17. Indian experience

Jain (1994) described the drought management strategy successfully adopted in India during the 1987 drought which was the second worst this century and affected 285 million people. The strategy included careful husbanding of water resources, contingency crop planning, livestock management, off-farm employment generation programmes and delivery of 21 million tons of foodgrains for ensuring food and nutritional security.

Unlike the drought of 1965-66 where 80 percent of the expenditure was spent on emergency relief, 94 percent of the expenditure during the 1987-88 drought contributed to development. To a great extent, the management strategy depended on resource transfer in the form of wages, food, water and fodder from surplus to deficit areas. The experience led to the appreciation of the need for dovetailing development strategies with the resource potential of the drought-prone regions to reduce their vulnerability to drought.

Drought is no longer viewed as a discrete event calling for emergency relief. India's current drought management continuum covers early warning and monitoring, emergency response strategies, a standby financial support arrangement, preparedness plans (e.g. food crop production, employment generation, food security, drinking water, health care, nutrition and livestock preservation) and preventive measures which seek to increase integration of drought mitigation with development programmes.

The following are some comments from his paper.

- The early warning system includes monitoring ground water levels and in major reservoirs; changes in vegetation; and progress of crop sowing.
- The Indian contingency crop plan buffers stocks and fodder varieties.
- In the arid and semiarid regions with high rainfall deficiency where crop stabilisation is not feasible, the income security of resource poor farmers and agricultural labour is ensured through appropriate development programmes creating on-farm income sources independent of rainfall.
- Employment generation is the most important instrument of the drought management strategy for protecting people's entitlement to income and food.
- India has achieved macro-level self-sufficiency in food grain production.
- Livestock constitute the major capital reserve of the resource poor farming households in ecologically fragile, drought-prone areas in the country, and contribute

substantially to their food security. A major element of India's drought management strategy includes establishing fodder banks and fodder distribution centres.

While the drought management policy in India has proved to be very successful, there are several differences between the situation in India and that in most African countries.

- Most African countries do not have adequate financial and technological resources to implement the policy.
- Few African countries have a macro-level self-sufficiency in food grain production or fodder surpluses that can be stored and redistributed during a drought.
- Most of the food production in African countries is from rain-fed agriculture compared with predominantly irrigation agriculture in India.
- The lack of an efficient cross-continental communication network.
- The author does not mention the land degradation that is a major impoverishing factor in many African countries.

18. Strategy to combat future droughts and the consequent downward cycle of impoverishment

18.1 Before droughts occur

In 'normal' times there is little public interest, political will, and consequently adequate funding for drought mitigation measures. The following action should be taken within budgetary and staff constraints bearing in mind that the objective is to assist the rural poor to retain a productive capacity so that they can profitably resume their activities after conditions return to normal

1. Develop ongoing awareness programmes for affected communities and political decision makers
2. Develop vulnerability reduction programmes for those most likely to be affected by disasters – principally food, water, employment, housing, and health security programmes. This is critically important.
3. Develop early warning systems, especially vulnerability warnings.
4. Note that warning systems based on occurrence of malnutrition will probably be too late, as irretrievable damage will already have occurred.
5. Develop action plans for future disasters.

18.2 When a drought is expected

6. Issue an alert to decision-makers but not to the general public at this stage as a false alarm can result in a lack of confidence in the system.
7. Only issue a general warning when there is a strong possibility of an imminent disaster.
8. Institute counter-measures according to previously approved programmes.
9. Assemble emergency teams.

18.3 When the drought occurs

10. Activate public works programmes (cash-for-work rather than food-for-work) to maintain human dignity and a secure level of family and community incomes.

11. Activate other emergency measures depending on the nature of the problem.

18.4 After the drought

12. Drought alleviation measures must continue until pre-drought conditions have been restored

13. Carry out a post-drought analysis of successes and failures for future reference.

14. Make recommendations for future action.

15. Now is the time to obtain a commitment from political decision makers for an adequate budget and trained personnel as public and political interest soon disappears after conditions return to normal.

19. FLOOD RISK REDUCTION IN UNPLANNED URBAN SETTLEMENTS

19.1 Successes and failures in flood risk reduction

One of the many benefits rising from the activities during the Decade is the exchange of knowledge and experience in natural disaster reduction. Countries were invited to submit national reports from which successes and failures could be derived.

A notable success is the reduction of loss of life due to hurricanes (tropical cyclones) in the USA. The death rate per decade decreased from 8 000 at the beginning of this century to less than 200 in the 1990s. During this period the population at risk increased from less than a million to more than nine million. The dramatic improvement was the result of a combination of several factors. Remote sensing systems detected the presence and path of the tropical cyclones days in advance. The people at risk were well aware of the danger and reacted swiftly when warnings were issued. Efficient evacuation procedures were in place, and few lives were lost. There was an increase in damage to property, but most of the damaged structures were insured, and consequently very few families lost all that they possessed. Civil administrations remained intact and there were no migrations to safer areas.

From this experience it can be anticipated that risks of loss of lives and livelihoods associated with floods can be reduced significantly in situations where the people at risk are aware of the dangers; long warnings can be transmitted directly to those at risk; evacuation to safe areas within a reasonable distance is possible; property insurance is available and affordable; and the civil administrations and infrastructure remain intact. Conversely, risks increase when these conditions are not present. The opposite extreme situation is illustrated by the 1997-98 Horn of Africa floods where none of these conditions existed.

The migration of the rural poor to the cities and resultant development of informal settlements in flood prone areas have caused an exponential increase in the risk of loss of life and possessions during floods.

Furthermore, the sector of the population requiring rehabilitation assistance after sustaining flood damage has shifted from the farming communities along large rivers to urban communities along smaller rivers. The main farming activities on flood plains are along the larger rivers with flat slopes and large catchment areas. There is a much longer

warning time and, because of the lower velocities, people can escape by wading through the slow flowing water, or can often be rescued from the roofs of their houses by boat or by helicopter. In urban areas the catchments are smaller, with consequent very short warning time. The rivers are steeper with greater destructive power People will not be able to wade through the rivers to safety. It may still be raining heavily when the floods occur thereby preventing helicopter rescues. There will also be a much shorter time for mobilising the rescue services.

20. Awareness programmes

The development and dissemination of awareness programmes is an essential prerequisite for successful flood risk reduction measures. This is particularly important for newly established communities who have not been exposed to flood risks. In many cases the only viable flood mitigation procedures are the development of flood awareness programmes, which include recommended procedures to be followed during and after floods.

Impediments to efficient awareness programmes in Africa include low literacy levels. (Only 60% of the population of Burundi are literate, and low literacy levels exist in many other African countries.) Other impediments to communications with those at risk are the variety of vernacular languages, dialects and customs.

21. Early warning systems

> *'National Governments have the sovereign right and responsibility to issue timely warnings when it has been determined, through scientific and other expert means, that segments of their populations are at risk.'* (Meeting on evaluation of preparedness and response to hurricanes George and Mitch)

Flood warning systems operate at three levels Meteorological warnings provide the longest warning but least accuracy. Once the rain has fallen, hydrological rainfall-runoff models will provide more accurate warnings but shorter warning periods. Flood routing methods based on upstream flow measurements will provide the most accurate predictions, but the warning periods will be shorter.

All three methods are usually available in developed countries, a good example being the system available in Japan where subscribers can access the latest information for any particular area through their home computers. However, this high level of technology is not available in any of the countries on the African continent, where vulnerability to floods continues to increase.

- The role of government is to provide one official voice in the preparation of early warnings which must be understandable and credible.
- The probability of detection of severe meteorological events is increasing and the false alarm ratio is decreasing.
- Reaching the vulnerable is not easy.
- Early warning without response is meaningless.

21.1 Meteorological forecasts

Warnings of severe, widespread rainfall based on global observations are feasible up to four days in advance of the event. For example in February 1987 warnings of the possibility of unusually severe rainfall over eastern South Africa were issued by the Meteorological Office

in Bracknell in the UK four days in advance of the commencement of the rainfall. These were repeated by the South African Weather Bureau. However no action was taken by any authority in the threatened area. A total of 287 flood-related deaths occurred of whom 214 drowned in the steep, rapidly flowing rivers. Another 101 people were reported missing. Considerable damage was caused to communications, and ironically to the water supply systems. Water had to be rationed in Durban which is South Africa's third largest city

Where available, satellite and radar imagery are very useful for determining where heavy rainfall has occurred. They also provide accurate information where rain has not occurred. This is important information in the case of widespread flooding. South Africa is the only Sub-Saharan country where this information is available, although radar coverage is limited.

Impediments to the development of meteorological forecasting are the lack of capacity in most African countries to apply the necessary technology. National forecasting services are poorly equipped and often lack the required technical skills. Even where this capacity is available, institutions from outside the country's borders frequently issue warnings before the national agencies are in a position to do so. National agencies lose credibility because they are less well equipped, and consequently take longer to issue the warnings. They are also at a disadvantage because they have to be conservative when issuing warnings. In these countries the ideal is a co-operative venture between the national and the external meteorological agencies. This has not yet occurred.

Another difficulty is that the communities at risk are scattered over wide areas and do not have access to telephones or radio communications. These result in frustrations and comments questioning the value of early warning systems when people do not react to them.

21.2 Warnings based on flood routing procedures

Warnings based on flood routing procedures are only feasible on large rivers with long travel times measured in days. However, in these rivers the water levels rise slowly and floods seldom result in loss of life or livelihoods. These warnings are nevertheless useful for implementing planned evacuation procedures.

21.3 Antecedent precipitation indices

Antecedent precipitation indices are an under-utilised basis for flood warning systems, particularly in moderate to low rainfall regions. In these regions the average soil moisture content prior to the occurrence of a flood is generally low. As a result storm rainfall has to satisfy the soil moisture deficit before appreciable runoff occurs. Studies in South Africa have shown that antecedent precipitation indices based on daily rainfall observations are good indicators of the areas where flood generation potentials are such that floods can be expected if heavy rain continues. They also provide a good indication of the amount of additional rainfall required to generate floods. Appropriate action can be taken as soon as this additional rainfall is observed.

22. Structural measures

Many developing countries do not have the financial resources to implement structural flood control measures. Large multi-purpose dams with uncontrolled spillways will reduce flood peaks to some extent, but this will generally decrease with increase in flood magnitude. Dams with controlled spillways will have a larger flood peak reduction potential, but can have the opposite effect if incorrectly operated. There are examples of this happening in South Africa.

Dam failures can have a very large damage potential, but modern dam safety requirements have significantly reduced this likelihood to close to zero in the case of

potential 'dry weather' failures. Occasional dam failures during floods usually occur when the flood water levels are already high downstream of the dam. The incremental flood magnitude, and increases in water level and water velocity downstream of the dam are usually quite small, particularly in the case of breached earth fill dams. Two moderately sized earth fill dams failed during floods in South Africa, but these did not cause any loss of life.

23. Flood risk reduction in informal settlements

Complete success of flood risk reduction measures in informal settlements within urban areas is unlikely to be achieved because of the very high exposure to flood risks, as well as limitations of manpower and other resources available to deal with the resulting emergencies. An unpalatable fact is that after a flood the failures such as loss of life can easily be measured, but successes can not.

The ideal solution in an urban area would be to design and build all drainage systems to provide a high degree of safety, and to prohibit residential occupation or other activity in areas where risks cannot be avoided. This solution is not economically feasible as far as the structures are concerned and socio-politically intractable as far as the unplanned occupation of flood plains is concerned.

There are five options available for reducing the risk of loss of life and possessions of people living in flood prone unplanned settlement areas. The following comments summarise the advantages and disadvantages of each option, the information required for decision making; and the technology required for its implementation.

23.1 Option 1 - Do nothing

The option to do nothing and let nature take its course is the default option. There are many reports from developed as well as developing countries which cite the lack of political will to take unpopular decisions which incur additional costs that produce no visible benefits. The advantages are minimal cost and (assumed) avoidance of the legal consequences of direct action on the basis that residents in flood prone areas are there at their own risk. The disadvantages are the possible loss of life and possessions with resultant humanitarian, social and political consequences.

23.2 Option 2 - Apply measures to control occupation in flood prone areas

The prohibition of residential occupation below designated floodlines and the imposition of building codes within flood-prone areas are standard practices in many local authorities throughout the world. These are the most effective options for reducing flood-related risks in urban areas. However, these measures have become unenforceable in many developing countries where there has been uncontrollable migration from rural to urban areas. There are many reasons for this migration – most of them poverty related. The obvious solution is to encourage occupants in the danger areas to move to safer areas, but this is often impractical in the short term. The main disadvantage is that the danger areas may be re-occupied by others.

Information required for decision making is whether or not alternative ground is available. Will the people go there? Can re-occupation by others be prevented? What are the costs of preparing the new area? What are the relocation costs?

23.3 Option 3 - Structural measures

The purpose of structural measures is to reduce flood peaks (flood control dams), or protect areas from inundation (flood levees), or reduce flood levels (canalisation). The advantages of structural measures are that they can provide effective protection against minor floods. The disadvantages are the high cost and false sense of security as it is always possible that a flood exceeding the design flood may occur. In general, the larger the flood, the less effective the structural flood protection measure is likely to be.

The information required for decision making is mainly the availability of suitable sites and finance. The technology required for implementation is an advanced knowledge of flood hydrology, river hydraulics and structural design.

23.4 Option 4 – Develop flood warning systems

The operation of flood warning systems is the most efficient method for reducing the risk of loss of life where the unplanned occupation of flood prone areas has taken place, and legislation prohibiting residential occupation in these areas has not been enforced.

There are several important pre-conditions for any flood warning system. All people within the flood prone areas must routinely be made aware of the danger so that they will react immediately when warnings are issued. It must be physically possible to relay warnings timeously to all people at risk. A continuously manned operations centre must be available so that trained staff can receive and interpret weather and flood related information and take appropriate action should flood situations develop. The technology required for implementation includes a high degree of computer-based communications technology together with a sound knowledge of flood hydrology and river hydraulics.

The disadvantages of flood warning systems are that even where efficient systems are in operation, there will be occasions when flood warnings are issued and no damaging floods occur, or conversely damaging floods may occur without warnings being issued. These could result in loss of confidence in the flood warning system and possible claims for compensation. An ineffective flood warning system is worse than no system at all.

The information required for decision making includes the availability of a manned operations facility, technical expertise and financing. An adequate knowledge of flood hydrology and river hydraulics is required for the location of designated floodlines. Questions that have to be addressed include: can residents be warned in time, and will residents have confidence in the warnings and in the authority that issues them?

23.5 Option 5 – Develop community river watch systems

There are many situations within and outside the jurisdiction of local authorities where efficient flood warning systems are impractical for financial or logistical reasons. In these situations the only feasible solution is to provide facilities and knowledge to local communities so that they can operate their own river watch systems.

The purpose of a river watch system is to make residents within flood prone areas aware of the danger so that they can take appropriate action should floods occur. They will have to familiarise themselves with the location of safe escape routes, and gathering places where they can temporarily keep their possessions until the river subsides. The flood awareness programme could include the dissemination of regular newsletters, marking previous flood levels on beacons, posts, telephone poles, bridges, etc. or including floodlines on title deed plans.

The advantages of a river watch system are that it is an efficient system in small communities, and requires minimum installation and operation costs. The disadvantages are

that it is only effective where residents are literate and have an appreciation of flood risks. Residents have no means of obtaining prior warnings of heavy rainfall within the catchment or upstream river flow. Communities usually have no experience of floods and consequently the need for a river watch system. Communities may lose interest after a long period during which no warnings are necessary. Adequate knowledge must be available to assist communities to develop their own systems.

The information required for decision making includes locating occupied flood prone areas, and determining the flood risks within these areas.

24. An invitation to disaster

There are tens of thousands of people living in unplanned, flood prone settlements in urban areas. Most local authorities around the world prohibit residential occupation below a designated floodline, yet in many urban areas in developing countries there are thousands of people living along the banks of rivers below this floodline. Shacks are often built on all available space right up to the edge of the almost vertical river banks. In some cases shacks are built on refuse dumps within the channel itself. Even minor floods that do not overtop the river banks could engulf the shacks within the river channel, and undermine the river banks causing the shacks on the banks to collapse into the river.

Once the flood water level rises above the river banks the flimsy, densely packed shacks further from the river will start collapsing. The debris from the shacks, particularly floating timber and submerged corrugated iron sheets caught in the fast flowing water will seriously injure escapees attempting to wade through the water even if this is less than knee-deep.

A lot of floating debris will be carried by floods, including uprooted trees from the upstream catchment, and material from destroyed houses and their contents. This debris will hinder rescue attempts and increase the probability that people washed into the river will drown. Debris may also block bridge openings and deflect the flood to another area that would otherwise have been out of danger. Lives may be lost when spectators gather on bridges or on the river banks and their escape routes are cut off as the river rises, or the river banks collapse. It will be impossible to use rubber boats on the river to rescue people trapped in the debris. A major flood will rise rapidly, destroy all shacks in its path and result in a large loss of life.

24.1 Options for reducing the flood risk in unplanned settlements

The 'do nothing' option is obviously unacceptable in this situation. Structural flood risk reduction measures are not a viable option as there are seldom suitable upstream dam sites, and there is no unoccupied space on the river banks for the erection of flood levees. Canalisation of the river channel will not reduce flood levels. The relocation of families living within flood prone areas to safer areas is the obvious long term solution. This can be achieved by the provision of new houses in safe areas for those most at risk. However, there are difficult political decisions that have to be taken before this objective can be achieved.

Those most at risk are usually those who arrived last by which time no other land was available. They therefore have the lowest priority for new houses. If they are given high priority, this policy will become known and will encourage others to deliberately occupy unsafe areas. Areas that have been evacuated may subsequently be re-occupied if the local authority does not have powers to prevent this happening. Alternatively occupants of shacks in unsafe areas may prefer to stay where they are rather than to move to better housing further from their places of employment, schools, and other facilities.

This leaves the implementation of a flood warning system as the only viable short term solution

24.2 River watch systems

A simple community based river watch system should be instituted in all unplanned settlements vulnerable to floods. This could consist of a watchman on the river bank, and previously identified gathering areas to which the affected families could retreat when floods occur. In the short term, often the only viable options to reduce the loss of life in vulnerable informal settlements in developing countries are simple and inexpensive river watch systems coupled with awareness programmes. These can be upgraded to more sophisticated flood warning systems as finances permit.

24.3 Flood warning systems

Automatic rainfall telemetry equipment can be installed at one or more sites upstream of the area. Water level information can be relayed to an operations centre and sirens within the settlements can be activated by radio from the operations centre when the water level in the river reaches a level that is likely to pose a risk in the settlement area. The advance warning may be very short - possibly less than 30 minutes - so it is imperative that the communities at risk should know what to do when the sirens are sounded.

The final solution is to provide incentives that will encourage the threatened communities to move to less vulnerable areas. In many cases this will be a long process as housing will have to be provided at a faster rate than the influx of socially and economically disadvantaged people into the high risk areas. There are many communities in the world in similar situations.

25. INTO THE 21st CENTURY

The attention paid to natural disasters and vulnerability reduction by the international community has grown steadily during the Decade. Many countries have reported significant progress in natural disaster reduction. The overall world-wide picture that is emerging is that there has been a significant reduction in loss of life in developed countries, principally due to more efficient warning systems coupled with awareness programmes. Good examples are recent severe floods along the Rhine River in Europe and the Mississippi River in the USA. However, economic losses continue to rise in these countries due to economic pressures that encourage development within higher risk areas.

The following are some condensed comments from IDNDR and other reports.

- There is a clearer distinction between rapid and slow onset disasters.
- Significant progress and decrease in loss of life have been achieved in developed countries but the loss of life and impoverishment still continue to increase in developing countries.
- Socio-economic consequences of disasters including the rising death toll from malnutrition and disease are still not sufficiently appreciated and addressed.
- It is also not fully appreciated that socio-economic vulnerability reduction measures and not physical vulnerability reduction measures are the most effective for risk reduction in African developing countries.
- The effects of drought continue to deepen social polarization and poverty. The poorest families find it increasingly difficult to recover from one drought before entering another. There is progressive income and asset depletion among the poorest

households who sacrifice long-term economic growth by holding their assets in liquid or near liquid forms.

- Sub-Saharan Africa is the only major region of the world where food security has been getting worse rather than better. In 30 out of 35 countries in Sub-Saharan Africa food production per capita is lower today than it was in 1980, which in turn was lower than that in 1970.
- The ability of many countries to finance disaster mitigation activities is hampered by financial austerity programmes associated with economic reform and the heavy tax burdens required to service the national debt.
- Over a period of time, recurrent small-scale hazards tend to cause more damage than infrequent large-scale hazards.
- Limited financial resources and trained personnel have become critical problems in rural areas.
- In many countries there are disaster plans on paper but not much planning on the ground.
- Disasters are relatively more costly in developing than in developed countries.
- In the United States Hurricane Andrew caused 40 deaths. In Bangladesh a hurricane caused 120 000 deaths
- The poor suffer in a personal sense while the rich suffer in an economic sense. This has an effect on their perceptions when adopting procedures to combat disasters.
- People who have to live in vulnerable areas seldom do so by choice.
- Social impact studies should include environmental impact studies and not vice-versa.
- Special attention needs to be focused on pre-famine indicators that give the earliest possible warning that a food supply problem may be imminent.
- Agencies whose actions are triggered by the actual incidence of drought should pay just as much attention to rehabilitation as they do to emergency supplements to consumption.
- Successful cash-for-work projects such as public works and clearing exotic vegetation should be encouraged.
- Studies on the impact of drought show very clearly that a critical variable affecting the maintenance of productive assets is the availability of off-farm income flows.
- Early warning systems should be based on both physical and social vulnerability, for example nutritional indicators and measures of vegetation change.
- Disaster mitigation plans in the rural areas of Africa should move away from environmental concerns to human livelihood concerns. These measures must be considered in conjunction with the social, economic and political limitations of the communities at risk
- Financial security of the UN agency responsible for natural disaster mitigation must be assured.
- Why has a continent so burdened with risks received so little attention from the IDNDR activities? When did America and Western Europe last experience a famine?

26. Role of the individual

The role of the individual in accommodating natural disasters depends on his/her willingness and capability of doing so, as well as the availability of knowledge that will allow the individual to plan for the unforeseen event.

It is the ambition of most people not only to survive but also to prosper. Exposure to natural disasters will increase where livelihoods have to be achieved in degrading environments.

27. Role of the State

The State should be responsible for providing the necessary advice to rural communities at risk and taking action where the advice is ignored. The State should avoid being perceived as an obstruction to development or as the sole owner of the environment.

27.1 Criteria for disasters requiring action at a national scale.

- The establishment of criteria for determining when action in the form of prevention, mitigation or rehabilitation, should be taken by the various tiers of government is a difficult issue that has to be addressed in a national disaster management strategy. The following are some suggestions. The suggested criteria are tentative values.
- **Severity.** The severity of the event can be gauged by the number of people directly at risk of being unable to recover from the event. In the case of an event that has occurred, 50 families could be the minimum. In the case of a potential disaster requiring State action prior to the event 100 families potentially at risk is a reasonable figure.
- **Widespread.** The widespread nature of the event requiring intervention will depend on the tier of authority (national, provincial or local authority). At national level a disaster affecting one or more magisterial districts is the usual criterion
- **Rarity.** The usual criterion is an event that is expected to occur once, or at most twice in a lifetime. In engineering terms this would be a 1:20-year or 1:50-year event in the case of floods. In the case of droughts it could possibly be as frequent as 1:10-years.
- **Recovery capacity**. The event should be such that it is beyond the capacity of the community to withstand without incurring long-term damage. The average income of the families in the affected area would be a readily available figure Using this criterion a differential level of State aid could be provided depending on the economic vulnerability of the affected community.

27.2 Critical needs

- The most critical need in many countries is the establishment of a national disaster management policy with the political will to carry it through.
- **Priorities.** Priority should be given to actions that can have maximum beneficial effect at minimum cost. In the case of floods this is the preparation and dissemination of awareness knowledge and the development and operation of flood warning systems. In the case of droughts, priority should be given to ongoing programmes that increase the resilience of those least able to recover from the effects of droughts.

- **Administrative arrangements and responsibilities.** This is the area where disaster mitigation measures are most difficult to implement. These measures require inter-departmental co-ordination, but the responsibilities should rest with the individual State departments. Because many of the decisions have to be made at the political level, political administrators should be involved in the development of the policy, particularly in the final stages. This aspect of disaster mitigation requires a thorough study.
- **Regional and international co-ordination.** The administrative structures and the will for co-ordination at an international level usually exists and can be readily implemented in the case of regional droughts.
- **Government intervention and assistance** should be predictable and clearly defined
- There should be **incentives** to encourage resource conservation and self-reliance. These should promote risk management and long-term sustainability.
- **Communication programmes** should be designed to alert all relevant governmental and non-governmental bodies and potential recipients of assistance to impending disasters.
- **Financial resources.** The allocation of funds for disaster mitigation involves making decisions regarding the relative merits of actions that will be of immediate benefit (for example the provision of water), and actions that may indirectly benefit the recipients at some time in the future (for example the canalisation of a river through an area prone to flooding) Professional staff can assess the relative benefits in financial terms but the elected representatives will have to make the final decisions.
- **Political will.** There has to be the political will to make unpopular decisions. World-wide experience shows that elected decision makers from town mayors through to national leaders prefer to arrive at the scene of a disaster, and provide words of sympathy and financial aid to the victims (none of which help those who died in the disaster), rather than spend money on measures that would have prevented or diminished the effect of the disaster in the first case.

28. Role of Non-Government Organisations

Where communities are not directly involved and are the passive recipients of relief, the result might be the aggravation of a dependency syndrome. Because NGOs provide relief more quickly - and in the case of small disasters, more appropriately - it is important that the government ensure that NGOs receive information promptly. At the same time NGOs have much useful information to offer to the local early warning system. NGOs should therefore be a formal part of the local early warning system. Even where disasters are so large that they are beyond their resources. NGOs often are able to provide assistance that is complementary to government. Good links with the NGOs should therefore be promoted at all levels.

28.1 The roles of NGOs

- Most NGOs have their own objectives, goals, and philosophies. In some cases common principles may bring groups of NGOs together.
- In time of disaster NGOs are quick to respond, they cut through red tape and bring relief a lot faster than government.

- They offer a wide variety of experience in many different fields from their pool of volunteers.
- Their fundraising capability and good media appeal have helped them to mobilize resources quickly and meet the needs of those in distress.
- Local NGOs have the advantage of local knowledge and expertise.
- NGOs have acted as pressure groups.
- Their neutrality and unbiased approach make it easier for them to gain access to communities. They can intervene in situations where government is unable to overcome political obstacles.

28.2 Co-ordination between NGOs and government

- Both government and NGOs have the interests of the communities at heart. It would be catastrophic for one to view the other as an interfering or challenging opponent.
- To facilitate effective coordination and efficient utilisation of relief and development efforts, government should designate a point of contact which NGOs can use for liaison at local, provincial, and central levels.
- There has to be a well-understood and accepted plan and an established and accepted authority and chain of command which spells out clearly who does what to what extent, time frames and the utilisation of resources.

28.3 The NGOs role in mitigation and early warning

- NGOs in the form of farmer's associations and unions can offer pre-emptive intervention in building local capacity towards reducing their vulnerability and increasing their capacity to sustain themselves through community based awareness.
- NGOs can assist in conducting ongoing assessment and monitoring throughout the existence of a hazard.
- International experience suggests that democratic government needs NGOs to exist and expand, because NGOs can assist in designing policies and can advocate the interests of those whose needs are overlooked
- NGOs are not perfect entities, but nor is government. They each have strengths and weaknesses, but a coordinated effort can lead to a country that has less disasters and is safer for all.

29. Education and training

Education and training are often seen in the context of schools, universities and specialised training institutions. While these undoubtedly play a very important role, the type of knowledge that these bodies provide does not meet the immediate needs of the rural communities at risk from natural disasters. Nor is there time to wait until children have completed their schooling, or the universities have trained local specialists in sufficient numbers to reverse the downward trend of impoverishment that these communities have to endure.

In many developing countries the limited financial resources and technological expertise prevent the development of disaster mitigation measures. The importation of expertise

developed elsewhere is inhibited by language differences and lack of expert knowledge of local socio-economic conditions of the recipients and their ability to understand and implement the proposals.

Knowledge is more successfully transferred by example than by theory. The most likely scenario for success would be to select several communities that have expressed their willingness to participate, and then to develop mitigation measures in a tripartite alliance consisting of the communities, outside expert organisations working in conjunction with their national counterparts, and local agricultural extension officers. All three parties would benefit from the exercise. Once a successful procedure has been developed, this will greatly facilitate the transfer of knowledge to other communities.

The three ingredients of this success are willing communities, pragmatic and knowledgeable experts, and enthusiastic local extension officers. Conversely, success is unlikely to be achieved if one or more of these ingredients are absent.

The most unlikely route to successful technology transfer is when the State attempts to impose broad recommendations by well-meaning outside scientists against the will of local communities. There is no learning experience by either the communities or the State. A good example is the imposition of environmental conservation measures. The benefits of these measures have to be demonstrated in actual examples and not imposed, particularly if the benefits are not apparent within a year or two at most. Alternatively, the State will have to provide financial incentives instead of punitive disincentives if the programmes are to succeed. The danger of this approach is that it increases the community's dependence on the State. There is also little learning experience.

30. Disaster mitigation research

The greater the vulnerability of the population to natural disasters, and the smaller the budget available for disaster reduction measures, the greater the need for research required to determine the most cost-effective measures for risk reduction. If unlimited funds were available for upliftment and risk reduction programmes there would be little need for research because large, inefficient programmes would probably be effective. Consequently, the need for research increases with decrease in the availability of funds.

In many countries of the world there is great concern for the degradation of the environment. There are many scientists undertaking research on climate change and on ecological and environmental problems, but not many researchers are undertaking research on disaster risk reduction. The consequence is readily apparent in the unreasonable and unattainable recommendations made by scientists that drought risk reduction can be achieved by the imposition of environmental conservation methods. Those who hold this view seldom appreciate that environmental conservation is an unattainable ideal in the poor rural communities of Africa. This imbalance will have to be rectified if the slide into further impoverishment has to be turned.

31. General conclusions

In many developing countries in Africa the rural areas are no longer able to support the rising populations that depend on them. The ability of these countries to finance disaster mitigation activities is hampered by financial austerity programmes associated with economic reform and the heavy tax burdens required to service the national debt.

Drought mitigation strategy. Disaster mitigation plans in the rural areas of Africa should move away from environmental concerns to human livelihood concerns. Because of the frequent occurrence of drought and its spatial extent, the costliest option is to ignore drought and simply react to each incident. Countries should include natural disaster reduction

as part of their development plans, otherwise progress in social and economic development will continue to be eroded by recurring disasters. Disaster prevention, mitigation and preparedness is better than disaster response in achieving the goals and objectives of the Decade. These measures must be considered in conjunction with the social, economic and political limitations of the communities at risk.

Sub-Saharan Africa is the only major region of the world where food security has been getting worse rather than better. In 30 out of 35 countries in Sub-Saharan Africa food production per capita is lower today than it was in 1980, which in turn was lower than that in 1970.

Flood risk reduction in unplanned urban settlements. The best solution is to provide incentives that will encourage the threatened communities to move to less vulnerable areas. In many cases this will be a long process as job opportunities and housing will have to be provided at a faster rate than the influx of socially and economically disadvantaged people into the high risk areas. This leaves the implementation of flood awareness programmes and flood warning systems as the only viable short term solution.

Education and training. In many developing countries the limited financial resources and technological expertise prevent the development of disaster mitigation measures. The importation of expertise developed elsewhere is inhibited by language differences and lack of expert knowledge of local socio-economic conditions of the recipients and their ability to understand and implement the proposals. The best solution method of technology transfer is by planning and operating demonstration projects.

Research. There are many scientists undertaking research on climate change and on ecological and environmental problems, but not many researchers are undertaking research on disaster risk reduction. This imbalance will have to be rectified if the slide into further impoverishment has to be turned.

International assistance. The poorer countries of the world will remain dependent on international assistance for a long time to come. The magnitude of this assistance will continue to increase until a level of sustainable existence is reached. The form of this assistance should move away from the traditional emergency assistance after disasters have occurred towards assistance in developing vulnerability reduction measures on a national scale.

32. Acknowledgements

I cannot conclude this account without acknowledging the invaluable contributions made by many individuals, organisations, and State and international agencies towards the alleviation of the plight of the people of Africa resulting from natural disasters. Their principal role has been the alleviation of the consequences of disasters and the development of strategies to minimise the effects of disasters. Curing the problem rests at government level and it is at that level that this presentation is directed.

In this presentation I have drawn heavily on numerous reports that have been written by the United Nations agencies, national reports and conference reports, as well as discussions during IDNDR meetings and conferences. I have also paraphrased articles in STOP DISASTERS which is a bi-monthly newsletter dedicated to the Decade published by the Osservatio Vesuviano.

This presentation also includes current approaches by academics and practitioners in South Africa which is currently going through the process of developing national policies on disaster management. In South Africa, as elsewhere in the world, drought alleviation strategies have traditionally been aimed at aiding agriculturalists to retain productive capacity and resume production when conditions improve. South Africa has a unique juxtaposition of

first and third world economies; a developed commercial farming sector and a large subsistence farming sector; affluence and poverty; assured national food security but no household food security: sophisticated urban water supplies but vulnerable rural water supplies.

The selection and interpretation of these sources reflect my personal views based on more than 40 years experience in this field.

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