as a result of the information. Information use and links to response mechanisms are characteristically the weak spot of food information systems (SCF/IDS, 1992). The SADS food information system aimed to provide appropriate information to decision makers. It was not, however, driven by the key issue of who would exploit this information. Consequently, questions of how it is used, by whom, and for what, have lagged behind those relating to data collection, analysis and production. Who were the different user groups of SADS information and how did they use it?

Government sectoral and planning departments at the national, regional and local level all received the SADS Bulletins regularly. Those most closely associated with food security issues were particularly targeted: Programme de Restructuration du Marché Céréalier, the national early warning system (Système d’Alerte Précoce - SAP), major donors, the USAID’s Famine Early Warning System and the World Food Programme. Non-governmental and international organisations in the Mopti region were also regular readers. No formalised institutional links to government existed.

Information was used:
- to verify and supplement information from the national early warning system, in particular to identify pockets of food insecurity;
- to assist in food aid assessment needs;
- to provide local level vulnerability assessments unavailable through the SAP;
- to aid understanding of the complexity of the local food economy and to provide background information useful for the planning and implementation of development projects;
- to plan service provision in urban areas, following unusual inflows or migrants, by the Social Affairs department;
- to brief and orient new personnel to the region, by the District Administration and Department of Agriculture; and
- to provide information on cereal and labour market prices for NGOs.

SADS information proved timely in alerting decision makers to pockets of food insecurity, sometimes missed by the national early warning system. This was so particularly in good harvest years when deficit areas in the north of the Mopti region were signalled by the SADS system. This was the case in 1988/9 and 1991/2 when USAID was alerted to various pockets of crop failure and local food insecurity which would otherwise have gone unnoticed. Information on the relative vulnerability of producer groups from the SADS Bulletins, for example, was incorporated into the USAID’s FEWS vulnerability assessments for Mali.

The SADS Bulletin was, however, one information source among several at both national and regional levels (the SAP and USAID’s Famine Early Warning System, Système d’Information des Marchés, field reports from NGOs, etc.). Decisions were rarely made solely using the SADS information.

Constraints to the use of information

Whilst the information produced by the SADS was of general value to planners in government and NGOs, its influence on
decision making was limited. The principal reasons are institutional. No direct or institutional links to government at national, regional or local levels existed. The exception is SCF's role in the Regional and National SAP working groups. SCF played an important role in the monthly SAP meetings, held to discuss and prepare the monthly early warning Bulletins for the Region. The following are some of the existing constraints to greater exploitation of the SADS information by those involved in famine early warning, as well as broader food security and planning issues.

Factors related to the institutional context
(1) Information and response were not linked institutionally. The SADS food monitoring project was an NGO-run information system, operating outside government structures. The information was therefore not automatically fed into the government planning and response system.

(2) Information users are reluctant to use qualitative assessments of food security and vulnerability, based on local people's knowledge and perceptions, even when backed up by more 'objective' data. There is a reluctance to use this type of information to grapple with the complexity of the local food economy.

(3) Limited geographical coverage means that much of the information cannot be generalised to a larger population or area and is therefore of limited value to those involved at the regional level or above.

(4) There are problems of integrating micro-level data in national information systems. Organisations at national level find it difficult to integrate local food access data because of aggregation difficulties. In addition, decision making at national level depends largely on quantitative data, in order for resource allocation decisions to be made across regions.

(5) There is weak planning capacity at local and regional government levels (in terms of financial, human and organisational resources). Yet these are the greatest potential users of micro-level information who are best placed to exploit the information for planning purposes (agricultural, fishing, pastoral and co-operative services).

(6) Response to food crisis is typically reactive (i.e. crisis management, largely involving food aid), rather than in terms of prevention of, or preparation for, drought.

Factors relating to the information system
(1) Targeting of information users was insufficiently refined. Information was provided to a large number of users with highly varied information needs, working from the local up to the national level. As a result, tailoring information to users' needs and maintaining the quality of relevant information was difficult.

(2) There were insufficient recommendations on a regular basis of appropriate responses to food insecurity in the Bulletin. Where the fundamental problem is one of chronic food insecurity, however, sometimes becoming more acute, response options tend to be oriented towards poverty reduction and medium-term initiatives. Regular recommendations could tend towards repetition.

SCF's use of the information
In 1991, SCF began to test and develop appropriate and sustainable ways of improving rural producers' resistance to drought in the long-term. Lack of credit having been identified by the monitoring system as a critical constraint (SADS, 1989), SCF established a village loans programme. The food security monitoring
was used in the identification of target villages and of a flexible loan programme as a suitable intervention. In addition, the detailed knowledge of seasonal activities and food problems acquired by the project aided the planning and monitoring of activities (SADS, 1992).

The extent to which the accumulated knowledge of the first years has influenced the credit project is, however, hard to evaluate. Specific uses to which the loans were put were identified and chosen by village associations. The approach to working with rural people, being essentially participative, was not one which depended wholly on the information base of the monitoring system. This demonstrates the paradox of a development practice which is based on negotiation with participating communities and trial and error on the part of all involved.

CONCLUSIONS

SCF's SADS project has established a system for monitoring food security and identifying vulnerable groups and zones, which was operational in Mali from 1987 to 1993. It provides a potential model for the development of local food security monitoring systems elsewhere. In this paper I have attempted to identify some of the lessons learnt from this experience in the Mopti Region. A number of shortcomings have been raised, particularly in relation to the institutional links between information producers and users. The main conclusions are as follows.

Firstly, SADS has shown that a relatively cost-effective methodology can be established, based mainly on socio-economic information and on primarily qualitative assessments. The system has been shown to be operationally feasible over a five-year period and can produce timely and reliable warnings of localised food problems.

Secondly, food security assessments cannot depend on a small number of key indicators, particularly in an area of multiple production systems. All the indicators are specific to the area, season and production group, and must be regularly revised.

Thirdly, coping strategies are a key element in food security monitoring, but interpretation can be complex and requires finely tuned local knowledge, and analytical capacity is essential. They are only one piece of information in an overall mosaic. Genuine ‘coping’ strategies, as a reaction to unusual food stress, need to be differentiated from longer term structural shifts in people's ways of acquiring food. Monitoring must take account of the intensity, timing of and returns to coping strategies.

Fourthly, focusing on coping strategies tends to overestimate people’s resilience. Many coping strategies have negative impacts on livelihoods. Reinforcing coping strategies is rarely a prescription for improving long-term livelihood security, or for allowing people to break out of a cycle of semi-subsistence living.

Fifthly, ensuring response to information is often difficult to achieve. The link between information providers and users must be made explicit from the outset. Institutional issues, and how to ensure integration of information and response, must be given priority in the design of information systems. Whilst political and economic factors will always intervene, linking information systems institutionally to local or regional planning capacities will increase the probability of eliciting response.

Finally, the SADS approach has potential for use elsewhere, if adapted to the specificities of the local environment. Attention must be paid to the sustainability of the institutional set-up. A similar methodology could be introduced where institutional issues are made a priority from the outset, local information systems are weak and information is used for local development planning.
Notes

1. See SADS (1989), the first issue of the SADS Bulletin (SADS, quarterly, 1987) and Davies (1993) for more in-depth description and analysis of the project’s objectives and methodology.

2. Which types of information can be useful to rural people and how to transmit it are questions which have been little explored. With the start of SCF adult literacy activities in support of the credit programme, this feedback of information is being examined in greater detail. A local language journal is being produced in order to provide useful information for village associations involved in cereal and seed banks and other community enterprises.

3. Further analysis of SCF’s experience with SADS local food security monitoring can be found in SCF’s Working Paper series (Lambert, 1994), and in a study of food and livelihood insecurity based on data derived from the SADS (Davies, 1993a).

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R.J. Lambert
Save the Children Fund (UK)
17 Grove Lane
Camberwell
London SE5 8RD
UK
Strategy and Organizational Disaster Preparedness

MAHASWETA M. BANERJEE and DAVID F. GILLESPIE

Strategy is introduced as a predictor of disaster preparedness. Tests with multiple regression show that strategy, disaster experience and capacity for disaster response are the strongest predictors of preparedness. We conclude that the measure of strategy warrants further refinement and that the study of preparedness must move from idiosyncratic, disconnected studies to a more theoretically organized set of studies that verify useful guidelines for monitoring and enhancing disaster preparedness.

Organizational disaster preparedness saves lives, property and money. Organizations typically prepare for disaster by experiencing them and then developing their strategy and capacity for disaster response. Although experience with disasters and capacity for response have been supported empirically in their relation to disaster preparedness (Drabek, 1986; Gillespie and Streeter, 1987), strategy has not been studied in relation to preparedness. Strategy is a potentially powerful variable in relation to preparedness because it is anticipatory by nature and, therefore, can help to promote preparedness before an organization has to experience a disaster.

In this paper we introduce strategy as a predictor of preparedness. Strategy involves decisions about an organization’s future. The potential merit of strategy is that it can be proactively taught and applied in virtually every kind of organization. Experience teaches, but it is reactive. Capacity building can be proactive, but there are operating constraints to be accommodated. We believe that understanding strategy in relation to preparedness will lead to higher levels of preparedness among organizations.

PREPAREDNESS

Preparedness is a series of activities undertaken prior to disasters that lead to fewer injuries and deaths, and lower costs after a disaster strikes (Gillespie et al., 1993; Faupel, Kelley and Petee, 1992; Gillespie and Streeter, 1987; Perry, 1987; Drabek, 1986). The Office of the United Nations Disaster Relief Co-ordinator (UNDRO) points out that preparedness is concerned with forecasting and warning; education and training; operational plans; stockpiling; and funding (Brown, 1976). In other words, preparedness is a multi-dimensional concept.

Drabek’s (1986) compendium on disaster research reveals that preparedness has been studied at different levels and that separate aspects of preparedness have been considered. It has been studied
at the individual, group, community, organizational, societal and international levels. Even when the organization is the level of analysis, the focus has been limited to one or another dimension of preparedness. Most authors focus on operational disaster plans (Dynes, Quarantelli and Kreps, 1972; Dynes and Quarantelli, 1975; Wolensky, 1977; Perry, 1979).

Research at the organizational level has considered the preparedness of different types of agencies: emergency management agencies (Anderson, 1969; Mulford, Klonglan and Tweed, 1973); hospitals (Gray, 1981; Alldred, Hiscott and Scanlon, 1982); mental health agencies (Titchener and Kapp, 1976; Erickson, 1976); media organizations (Kueneman and Wright, 1975); schools (Turner et al., 1981; Crabbs, 1981); first responders (Py, 1978; Gray, 1981; Belardo et al., 1983); and tourist businesses (Drabek, 1991). The findings from these studies have limited applicability across these various types of organizations primarily because such highly varied aspects of preparedness have been studied.

Drabek (1986) shows that research on disaster preparedness has examined primarily the individual and the community levels of analysis. At the individual level, Faupel, Kelley and Petee (1992) state that it is almost axiomatic that higher levels of preparedness will result in more appropriate response activities. Perry and his colleagues have consistently found that effective response to disasters is closely related to the planning and preparedness of individuals and households (Perry, 1979; Perry, Lindell and Greene, 1981; Perry and Greene, 1982, 1983).

Although disparate in focus, the disaster literature suggests that preparedness is a set of activities that lessens disruption following disasters. Preparedness, however, cannot be directly assessed until response to a disaster occurs, and then it can be assessed only if pre-disaster measures of tasks to be performed have been taken (Gillespie and Streeter, 1987). On the other hand, preparedness can be indirectly assessed through the study of disaster plans (Drabek, 1986), inter-organizational relations (Gillespie et al., 1986), disaster relevant training sessions and exercises (Gillespie and Streeter, 1987) and education (Faupel, Kelley and Petee, 1992).

Influences on preparedness include previous disaster experience (Anderson, 1969; Gillespie and Streeter, 1987), capacity (Mileti et al., 1975; Gillespie and Streeter, 1987), size (Quarantelli, 1981), and perhaps organizational age and strategic choice (Drabek, 1990; Banerjee, 1992). The relationship between these variables and preparedness is discussed in more detail below.

**PREDICTING PREPAREDNESS**

In this paper we examine the relationship between organizational disaster preparedness and five independent variables: strategy, experience, capacity, age and size. Each of these variables is assumed to be related positively to preparedness. The basis for these assumptions is discussed below.

**Strategy**

Strategy entails making decisions about an organization’s future by changing the allocation of resources (Chandler, 1962; Collier, 1981). Miles and Snow (1978) indicate four ways to assess strategy: defender, prospector, analyzer and reactor. The key dimensions underlying Miles and Snow’s (1978) classification are: (a) entrepreneurial concerns, (b) administrative concerns and (c) engineering concerns. Entrepreneurial concerns emphasize the rate at which an organization changes its services or markets in order to adapt to its environment. Entrepreneurial concerns translate
into administrative concerns when there are changes in organizational structure or internal processes. Engineering concerns focus on basic and applied aspects of engineering. They affect administrative structure, expenditures and orientation toward services or markets.

Conceptually, Miles and Snow's (1978) strategic typology of disaster response organizations suggests the following pattern. Defenders are those that have a stable disaster service orientation, centralized administration, and a high concern for efficiency and evaluation. Prospectors are those organizations that get involved in disaster response when the opportunity arises. They have a decentralized administration and a low concern for expenditure and evaluation because they spend a lot of energy on researching new market opportunities. Analyzers, unlike prospectors, are not the 'first in' in new service areas. Analyzers have a stable service orientation like defenders, but they get into new but tested areas, normally after prospectors have found it to be productive. Analyzers have a decentralized administration and a high concern for evaluation and efficiency. Reactors have no proactive service or market orientation. Characteristically, reactors respond to external demands without attempting to match internal exigencies.

Drabek (1990, p. 59) identified fifteen different strategies, five of which had multiple indicators used by 12 directors, to 'maintain the integrity of their local emergency management agency and to improve the disaster response capability of their community'. Drabek reports that nearly all of these strategies were used by all the directors. Directors located in larger communities tended to use them more frequently as compared to those in smaller communities. The only exception related to the use of mergers as a strategy, which was used more in smaller communities than in larger communities.

Although the relationship between strategy and preparedness has not yet been assessed empirically, there is evidence that strategic choice and effectiveness are related (Banerjee, 1992; Cameron, 1986; Hambrick, 1983; Snow and Hrebiniak, 1980; Miles and Snow, 1978). Since, conceptually, preparedness predicts the effectiveness of disaster response in organizations (Banerjee and Gillespie, 1994), there is reason to believe that strategy influences disaster preparedness. Banerjee (1992) found that defenders have the highest levels of preparedness, followed by analyzers and prospectors; reactors are the least prepared.

Experience with disasters

Numerous studies have shown that previous experience with disasters is related positively to preparedness (Anderson, 1969; Kueneman and Wright, 1975; Warheit, 1968; Nehnevajsa and Wong, 1977; Britton, 1981; Gillespie and Perry, 1984; Gillespie and Streeter, 1987). Further, frequent experience with disasters and the high level of resulting damage make the need for preparedness more widely recognized (Mileti, Drabek and Haas, 1975).

Capacity

Mileti et al. (1975) emphasize the importance of organizational capacity as it relates to pre-impact warning in a community. Gillespie and Streeter (1987) developed a comprehensive index of organizational capacity and found a strong relationship between capacity to respond to disasters and preparedness.

Age

No research has reported the relationship between organizational age and prepared-
ness. At the individual level, Shimada (1972), Schiff (1977) and Turner et al. (1979) found that age is related to preparedness. Older adults (40 to 50 years old) were much more likely to take preparedness measures than individuals in their 20s (Shimada, 1972). Likewise, Turner et al. (1979, p. 23) found that 'people over 50 years of age, people with especially strong attachment to their local community and those who live in especially vulnerable circumstances are most likely' to take preparedness measures. At the organizational level, the logic underlying the relationship of organizational age and preparedness is that older organizations are more likely to be invested in their community because of interdependencies that derive from the normal give and take between the organization and its surrounding environment. The larger the investment of the organization in the community, the stronger the association between age and preparedness.

Size

Drabek (1986) hypothesized that the larger the organization, the greater the likelihood that disaster planning will occur. Quarantelli et al. (1979) studied a sample of US chemical firms and found that smaller firms were not involved in disaster planning because they perceived the threat of disaster to be less relevant to their firms. A survey of Japanese private businesses reported similar findings (Drabek, 1986, reporting on Yamamoto and Quarantelli, 1982). Drabek, however, also reported contradictory findings related to size and preparedness. An earlier study of Japanese transportation companies, for example, found that size was not related to preparedness. Because of these mixed findings, Drabek (1986, p. 30) recommended further research in this area ‘to permit documentation of the range of variation and its determinants’.

METHODS

Population characteristics

We studied 80 disaster response organizations located in 50 metropolitan cities of the United States. These 80 organizations represented two different populations of disaster response organizations. One population consisted of all 53 Metro Key Resource Chapters of American Red Cross (MKRCs). The other population comprised an ego-network of all 27 local organizations deemed strategic for disaster response by one MKRC located in the Midwestern United States. This population is referred to as the ‘Local Organizations’.

Each MKRC is considered a separate organization, despite the fact that all MKRCs work under the central American Red Cross headquarters which sets broad policies and procedures for all chapters. These MKRCs are independent in that they are responsible for their own fundraising and have some flexibility in deciding the types of services that will be offered by each Chapter. The Local Organizations include a mixture of different kinds of organizations: police and fire departments, emergency management agencies, utility companies, health related organizations, social service agencies, a municipal league and a business umbrella organization.

All the MKRCs of the Red Cross have a Congressional mandate to respond to disasters, while about half of the Local Organizations have a similar mandate. Although conceptually it is cleaner to study only one population, for example, the MKRCs, the Local Organizations were included in this study to provide opportunities for the replication and generalization of findings.

Data were collected from October 1991
to February 1992 through telephone interviews with 72 top administrators. Out of the 72 organizations, 49 are MKRCs and 23 are Local Organizations. This is a 90 percent response rate.

**Measurement**

*Preparedness* was measured with Gillespie et al.'s (1993) 28-item index of physical (7 items), planning (6 items), training (7 items), financial (4 items) and community (4 items) preparedness. Physical preparedness assesses the degree to which organizational plans emphasize the physical safety of buildings; planning preparedness assesses the degree to which organizations emphasize internal disaster planning; training preparedness assesses the degree to which organizations emphasize disaster training of staff and volunteers; financial preparedness assesses the degree to which organizations emphasize raising and allocating funds for disasters; community preparedness assesses the degree to which organizations emphasize disaster education and community involvement to reduce the loss of life, injury and property damage. The sub-scales were converted to standardized z scores to provide equal weighting in the overall measure. The five z score items were added, the total divided by 5, and a constant of 3 was added to eliminate negative values. This variable ranges from 0.66 to 4.47, with a mean of 3.0, a standard deviation of 0.86 and a skew of -0.90. Alpha reliability is 0.88.

*Strategy* was measured as the degree to which administrators focus on administrative, entrepreneurial and engineering concerns. In this study, administrative concerns are measured through the clarity of authority; entrepreneurial concerns through the emphasis on provision of stable services. Engineering concerns are approximated through concern for evaluation and efficiency because they are believed to reflect expenditure on market-

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ing and research and development (Miles and Snow, 1978). As data related to marketing, research and development could not be obtained for all organizations, concern for evaluation was used as a surrogate measure.

Here strategy is a three item index indicating the degree to which (a) it is clear who has the authority to direct disaster services, (b) a set of stable disaster services are provided and (c) disaster services are evaluated. The scaled items are scored from 0 ('does not apply at all') to 7 ('applies perfectly'). These three variables were added and divided by 3. This new variable ranges from 0.00 to 7.00. It has a mean of 5.14, a standard deviation of 1.92, a skewness of -1.89 and an alpha reliability of 0.81.

*Experience* with disasters was measured as the number of times an organization responded to different types of disasters. There were eight different categories of disasters: flood, tornado, hurricane, earthquake, cold/heat, fire, hazardous materials accident and others (Gillespie et al., 1986). Responses were open-ended. Because of a skewed response pattern, this variable was dichotomized as a 0 ('never responded') and 1 ('responded'). Due to the unevenness in the data (5 out of the 8 variables have a standard deviation larger than the mean), experience was constructed as the number of times organizations had responded to floods, fires and hazardous materials accidents. These three variables were added and divided by 3. This measure of organizational experience with disasters has a mean of 0.68, a standard deviation of 0.37 and a skewness of -0.86. It has an alpha reliability of 0.74.

*Capacity* for disaster response was measured as the ability of an organization to provide various types of emergency and social services to victims of disasters. Twenty-three variables were used to construct this measure: warning, evacuation,
communications, damage assessment, road clearance, fire fighting, debris removal, life lines repair, search and rescue, security, shelter, feeding, first aid, transportation, information, referral, storage, crisis counselling, medical supplies, household supplies, clean-up supplies and case management. These items reflect a comprehensive capacity list for disaster response organizations based on elaborate discussions, prior to data collection, with administrators of emergency management and social service agencies. The variates range from 0 ('no capacity') to 7 ('full capacity'). The capacity variable was created by adding the twenty-three variables and dividing by 23. It has a mean of 2.29, a standard deviation of 1.00 and a skewness of 0.33. Its alpha reliability is 0.85.

Age was measured as the number of years an organization had been involved with disaster work. It was assumed that the longer an organization had been in the disaster business, the higher its preparedness. This is an open-ended variable. It was computed as 1992 minus the year the organization started disaster work. The oldest organization started its disaster services in 1826. The youngest organization got involved in disaster work in 1989. This variable has a mean of 55.71, a standard deviation of 37.06 and a skewness of 0.03.

Organizational size was measured as the number of trained paid staff and volunteers. This measure was constructed out of eight separate variables which were all open-ended. The eight variables were: (a) total full-time equivalent (FTE) paid positions in the organization, (b) total number of volunteers in the organization, (c) full-time equivalents that were trained in disaster work, (d) volunteers trained in disaster work, (e) total full-time equivalents added to disaster service unit, (f) total number of volunteers added to disaster unit, (g) total number of staff that had left disaster services and (h) total number of volunteers that had left disaster services. Organizational size, the new variable, was created first by subtracting the number of trained paid personnel and volunteers from total FTEs and total volunteers, and then subtracting the number of trained paid staff and volunteers that had left the unit from those that had been added to the unit. A log transformation was performed as the measure was not normally distributed. The transformed variable has a mean of 3.50, a standard deviation of 1.37 and a skewness of —0.53. It has an alpha reliability of 0.80.

Analyses
Analyses were conducted to test the predictability of strategy, capacity, experience, age and size in relation to preparedness. The distribution of each variable was examined with frequency distributions, means, standard deviations and measures of skewness. Also, stem and leaf plots, box plots and normal probability plots were examined to assess the appropriateness of each distribution for ordinary least squares regression. The five hypotheses were tested by regressing the measure of preparedness on strategy, capacity, experience, age and size.

RESULTS
Table 1 shows that the five hypotheses were supported with significant positive relationships between preparedness and each of the hypothesized variables. It was expected that organizations with a high concern for clear authority, provision of stable services and evaluation of service delivery would have higher levels of preparedness compared to those with a lower concern for each of these three dimensions ($r = 0.65, p < 0.001$). Second, experience with disasters is related to preparedness ($r = 0.46, p < 0.001$). Third,
organizational age is related to preparedness \( (r = 0.44, p < 0.001) \). Fourth, organizational size is related to preparedness \( (r = 0.41, p < 0.001) \). Last, capacity for responding to disasters is positively and significantly related to preparedness \( (r = 0.37, p < 0.001) \). Together, these findings support the construct validity of preparedness.

Earlier disaster research has been limited to testing bivariate relationships of experience and preparedness, capacity and preparedness, and size and preparedness. In this study, multiple regression was used to test simultaneously these earlier predictors of preparedness and also to test the relationship between strategy and preparedness. Table 1 shows that when all the five predictors were included in one regression model, none of the variables except strategy had a significant relationship with preparedness. As there is no theory to guide this analysis, various models were run to test which combination of variables would best predict preparedness. Table 2 shows that among the five independent variables studied, strategy, experience and capacity were found to be the strongest predictors of preparedness, with significant standardized beta weights of 0.53 \( (p < 0.0000) \), 0.19 \( (p = 0.05) \) and 0.17 \( (p = 0.05) \) respectively. Organizational size and age failed to achieve significance in any model when strategy was included.

Among the variables examined, strategy is the strongest predictor of preparedness. It appears that organizations with high concern for clear authority, provision of stable services and evaluation focus more on maintaining or increasing higher levels of disaster preparedness. Consequently, preparedness levels vary for different strategic orientations.

These three variables together explain about half of the variance in preparedness \( (R^2 = 0.48) \). Thus, it appears that strategy, experience with disasters and the compre-
hensiveness of capacity to respond to disasters together influence the total preparedness levels of organizations. Our findings suggest that although organizational size and age may be important variables in relation to preparedness, they are not as important as strategy, experience and capacity.

SUMMARY AND CONCLUSIONS

There is no theory that tells us how organizations can be prepared in a systematic and comprehensive manner. Until recently, multivariate relationships among the predictors of preparedness had not been tested. This is a serious weakness in our understanding of preparedness and how to achieve it. Systematic research and longitudinal studies should be conducted with at least these variables to estimate more conclusively their impact on preparedness.

While the measure of strategy used in this study is a surrogate, it represents an improvement. Prior research has studied strategic choice as a dichotomous variable. There are many problems with research on strategic choice, not only in the area of statistical analyses, but also with regard to how correct the choice of strategy is on the part of the respondents (Snow and Hambrick, 1980). Thus, the measure of strategy used in this study pushes us toward more refinement.

Although it is easier to study one population, our study of two different populations allowed for replication and greater generalizability of findings. For example, had we studied only the MKRCs, it could have been argued that the findings apply only to the Red Cross Chapters. On the other hand, had we studied only the Local Organizations, again it could be argued that this group comprises a mixed bag of organizations where the population size is small and, therefore, the findings are not applicable to other types of organizations. Thus, we believe that pooling these two different populations of disaster response organizations provides greater stability of findings. Banerjee (1992) examined the two populations separately and found strategic choice, preparedness and effectiveness to be related similarly in the two populations.

From the predictors of preparedness it is evident that the three most important factors — strategy, experience and capacity — are within the control of administrators. They have to focus on clear authority, stable provision of disaster services and periodical evaluations of their service delivery system. Second, the more disasters of all kinds that organizations respond to, the higher their preparedness. Deficiencies detected during responses usually led to adjustment in their planning, training, physical, financial and community preparedness. Further, experience with disasters also facilitates knowledge of what must be done to monitor the capacity for disaster response and, accordingly, adjustments have to be made to the different components of a comprehensive response capacity. With more testing of theoretically based predictions, our ability to monitor and enhance organizational disaster preparedness will expand.

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**Mahasweta M. Banerjee**  
School of Social Welfare  
University of Kansas  
Lawrence  
KS 66045  
USA

**David F. Gillespie**  
GWB School of Social Work  
Washington University  
St Louis  
MO 63130  
USA
Emergency field medical facilities constructed after a disaster are frequently managed by medical staff even though many of the day-to-day problems of hospital management are unrelated to medicine. In this paper we discuss the short-term management of one of these problems, namely the control and disposal of sanitary wastes. It is aimed at persons in the medical profession who may find themselves responsible for a temporary hospital and have little or no previous experience of managing such situations. The wastes commonly generated are excreta, sullage and refuse. In addition, surface water must also be considered because its inadequate disposal is a potential health hazard. The paper concentrates on short-term measures appropriate for the first six months of the hospital or clinic’s existence. Facilities expected to last longer are recommended to install conventional waste management systems appropriate to the local community and conditions. In most situations, wastes should be disposed of underground either by burial (for solids) or infiltration (for liquids). The design, construction and management of appropriate disposal systems are described.

The concept that health epidemics are an inevitable consequence of disasters and other similar events is not supported by current statistics (Oxfam, 1985; Blake, 1989). Nevertheless, the provision of medical care often forms an essential part of caring for traumatised communities. According to experience reported by Oxfam (1985), initially most patients suffer from illnesses related to the disaster, but as time progresses cases become more related to poor living conditions. Many of these secondary illnesses will be related to poor diet, inadequate water supply and sanitation, and limited knowledge of basic hygiene. These problems tend to be greater if the disaster has occurred in a developing country where infrastructure is weaker and there are fewer emergency resources.

When field hospitals are constructed, medical staff are naturally more concerned with the provision of medical aid than with the day-to-day running of the hospital. Hospital management should not be overlooked, however, if the unit is to function effectively. Part of the management function is the provision and operation of support services such as water supply, electricity and waste disposal. It is unfortunate, but not surprising, that the latter is often given scant attention until
the problem becomes too great to be ignored (Giroult, 1992; Swenson and Schodorf, 1987). This is because there is virtually no written information available giving specific guidelines for the provision of sanitation in such circumstances. A recent extensive literature review (Dean, 1992) was unable to find any specific guidelines for the provision of sanitary facilities in emergency medical establishments.

In this paper we discuss measures for controlling and disposing of wastes from temporary field hospitals and clinics. Our discussion is based on the literature review undertaken by Dean (1992) and the wide experience of one of the authors (Reed) in low cost sanitation for low income communities and refugee camps. The measures described will be appropriate for most situations. If, however, ground conditions on the site are particularly difficult, such as those found in swamps or where there is rock very close to the surface, then it is recommended that expert advice be sought. Furthermore, the measures described are primarily for short-term situations. If the facility is expected to last longer than six to twelve months, then durability and low maintenance requirements will become more important. This may lead to other waste management systems being more appropriate.

The great majority of medical care in field medical centres is provided on an out-patient basis through small clinics (Seaman, 1981; UNHCR, 1982). Where more expert attention or in-patient care is required, patients are commonly referred to an established hospital nearby. The need for local in-patient care only tends to arise for children suffering from severe malnutrition (Seaman, 1981) or where cases require isolation, such as during cholera epidemics. It is in these latter situations where consideration of sanitary facilities becomes a major issue, both for the hygienic operation of the hospital and the prevention of contamination of the surrounding environment.

THE WASTES PRODUCED

The wastes produced comprise of excreta (faeces and urine), other body fluids (blood, vomit, mucus, etc.), solid waste, sullage and surface water run off following rainfall. The latter is not technically a waste product, but its proper disposal will significantly improve the quality of the hospital environment and reduce the prevalence of disease-carrying insects such as mosquitoes and flies. Data on the composition and quantity of hospital waste are very limited and much of the information given below is abstracted from literature describing domestic waste in developing countries. There is an urgent need to collect more information on the content and quantity of hospital waste.

The volume of excreta produced by humans varies with diet and climate. It is, however, usually in the range 1.0—2.0 litres per day including urine (Franceys et al., 1992). For disposal purposes, the volume of anal cleaning material and flushing water (if any) must also be added. Solid waste may include hazardous material such as human tissue, chemicals, sharp objects and anything that has been in contact with any kind of pathogen. On the other hand, it may be non-hazardous, such as uncontaminated and non-sharp waste and packaging. For field medical facilities, it is recommended that all waste be treated as hazardous and disposed of accordingly (Danteravanich and Bhargava, 1990). Very few data exist on the volume and density of field hospital wastes. Danteravanich and Bhargava (1990) reported generation rates varying between 0.55 and 0.30 kg/cap/day at a hospital in Thailand. The ratio of in-patients to out-patients was 1:0.67 for the high rate and 1:1.69 for the low rate. Field medical units tend to have few in-patients, so a generation rate
of 0.30 kg/cap/day could be assumed. Waste density will vary according to composition but, where it consists primarily of dressings and packaging, it will be about 100–150 kg/m³ (Flintoff, 1986). This gives a volumetric generation rate of 2.0–3.0 litres/cap/day.

Sullage is waste water that does not contain excreta or toilet wastes except those arising from soiled bodies and clothing (Cairncross and Feachem, 1983). Sullage originates from bathrooms, kitchens, laundries, floor washing and general cleaning, such as in operating theatres (MSF, n.d.). It contains organic wastes (mainly from the kitchens and laundries), soaps, detergents, dissolved oils and greases and cleansing agents. The volume of sullage generated is largely dependent on the volume of water consumed less the amount used for excreta disposal. Field hospitals do not generally generate large quantities of sullage because they have few in-patients and do not have access to large volumes of water (Courvallet, 1992). Few published data exist on the volumes of sullage generated, but the authors recommend 55 litres/cap/day for a field hospital, 25 litres/cap/day for a feeding centre and 100 litres/day for an outpatients clinic. These figures will increase dramatically where cholera patients are treated because of the additional water required for sluicing down.

Surface water run off is derived from rainfall and will therefore depend entirely on the local climate. Provided the site is kept clean, run off will constitute little danger to health. Its disposal must still be considered, however, since pools of surface water will encourage mosquito breeding and restrict mobility around the site.

CONTROL AND DISPOSAL OF WASTES
Wherever possible, existing services (sewers, toilet blocks, refuse collection systems, etc.) should be utilised, including rehabilitation if necessary. Such an approach may reduce standards, but temporary overloading of existing facilities is preferable and faster than providing new disposal facilities. Where no facilities exist (mainly rural areas) or a reduction in the standard of existing facilities is unacceptable, new temporary facilities will be required.

Excreta disposal
The type of excreta disposal facility installed should take account of the local site conditions, access to construction materials and local culture and customs. This often means that different disposal facilities must be provided for the staff and the patients. UNHCR (1982) and UNICEF (1988) recommend that one toilet cubicle should be provided for every 10 persons using the hospital (staff, patients, attendants, etc.). Reed (n.d.), however, suggests 50 persons per cubicle for latrines serving refugee camp residents. In our opinion, allowing 10 persons per cubicle is unnecessarily low. One of us (Reed) has observed public latrines in a refugee camp in Bangladesh being regularly used by 100 people per cubicle per day without difficulty. A figure of 25 persons per cubicle is recommended. In the early stages of establishing new medical facilities, however, a higher number of users per cubicle is acceptable.

UNHCR and other authorities make no recommendations on the type of latrine to be used in field medical facilities. The following recommendations are based on our experience and international research on on-site sanitation (Franceys et al., 1992; Cairncross and Feachem, 1983). Initially, a simple pit latrine (Figure 1) is recommended. A pit capacity of 1.5 m³ should serve ten people for approximately six months. Unfortunately, simple pits tend to become odorous and attract flies and mosquitoes, particularly in warm humid
Toilet building of any material appropriate to the area. Floor slab of wood or concrete at least 15cm above ground level. Mound of excavated soil to seal pit lining and stop ingress of surface water. Hole in slab preferably covered when not in use. Pit lining of wood, block or stone extends at least 0.5m below ground level. Extend deeper if soil is unstable.

FIGURE 1 Simple pit latrine for temporary use

climates (Franceys et al., 1992). As soon as possible, the pits should be upgraded either by fitting a water seal (Figure 2) or converting it to a ventilated improved pit latrine (Figure 3). Latrines fitted with a water seal are only appropriate for communities that use water or soft toilet tissue and water for anal cleansing. All pits should be filled in with soil when the contents reach 0.5 m from the surface to prevent pathogenic organisms migrating to the surface and deter animal scavengers (Franceys et al., 1992).

The type of toilet and level of privacy provided also depends on custom. Squatting toilets, for example, are easier and cheaper to construct and more hygienic than pedestal toilets, but they may not be accepted by the local community. Failure to take account of local preferences leads to the latrines not being used and people defecating in the area around the hospital with consequent health hazards.

In larger establishments, where a large number of latrine cubicles are required quickly, trench latrines (Figure 4) are more economical on space and cost but require more maintenance (Reed, n.d.; UNICEF, 1988). Trenches with a maximum of five cubicles are recommended to limit congestion and smell. Separate trenches should be provided for men and women. The spacing between the foot rests should be varied in the cubicles to allow for different sized users. One cubicle in each trench should have the foot rests close together for the use of children and old people. A small hand rail may also be required. At least once a week the contents of the trench should be levelled and covered with 0.1 m of soil to control fly breeding and odour. When the trench contents reach 0.5 m from the surface, the latrine should be closed and the remaining hole filled with compacted soil (Reed, n.d.).

Commercially available package latrines such as the Oxfam Sanitation Unit (Oxfam, 1985) may also be appropriate. Most consist of a series of toilet cubicles connected to a...
holding tank. They are only appropriate if there is a regular water supply and facilities for emptying the holding tank and safely disposing of the contents.

All communal latrines require constant routine maintenance, particularly frequent cleaning of the toilet area. Failure to keep the toilets clean will lead to offensive odours and fly nuisance. This will deter people from using the facilities and perhaps defecating in places that produce a health and environmental hazard (Smith and Reed, 1991).

**Solid waste disposal**

General wastes should be stored in sealed containers, preferably plastic bags for ease of handling (Hueber, 1989; Flintoff, 1989). Sharps such as needles and blades should be placed in a sealed container such as an old milk powder tin with a small hole in the top (MSF, n.d.) or prefabricated cardboard containers like those approved by WHO and UNICEF (Cundell, n.d.). A small amount of disinfectant can be put in the bottom of the container to control smell and flies.

Experts disagree about whether burial or incineration is the best method for disposal of solid waste. Oosterloo (1992), Courvallet (1992) and Woodhouse (1991), amongst others, recommend incineration. Potts (1992) prefers burial. Incineration of combustible material will undoubtedly reduce the volume of the waste, but in the conditions prevalent in field medical centres it is unlikely that the high temperatures required to completely destroy pathological material will be achieved. It is
Fly proof netting over top of pipe check regularly for breakages

Vent pipe 150mm dia min at least 0.5m above roof

Concrete or wooden floor slab at least 15 cm above ground level

Superstructure must be kept dark

Air flow

Soil mound

Pit lining extends at least 1.0 m below ground level

FIGURE 3 Ventilated improved pit latrine

Top of partitions to be covered if rain likely

Cloth screens front & rear

Light weight timber frame

Excavated soil

Partitions (optional) of local materials 0.9 m apart

Spacing of foot rests varied to suit adults and children

Top 0.5m of trench lined with plastic sheeting secured under the floor plates

15 x 2 cm timber foot rests & floor plates

Trench 0.8m wide x 2.0m deep. Length to suit the number of cubicles required

FIGURE 4 Simple trench latrine
When the contents reach 0.5 - 1.0 m of the surface the hole is filled in with soil. A 10 cm layer of soil is recommended, therefore, that all solid waste should be buried (Figure 5), although total waste volume can be reduced by the prior incineration of combustible waste in an incinerator similar to that shown in Figure 6. Our experience has shown that the hole should be as deep as possible, allowing for approximately 1.0 m$^3$ per ten people per month. The contents of the pit should be covered on a daily basis with 0.1 m of soil to control smell, limit wind blown litter, prevent fly breeding and hide unsightly contents. The pit should be covered with at least 0.5 m of soil when full to deter animal and human scavengers (Flintoff, 1986). The pit should
Excavated soil on top of a sheet of plastic, building paper, metal etc.

Inlet pipe

Large stones to support the pit walls and top

Pit area available for infiltration

Excavated soil on top of a sheet of plastic, building paper, metal etc.

Inlet pipe

Large stones to support the pit walls and top

Pit area available for infiltration

FIGURE 7 Simple soak pit for solids free liquid wastes

also be surrounded by a strong fence to keep out scavengers (animal and human). When the pit is full it may be necessary to bury a sheet of wire mesh just below the ground surface to prevent animals exhuming the pit contents.

Sullage disposal

Whilst many of the manuals for refugee and emergency health care (UNHCR, 1982; UNDRO, 1982; Oxfam, 1985; Renchon et al., 1988) discuss the provision of excreta and solid waste disposal (for domestic rather than institutional situations), very little attention has been paid to the safe disposal of sullage. Accordingly, most of the recommendations given in this section are based on our experience of sullage disposal in low income communities and refugee camps, and general texts on sullage disposal such as EPA, 1980; Laak, 1986 and Perkins, 1989.

Wherever possible, sullage should be disposed of close to the point of origin. This will limit the spread of problems associated with sullage disposal and reduce the need for pipes or channels. The most common locations for sullage generation are water taps, kitchens, laundries and bathing areas. The simplest disposal method is to divert the sullage to local water courses. This method is satisfactory only if there is a good ground slope and the wastes will not endanger the receiving water quality or pollute the water source of communities living downstream.

The preferred option is to infiltrate the waste water into the ground. Water containing few suspended solids such as that from water taps and bathing areas may be put directly into soak pits similar to that shown in Figure 7. The size of the soak pit will depend on the volume of sullage and the infiltration capacity of the soil. Table 1 gives suggestions for the absorption capacity of common soils. Dividing the daily sullage volume by the soil absorption rate gives the soak pit wall area required for disposal. If the required infiltration area is large, resulting in a big seepage pit, or the local soil conditions do not permit the excavation of a deep pit, an infiltration trench can be used (Figure 8). In such circumstances, the trench wall area below the top of the porous pipe is available for infiltration. Sites having rock close to the surface or a heavy clay soil pose special problems for waste disposal. It is recommended that expert advice be sought in such circumstances since solutions will be heavily dependent on local conditions.

Sullage containing suspended material such as vegetable wastes or large quantities of grease should not be put directly into the soil as suspended material will
TABLE 1

Infiltration rates for waste water into different soil types

<table>
<thead>
<tr>
<th>Soil type</th>
<th>Description</th>
<th>Infiltration rate (litres/m²/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravel, coarse and medium sand</td>
<td>Moist soil will not stick together</td>
<td>50</td>
</tr>
<tr>
<td>Fine and loamy sand</td>
<td>Moist soil sticks together but will not form a ball</td>
<td>33</td>
</tr>
<tr>
<td>Sandy loam and loam</td>
<td>Moist soil will form a ball but still feels gritty when rubbed between the fingers</td>
<td>24</td>
</tr>
<tr>
<td>Loam, porous silt loam</td>
<td>Moist soil forms a ball which easily deforms and feels smooth when rubbed between the fingers</td>
<td>18</td>
</tr>
<tr>
<td>Silty clay loam and clay loam</td>
<td>Moist soil forms a strong ball which smears when rubbed but does not go shiny</td>
<td>8</td>
</tr>
<tr>
<td>Clay</td>
<td>Moist soil moulds like plasticine and feels very sticky when wetter which smears when rubbed but does not go shiny</td>
<td>Unsuitable for soak pits</td>
</tr>
</tbody>
</table>

Adapted from Franceys et al. (1992).

FIGURE 8 Infiltration trench (adapted from EPA (1980))

Layer of plastic to keep out surface water
Clean gravel or stones
Gravel finishes 5 cm above pipe top
Layer of plastic to keep out surface water
30 cm of top soil
10 cm porous pipe
30 cm of top soil
15 - 100 cm depending on drainage area required
10 cm porous pipe
30 - 100 cm
block the soil pores and prevent infiltration. Neither should they be disposed of directly to surface drainage systems as the organic material will block the water courses, attract flies and become unsightly and odorous. Grease can be removed using a simple trap similar to the one shown in Figure 9. The trap can be built of bricks, blocks, wood or part of an oil drum. Grease should be removed from the trap daily. Suspended material can be removed by passing the sullage through a sieve made of woven sacking. The sacking will need cleaning and replacing regularly and should be replaced as soon as possible by a settlement tank similar to the one shown in Figure 10. Table 2 gives suggested sizes for different flow rates. The outflow from the settlement tank should go to a soakage pit or trench or nearby water course. The settled material in the tank should be removed when the tank is about one-third full of solids and buried. The sizes given in Table 2 assume that the solids will be removed from the tank every three months. If the hospital is to become permanent, a larger tank is preferable so that sullage from other sources can be connected and the tank emptied every three to five years.

**Disposal of surface water**

One of the key elements in the control of surface water run off is the site selection. A site that slopes slightly is better than one that is flat or steeply sloping (Appleton, 1987). Surface water should be collected in channels, initially of earth, and discharged to nearby water courses. It should not be combined with sullage for disposal to soakaways (Dean, 1992). As with all other sanitary facilities, the channels must be cleaned and maintained regularly. Standing surface water is an ideal breeding ground for mosquitoes (Cairncross, 1988) and accumulated refuse can harbour other vectors such as rats and flies (Cairncross and Feachem, 1983).

**CONCLUSIONS**

Although medical services are required in almost all emergencies, most patients are treated as out-patients and the amount of waste produced is usually small. The
The tank could be constructed above ground. Inter connected oil drums of equivalent volume could also be used.

FIGURE 10 Typical design for a settlement tank (source: Franceys et al. (1992))

TABLE 2
Sizes of settlement tanks for different flow rates

<table>
<thead>
<tr>
<th>Inflow rate (litres/day)</th>
<th>Liquid depth(^a) (m)</th>
<th>Tank length(^b) (m)</th>
<th>Tank width (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,000</td>
<td>1.2</td>
<td>1.9</td>
<td>1.0</td>
</tr>
<tr>
<td>5,000</td>
<td>1.4</td>
<td>2.8</td>
<td>1.4</td>
</tr>
<tr>
<td>10,000</td>
<td>1.5</td>
<td>3.3</td>
<td>1.7</td>
</tr>
<tr>
<td>15,000</td>
<td>1.5</td>
<td>3.4</td>
<td>1.7</td>
</tr>
<tr>
<td>20,000</td>
<td>1.5</td>
<td>4.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Notes:
\(^a\) Allow an extra 30 cm between the top of the liquid and the roof of the tank.
\(^b\) If the tank is divided into two compartments, the first should be twice the length of the second.

Adapted from Franceys et al. (1992).

The measures discussed in this paper should be considered temporary. Most field hospitals have a lifespan of less than six months and the options suggested should be adequate for such situations. There will be times, however, when these options are not appropriate. Hospitals constructed on rock, swampy ground or heavy clay soil are examples. In such...
situations, waste disposal is likely to be more difficult and expert advice should be sought. Hospitals expected to last longer than six to twelve months can be considered semi-permanent. Durability and low maintenance requirements will become more important and this may lead to other waste management systems being more appropriate.

As much use as possible should be made of existing waste disposal facilities. Temporary overloading of an existing system is usually preferable to constructing something new and independent. Such an approach is most feasible in urban areas. In rural areas, the hospital or clinic is likely to have to make its own arrangements for waste disposal.

Except for surface water, which can be disposed of to local water courses, all sanitary wastes are best disposed of underground. Subsurface disposal is the simplest method and minimises the possibility of cross-infection and environmental contamination.

The importance of regular maintenance of all waste disposal facilities cannot be over-emphasised. Latrines left uncleaned will fall into disuse, refuse pits not regularly covered with soil will attract vermin, animals and flies, and poorly maintained sullage disposal facilities will become clogged, giving rise to odour and flies. Personnel must be specifically assigned to maintain the facilities daily. Latrine cleaning is not a popular chore, thus frequent and close supervision is necessary to ensure that they remain hygienic.

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R.A. Reed and P.T. Dean
Water Engineering and Development Centre
Loughborough University of Technology
Loughborough
Leicestershire LE11 3TU
UK
Observations on the Yokohama World Conference on Natural Disaster Reduction, 23–27 May 1994*

IAN DAVIS and MARY MYERS

On the third day of this long awaited conference, there was a minor earthquake off the coast of Japan. Had the epicentre been below Yokohama, and of greater magnitude, then the deserted conference press room might have attracted a little more media interest. Instead, the 2,000-plus delegates at the World Conference on Natural Disaster Reduction enjoyed relative calm during their week-long meeting, held in a splendid hotel and conference facility that was constructed on made up ground captured from Tokyo Bay. Ironically, this reclamation started with the dumping of building debris following the great Kanto earthquake of 1923. Whilst the Yokohama deliberations were largely ignored by both the press and the forces of nature, the results proved to be unexpectedly valuable.

Three words could be used to capture the positive aspects of the conference: ‘enthusiasm’, ‘realism’ and ‘co-operation’. Despite the parading of familiar statistics to demonstrate the growth of disasters which has occurred in spite of any enhanced safety measures that may have resulted from the International Decade for Natural Disaster Reduction (IDNDR), a universal spirit of optimism was in evidence. Unanimity prevailed in the technical sessions that much could be done to reduce risks through social, economic and technical measures. There was also a growing awareness from the political plenaries that, behind the inevitable rhetoric, foundation blocks were being set in place to provide substantive support, in the form of political will that can unlock financial provision. Most delegations omitted any detailed promises, but UK heads were held aloft when the leader of the British delegation, Andrew Bearpark from ODA, made a pledge of a 50 per cent increase in the UK Government’s budget for preparedness and mitigation for the coming year, putting it up to £3 million sterling. Even though this is less than a mere 2 per cent of the total UK Emergency Aid Budget, this still represented genuine progress that would certainly not have happened without the impetus of IDNDR and perhaps even of this World Conference.

Official conference papers were self-critical in admitting the weaknesses of the first four years of the IDNDR. So it was a tribute to the skills of the organising committees, and in particular to Dr Olavi Elo, the Director of the IDNDR Secretariat and his team, that past management problems and apathy may well have been converted into genuine commitment from

*See Michel F. Lechat’s conference report in this issue (pp. 374–81).
governments and the UN. Suffice it to say that no less than 150 countries have established National IDNDR focal points or committees. On a visit to a number of South Pacific Island countries in the weeks immediately before Yokohama, it was clear from IDNDR representations that the need to develop national reports as well as a regional statement for the conference had been of immense value. This stocktaking exercise not only required candid reflection on past experience, it also obliged countries to produce a position or policy statement on the development of preparedness and mitigation and, most important, to share the review process with neighbouring countries. This evaluation also occurred within the UN system, a process that was productively aided through the sensible formula of delegating the organisation of most of the technical committee sessions to different UN agencies. The examination of past success and failure by governments and UN agencies is an essential prerequisite to the development of effective protective measures at both national and regional levels, and it may well prove to be one of the main achievements of IDNDR to date.

The conference embraced three main activities, or mini-conferences which ran in parallel. They appeared to be for the benefit of different audiences: political, technical and technical/commercial. Politicians and civil servants from the various delegations could be found in the plenary sessions or the drafting committee. Academics, scientists and consultants tended to split their time between the technical committees and the poster sessions. It is doubtful if many with a technical orientation attended the political discussions and vice versa. The discussions provoked by technical presentations were, however, very fruitful, as physical scientists talked to social scientists, bureaucrats talked to technocrats and American tornado experts talked to women’s groups from Bangladesh.

The attendance in the open sessions in the political and technical conferences was frequently very small, whilst the foyers and refreshment areas were always crowded. Such external activity may have indicated that networking was in fact the main pursuit for the majority of participants. This vital process would, however, have been greatly improved if the conference administration had not made two rather elementary omissions. Firstly, participants were not given name badges, just a security label with names too small to read set beneath a blurred polaroid portrait that reduced us all to prime criminal suspects. Secondly, it was not until the fourth day that a participant list was produced, and even then it failed to include temporary addresses in Yokohama or permanent addresses for follow-up purposes. The result was that contact between strangers was inhibited and opportunities for reunions with friends and colleagues were frustrated without knowledge of who was or was not present.

The non-political sessions were well-balanced, with good coverage of both the physical and social aspects of disasters and their consequences, thus taking note of persistent early criticism of the focus of IDNDR. The innovative session led by UNICEF and the International Federation of Red Cross and Red Crescent Societies on Community Vulnerability contained some memorable presentations that addressed one of the most neglected aspects of the subject. Therefore, it is hoped that, as a follow-up to this initiative, the future Scientific and Technical Committee of the IDNDR (STC) will have a more balanced representation from social and physical dimensions of risk reduction.

The issue of vulnerability was notably high on the agenda throughout the week and the problem of drought was given a special session to itself. Both these sessions emphasised that humanity’s actions and apathy are just as responsible for calamities as the forces of nature. This was
also recognised by the panelists in most of the other technical sessions. It was also encouraging to hear various speakers place their emphasis with more than a passing mention on the value of traditional warning systems and the ‘coping strategies’ of families at risk. Furthermore, some attention, albeit limited, was given to the issue of human-caused complex emergencies involving armed conflict.

There is an uneasy awareness in such conferences of stage management of emerging conference declarations, in this case rather pompously termed the ‘Yokohama Message to the World’. Many delegates attending the Technical Committee assumed that the findings that were being duly set down by the rapporteur would then be transmitted to the Conference Drafting Committee for inclusion in the final communiqué or message. This was not the case, however, the reports being merely attached to the final outcome. The serious discussion took place in a pre-conference meeting held in Geneva to prepare an outline set of conclusions which was transmitted to the national delegations. This was attended by a selected group of governmental and UN representatives. We do not know the basis for this selection. Was it arrived at democratically as a representative set of nations or on other criteria? This crucial process of initiating the drafts that led to the final conference outcome would have been significantly improved if technical specialists in the galaxy of fields involved in risk assessment and mitigation could have also contributed at this stage and throughout the drafting process. The scope of debate in Yokohama in the political conference sessions was primarily procedural rather than relating to substantive concerns. This is the standard UN practice for major conferences and may well be the only possible formula to secure any agreed statement. However, the process wastes a unique and highly costly opportunity for genuine, unconstrained debate with the principal actors ‘on-stage’ and reduces the process to diplomatic posturing. It was no wonder, therefore, that the vast room for the political discussion was so sparsely occupied.

But despite the rhetoric — and there was, of course, plenty of that — there was a sense of people becoming more specific in their analysis and more realistic in their calls for action. One delegate from a donor country commented that he had anticipated a barrage of demands from recipient countries for increased aid to fund costly preparedness and mitigation measures. His fear did not, however, materialise. Rather, there was a persistent note in the country and regional presentations that the primary responsibility for protective measures rested firmly within each country and many went further to state how they were addressing their own problems through their own resources. If this spirit is widespread, it will indicate that mitigation is indeed an empowering process, in contrast to relief which is all too often the bedfellow of dependency.

Peter Hansen, UN Under-Secretary General for Humanitarian Affairs, had effectively emphasised the significance of vulnerability reduction being the primary responsibility of national governments in his opening speech:

... the aims of the Decade are part of the wider agenda to achieve sustainable development. They relate to the reduction of physical and human vulnerability. That vulnerability depended on the inherent risk of a particular environment and human actions which affect the exposure to those risks. A coordinated international strategy for disaster reduction and mitigation is like preventive diplomacy — it reduces the threat before the disasters become crises. Disaster mitigation is the responsibility of every national government.

Inevitably, there were some negative elements and significant gaps. The plea by Dr Elo at the outset that this would be a
'daring conference' was not fulfilled. A possible reason for this was the absence of a contingent that has energised so many past, rather predictable, UN conference deliberations. The missing element was the NGO community. One estimate was that there were fewer than 40 agency representatives present and those that did attend felt they were marginalised into a second class role, such as being excluded from the long delayed participant list. Reasons for the NGO absence may have included their stereotypical preoccupation with disaster relief as opposed to preparedness, or more simply that exorbitant Japanese prices were far beyond their restricted travel and conference budgets. 

The NGO voice was sorely missed at the conference, just as it has been for the first four years of the IDNDR. The reality is that most NGOs have largely ignored the Decade. Thus, in this conference there was no radical critique from the NGO community and none from an informed media to challenge the rather comfortable accepted wisdom that was being all too readily endorsed. For example, an active NGO lobby could have mounted pressure on certain governments present with abysmal records of respect for human rights which has occurred in several previous UN conferences. This relates to a long neglected ethical concern of disaster protection: ‘the right of vulnerable families for protection or at the very least to be informed of any knowledge their government might possess concerning the risks they face’. Another issue that ‘stayed well beneath the deep pile conference carpet’ for fairly obvious reasons concerned the sensitive issue of the political process as one of the causes of vulnerability. This relates to the conscious or unconscious actions of governments which may create or increase the exposure of their weaker citizens to severe risks. Ironically, the same government, or UN agency, might well be seeking to reduce vulnerability in one sector whilst significantly increasing it within another. The Yokohama Message and Plan of Action contain some very useful clauses as well as bland messages for the national, regional and international levels. For example, countries were asked to ‘Consider making use of NGO support for improved disaster reduction at the local level’ and were encouraged to ‘Endeavour to document all disasters’. Well yes, that might be a start. No doubt those practised in the art of reading between the lines of UN resolutions may find some hints of significant policy directions. We recognise, however, that it is easy to be dismissive of UN resolutions and ignore the reality that even bland statements can provide useful ammunition for hard-pressed officials in convincing sceptics that preparedness planning is essential.

Until three months before the event, it was rumoured that there was inadequate money. Fortunately, Japan saved the day by providing the necessary resources to host the event at the eleventh hour. But pre-conference organisation left much to be desired (Peter Hansen, Under-Secretary General of Humanitarian Affairs admitted it was a ‘nightmare’) and during the event the lavish hospitality afforded by the Japanese Government and the City of Yokohama only partially covered the cracks. As already noted, things were chaotic at times; for example, the registration system left many without even a simple map of the huge conference location. Added to this, the prices in Yokohama were so prohibitive (£3 for a cup of coffee) that many delegates spent much energy outside the conference trying to move to cheaper hotels and to find lunch in modest noodle bars.

Yokohama was generally agreed to have relaunched the International Decade for Natural Disaster Reduction at its halfway mark. The efforts of the last five years were officially admitted to have been a disappointment. As the Yokohama Mess-
... the Conference is at a crossroad in human progress. In one direction lie the meagre results of an extraordinary opportunity given to the UN and its Member States. In the other direction, the UN and the world community can change the course of events by reducing the suffering from natural disasters. Action is urgently needed.

With this, delegates have been sent forth to spread the word and double their efforts.

We left Yokohama in an optimistic mood. Despite all the pressures that could have resulted in yet another inconsequential conference, there were distinct signs that this will be seen as a very important event where an influential body of enthusiastic delegates arrived at a consensus on some of the ends and means for risk reduction. It is no mean achievement that the vision of just one energetic man, Frank Press, had grown to this scale in the space of less than ten years.

Ian Davis
Oxford Centre for Disaster Studies
P.O. Box 137
Oxford OX4 1BB
UK

Mary Myers
Cranfield Disaster Preparedness Centre
Cranfield University
Shrivenham
Swindon
Wiltshire SN4 8LA
UK
Raising the profile of social, economic and cultural issues on the disaster prevention and management agenda in Latin America has been a slow and not altogether easy process. The origins of social research into disasters, as a recognized research field, can be traced back to the pioneering work of Gilbert White (1974) in the USA. However, it was not until the 1960s that a 'sociology of disasters' emerged, a school largely identified with the work of Dynes and Quarantelli (1972) whose contributions sought to link disaster research to themes such as behavioral and organizational analysis. Other relevant contributions to the development of social theory on disasters include the work of Wisner, Westgate and O'Keefe (1977), who approached disaster research from a social conflict perspective, and Davis (1981) and Curyn (1983), whose work had a more practical, program-oriented approach. The volume compiled by Hewitt (1983) was perhaps the most ambitious attempt to that date to produce a social theory of disasters. Unfortunately, the publications of these authors had little dissemination and even less influence in Latin America. Latin American social science seemed aloof to the disaster question and there was little or no contact between the natural, engineering and social sciences.

In Latin America itself, major disasters such as Huaraz, Peru (1970), Managua, Nicaragua (1972) and Guatemala (1976) led to social research into response, recovery and reconstruction being undertaken. In general, however, the researchers were outsiders, their work was published in English and never distributed in Latin America. It was only recently, in the 1980s, that Latin American social researchers began to interpret the disasters occurring in their own countries (the floods and drought associated with the El Niño current; the earthquakes of Popayan, Colombia in 1983 and Mexico in 1985; as well as the Armero tragedy in Colombia in 1985, to mention just a few). The books by Caputo, Hardoy and Herzer (1985) and by Maskrey and Romero (1985) were amongst the first publications produced in the region in Spanish which examined disasters from a social perspective. By the second half of the decade, a small nucleus of researchers had begun to gather in Peru, Colombia, Mexico and Central America.

This endogenous social research in the 1980s failed to achieve a critical mass and had little impact on public policy. Individual researchers had little communication with each other and no access to specialized bibliography. The dissemination of research results was very limited. Social research on disasters remained on the margins of a field dominated by the natural and engineering sciences, which enjoyed a high degree of institutionalization and access to international funding. At the start of the IDNDR in 1990, the contribution of social research on disasters in Latin America was largely invisible.

It was in this adverse context that, in August 1992, ten institutions from Mexico, Costa Rica, Colombia, Peru, Ecuador and Brazil decided to break the deadlock by forming the Network for Social Studies on Disaster Prevention in Latin America (LA RED). The aim of LA RED (1993) was to break down the isolation between researchers, stimulating comparative social research on disasters and generating dissemination channels for the research results in order to achieve an impact on public policy. Thanks to the vision of the Emergency Aid Unit of the ODA, which gave support to the initiative right from the start, the Research Agenda of LA RED was published a few months later and rapidly became a new center of gravity and stimulus for social research into disasters in the region.
As a good example of the stimulus given to social research into disasters in the region, the Mexican Social Science Council (the coordinator of LA RED for Mexico and North America) organized an international seminar on Society and Disaster Prevention in Mexico in February 1994. The seminar was broadly structured around the research agenda of LA RED with sessions on: theoretical and conceptual aspects of disaster prevention; vulnerability and development models; history and disasters; culture, education and disasters; instrumental systems and technologies for disaster prevention; and governmental systems and social participation in disaster prevention. The seminar was a unique opportunity for Latin Americans to meet researchers from North America and Europe, with papers presented by Kenneth Hewitt, Enrique Quarantelli, James Mitchell, Ian Davis, Habibul Khondker, Diana Liverman, Panos Touliaatos, Jane Mocellin, Louise Comfort and Benigno Aguirre, amongst others. At the same time, it served to expose these researchers to the new dynamism of Latin American and Mexican social research on disasters. Members of LA RED such as Allan Lavell, Jesus Manuel Macias, Andrew Maskrey, Virginia Garcia, Gustavo Wilches-Chaux, Elizabeth Mansilla, Eduardo Franco, Omar Dario Cardona, Fernando Pliego and Juvenal Medina acted as commentators or presented papers in their own right. Mexican researchers, such as Ovsei Gelman, Roberto Meli, Mario Garzas, Isabel Campos, America Molina, Daniel Rodriguez, amongst others, provided important perspectives from their own country. The papers presented at the seminar are to be published by the Mexican Social Science Council in association with LA RED and will be available in 'good bookstores'.

The seminar helped to build bridges between researchers from Latin America and other parts of the world, and demonstrated that social research on disasters in Latin America is now very much on the agenda and here to stay. A month later, in March 1994, the Inter-American Conference on Natural Disaster Reduction, organized by the Colombian Government with LA RED and other regional organizations, adopted a Declaration on the IDNDR which gave a high profile to social issues, something which would have been improbable only a few years before. Many ideas in the Cartagena Declaration were echoed in the Yokohama Message, product of the World IDNDR Conference held in May 1994. As a result, the perspectives for both social research as well as its practical application in disaster prevention and management programs have probably never been better.

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Jorge Chavas 275
Miraflores
Lima
Peru

World Conference on Natural Disaster Reduction, Yokohama, 23–27 May 1994

Conceived initially as a world conference of the national committees for the 1990–2000 International Decade for Natural Disaster Reduction
(IDNDR) and a mid-term review of the Decade, the conference was endorsed by the General Assembly in December 1993 as a United Nations Conference (resolution 48/188). The objectives of the conference were stated as follows: (a) review the accomplishments of the Decade at national, regional and international level; (b) chart a programme of action for the future; (c) exchange information on the implementation of Decade programmes and policies; and (d) increase awareness of the importance of disaster reduction policies.

Participants included representatives of 147 States, observers from associate members of regional commissions, representatives of the secretariat of the Economic and Social Commission for Western Asia, 9 United Nations bodies and programmes, 7 specialized agencies and related organizations of the UN (FAO, IFAD, UNESCO, WHO, World Bank, UNIDO, WMO), a large number of intergovernmental organizations, including the European Commission and the Pan American Health Organization, many non-governmental organizations, the National Academy of Sciences of the USA, as well as a number of individuals, including scientists. Simultaneous interpretation was provided in the six official languages of the United Nations (Arabic, Chinese, English, French, Russian, Spanish) as well as in Japanese.

The conference was divided into four categories: (1) Plenary Sessions for policy statements by high-level governmental representatives; (2) a Main Committee reviewing the programmes and policies of IDNDR, which included the presentation of regional reports and a session on the public/private interface; (3) Technical Committees on selected topics; and (4) Scientific Poster Sessions. In addition, an exhibit was held during the conference on non-commercial topics and achievements related to disaster reduction.

The conference was opened by Dr Peter Hansen, Under-Secretary General for Humanitarian Affairs, representing the Secretary-General of the United Nations. It heard an address by the Crown Prince of Japan, Prince Naruhito. It also heard addresses by Mr Y. Hirata, Vice-Minister of Foreign Affairs of Japan, and by the Mayor of Yokohama, Mr H. Takahide.

Most significant was the introductory statement by Dr Olavi Elo, Director of the DHA/IDNDR Secretariat and Secretary-General of the Conference. Dr O. Elo tackled directly the problem of so-called complex emergencies:

Today, the reasons for having created the Decade may appear to be somewhat trite: mankind seems to have stumbled into a proliferation of political, ethnic and religious upheavals... Societies are so overwhelmed by human emergencies, by human disasters, that we have halted in our tracks, as it were, on the road to progress and development, to stand helplessly by, paralysed, watching so many human tragedies unravel before our eyes.

Yet the conference demonstrated that much can be done to reduce part of the human suffering due to natural disasters and, as expressed by the motto of the meeting, ‘Make a Safer World in the Twenty First Century’.

Mid-term review of the activities for natural disaster reduction

A detailed report was presented by the Secretary-General of the Conference. It stressed that disaster relief alone cannot overcome the overall problems posed by natural disasters. The importance of disaster management, information collection, dissemination and communication, the coordination of international action, including prevention, mitigation and preparedness, have rapidly gained in importance with advances in knowledge, awareness and technology.

At the time of the conference, 135 countries had declared their formal participation in IDNDR, 83 of which had established national committees and 48 had appointed ‘focal points’. Although the national reports submitted by 92 countries indicate that progress has been made, it is obvious that the developing, and particularly the least developed countries, need support to reach the Decade’s targets, especially for training, risk assessment, hazard mapping and warning. Information dissemination, technology and communications systems are recognized as the most important components of disaster management. Since information technology is evolving very rapidly, the different systems and networks available, as well as databases, have to be evaluated. The INTERNET may become the basis for future...
disaster information sharing and exchange. Economic aspects, as well as the necessary involvement of the private sector, was strongly emphasized.

With respect to research, 33 IDNDR projects are currently underway. They may be grouped into several categories: drought; earthquake and tsunami hazards, such as the Global Seismic Hazard Assessment Program (GSHAP) conducted by the International Council of Scientific Unions (ICSU) and the Cooperative Project for Seismic Risk Reduction in the Mediterranean Region (SEISMED); floods and storms, such as the Tropical Cyclone Warning System for the South West Indian Ocean Region, of which the World Meteorological Organization (WMO) is the promoter; volcanoes; other natural disasters (Lake Nyos); public health, such as the Supply Management Project in the Aftermath of Disaster in Latin America and the Caribbean, conducted by the Pan American Health Organization, as well as other WHO, PAHO, UNICEF, International Civil Defence Organization and International Federation of Red Cross projects; training and technology transfer, such as projects sponsored by UNESCO, WMO, the World Federation of Engineering Organizations (WFEO) and the Disaster Management Training Programmes of DHA/UNDP; risk assessment; information; and the socio-economic impact of natural disasters.

Special emphasis was put on the need to enhance public awareness. In this respect, the newsletter Stop Disasters published at the Osservatorio Vesuviano in Naples has become the main promotional platform of the Decade. Presently distributed in 192 countries and territories, it plays an outstanding role in disseminating relevant information.

Yokohama strategy and plan of action

As an outcome of the conference, the plenary of government delegates adopted a document which will provide guidelines for Natural Disaster Prevention, Preparedness and Mitigation. It consists of 18 points. While a number of important principles are listed, such as the need to develop a global culture of prevention, promote self-reliance, networking of centers of excellence, 'people participation', community-based programmes, effective national legislation, regional and subregional cooperation, integration of the private sectors and involvement of non-governmental organizations, relatively little reference is made to the potential contribution of science and technology, especially research, if only in relation to improved risk assessment, broader monitoring and communications of forecast and warning, and making available existing technology.

The link between sustainable development and disaster reduction, disaster losses and environmental degradation, as emphasized in Agenda 21 of the Rio Conference, was recognized. This is a new and important insight for the future of IDNDR, which meets the continuous concern of the Scientific and Technical Committee of the Decade in the last few years.

The assessment of the status of disaster reduction midway into the Decade as outlined in the report includes a number of interesting points such as the need for vulnerable developing countries to revise, apply and share traditional methods to reduce the impact of natural disasters, supplemented and reinforced by access to modern scientific and technical knowledge. While recognizing the important contribution of some entities of the UN system to the Decade's implementation, the report also recognized that not all such entities have provided the desired input, emphasis in recent years having again been placed primarily on disaster response. This has slowed down the momentum of the Decade's initial phase, based on the consensus of the importance of action before disasters strike. It was also stressed that the existing tools, which can yield improvements towards disaster management, are not always utilized to the full extent of their potential. It was stated that, although not a part of the mandate of the Decade, the concept of disaster reduction should be enlarged to cover natural and other disaster situations, including environmental and technological disasters and their interrelationship.

Among the activities at the international level recommended by the Plan of Action, one specifically stresses the need to ensure cooperation in the area of research and science and technology development. Priority should be given to the establishment and strengthening
of early warning systems, particularly in the least developed, land-locked and small island developing states.

Regional reports

Two sessions of the Main Committee were dedicated to Regional Reports. They were organized and coordinated by the Pan American Health Organization, Regional Office for the Americas of the World Health Organization (PAHO/WHO). The objective of these sessions was to promote inter-country collaboration, more specifically to identify those aspects of the proposed Plan of Action for the second half of the Decade which will be best undertaken on a regional basis rather than nationally or globally.

In his introductory statement, Dr C. de Ville de Goyet reminded us that poor countries usually pay a much heavier toll in human lives than their developed counterparts: 'Some developing countries would gladly put themselves in the position of reporting losses in billions of dollars rather than in tens or hundreds of thousands of fatalities'. He also reiterated the need to consider disaster reduction as a health priority: "The old stereotype of the health sector as simply a provider of medical care to victims of disasters has been replaced by a vision of this sector as the social conscience and advocate for prevention, mitigation and preparedness measures that reduce the vulnerability of the least privileged groups'. Because developing disaster-prone countries share the same vulnerability and weak infrastructure, it is only logical that they also share efforts to seek solutions to reduce their vulnerability. He concluded with a call for a regional approach. While the strong and lasting commitment of the international community is essential, the future of disaster reduction lies in proactive collaboration between neighboring countries, mutual assistance agreements and, finally, in specialized subregional or regional programs or institutions.

The sessions were organized in regional panels. Examples of regional cooperation were given from Europe (the European Commission, the National Committees in the European Union, Council of Europe, CIS), Africa (earth sciences, meteorology, locust research programme, land management), Asia, South Pacific, Latin America (training), the Caribbean and Japan. A well-illustrated report, A World Safe from Natural Disasters, on the ongoing activities for IDNDR in Latin America and the Caribbean, edited by PAHO, should be mentioned.

Public/private interface

The full title of this session was ‘From Disaster Management to Sustainable Development. How the public, private sector and voluntary organizations can work together’. It was organized by the World Health Organization (WHO). The session featured leaders in business, government and voluntary organizations who outlined their experiences related to disasters and development. Based on their experience, they offered a cost-effective, new paradigm for emergency management that is integrated into a cycle of sustainable development. The new paradigm is based on formal partnerships between all parts of society that build a ‘preventive culture’ towards disasters. The emphasis is on disaster prevention, mitigation and emergency preparedness activities as part of development. Where emergencies occur, such partnerships provide an efficient means to reduce the impact of disasters and ensure that recovery and rehabilitation activities lead to long-term sustainable development.

The speakers outlined the elements needed to make this approach succeed: political will, public awareness, development of local and national resources, and strong cooperation between public, private and voluntary sectors. This cooperation must be based on a clear division of responsibilities between the public and voluntary sectors: each has a role to play and the roles have to be complementary and efficiently coordinated. Speakers included F. Bassani from WHO; M.M. Mahfouz ('Coping with Disasters: a culture in Egypt'); C. Presenti ('The Roles of Technical Services and Research: An Italian Experience'); J. Taft ('The Role of Non-governmental and Private Organizations in Disaster Reduction'); A. Tevoedjre ('Emergency Management in Africa: a social responsibility'); M. Feria Miranda ('The Partnership Role of NGOs in a New Disaster Management Paradigm'); G. Berz ('Cost of Disasters: areas of cooperation with the insurance industry'); and R. Natarajan ('The Role of the Private Sector in
Disaster Management

Presenting the point of view of non-governmental organizations, Julia Taft, President and Chief Executive Officer of Interaction (an organization based in the United States), said that experience had reinforced the view that non-governmental organizations were the primary implementors of disaster relief programmes. Since they brought culturally sensitive insight to the local hazards and traditional coping mechanisms, such organizations must be included in all phases of the planning and implementation process. To make disaster response by donor organizations and non-governmental organizations more cost effective, disaster and development professionals on all levels should better integrate their work. Development and relief must no longer be approached as separate disciplines. Often a disaster could be avoided if the problem was treated as a development rather than a relief issue.

The major conclusions of the session were as follows:

(1) Emergency management is not a stand-alone science, function or discipline. It is part of the sustainable development cycle. No one group has all the answers nor are there universal recipes — solutions must be specific to local characteristics.

(2) Structured partnerships are needed to integrate and maximize all relevant skills and capacities in a mutually supporting framework. The framework should be based upon the sharing of knowledge from all disciplines — socio-economic, scientific and environmental.

(3) Sustainable development needs to be recognized as the best form of disaster prevention. Disaster mitigation and relief are the first steps in recovery towards sustainable development.

(4) Any such framework for partnership must be based on maximizing the comparative advantages of the public sector, private sector, NGOs and voluntary organizations — and the ‘value added’ each sector can bring to such a partnership.

In approaching the interlinked sustainable development/disaster prevention cycle, top priority should be given to local and national capacity-building — the community is the most important partner for all. International support should also be devoted to building national capacity — both directly and through regional institutions and organizations. Finally, clear definition and understanding of roles and responsibilities is vital between all partners involved in disaster management and at all levels — community, national, regional and international.

Technical committees

As we were reminded by the Secretary General of the Conference in his opening statement, the proclamation of IDNDR in 1990 completed a process which had started as an initiative of the world scientific community and individuals concerned about the ever-increasing toll of disasters on human life and national economies, particularly in developing countries. The Decade was intended to facilitate the application of the results of science and technology which have become widely available and affordable, but have not attracted a sufficient level of political attention to become common practice among nations and in people’s lives.

The World Conference having become an intergovernmental UN Conference, the technical sessions were seen as a unique opportunity to ‘market’ science and technology and demonstrate their potential for disaster reduction to the high level policy makers gathered at Yokohama. In keeping with this perspective, the seven half-a-day sessions were carefully prepared by their respective organizers, i.e. a number of UN entities and other organizations to whom due credit should be given. To the extent that they attracted sufficient attention from the governmental delegations, it is to be hoped that these sessions will have a decisive impact on the future of the Decade in bringing science closer to the people.

Vulnerable communities

This session was organized by the International Federation of Red Cross and Red Crescent Societies and UNICEF. A number of major points came out of the presentations and discussions. A greater effort must be made to build disaster response and mitigation upon the real needs of the communities affected.
Plans should more fully involve women’s groups in their formulation and implementation. Local communities are very heterogeneous and vulnerability therefore varies with social conditions, physical location, time and many other factors. Preparedness, planning and mitigation measures need to take this heterogeneity into account. Particular attention needs to be paid to the fast growing towns and cities, regardless of size, where community support structures are likely to break down and poverty is most prevalent. The effects of natural disasters are greatly amplified by conflict and it would be irresponsible to ignore this reality in preparedness and response planning.

Hazard-resistant structures

This session was organized by the ICSU, the WFEO and the Union of International Technical Associations. Preparedness — the preparedness of entire communities — is the key to ensuring that grave natural hazards do not become massive natural disasters. A vital part of preparedness is the achievement of Hazard Resistant Structures, which is possible at astonishingly low cost. Presentations were made on ‘What science and technology can do for natural disasters reduction’ (J. Lighthill); ‘Cyclone shelters in areas prone to storm surge’ (J.S. Choudhury); ‘The reduction of structural vulnerability to natural disasters’ (A.G. Davenport); ‘Design and construction of buildings to withstand natural disasters’ (S. Mustow and S. Steedman); ‘Protection of non-engineered housing from natural hazards’ (A.S. Arya); ‘Reconditioning of existing adobe housing to mitigate the effects of earthquakes’ (A. Giesecke); ‘Development of lightweight natural rubber-based bearings for protection of small buildings’ (Ong Eng Long).

Effects of disasters on modern societies

This session was organized by the United Nations Centre for Regional Development. On the basis of many presentations scanning this complex topic, the concept of modern societies was defined to include mega-cities, metropolitan regions and even medium-sized cites in developed and developing nations. The concentration of Twenty-First Century populations in these areas will lead to extremely complex emergencies in which population growth, environmental degradation and socio-political upheavals will aggravate the effects of natural disasters. Recommendations were made regarding the need for applied risk assessment to specific urban areas and regions with their implications for planning, education and international cooperation.

Interrelationships between technological and natural hazards

This session was organized by the United Nations Environment Programme. The session highlighted synergistic disasters such as technological emergencies caused by earthquakes. It aimed at increasing awareness of the causes, implications and possible solutions to managing such complicated disaster scenarios by drawing experience from around the world. Experiences were presented from the US (Hurricane Andrew), the Russian Federation (flooding in the Caspian Sea region) and Japan (flood prevention in urban areas), and management issues were discussed as they related to other countries (Thailand, Italy, Peru).

The Committee emphasized the need to use an integrated approach for the management of natural and technological hazards. It should be fully included in the environmental aspects of disaster. In this respect, an important role should be given to cooperation between the private and the public sector. Existing international frameworks and programmes, such as the Awareness and Preparedness for Emergencies at the Local Level (APELL) and the Centre for Urgent Environment Assistance of UNEP, were mentioned.

Economic aspects of disaster reduction for sustainable development

This session was organized by the United States National Academy of Science and the World Bank. This technical session brought together experts who provided an overview of the economics of disaster reduction for sustainable development, discussed the primary issues and state of knowledge and experience in these two areas (decision making for investments and insurance arrangements), identified opportunities and recommended directions for the remainder of the Decade to decision makers
in the private and public sectors. The session featured presentations from Mexico, Bangladesh, the USA, the Philippines, Italy and China. It covered a large range of subjects, including the impact of natural disasters on national economies, the relation between disaster vulnerability and sustainable development, benefit-cost analysis, the role of insurance, as well as case studies.

The need to improve the economic valuation of disaster impacts was stressed. Addressing risk issues should have high priority, which includes risk estimates (uncertainty and ambiguity), coverage (access and multiple hazards), enforcement (legislation and regulation) and sharing (private and public sectors). Insurance techniques should also be adapted more systematically in the developing world and non-formal insurance mechanisms should be strengthened.

**Warning systems**

This session was organized by the WMO and UNESCO. The objective was to provide an opportunity for an exchange of information on views between scientists, practitioners, users of warnings, policy makers and others concerned with all facets of warnings related to natural disaster reduction. Presentations included exposes on the roles of national and international agencies in warning (J. Hunt, UK); risk management and the assessment of hazards (E. Plate, Germany); trends and future prospects (R.C. Sheets, USA); and specific examples (floods, landslides, earthquakes, tsunamis, volcanoes), as well as a presentation on the dissemination of, and response to, community-based warnings in Japan. They emphasized the critical and comprehensive importance which must be given in terms of policy formulation and the timely and accurate implementation of predetermined activities in which both technical personnel and official authorities share responsibilities. While no single warning or forecasting system is appropriate to all environments or hazard characteristics, each shares the following components: risk assessment and management, hazard monitoring and the dissemination of warnings, and response mechanisms to warnings, particularly at the most immediately threatened level of the society.

The presentations are reproduced in a brochure published jointly by the WMO and UNESCO.

**Drought management**

This session was organized by the UN Food and Agriculture Organization and the International Fund for Agricultural Development in collaboration with the World Food Programme. It was divided into two parts, followed by a panel discussion. The state-of-the-art of drought management was outlined, including early warning systems at the global and national levels, preparedness planning for drought, assessment of vulnerable populations, emergency relief strategies, rehabilitation and mitigation of agricultural production systems. The application of preparedness, relief and mitigation in drought-prone areas was demonstrated through case studies.

Special mention should be made of a presentation on the Indian experience in the management of drought (R.G.A. Jain). Initiatives taken during the major 1987 drought in India led to a well-established most successful drought strategy which now includes an early warning and monitoring system, emergency response mechanisms, standby financial support arrangements, preparedness plans for crop production, employment generation, food security, health care and livestock preservation. Other encouraging experiences were reported, especially from Southern Africa, Sub-Saharan Africa and Australia.

It was stressed that drought management should aim at enhancing the capability of communities and at using low-cost technologies, with special focus on mechanisms to empower the very poor and socially disadvantaged groups within them who suffer most. The emphasis in agricultural research should shift from better-off farmers and irrigated areas to small farmers and dry land areas. Development programmes should also concentrate efforts on improving the economic conditions of smaller and marginal farmers. While forecasting and warning mechanisms could be used effectively to increase the capacity of farmers to cope with drought, the success of this effort would depend upon the dissemination of the needed information to them. Long-term development efforts should build drought proofing
measures into various programmes. This also should be supplemented by regulatory measures for the judicious use of water resources in fighting drought. Food security and employment generation were the key to empowerment of the extremely poor among vulnerable communities. The management of food supply should also incorporate measures against the hoarding of grain and unfair trade practices, apart from ensuring the efficient distribution of essential commodities.

Posters session

The poster session was excellently coordinated by UNESCO. Some 200 posters were presented. They were grouped into the following categories: IDNDR Demonstration Projects; Information Systems and Technology, including early warning; Education; Health; Social Sciences; Earth Sciences; Legislation, Regulations and Land Use. These posters illustrated the activities currently underway and the achievements accomplished under the sponsorship or on the occasion of the Decade.

The Yokohama message

The World Conference concluded with a message in 10 points, The Yokohama Message, adopted by the Member States of the United Nations and other states. In summary, it recalls that those usually most affected by natural and other disasters are the poor and socially disadvantaged in developing countries. Disaster prevention, mitigation, preparedness and relief are four elements which contribute to, and gain from, the implementation of sustainable development policies. These elements, along with environmental protection, are closely interrelated. Disaster prevention, mitigation and preparedness are better than disaster response in achieving the goals of the Decade. Disaster response is not sufficient, as it yields only temporary results at a very high cost. The response to complex emergencies, although compelling, should not divert us from pursuing a comprehensive approach. Regional and international cooperation will significantly enhance our ability to achieve real progress in mitigating disasters through the transfer of technology and the sharing of information. The information, knowledge and some of the technology can be available, in many cases, at low cost. The message noted that the Yokohama Conference lay at a crossroad in human progress. In one direction was the meagre results of an extraordinary opportunity given to the United Nations and its Member States. In the other, the United Nations and the world community could change the course of events by reducing suffering from natural disasters. Action is urgently needed and it is to be hoped that The Yokohama Message will be heard by Governments and all concerned.

Michel F. Lechat
Department of Epidemiology
Catholic University of Louvain
1200 Brussels
Belgium
Evangelical Christians and Disasters

The negative tone of some of Hugo Slim’s comments in his review of Christian Perspectives on Disaster Management (ed. I. Davis and M. Wall) in the June 1994 issue of Disasters (p. 185) prompts me to make two points.

First, evangelical Christian churches are often the only effective grassroots community organisation in many parts of the developing world. Many of them have asked us to help them with disaster management training. If Hugo Slim is unhappy at the thought that these churches be given this opportunity to contribute to the well-being of their own communities, it would perhaps be interesting to know which local groups he approves of as being suitable for this task.

Second, evangelical Christians, who believe in a God of love, have special questions to wrestle with in the face of suffering and disaster. The book attempted to face up to these and give advice as to what constitutes an appropriate Christian response.

Your readers might be encouraged to know that this advice recognises, rather more than your reviewer indicated, that again there are special problems for evangelical churches to face up to; so, for example, ‘Our relief efforts must be done with genuine care and compassion and total respect for the people and their culture.’ Churches are asked to take seriously the possibility of evangelism that abuses people in a disaster situation: ‘all preaching must be to people who can choose to either listen or to follow or walk away’.

We therefore genuinely believe that this book makes a serious and helpful contribution to equipping a significant group of people in the developing world to behave with real compassion in the face of disaster.

Jennie Collins
Tear Fund

Hugo Slim writes:
Many evangelical Christian churches give important help to those affected by disasters. (I have worked with two church based NGOs during emergencies in Ethiopia and Bangladesh.) The nature of their evangelical mission means that they have a deep and long-term commitment to their communities and can draw on a dedicated workforce from among their followers. This often makes their relief work more grounded in the community than that of secular NGOs.

My concern remains with the evangelical motives behind such relief work, and with a theology which sees eventual missionary opportunity in disaster and suffering. The training about which I had reservations was not the disaster management training of evangelicals per se, but the hand-in-glove approach of evangelism and relief, however ‘respectfully’ the former is carried out, or temporarily suspended during emergencies. As I made clear, such opportunism is not the preserve of evangelical NGOs: disasters are also a way into countries and communities for secular NGOs and, nowadays, for international armies. Humanitarian emergencies provide openings through which all kinds of ideological groups from the more powerful parts of the international community can gallop in and plant their stake.

The evangelical community’s ‘special questions’ about disasters and a loving God are indeed addressed in the book and evangelicals working in such situations will, I’m sure, find this very useful. But, to my mind, the particular theodicy behind the book is distinctly dubious because it hints at a Christian God working amidst disasters to bring about the eventual conversion of Africa: ‘This means that disasters are one of the contexts, and indeed one of the forces, which will help spread the Gospel of Jesus Christ’ (p. 47).

The basic stated objective of this book is to provide a conceptually consistent and analytically relevant framework for the analysis of the economic and social impact of disasters from a political economy stance, on which policymaking can be based; and to apply that framework to considering issues relating to their mitigation and prevention. Albala-Bertrand challenges the conventional wisdom that disasters are detrimental to the development process, arguing that such views are the result of partial analysis. The book focuses particularly on natural disasters in developing countries.

In keeping with other analyses of the economic impact of disasters, Albala-Bertrand correctly differentiates between direct and indirect costs. However, unlike other analyses (e.g. Andersen, 1991), a third category generally termed secondary effects and consisting of costs incurred as a consequence of lower economic growth, such as inflation, increased balance of trade deficits and increased national indebtedness, is not identified. Within direct costs, a distinction is made between physical assets, which perform functions of production (such as productive infrastructure and resources), and distribution (such as transport infrastructure). The former are referred to as base units and the latter as intermediating channels. Indirect effects of disaster occur via physical losses of base units and intermediating channels. Four areas of disaster response are also identified, some of which are endogenous (such as price and stock adjustments and household coping mechanisms) and others exogenous. These areas of response are defined as those acting on the event, comprising technical actions to reduce the magnitude of the hazard; those acting on the interaction boundary, comprising engineering preventive measures to limit the impact of the hazard on the afflicted area; those acting on the social setting, comprising engineering and social measures to reduce vulnerability to a hazard with societal issues sometimes preventing certain groups from obtaining engineering technology; and those acting on the effects of interaction, comprising measures taken in the aftermath of a disaster to limit indirect effects and reverse the direct effects. Development may increase vulnerability to drought, for example, via its effect on the rate of deforestation (for example, to expand areas under cash crops) and soil erosion.

Both short-term (the year of impact) and medium-term (the year of impact plus the two succeeding years) impacts are analysed, with the two years preceding the disasters taken as the reference period. Some twenty-eight disasters in twenty-six countries over the period 1960–79 are examined, comprising nine earthquakes, eight cyclones, three floods, two droughts as well as two cyclones and floods combined, one earthquake and flood combined and one earthquake and tsunami combined. The disasters examined were all 'a matter of international concern'. Two developed countries, Australia and Italy, are included in the example as 'reference cases'. Variables are analysed in terms of impact on overall direction of movement (i.e., growth or decline), average year on year changes over the period t−2 to t+2 and averages for the period t−1 and t as compared to t0, t+1 and t+2. The analysis is not adapted to take account of other factors simultaneously impacting on economies either at the national or global level although such factors are cursorily acknowledged in passing. Albala-Bertrand claims that his findings refute received wisdom, with the qualification that they hold largely for sudden-impact disasters. He concludes that there are no such things as economic 'national calamities' and that natural disasters cannot 'significantly retard the growth of developing countries'. Instead, although disasters do have some redistributitional impacts, Albala-Ber-
trand maintains that economies are more than compensated for such losses.

There are, however, a number of problems relating to this quantitative analysis. First, the conclusions drawn are highly generalised across countries, as revealed by studying the tables provided in the annexes. In particular, it would appear that a distinction could usefully have been made between earthquakes and other sudden-impact disasters. For example, although overall Albala-Bertrand concludes that the rate of growth of GDP improves after a disaster, examination of the results indicates that ten of the twelve countries reported as experiencing lower GDP growth in the two years succeeding the disaster event experienced non-earthquake disasters. Furthermore, a considerable part of the increase in GDP growth resulting after earthquakes could perhaps be accounted for by temporary construction booms which, according to Albala-Bertrand's data, are particularly common in the aftermath of large earthquake disasters. As Coburn and Spence (1992) argue, such construction can often be undertaken by large outside contractors, rather than small local companies, in part driven by the perceived humanitarian desire to speed the reconstruction process. These outside contractors may be unwilling to subcontract local firms or even use local labour, creating local unemployment, and thus reduced flows of income into the local economy, and possible loss of skills in the longer term. Large short-term boosts to the construction industry may also indicate lack of careful planning in reconstruction, reducing the extent to which the disaster-resistance of buildings is increased or to which the opportunity to improve the quality of economic assets more generally is taken up.

Second, disasters are analysed as isolated events within a very restricted time frame, rather than looking at their cumulative impact over a longer period. Development is a long-term process which cannot be measured in periods of only five years. Third, the disasters analysed are not weighted by the magnitude of each event. Admittedly, such analysis is inhibited by the weakness of available global statistics on disasters, which are both incomplete and inconsistent between sources. Provision of available data for each disaster analysed, however, even if inconsistent between disaster events, would allow the reader to make some qualitative judgements on the relative magnitude of each disaster. Fourth, the analysis relates to the period 1960-1979, with more recent disasters excluded. The economic climate of the 1980s was somewhat different, with developing countries generally experiencing lower rates of growth, increased indebtedness, structural economic difficulties resulting sometimes in the adoption of major reform programmes and lower commodity export prices. Analysis for this period might produce somewhat different results if, as some argue, disasters accelerate underlying economic trends. Fifth, whilst the broad coverage of a number of disaster events has the appeal of purportedly making the findings more universally applicable, in practice, because of the relatively superficial analysis then applied, it may produce misleading results. For example, although variables examined include the trade and budget deficit, no attempt is made to analyse changes in the composition of these variables. Furthermore, desk-based analysis necessarily implies virtually total exclusion of analysis of the informal sector which may be both significant in size and particularly vulnerable to disasters.

Albala-Bertrand also conducts a qualitative assessment of the indirect economic impact of disasters, as well as of indirect impacts on household conditions, health and nutrition status and public activities. Indirect effects depend on the economic importance of the affected economic sectors, the availability of alternative supply sources and infrastructure and the duration of the disaster. A distinction is made between intra-effects, inter-effects and outer-effects. Intra-effects refer to intra-industry linkages and can be analysed using conventional input-output tables. Inter-effects concern the impact of disasters on the interactions between households and producers via the circular flow of income. Outer-effects relate to the discontinuities between income withdrawl and leakages, such as in the form of investments, subsidies, exports and credits. It is argued that such variables depend on policy and expectations rather than on stable technical or behavioural patterns. Albala-Bertrand argues that in developing countries, since traded goods are predominantly final products, disasters primarily impact on intra-industry linkages via their effect on industrial services infrastructures. Furthermore, since disasters
generally affect only one region of a country, they typically do not affect the whole of any one particular sector. Economic linkages between regions, as between sectors, in developing countries are assumed largely to be in the form of demand for and supply of final goods. Potential intra and inter-effects of disaster are further reduced by in-built response mechanisms such as dis-saving, dis-investment, run-down of buffer stocks and credits, and increases in price. Albala-Bertrand concludes his analysis of the indirect effects of disasters by stating that:

... indirect effects of economic disarticulations on the economy as a whole appear to be hardly significant, except in very special and improbable circumstances.

Once again, however, these arguments are possibly more applicable to earthquakes, and possibly volcanic eruptions, than to other natural disasters; and to the 1960s and 1970s rather than more recent years. For example, Andersen (1991) argues that hurricanes, floods and droughts have larger indirect and secondary effects than earthquakes and hurricanes, in part because they may affect a larger geographical area. Furthermore, inter-sectoral and inter-regional linkages typically strengthen as part of the development process and so are probably stronger now than in the period of analysis. Such strengthening could imply increased vulnerability to disasters in the earlier stages of development.

Another argument put forward by Albala-Bertrand is that direct disaster losses to capital stocks, once relief and rehabilitation measures are underway, do not typically constitute a particular threat to economic growth potential overall. He also disputes the types of claims of inadequate relief which are frequently made in the aftermath of a major disaster. Such claims, he states, are based on comparisons of the levels of estimated damage and assistance flows, confusing concepts of stocks and flows. Instead, he argues, under simplifying assumptions, that if, say, a capital-outflow ratio of 10 (i.e., in the economy overall it takes 10 units of capital to produce one unit of output) and a multiplier of 2 (i.e., one additional unit of capital will produce two units of income) are assumed, then a lost unit of production represents 0.1 units of potential income loss whilst a replacement unit will represent 2 units of income gain i.e., 20 times the lost income. Thus, full and rapid restoration of destroyed and damaged capital assets is not required in the aftermath of a disaster to ensure rapid recovery of the economy overall. This argument depends in part, however, on an adequate supply of cooperant factors. Furthermore, it assumes a short gestation period which may be inappropriate in some disasters. Cyclones, for example, may decimate plantations which require a number of years to become productive. In addition, repeated disasters can represent a disincentive to private domestic and foreign investors, encouraging the relocation of capital, possibly outside national boundaries. Thus, some of the more productive capital assets may not be replaced.

A further weakness of the book is that drought, the main disaster event affecting sub-Saharan Africa, appears to have been included only as an afterthought. Only two of the disasters included were droughts, of which only one occurred in sub-Saharan Africa. Furthermore, the drought event selected was the Ethiopian drought of 1973, an atypical example, as drought only ever affects certain parts of the country, with other regions of the country continuing to produce crops surplus to the region. Preliminary results from some ongoing research suggests that the impact of drought in some other sub-Saharan countries may be far more severe (Benson et al., 1993).

In conclusion, whilst the arguments presented may be thought provoking, the major downfalls of the book are its weak empirical evidence, which is insufficient to support the conclusions drawn, and the limited attention given to drought. Despite one of its conclusions, that ‘disasters are primarily a problem of development, but essentially not a problem for development’ the fact remains that some of the poorest countries in the world are also the most disaster-prone, with the remainder largely comprised of countries experiencing continued civil or external conflict over an extended period. If the possibility of disasters is not taken into account in the planning of projects and development plans more broadly, they can be highly disruptive, creating economic instability and possibly delaying the development process. More detailed assessments of the impact
of disasters are required, enabling the development of a sound methodology for policymakers to make economically rational decisions about disaster mitigation measures and to permit the inclusion of disaster risk analysis in the development planning process.

References


Charlotte Benson
Overseas Development Institute

The report is divided in four main sections. Following the introductory section, Section Two reviews the trends and causes of disasters. Section Three is dedicated to 'the dynamics of disasters', and Section Four, entitled 'Disasters Database', presents the database compiled by the Center for Research on Epidemiology of Disasters (CRED — Belgium).

Section Two presents the views of the Federation on pending disaster issues and introduces very effectively three major messages: (1) promotion of low cost preparedness; (2) linkage of lack of human rights and vulnerability to disasters; and (3) failure of the international community to provide resources commensurate with the needs. These issues and others such as the role of the military and of news media are well documented and argued. It is a very commendable effort to address publicly sensitive issues, educate the readers on inappropriate forms of assistance, and warn the international community on the danger of over-reliance on foreign medical teams or the use of military rather than local preparedness. However these issues have been with us for over two decades. Such an authoritative statement from a world leader should perhaps be the object of a 'position paper' or formal separate publication rather than part of an annual report.

In Section Three, eight types of disasters (from the AIDS epidemic to refugees and volcanic disasters) are briefly introduced and summarized in 2–3 pages on the general causes, effects and associated issues of each type of disaster. Each disaster is illustrated with a special case study outlining in less than one page a special policy aspect or issue. Selected examples are surprisingly outdated (e.g., Sudan's 1985 famine), the most recent dating from 1991. This points to a contradiction found in the title which suggests a review of the world disasters in 1993. In fact, all statistics and related figures or tables are based on data up to 1991 inclusive, leaving the reader somewhat disappointed not to find any data or review on the most recent and publicized disasters such as Somalia, Yugoslavia and Sudan.

Regarding the indicators selected for 'the top most affected five countries' (absolute number of persons killed or affected), these are definitely biased against smaller countries.
Obviously small islands of the Caribbean or the Pacific or small states of Central America are unlikely ever to rank among the top five in terms of casualties, regardless of the magnitude of the catastrophe.

Finally, the last two topics ‘Technology in response’ and ‘Information Exchange’ more or less address the same issue. Given the space allowed (2 pages), the authors effectively treated the increasing importance of computers and satellite communications in humanitarian assistance. The selection and presentation of the examples would have gained, however, by being both more representative and better documented.

Section Four, ‘Disasters databases’, is entirely dedicated to the database compiled by CRED. As recognized by the authors, ‘the quality of data is only as good as it is reported’ and ‘most reporting sources have a vested interest in the numbers they report’. The definition proposed of such basic and apparently obvious terms as persons killed, injured, homeless will be a helpful tool should the United Nations and the Federation attempt to standardize the reporting from, respectively, the governments and Red Cross Societies for the affected countries. Any attempt by an academic institution to apply these definitions to analyze a posteriori statistics collected on past disasters is rather futile. Notwithstanding these reservations, there is probably no other source readily available for historical data.

In brief, this publication is an excellent synthesis of the main issues affecting humanitarian assistance. It contributes towards dispelling some myths about international aid. It provides a wealth of statistics on past disasters but none for the year 1993. This leads the readers to wonder what can be expected from the World Disasters Report 1994? Considering the value packed in to this relatively short and generously illustrated publication, perhaps the main suggestion to the authors would be to keep up the excellent work but to change the title, for the next issue!

Claude de Ville de Goyet
Pan American Health Organization
Washington, D.C.

The process of ‘resettlement and rehabilitation’ of people affected by large dams is inherently problematic. The basic principle is unexceptionable: project-affected persons should be compensated in such a way that, in the end, they suffer no decline in their living standards. But how is this to be achieved? It is not just a question of giving them a lot of cash. As this book aptly reminds us, when large sums of money are given to people who are not used to handling them, cash can ‘run through their fingers like water in a sieve’. More importantly, perhaps, involuntary displacement often involves a threat to things that money cannot buy: family ties, community life, marriage networks, a way of life, etc. Displaced populations often insist that these should be preserved in the process of rehabilitation, not merely replaced with cash. And it is a matter of human rights that these common demands should be met.

It follows that resettlement and rehabilitation programmes typically involve not only cash compensation but also the re-creation of a whole society and economy through bureaucratic planning. And this is where things usually go wrong. The limitations of bureaucratic planning have emerged clearly enough in the recent development experience of a large number of countries, including India. Resettlement and rehabilitation programmes involve planning at a much finer level of detail than has usually been involved in these unsuccessful experiences. The results are predictable enough: inefficiency, corruption and failure.

Often things are made worse by the fact that the displaced population consists largely of marginalised sections of the society, for example, tribal communities. Members of these communities are often treated with indifference, if not aggressive contempt, by government officials. Due to low levels of literacy and other disadvantages, they also tend to have a limited ability to organise on their own and to make effective use of legitimate channels of protest.

This excellent book, which examines India’s experience with population displacement due to large dams, amply documents these inherent flaws of rehabilitation under
government auspices. Four case studies provide irrefutable evidence of the past failures of rehabilitation programmes in India and of the difficulties involved in achieving better results within the current legal, social and political framework. A short chapter on the (small) Baliraja dam in Maharashtra provides an interesting example of a ‘people’s alternative’ to large dams. The last three chapters deal, respectively, with rehabilitation laws, cost-benefit evaluation and the long-term requirements of a sound rehabilitation policy. The editorial introduction provides a helpful overview of the issues covered elsewhere in the book.

The message of the book is not entirely negative. The concluding chapters and the editorial introduction contain a number of creative suggestions for change. These are particularly important in the light of the recognised need for India to evolve a coherent national policy on resettlement and rehabilitation.

The significance of this book goes much beyond what it can do to foster change in India. This collection of case studies and scholarly analyses is also a very helpful contribution to our understanding of a worldwide issue. It is, besides, an enlightening example of what a good action-oriented research group (in this case, the Delhi-based Multiple Action Research Group) can do to provide competent guidelines for social change.

Jean Drèze
Delhi School of Economics


If 'the theory of famine is confused', as Stephen Devereux states in the introduction to his new book, then Theories of Famine goes only so far in clarifying this varied literature. This work, which takes much at face value and offers little resolution to past, often unnecessary controversies, might have benefited from a stronger voice from the author, who has previously provided useful insights on the subject. That being said, Devereux has assembled an accessible review of the most important issues related to famine and its causes. For that reason, the book represents a valuable contribution to the literature.

The author, in his section describing 'The Nature of Famine', promotes a persistent confusion in the literature, accepting without question the assertion that 'death is not essential to the definition' of famine. Arguably, without that central element, the term might just as easily describe the Great Depression of the 1930s in the USA. Similarly, by accepting the view that most famine mortality results not from starvation, but from disease, Devereux contradicts a later statement that 'no recent famine could not have been averted by taking food from somewhere else'.

In the section 'Theories of Famine', the chapter on climate gives drought its due as an important determinant of famine, while stressing the underlying factors that define vulnerability. But Devereux's commentary on Malthusian and neo-Malthusian theories, again, contains seeming contradictions regarding the influence of population pressure on poverty and famine vulnerability. The author also provides a thorough critique of Sen's landmark theory of entitlements, lending a clear perspective on the debate between proponents of supply-side and demand-side famine theories. A later chapter presents an excellent review of the determinants of market failure and its role in the famine process.

While offering no firm resolution, Devereux's chapter on famine and development balances the proposition that 'growth generates inequality ... resulting in rising vulnerability for some', with examples of other outcomes of the development process which have, in many instances, reduced famine vulnerability. This section, entitled 'The Political Economy of Famine', also uses selected case studies from Europe, Asia and Africa to contrast effectively the implications of adverse government policies, militarisation and conflict for the development of specific famines in each of those regions.

Given the state of famine theory overall, some attempt at a synthesis and treatment of policy implications seems called for in this type of effort, rather than the hurried summary provided in the concluding chapter. Another
gap is the lack of any systematic review of the literature on household responses to famine which, in addition to Sen's work, provides the best understanding of the processes which ultimately lead to famine.

Clearly, however famines are defined, the facts surrounding these tragic human events speak for themselves. As Devereux's work illustrates, the advances in theory over the past twenty years have broadened our perception of which facts are important as determinants of famine and have begun to place those facts in the proper context of the complex agro-physical, socioeconomic and even geo-political processes that define famine vulnerability.

Frank Riely
Tulane University


The management of various kinds of crisis is now the subject of an emerging interdisciplinary literature bringing together perspectives from public administration, political science, social psychology, sociology, media studies, international relations and other areas of scholarship. It has also generated a healthy market for consultancy. Without doubt Lagadec's previous work has made an important contribution to our understanding of these processes, in particular with regard to technological risks and associated disasters. His latest book, however, falls between two possible objectives. It promises operational guidance for managers and instead delivers a complex, difficult to read volume that comprises a rather untidy collection of ideas drawn from a large number of case histories; hardly the stuff for the busy risk management practitioner, nor well enough integrated with the academic literature to make a serious addition in that domain.

Lagadec states that the book is primarily aimed at decision makers, seeking to 'sharpen' their judgement by providing 'tools for thought'. Ninety-two case examples are listed, ranging from well-known emergencies such as the Mississauga mass evacuation following a release of chemicals, to a poisoned fruit scare in Italy. The text is peppered with sometimes quite long quotes, almost exclusively drawn from secondary sources. The quotes are used to make or illustrate general points, but there is little theoretical justification for these assertions.

The book's serious attempt to capture the complexity and diversity of crisis situations leads to the identification of numerous general patterns of events. These points are, however, sometimes so general as to offer little in the way of guidance for practical decision making. For example, indicators for the detection of potential crises include 'a strange drift... something doesn't fit, but no one can say why' and 'a degree of uncertainty and ambiguity that causes unusual uneasiness'.

A number of key areas are identified, including the possibility of contradictory objectives or 'no win situations', the way in which crises 'take on a life of their own' and the problems of expert knowledge. In the case of the latter, the potential frustration of decision makers desperately needing hard facts yet faced with equivocating experts is nicely illustrated by the story about US Senator Edmund Muskie's plea for an 'expert with one hand'.

The media can play an important role in crises. Indeed, they may generate them and, at one point, Lagadec graphically describes media attention as 'the barbarians attack'. Some effort is made to provide an understanding of media mechanisms that transcend naive characterisations like sensationalist, superficial, irresponsible and so on. There is little indication, however, that Lagadec has drawn on important insights contained in the literature linking media studies with risk communication theory.

In statements like 'the public is terribly aware of safety issues' and 'today our societies seem to be, if not more dangerous, at least more vulnerable and unstable than ever before', Lagadec seems to be thinking about the technologically advanced societies. Indeed, he notes that organisations in Europe and North America well prepared for crises 'are getting a considerable head start' in competition, granting them 'immediate and enduring supremacy'. Unfortunately, there appears to be no discussion of the contrasts and similarities
between crisis management in the public and private sector, or the applicability of the book's ideas to crises in developing countries.

The book offers a rich source of ideas on various general aspects of crisis management. It certainly does not offer a practical recipe book of techniques ready for implementation. It does, however, provide numerous ideas that may well be stimulating for individuals involved in contingency planning, especially in a corporate environment.

Tom Horlick-Jones
London School of Economics


The interdisciplinary nature of hazard analysis has meant that, to date, most advanced texts concerning specific natural hazards have dealt either with earth science or with social science perspectives. Few authors have ventured to produce specialised texts that examine the physical and social dimensions of a single hazard, despite the opportunities that such work would seem to offer to gain valuable new insights into hazard impact. In that respect, David Chester's scholarly piece of work is set to earn a distinctive place in the volcanological literature.

The book is well written and is exhaustively referenced. The text is supported by clear black and white line diagrams and photographs and by excellent summary tables that provide succinct information about important processes and theories. Social scientists may be disappointed by the bias of the book towards the earth sciences, with seven out of the nine chapters assuming a 'traditional' volcanological tone. To some extent, however, this reflects the emphasis in volcano hazard research to date. Chapter One, surprisingly enough, reviews planetary volcanism, although the emphasis is on those aspects of planetary science of relevance to volcanic studies on Earth. Chapter Two reviews the plate tectonics model and its relationship to volcanicity, but also considers alternative models, whilst Chapters Three to Five are concerned with magmatic processes, lava flows and pyroclastic materials. The author pays equal consideration to reviewing earlier ideas as to describing the latest developments in a field that has undergone dramatic transformations during the last 20 years. Whilst many basic principles are explained, readers unfamiliar with volcanic processes and geology may find parts of these chapters hard going at times. Chapter Six analyses the impact of volcanic gases on local and global climate, with examples such as the eruption of Krakatau (1883) and Mount Pinatubo (1991), whilst Chapter Seven focuses on the prediction of volcanic eruptions. A distinction is drawn between general prediction (termed forecasts) and specific prediction (termed prediction), and the important question of when prediction ceases to be cost-effective is considered. As is the case with so many natural hazards, Chester emphasises that 'even on the most intensively studied volcanoes, prediction remains a very inexact science' (p. 227). It seems unfortunate (to the reviewer), therefore, that society in general remains so preoccupied with this type of hazard response. Chester reminds us of the fact that most of the research on prediction is taking place in the West, yet the largest potential volcanic impacts are in the Third World.

The tone of the book changes in Chapters Eight and Nine where societal influences are focused upon and the author adopts a more theoretical approach. Chapter Eight begins with an excellent review of the major paradigms of hazard research that will prove of value to all students of hazards (volcanic or not) and society. The author stresses the dangers of both physically and socially deterministic approaches to hazard and disaster analysis, before moving on to suggest a framework for looking at human response to volcanic hazard in the context of development. A distinction is drawn here between developed and underdeveloped responses on the basis of what the author suggests are 'positive' and 'negative' response-conditioning characteristics of rich and poor societies (Table 8.6). A number of interesting arguments are presented that provide a rich source of material for discussion and debate. His framework is based on a 'modified dominant paradigm' (p. 244) of hazard analysis, so that the analysis is heavily influenced by Western, scientific interpretations of response but pays less consideration,
for example, to cultural influences. Chapter Nine develops upon the framework outlined in Chapter Eight with examples of ways in which developed and underdeveloped societies respond to high-magnitude/low-frequency and low-magnitude/high-frequency events. The important point is made that even 'in the most well-regulated society, good fortune can still be important in reducing losses' (p. 269).

Overall, in drawing together aspects of the physical and social dimensions of volcanic hazard, this book fills an important gap in the volcanological literature and should serve to remind scientists of the social dimensions to volcano hazard. Although practitioners seeking quick access to basic information on hazard and disaster management may find the text of less immediate value than those with time to digest its contents, the author is to be congratulated on his clear review style, attention to bibliographic detail and construction of informative summary tables. These characteristics alone serve to ensure that the book will be highly valued by student, lecturer and research specialist.

Martin Degg
Chester College
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