



"Partnerships for a Safer World  
in the 21st Century"



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Committee

Coping study on

## **RISK AND SOCIETY**

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### DESPAIR OF THE LITTLE PEOPLE

I am a little person from a little country within a country.  
 The messages of serious weather and climate variations have been heard loud and clear.  
 Is this a change in the winds?  
 Is this a change in temperature or rainfall?  
 Is this yet another catastrophic event?  
 Or is this a myth?  
 I am not so sure.

I am not scientifically sound, and yet,  
 I must figure out, for myself, how to cope.  
 Do you know where I live?  
 If so, can you make a change?  
 Am I safe and shielded from the inevitable?  
 Where do I go? I cannot afford an insurance policy.  
 How about my goats, sheep, cattle and fish.  
 Should they just perish?  
 Remember, this is my bank account and my village stock exchange, however small.  
 Have you thought of this?

I am told that my little country has a heavy debt burden.  
 I am told that I am the one to toil to service the debts of yesteryear.  
 I am also told that viral diseases, with yet no cure, are wiping out my kith and kin.

Furthermore, I have no land, capital or indeed sufficient knowledge to eke out a decent living  
 I am in a cul-de-sac.  
 Give me an outlet.

With the experience of yesterday,  
 I stand ready to change my ways.  
 But teach me how to do this.  
 Give me the necessary tools to act before it is too late.  
 I am ready to act now.  
 Assist me, then, to consolidate the little gains achieved thus far.  
 Make a difference in my life.  
 I am a little person from a country within a country.

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## **1. Executive Summary**

### **1.1 Introduction**

The production of food and the provision of water are the foundations on which society is built. These in turn are dependent on the productive capacity of the soils and the annual rainfall. In moderate climates the rainfall is generally dependable, and for most of the time it exceeds the needs of the soil on which it falls. The surplus flows into the perennially flowing rivers. The risks of below average rainfall can be quantified and accommodated in financially secure societies where alternative sources of food can be imported into the areas where shortfalls are experienced.

The situation is very different in the semi-arid regions of the world where soils are less productive and the rainfall is much more variable. River channels are dry for most of the year and water supplies cannot be assured without the construction of water storage works. The risks of crop failures and stock losses due to prolonged rainfall shortages (droughts) are consequently much greater.

The position is worsened by the high level of population growth in poor communities. This in turn has led to over-utilization of the natural environment which has become severely degraded and its productive capacity is severely diminished. Neither the agricultural communities themselves nor their governments have the financial resources to import food in times of severe shortages and they have to rely on emergency relief from other countries to avert widespread famine.

Because the climate in these semiarid regions is more variable, abnormally high rainfall is also more frequent and gives rise to severe floods with consequent high loss of life and loss of possessions and livelihoods.

These two forms of natural disasters – floods and droughts – are not only more severe in semiarid regions due to their more variable climates, but they also cause significantly more damage to the social and economic infrastructures that are affected by them. The rural populations are malnourished and more prone to disabling and life-threatening diseases which are on the increase in many African countries.

The situation in most countries on the African continent continues to deteriorate at an alarming rate, and the objectives of the United Nations General Assembly Resolution establishing the International Decade for Natural Disaster Reduction (IDNDR) are not being met. Disasters are not increasing because of the increase in the frequency of hazards, but because of the increasing vulnerability to hazards. The ability of many countries to finance vulnerability reduction measures is hampered by financial austerity programmes associated with economic reform and the heavy tax burdens required to service the national debt.

This presentation reflects the African perspective on natural disaster reduction. It is based on information gathered from many sources, including IDNDR publications, publications of United Nations agencies, African country reports, presentations at conferences, discussions with professional colleagues, and personal observations and experiences in Southern African countries stretching over a period of more than forty years.

The conclusion reached is that if the principles of natural disaster reduction – particularly vulnerability reduction methods – are not included in national policies, the slide from democracy to civil unrest and eventually to anarchy will affect an increasing number of countries on the African continent.

This is a complex problem with no easy solutions.

## **1.2 *African experience***

The severity of a natural disaster is the result of the combination of the severity of the hazard and the degree of vulnerability of the community to that hazard. There are a number of factors that contribute to the vulnerability of communities exposed to severe hazards, the most important being poverty and high population growth. These result in increasing utilisation of natural resources to the point where the natural ecosystems themselves become increasingly vulnerable to climatological perturbations, and can no longer support the communities that depend on them. In Africa more than 300 million people, comprising nearly half of the population, are dependent on fragile ecosystems, where small perturbations can have severe consequences. Hunger, malnutrition and disease follow.

Disasters lead to migrations to adjacent areas where the population pressures are further increased. There are also migrations to urban areas resulting in unplanned and unmanageable urbanisation. There are few job opportunities, and crime rates rise as the poor struggle to survive. The exposure to natural disasters continues, as there is no escape from floods, runaway fires, wind storms and tornadoes in these informal settlements. The inevitable result is an ever-steepening downward spiral of poverty and dependence on the State.

Disaster mitigation plans in the rural areas of Africa should move away from environmental concerns to human livelihood concerns. The costliest option is to ignore natural disaster mitigation measures and simply react to each incident.

## **1.3 *Drought mitigation measures in rural areas***

Food insecurity lies at the very heart of vulnerability to the effects of severe droughts. It is also the most difficult aspect of vulnerability reduction to implement. The key to breaking the downward spiral of impoverishment is the introduction of a combination of effective hazard and vulnerability reduction measures developed within the social, economic and political limitations of the communities at risk. These include investments in agricultural inputs, development of rural infrastructure, dissemination of appropriate technologies, education and training, social security systems, and access to credit and markets (especially for small farmers and women). When properly planned, public works programmes can augment rural infrastructure, ease unemployment, avoid public dependency of direct aid and maintain fair market prices for crops.

## **1.4 *Flood risk reduction in unplanned urban settlements***

The influx of rural poor and refugees into unplanned and unmanageable urban settlements has become a world-wide problem. There is seldom the political will to use coercive measures to discourage this phenomenon. In most cases the only feasible long term solution is to provide incentives that will encourage the threatened communities to move to less vulnerable areas. As this will be a long process, the implementation of flood awareness programmes and flood warning systems is the only viable short term solution.

## **1.5 *Education and training***

Knowledge is more successfully transferred by example than by theory. The most likely scenario for success would be to develop vulnerability reduction measures in tripartite alliances consisting of the communities, outside expert organisations working in conjunction with their national counterparts, and local agricultural extension officers. Once a successful procedure has been developed, this will greatly facilitate the transfer of knowledge to other communities.

## 2. The United Nations General Assembly Resolution: 1989

The United Nations General Assembly Resolution establishing the IDNDR is about people - their lives and their livelihoods.

Arising from the alarming world-wide increase in loss of life and physical damage due to natural disasters with resultant secondary effects of lost income, unemployment, reduced productive capacity and economic growth, the United Nations General Assembly Resolution 44/236 adopted in 1989 declared the period 1990-2000 to be the International Decade of Natural Disaster Reduction (IDNDR).

The preamble to the resolution stressed that natural disasters have adversely affected the lives of a great number of people and caused considerable damage to infrastructure and property world-wide, especially in developing countries. It recognized the necessity for the international community to demonstrate the strong political determination required to mobilise and use existing scientific and technical knowledge to mitigate natural disasters, particularly the needs of developing countries. It recognized further the important responsibility of the United Nations system as a whole for promoting international co-operation in order to mitigate natural disasters, provide assistance, and co-ordinate disaster relief, preparedness and prevention. It also recognized the importance of environmental protection for the prevention and mitigation of natural disasters.

Now, at the end of the decade, it is necessary to assess whether or not the objectives have been realised. As the principal beneficiaries envisaged in the resolution are the people in the developing countries, successes and failures should be seen from their perspective.

While there have been tremendous strides forward in natural disaster reduction in developed countries with their substantial financial and technological resources, this has not been reflected in the developing countries where the loss of lives and livelihoods continues to rise at an exponential rate.

The purpose of this presentation is to identify reasons for the lack of successes, so that these can be addressed in the decades ahead. It will be shown that from the perspective of the developing countries in Africa, there were two fundamental flaws in the General Assembly resolution. The first was the perception that the application of science and technology was all that was needed to solve the problem, and the second was the assumption that environmental protection could prevent or mitigate natural disasters.

The linkage between environmental conservation and disaster reduction was later reinforced at the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992 (Agenda 21). As will be shown below the conclusion that environmental conservation would lead to sustainable development is an unattainable objective in large regions of Africa.

It was not fully realised that all disasters are the consequence of the combination of the severity of the hazard and the vulnerability of the community to that hazard. For example a severe earthquake in the middle of the Sahara Desert is unlikely to result in loss of life and damage to property. However, a minor flood in a densely populated, unplanned urban settlement could result in a large loss of life and destruction of homes.

Emphasis was placed on hazard reduction through scientific and technological measures. There was no reference to vulnerability reduction through socio-economic measures.

Attention was drawn to the impact of natural disasters on health care, particularly to the vulnerability of hospitals and health sectors. There was no mention of health risks associated with natural disasters. Nor was the disastrous effect of HIV/AIDS contemplated.

### 3. The Yokohama Strategy and Plan of Action: 1994

A very successful mid-decade conference was held in Yokohama, Japan in May 1994. The conference served as a review of what the scientific and technical community, national governments, regional bodies and international organisations had done to prevent, mitigate and prepare for disasters. The conference started with some reservations.

The impact of natural disasters was on the rise. The member states gathered at Yokohama expressed their deep concern for the continuing human suffering and disruption of development caused by natural disasters. They affirmed that the impact of natural disasters in terms of human and economic losses had risen in recent years, and society in general had become more vulnerable to natural disasters. The people usually most affected by natural disasters were the poor and socially disadvantaged groups in developing countries as they were least equipped to cope with the disasters.

In Sub-Saharan Africa there was a steady increase in the number of significant disasters from the 1963-67 period to the 1978-82 period. Thereafter there was a dramatic increase to the 1983-87 period during which the number of disasters causing significant damage nearly doubled, disasters affecting significant populations jumped more than three times and those with more than 100 deaths almost trebled. In the period 1988-92 disasters causing significant deaths again increased by more than twice the number in the previous period. Other developing regions showed similar tendencies.

The two principal reasons for the loss of life were the devastating effects of severe regional droughts and the related migration to urban areas where there has been a rapidly growing development of informal settlements. This is a world-wide phenomenon in developing countries. One of the principal causes of the migration to the cities is that the rural areas are no longer able to support the rising populations that depend on them. Recurrent droughts in rural areas accelerate the process.

Countries were urged to 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 were stated to be better than disaster response in achieving the goals and objectives of the Decade.

The objectives of the Decade were confirmed:

*By the year 2000, all countries, as part of their plan to achieve sustainable development should have in place comprehensive national assessments of risks from natural hazards integrated into development plans, mitigation plans at national and/or local levels that address long-term prevention, preparedness, and community awareness, and ready access to global, regional, national and local warning systems.*

The Yokohama Strategy recognised that sustainable economic growth and sustainable development cannot be achieved in many countries without adequate measures to reduce disaster losses. There are close linkages between disaster losses and environmental degradation, as emphasised in the Rio de Janeiro Conference in 1992 (Agenda 21). The Rio Declaration was reaffirmed, in particular Principle 18 which stressed the need for the international community to assist States afflicted by natural disasters and other emergencies that are likely to produce sudden harmful effects on the natural environment of those States.

The Yokohama Strategy gave priority attention to the developing countries, in particular the least developed, land locked countries and the small island developing states where natural disasters continue to strike and increase in magnitude, complexity, frequency and economic impact. Whilst the natural phenomena causing disasters are in most cases beyond human control, vulnerability is generally compounded by human activity.

Education and training programmes and facilities for people professionally involved and the public at large have not been sufficiently developed. Also the potential of the information media, industry, scientific community at the private sector at large has not been sufficiently mobilized.

A number of positive results were achieved the first five years of the Decade, although unevenly and not in the concerted and systematic way as envisaged by the General Assembly. Only if these achievements are recognized, consolidated and accelerated, will the Decade be able to reach its goals and objectives and contribute to the development of global culture of prevention.

During the remaining part of the Decade all countries were called upon to express the political commitment to reduce their vulnerability, through declaration, legislation, policy decisions and actions at the highest level, which would require the progressive implementation of disaster assessment and reduction plans at the national and community levels.

Countries were advised to stimulate genuine community involvement and empowerment of women and other socially disadvantaged groups at all stages of disaster management programmes in order to facilitate capacity building, which is an essential precondition for reducing the vulnerability of communities to natural disasters. The application of traditional knowledge, practices and values of local communities for disaster reduction, should be recognized. Traditional coping mechanisms are a valuable contribution to the empowerment of local communities, enabling their spontaneous co-operation in all disaster reduction programmes.

It was recommended that extra-budgetary resources be provided for implementation of the Decade and, therefore, the voluntary contributions from Governments, international organizations and other sources including the private sector, were strongly encouraged.

#### **4. AFRICAN EXPERIENCE**

Tens of thousands of years ago the people who roamed the plains of Africa were hunter-gatherers who depended on the natural environment for their existence. During adverse climatic conditions they moved to less affected areas. Their mode of life inhibited the aggregation of large communities in small areas as this would soon deplete the natural resources in the immediate vicinity. Life expectancies were low and the nucleus populations were small, so there was little increase in populations, and few conflicts for favoured territories.

Along the banks of the Nile River in Egypt conditions were different and food crops grew readily on the fertile soil of the floodplain of the river. When floods occurred the land was inundated and when the floodwater receded crops could be planted on the moist soil. The floods in the Nile River provided life-giving water, and their slow rise and fall were no threat to life or livelihoods. The velocity of the water was too slow to cause physical damage. It was no longer necessary for all households to forage for food, as only a small proportion of the population could provide sufficient food for large communities. Large populations developed in relatively small areas which in turn resulted in the development of sophisticated societies. The area was not entirely free from the vagaries of nature as was demonstrated in the biblical references to the plagues of Egypt. Nor was it free from conflict with its neighbours and forces further afield. Nevertheless the population continued to grow and Egypt prospered.

The natural environment is never in a state of equilibrium. Seasonal and multi-year fluctuations have to be countered to ensure a sustainable utilisation of the resource. In the 1970s the Aswan High Dam was built to stabilise the flow in the Nile River. A system of canals was built to convey water to the irrigated lands. The dam also provides hydro-electric



power. In the event of a major flood the excess water will be diverted into low-lying areas of the desert adjacent to the dam. There is therefore complete control of floods in the Nile River, and maximum potential utilisation of the water in the river. However, the flow in the river is a finite resource and can therefore only support a finite population.

Up to the 1940s the irrigated lands along the Nile River were sufficient to feed the population and provide surplus food for export. Within the next thirty years the size of the population exceeded the production capacity of agricultural resources available to feed it. Increasing population pressure resulted in urban development spreading onto the highly productive agricultural land which was no longer subject to flood risks. This reduced the national food production. Simultaneously, the population in the rural communities continued to rise. This placed stress on the rural communities, and conflicts of interest developed between the individuals and the State.

The financial incentives for farmers to sell their land to developers were greater than potential incomes from agricultural production. It was also more profitable to sell topsoil for brick-making than to maintain agricultural production. Where government assistance was provided to poor farmers in the form of fertiliser quotas, some small farmers sold their quotas on the black market in exchange for quick cash. The government attempted to control the activities but intervention by the State was politically unpopular as it restricted the right of its citizens to prosper and determine their own futures. (Kishk 1996)

This and the following examples are useful for identifying the reasons for the general lack of success in achieving the IDNDR's objectives in the developing countries of Africa.

## **5. Southern African drought: 1991/92**

The 1991/92 drought was the most severe drought experienced on the African continent. It affected about 2.6 million square miles of sub-equatorial Africa. Twelve southern African countries were hit by the drought which caused greater crop failure than that experienced in Ethiopia, the Sahel, and the Horn of Africa in 1984/85. Twenty million people were at direct risk, including 1.5 million refugees. The southern African countries imported 12 million tons of food. Fortunately South Africa has an efficient rail transport system from its ports into the interior, and the distribution of food prevented widespread famine.

The three million tons of lost production would have been sufficient food for 25 million people. In South Africa alone more than 243 000 large stock units (cattle), and in excess of 107 000 small stock units (sheep and goats) died.

Cholera pandemics were reported from seven southern African countries. Outbreaks of other diseases with high fatality rates were reported. The drought threatened the collapse of the rural economy in some regions. Labour shedding by farmers and agricultural industries compounded the problem.

A drought management policy was subsequently developed in South Africa (and also in other countries in the region). The drought management strategy addressed issues including an efficient early warning system. It also addressed the implementation and maintenance of an infrastructure for addressing endemic poverty and malnutrition through targeted nutrition and development programmes which could also be utilised for addressing disaster conditions. The creation of administrative structures and communication systems to promote swift mobilization of resources as well as effective allocation and use of funds were also addressed. Rural development programmes were formulated to enable the population to become more independent, more self-sustaining, and less vulnerable to circumstances beyond their control.

Detailed discussions were held and reports were produced. However, as in the case of previous droughts, public and political interest quickly waned when the crisis was over and many recommendations were not implemented.

## **6. First African Sub-Regional Workshop: 1994**

The first African sub-regional workshop on natural disaster reduction was held in Gaborone, Botswana in November 1994. It offered the participating countries the first opportunity to start the process of transforming the conclusions of the Yokohama Strategy and Plan of Action into practice at country level. The first plenary session was devoted to a discussion of the beneficial relationship between sustainable development planning and practice on the one hand, and natural disaster vulnerability reduction measures on the other. Working groups and participants were challenged to identify specific prevention, mitigation and preparedness actions aimed at the cost effective and efficient management of major disaster types.

The principal theme of the workshop was the recent drought episode. Large amounts of international food aid and its efficient distribution helped to stave off famine. But representatives of the southern African governments said their countries did not want to fall into a habit of dependence on outside countries with what appears to be a recurring problem. They announced that they would focus on what they could do to help themselves - better knowledge, better internal teamwork, better use of their own resources. Countries in the region confront many of the same difficulties, and should share information and methods.

Two well-recognized patterns emerged repeatedly as countries recounted case histories. The first was that rapid rural population growth leads to over-settling, over-farming, and overgrazing of fragile landscapes in quest of enough space and nourishment.

The second was what was called a cycle of disaster in Africa. low levels of technology, poverty, high population growth, degradation of the environment, overgrazing, removal of trees, soil erosion, and decreased resilience to disaster. Droughts occur, followed by famine, disease, migration to cities and to neighbouring countries (as refugees), unplanned urbanization, occupation of flood prone areas, increased vulnerability, conflict, political unrest and civil war. More droughts and floods occur as the cycle is repeated.

Another legacy of the 1991/92 drought was the challenge for institution building. Those countries not already having agencies dedicated to coping with natural disasters were forced to develop at least temporary structures to respond to this one. They were also spurred to establish philosophies on how to provide relief. One positive lesson was that, when properly planned, public works programmes can augment rural infrastructure, ease unemployment, avoid public dependency of direct aid and maintain fair market prices for crops. Several countries planned to transform their drought response mechanisms to systems with focus on all relevant aspects of natural disasters, from prevention through response to development.

## **7. Horn of Africa floods: 1997/98**

Climatologists predicted that 1997 would see the beginning of '*The mother of all El Niños*'. One of the areas identified as being at risk was flooding in the Horn of Africa (principally Kenya and Somalia). Like the biblical prophecies this one also came to pass, but unlike the biblical prophecies the message did not get through to those at risk.

The rains came, and severe flooding occurred over a wide area. Hundreds of people died and 80% of the livestock (mainly sheep and goats) were lost. The loss of income resulted in malnutrition and outbreaks of life-threatening, water-related diseases. There was an exodus of 200 000 people to the already over-populated surrounding areas.

## **8. EL NIÑO was a non-event in Southern Africa: 1997/98**

Another area identified as being at risk due to the El Niño phenomenon was southern Africa where severe droughts were predicted. This prediction received widespread press publicity, and several southern African countries mobilized resources to deal with the forecast drought.

conditions in Southern Africa. In a media statement the South African government announced that action plans had been undertaken to counter the expected negative effects of the El Niño phenomenon. A special Minister's meeting of the Southern African countries was arranged, and an emergency fund was made available. Structures were established to deal with disaster related incidents, and measures were taken to ensure that the Interim Disaster Management Centre would have the necessary capacity and funds to act as an apex to coordinate all disaster-related activities.

Zimbabwe also embarked on a resource mobilization and capacity building campaign to prepare her population. The external media predicted an extreme drought situation, thus sending a near panic situation among farmers and the general public.

In the event most of Southern Africa received normal to above normal rains, but agricultural performance declined due to the cautious attitude adopted by many farmers. In Zimbabwe farmers, fearing the worst decided to minimize their losses by reducing the areas under staple food, diversifying to more drought resilient but less profitable crops; and resorting to wildlife farming. The maize production was reduced by 35% of the potential yield, and the nation was forced to import food for human and animal consumption. The Zimbabwe Stock Exchange reacted negatively to the news from the external press which resulted in fall of the value of stocks during the second half of 1997.

This false alarm serves as a lesson to those who relied on exaggerated overseas press reports, and to scientists to perfect their skills at producing forecasts which include estimates of their reliability, using a terminology that the general public will understand.

## **9. Regional Meeting for Africa: May 1999**

The purpose of the meeting was to look beyond the end of the Decade. The first item on the agenda was socio-economic concerns, followed by development and environment concerns, scientific and technological concerns and actions towards the 21<sup>st</sup> century. During the discussions it became clear that the principal objective of the 1989 United Nations Resolution establishing the IDNDR was not being met on the African continent. Natural disasters continued to cause loss of life and the livelihoods of tens of thousands of people as well as causing considerable damage to infrastructure and property.

Most countries had introduced legislative measures to mobilize resources when disasters occur. Several countries went one step further. For example in 1995 Ethiopia produced a visionary five-year plan with three principal objectives. That each household becomes food secure. That even when a disaster prevails the country will be able to overcome it with its own resources. That households and communities will be able to overcome any kind of disaster on their own through the development activities implemented by the government and through the capacity of the people being strengthened.

South Africa after extensive consultation produced a Green Paper on disaster management to ensure that an effective disaster management system is realised and implemented by way of a National Policy, which will be reflected in the subsequent White Paper.

However, no African countries have been successful in reducing vulnerability to droughts and floods through environmental conservation measures. There are also no national continuously operated flood warning systems. The most disappointing report submitted to the meeting was that by the United Nations Environment Programme (UNEP) where it was reported:

*1 The environment and related problems in Africa have been articulated at various levels and by several intergovernmental and non-governmental fora*

*2 These problems can be coarsely classified into the following categories: land*

*degradation, pollution and depletion of water resources, loss of forests and other organic species, impacts of the environment on human health and welfare, and inadequate policy and institutional response measures, inadequate capacity to keep abreast of changes in the environment, increasing pressure of human population and activities on the environment; economic sector and industrial activities not operating in tandem with environmental management; and lack of awareness on the side of policy makers and political conflicts*

*3 UNEP has not been able to live up to expectation in responding to various concerns because of poor coordination, lack of adequate financial resources; underestimation by the UNEP of the enormity of problems spanning 53 African countries in the vast continent, inadequate cooperation between UNEP and other regional and sub-regional players, and lack of mobilization of the private sectors*

In my opinion the lack of success is due to more fundamental reasons than those listed above. These are discussed later in this presentation. The following are some other comments made at the African Regional Meeting in Nairobi.

- People have been living in these areas for centuries and have developed survival techniques. Care must be exercised when proposing alleviation measures developed in other regions of the world.
- For the poor, natural disasters are not the only threats to lives and livelihoods.
- Droughts scatter people.
- Africa is being left out in the cold.
- The sustainable land use approach is not happening.
- Drought resistant crops are not succeeding.
- There is a dramatic unplanned and unmanaged urbanization due to a lack of policy by governments.
- There is a lack of capacity to apply technologies.
- Confusing messages are coming from the scientific community which is undermining the credibility of local agencies.
- Local agencies are being overwhelmed with confusing and inappropriate technology.
- There is no way to reverse the trend. After 20 years Africa is on the verge of total collapse.

These examples from Africa must lead to the question -- why are the lessons and experience of thousands of years, of no avail? And even more importantly, why is modern scientific and technological knowledge of so little assistance in preventing the continuing large loss of life and livelihoods on the African continent?

## **10. Disaster reduction and sustainable development**

All land used for pastoral agriculture has a finite livestock carrying capacity. This equals the rate of growth of palatable vegetation. The rate of growth varies not only with seasonal changes in rainfall, but also multi-year changes such as during droughts. Over-grazing can have serious consequences when the vegetation changes from palatable species to less palatable species. Land cover can be reduced, encouraging the erosion of productive topsoil. Gully erosion follows, and eventually large tracts of land become unproductive.

During the past 50 years a great deal of research has been conducted in South Africa and elsewhere to determine the optimum stock carrying capacities in semiarid regions, and the means to ensure long term sustainability. These include rotational grazing systems where the grazing is fenced into separate sections. Some sections are intensively grazed and subsequently rested to allow the vegetation to recover. State aid was made available for controlling soil and gully erosion, and penalties imposed where land was allowed to deteriorate. During droughts, State-subsidised stock reduction schemes were introduced that enabled farmers to maintain nucleus herds until conditions improved.

However, it is far more difficult to introduce these measures in communal farming areas where there is no individual land ownership. This is the situation in most African countries. In these areas intervention by the State is often seen as a threat rather than providing assistance.

For example, in a report on the position in Senegal it was stated that the pattern of disaster vulnerability had been deepened by territorial reforms that led to the creation of a highly bureaucratic system. People were subordinate to central government in all sectors of resource management including forest protection and agricultural development. The administrative reorganization resulted in the abolishment of indigenous land use and responsibilities.

This view was repeated in the case of Sudan where it was reported that excessive human pressure on fragile natural resources and harsh climatic conditions have resulted in severe land degradation. Socio-economic investigations showed that traditional land-use systems had undergone a dramatic change. In the early 1970s the policy was that the natural resources of State-owned lands should be accessible to all. This led to the abolition of communal grazing areas, thus eliminating the rights of the local communities to manage and nurture their own resources.

A more recent example is the 1998 drought in the Limpopo valley of Southern Africa. Previously, State-owned land was unexploited during normal years but made available for grazing in times of drought. However, increasing development increased the stocking rate within the adjoining areas, making these areas more vulnerable to drier conditions. The use of State owned land for emergency use became more frequent, until it was also degraded and unable to function as a buffer during severe droughts.

### **10.1 Misguided notions of sustainable development**

The origins of the concept of sustainable development go back to the 1980s. In 1987 the Brundtland Report of the World Commission for Environment and Development defined sustainable development as meeting the needs of the present generation without compromising the ability of future generations to meet their own needs. Since then the concept has been promoted world wide. It was included in the 1989 General Assembly Resolution establishing the IDNDR as well as in the 1994 Yokohama Declaration. In 1992, The Earth Summit in Rio de Janeiro presented Agenda 21 as a master plan to achieve sustainable development. It is a broad concept that goes beyond the tradition of wise use of resources and introduces ecological, economic, equity, and social considerations.

Several African countries have adopted this concept in their constitutions or in legislation. A good example is to be found in the constitution of the Republic of Namibia.

*The State shall actively promote and maintain the welfare of the people by adopting, inter alia policies aimed at the maintenance of ecosystems essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future*

The emphasis is on the welfare of the people, and the utilization of the natural resources on a sustainable basis for the benefit of the people. It is the socio-economic aspects that have to be addressed and understood if the goals of sustainable development and natural disaster reduction are to be achieved. The issue is how can the welfare of the people be assured within the constraints of environmental conservation?

Few would disagree that environmental degradation due to over-utilization of the natural resources has made large areas of Africa increasingly susceptible to natural disasters. Nor can it be disputed that if environmental degradation is reduced, the vulnerability to natural disasters will also be reduced.

However, there appears to be a lack of appreciation of the fact that this is a complex socio-economic problem. All the well-meaning resolutions of international bodies including the United Nations agencies, and the adoption of these policies by national states will come to nothing if the root causes of the increase in vulnerability to natural disasters over large areas of Africa, are not addressed.

African experience has shown that edicts issued by the State that attempt to enforce environmental conservation in an attempt to achieve sustainable development will be ignored if they do not lead to an early and recognisable improvement in present living conditions.

One fundamental fact has to be appreciated by those who propagate this approach. The concept of sustainable development is based on the assumption that the targeted resources are not yet fully utilised. There are very few, if any, poor communities anywhere in the world who are already over-exploiting the long term productivity of the natural environment who will be prepared to make personal sacrifices in their present low standard of living in order to ensure the maintenance of a higher standard by future generations. It is unlikely that local political decision makers would attempt to enforce conservation practices in this situation. Overseas pressure groups could more profitably target their financial resources and advice on alleviating poverty as the route to follow to achieve environmental conservation.

Here is a selection of relevant comments

- It has been claimed that democracy is fundamentally incapable of properly protecting the environment.
- It was the obviously non-sustainable lifestyles and economic systems and economic systems of the industrialised countries that created a need for a new, ecologically enshrined development paradigm.
- The fundamental interdependence of ecological, economic and social objectives is the heart of the sustainability concept.
- From a political science perspective, the concept of 'sustainable development' is included with concepts such as 'freedom' and 'justice', among society's primary objectives. However, like 'freedom' and 'justice' it is incapable of precise definition, and protagonists use the concept to promote their own objectives and ideas.
- Distributing the costs of environmental management is complicated because of the scientific and economic uncertainty.
- The cost of unchecked environmental degradation will not fall evenly
- A difficulty in developing sustainability is devising policies that are able to survive political and ideological challenges.
- Neither sanctions nor incentives are particularly strong in these circumstances.
- Disaster reduction and sustainable development are mutually supportive goals.

## 11. Pattern of impoverishment of the rural poor

Disasters are not increasing because of the increase in the frequency of hazards, but due to the increasing vulnerability to hazards. The increase in vulnerability to disasters in many developing countries of Africa arises from the following repetitive sequence.

1. Growing population.
2. Increasing utilisation of natural resources.
3. Land clearing.
4. Felling of trees for firewood.
5. Overgrazing of fragile ecosystems especially in semi-arid areas.
6. Soil erosion.
7. Desertification.
8. Collapse of natural ecosystems.
9. Hunger and malnutrition.
10. Partial recovery after the drought has passed, and the cycle is repeated

The downward trend of impoverishment will continue unless this cycle is broken. If conditions continue to deteriorate, the rural population will be attracted to urban areas on the assumption that their living conditions will improve.

11. Migration to the cities by rural poor and refugees.
12. Unplanned occupation of high risk peri-urban areas.
13. Few job opportunities.
14. Rising crime rate as a means of survival.
15. Breakdown of civil administration.
16. Political instability.
17. Civil war.
18. Cross-border conflict.
19. Anarchy.

These symptoms are present in many African countries.

## 12. Rescue and rehabilitation

Rescue and rehabilitation have been called the '*biscuits and blankets*' approach to disaster mitigation. In most countries the rescue services are well organised, particularly if the event only affects a small area, or a few people. However, the larger the area, or the larger the number of people affected, the greater the need for the preparation of thorough contingency plans involving not only the rescue organizations, but also the communities at risk. The two most important hurdles to be overcome during rescue operations in developing regions are the difficulty in obtaining accurate knowledge of the extent of the disaster, and the co-ordination of rescue activities during the disaster.

Within the African context it is imperative that authorities make every effort to restore the affected communities to at least their pre-disaster status as soon as possible. This includes activities to combat malnutrition, disease, loss of livelihoods, and migration to areas that are perceived to be less vulnerable to disasters. Failure to do so will increase their vulnerability to future climatic extremes.

In many countries the authorities entrusted with rescue and rehabilitation responsibilities are given the wider responsibility of disaster risk reduction activities (principally vulnerability reduction). However, there is growing concern that these two activities - rescue and risk reduction - are incompatible in that rescue is a short-term emergency response while risk reduction is a continuous process involving different organisations with different objectives.

Although rehabilitation in the form of financial assistance has been the traditional response to disasters, the provision of State aid after the event as an alternative to pre-emptive action is becoming less socially and politically acceptable. Emergency assistance will continue to have an important role to play but it is too frequently spurred by the appearance of hunger.

International assistance plays a major role in alleviating the effects of natural disasters. Relief assistance is often delivered too late to avert the liquidation of household and farm assets. Subsistence farmers and their families do not go hungry until after they have sold their assets. By the time the danger signals of hunger are heard, farmers have already reached a level of impoverishment that severely reduces their ability to recover after the drought is over. They have not starved, but they have lost their assets, sometimes permanently losing income-generating potential. There is still a large group of survivors of the Sahelian droughts of the 1980s who remain refugees, without the basic means of re-establishing their independent existence as producers.

The ability of government to deal with disasters is based on the availability of adequate institutional capacity. The biggest weakness in institutional capacity lies at provincial and local levels. In some cases local government structures lack resources and are often not functional or have little or no planning in place should disasters occur. Budgetary constraints often result in a limited capacity to respond effectively with the minimum resources. In cases of emergency the release of funds often takes a long time due to complex state tendering procedures.

It is becoming increasingly difficult for international organizations to provide aid efficiently and effectively. This is because apart from logistical problems, the responsibilities of some of the actors are not clearly defined and co-ordination is inadequate.

The following account by Cardo (1997) is typical of unplanned assistance experienced in many developing countries after a disaster.

*The humanitarian help, however, was largely unorganized, totally unplanned, completely relief and rescue oriented. The voluntary sector, support agencies, donor and funding agencies reacted quickly and spontaneously, but without any far-reaching plan. While attempts to help were no doubt sincere and well-intentioned, they did not have any long-term action plans.*

*Unfortunately relief that was rushed in was accompanied by publicity and propaganda seekers. Various donor and funding agencies were filmed distributing cash against the backdrop of chaos and confusion. The agencies vied with each other, tripped over each other to be the first ones on the scene. Volunteers, though well-intentioned, worked in isolation and suspicion of each other. Materials that were brought in – tents, blankets, food and water – mysteriously vanished only to reappear in market places. And materials that did manage to reach the victims proved to be useless such as leaking tents, blankets too warm for the local climate, unpalatable refined grain, etc.*



The following comments were made during the IDNDR African regional conference in Nairobi in May 1999.

- Inappropriate relief – overwhelming needs – highly stressed officers – competing priorities – influx of international assistance – outburst of mutual assistance – lack of coordination.
- Information is not shared due to rivalry between agencies.
- Donor fatigue sets in – its purpose must be identified and the results must be tangible.
- How much donor money is needed and where will it come from?
- There are doubts about the UN agencies' capacity to assist.
- Politicians are misusing aid to get votes. Even reporting a disease can become a political issue.
- Funding is readily available after disasters but little for preventing disasters
- Unsolicited and inappropriate relief.
- Recent research findings demonstrate the marginal role played by relief food distribution.
- Relief in the form of food-for-work (preferably cash-for-work) that can be geared up or scaled down is preferable to piecemeal relief actions. It is difficult and takes time but there is no alternative.
- The last people to get information are the people themselves.

### **12.1 *Inappropriate technology and assistance***

The following are some examples of inappropriate technology and assistance in Africa.

- Africa needs technical assistance but not the sort that tries to make it leap forward to practices its farmers can neither sustain nor afford. It needs assistance to make the best of its own material and intellectual resources.
- During a disaster some families need aid, but others need credit.
- Inappropriate assistance can cause more harm than good.
- Drought resistant crops were introduced. However, the income from these crops was less than that of commercial varieties. The introduction was not successful.
- An exotic breed of cattle was introduced in a semiarid area as a substitute for the indigenous cattle. Controlled experiments had shown that they are more efficient in converting fodder into meat. The substitution of these cattle was unsuccessful as they were susceptible to African cattle diseases to which the indigenous cattle were immune.
- Groundwater abstraction costs in the sandy interior of Southern Africa are very high. A plant was installed to generate methane gas from cattle manure to be used as a fuel for pumping water. The collection of this manure deprived the natural grazing of a source of nutrients. Now donkeys are used to operate pumps using the two thousand year old Archimedes screw principle.

### 13. DROUGHT MITIGATION MEASURES IN RURAL AREAS

In general, the objectives of any State are to provide a long-term shelter within which its citizens can prosper. Where this shelter is endangered, the State is obliged to take action to preserve it. The objectives of the individuals within the State are firstly to survive and secondly to prosper within the national shelter. The objectives of the State as well as its citizens are accommodated in most developed countries, but not in many developing countries where the long-term objectives of the State conflict with the short-term objectives of large communities.

It is clearly impossible for the State to accept responsibility for every disaster that may befall its individual citizens. It is equally clear that the State has responsibilities for implementing disaster mitigation measures for larger, highly vulnerable communities. Actions required at national level should consist of several phases.

- **Increase the resilience of vulnerable communities.** The difficult issue of drawing the line between helping the people to help themselves and making the people dependent on the State for the rest of their lives is well documented. The assistance should be such that it provides assistance in a manner that does not encourage long-term dependence on the State.
- **Implement disaster awareness programmes.** This is both the cheapest and the most effective method of disaster mitigation.
- **Operate warning systems.** The more accurate the warning and the earlier that it can be provided, the greater its disaster reduction potential.
- **Provide rehabilitation measures during and after a disaster.** This is the 'biscuits and blankets' action that is efficiently carried out in most countries. NGOs are often the main contributors to these measures.
- **Developing alternative livelihood systems in areas prone to desertification.**

#### 13.1 *Food security*

Food insecurity lies at the very heart of vulnerability to the effects of severe droughts. It is also the most difficult aspect of vulnerability reduction to implement.

- In Africa women are responsible for tilling the fields, drawing water, and caring for the sick. During a drought there is more disease and sickness, reduced availability of water and fuel. Pregnant and lactating women need more nutrients, and are more vulnerable. More than 50% of the children are ordinarily malnourished. This is worse during a drought.
- There are fewer meals and people start eating seeds for the next season's crops. Distress sales cause a lowering of prices, while restocking has to take place at higher prices.
- The underlying reasons for food insecurity in non-acute periods are responsible for increased household vulnerability in times of emergency.
- Despite the drought resilience of small grains, increases in areas planted with drought-resilient crops are less than expected. There has been little shift to more drought resilient crops.

- There is growing pressure to identify and encourage livelihood practices that are more likely to sustain food security in high risk areas and discourage practices that enhance the risk. This places reduction of risk at the centre of development planning.
- Innovative ways of combining attitude change and capacity-building in vulnerable areas should be identified and encouraged.
- Innovative strategies to protect food insecurities in times of stress that augment and reinforce risk-averse agriculture should be explored.
- Subsidise access to drought-tolerant seed and encourage greater crop diversification
- Reduce the need for large-scale food relief.
- Initiate ongoing employment projects that can be readily scaled up in times of stress, particularly those that have lasting effects on the environment and sustainable agriculture.
- Protect the environment.
- Exercise care with 'safety nets' as even moderate adverse weather events can have severe impacts on resource-poor families if other forms of income support are withdrawn or are not accessible.

Development gains in at-risk communities could be quickly undermined by poorly managed responses to climate and rainfall variability. Development planning must therefore ensure that the development inputs that reduce household vulnerability to external shocks must themselves be sustainable during times of increased stress.

### **13.2 Water security**

The target in South Africa is to bring at least 25 litres of clean water per person per day to the majority of the people at a walking distance of not more than 200 metres from their homes. There has been very good progress towards achieving this objective

- The demand for water in many countries of the world will soon exceed available water resources. The frequency and magnitude of the shortages will increase as the demand increases, particularly in semiarid regions where river flow is ephemeral and highly variable.
- In situations where average availability of water per capita is low, even slight variations can render whole communities unable to cope and create potential disaster conditions.
- As the demand for water increases with increasing population, the position is reached where even in good years there will be insufficient water to meet the demands. The modern tendency is to institute demand management to restrict wasteful usage rather than construct more storage dams to meet the rising demand.
- The effect of proper and equitable sharing of international waters is to assist in avoiding disaster conditions in neighbouring states and to avoid the inevitable social, economic and political repercussions of conflicts.
- A disaster management plan in relation to water under conditions of progressive scarcity should have a clear and unambiguous process of progressive declaration; how compliance monitoring and enforcement will be achieved and by whom; what institutions will be involved and what human and material resources will be available.

- Difficult and far-reaching decisions need to be made during times of plenty to be able to manage during times of scarcity. Political foresight and will are required to make these decisions.
- The impact of drought on rural water supply systems is exacerbated by underdevelopment and poor maintenance of existing water supply systems.

### **13.3 *Employment security***

Recurrent droughts lead to loss of employment and increased dependence on the State. Public works programmes are a more effective means for maintaining community welfare than food or financial handouts.

### **13.4 *Health security***

Every disaster has serious implications on public health. Disasters such as drought, famine, floods, refugees, displaced persons and epidemics which affect the health and quality of life of large and poor communities, are more closely associated with African countries than with any other regions.

- More people are killed by disease after floods than directly by floods
- In the countries of Africa, various communicable diseases such as cholera, meningitis, haemorrhagic fever, and water-related diseases follow droughts and floods.
- Since 1982 Africa has reported the highest incidence rate of cholera in the world. In 1994 cholera was present in more countries in Africa than ever before, with 28 countries reporting 162 000 cases.
- There has also been an increase in emerging and re-emerging infectious diseases due to an increase in population movement after disasters.
- Cross-border surveillance and epidemic disease prevention and control remain weak.
- In Africa AIDS has become the major natural disaster of modern times. In large parts of Southern Africa the death rate has exceeded the birth rate for the first time in history. It is anticipated that the average life expectancy will decrease instead of increasing in the coming decades.

## **14. Hazard warning**

Early warnings can significantly reduce the impacts of floods and droughts. Meteorological forecasts have increased in accuracy during the Decade, principally as a result of remote sensing from satellites and mathematical modelling. However, inaccurate long range forecasts can cause loss of confidence in the forecasting methods.

- There are several tools for anticipating drought, including weather forecasting, modelling soil moisture levels and remote sensing. Those who prepare and issue warnings should be familiar with the communities to whom they are issued and the possibilities of these communities to take effective action.
- The response to warnings is directly influenced by the extent to which prospective recipients have knowledge and understanding of the hazardous events concerned, the timeliness, accuracy and form of the warnings issued, the action required and the confidence of the affected people in the information to which they are exposed.

- Certain key information elements include detecting, evaluating and predicting a hazard; constructing a forecasting or warning message; spreading the warning message; and creating effective preparedness and mitigation responses.

#### **14.1 Frequency, variability and severity**

The frequency, variability and severity of climatic extremes all increase with decrease in average annual rainfall i.e. with increase in aridity. Generally the greater the aridity of a region, the greater the duration and severity of periods of departures from the average conditions. It is therefore incorrect to maintain that a low rainfall region is necessarily drought prone.

There is growing global evidence that shows that there has been a general increase in climatic variability (floods as well as droughts) in recent years. This has been variously ascribed to either human or natural climate change, or long range natural periodicity. Whatever the cause, this tendency of a worsening situation should be taken into account in national plans.

#### **14.2 Remote technology**

The lack of technological expertise, experience and financial resources for operating warning systems in developing countries can be partly overcome by interpreting remotely sensed data in countries that have these resources. The results can be transmitted to the countries that need it. This requires a co-operative effort if it is to be successful.

### **15. Vulnerability warning**

Advances in satellite communication technologies enable early warning systems to provide more reliable monitoring of vegetation cover. Agro-meteorological and satellite based data for monitoring food crop conditions and drought detection are extensively used by the early warning systems. The principal objectives are to continuously monitor food supply and demand conditions, identify countries and regions where food shortages are imminent and assess possible emergency food requirements. Substantial progress has also been made in establishing national early warning systems in many developing countries. However, early warning is often not well integrated with decision-making and response mechanisms to hazards.

Special attention should be focused on pre-famine indicators that give the earliest possible warning that there is a food supply problem on the horizon. Changes in local market prices of basic foodstuffs should be closely monitored in countries most prone to food emergencies. Additional warning indicators are cereals stocks, market arrivals, labour wages, cattle prices, and slaughter rates. Other indicators could include queues at food shops, population movements, cases of malnutrition and starvation related deaths, warning of the descent into a disaster situation.

#### **15.1 Information required**

An alternative approach is to focus on how people feed themselves during a drought rather than how they failed to do so. Key aspects are the tracking of livelihood changes over time and also the tracking of crisis indicators during periods of stress. Such a system usually tries to link relief and development before the onset of the crisis.

- Crop, rainfall and other physical data are not the only constituents of an early warning system. Such data may be essential for a forecast but do not identify victims of

potential hazards. Other indicators that may be used to mitigate a disaster include nutritional indicators, nutritional and health-related surveillance systems and other welfare indicators including information on employment.

- As a result of this broad approach the information obtained should contribute to the assessment and targeting of appropriate interventions to reduce vulnerability.
- With greater clarity on what constitutes a disaster, there will be greater clarity on the appropriate response needed. The response can become more automatic, more part of the system, rather than crisis management activity.
- Information obtained through an early warning system should be tied to broader welfare and other measures.
- There is an urgent need for the establishment of natural and social databases. These are an essential requirement for effective monitoring of changes in both natural conditions and vulnerability.
- It is also essential that those at 'grass-roots' level are incorporated into the creation of an early warning system. Communities also know who is most vulnerable. Existing development forums in rural areas could be asked to collect and monitor early warning data required for their area.
- Financial accounting of hazard management and early warning system should be ensured at all levels

### **15.2 Constraints to establishing an early warning system**

- An effective early warning system is impossible if adequately trained staff and finance are not available.
- The aim should be to begin as soon as possible with a manageable early warning system, but with the vision and commitment to move towards a decentralised and comprehensive system.
- The success of an early warning system will depend on whether the aims of the early warning system are clear from the outset. The collection and application of a wide spectrum of information is essential.
- The scope of the early warning system should be such that it can be beneficially used for routine observations in order for it to survive.

## **16. Socio-economic risk reduction methods**

There are at least two strategies for managing drought risks in Africa. The first is to maximise the gains, while the second is to minimize the losses.

The first is the preferred option for less vulnerable areas with higher production potentials. The strategy is to maximise the value of production in normal and good rainfall years, while minimising the set-backs in bad years. The idea is that gains from a higher value strategy will outweigh the losses, which themselves will be reduced by on- and off-farm development. It is an outward-oriented drought management strategy and it is essential if small farmers are to escape from the rural poverty trap.

The second strategy is more defensive and conservative. It is the preferred option for the very marginal and vulnerable areas. It involves an emphasis on survival mechanisms such as the use of drought tolerant crops for domestic and local consumption. The emphasis is on

survival in a hostile environment rather than for income generation. This should not be seen as a permanent solution.

Risks must be managed in such a way by the State and the subsistence farmers that a route is opened that leads not only away from vulnerability to drought, but away from poverty as well.

### ***16.1 Accommodating climate variability***

The basic objective at all levels from the individual citizen through to the nation as a whole is an increasing, or at least a constant level of prosperity in the face of climatic variability. This is achieved by the provision of storage of essential commodities in times of plenty for use in times of scarcity.

- **Storage of water** is achieved by building storage dams or utilising natural storage in groundwater. Many countries have sophisticated and effective programmes for the provision of water to all those who need it. Storage dams are generally designed to provide a constant supply during prolonged droughts – usually three to five years of deficient flow. They are therefore not sensitive to droughts of a shorter duration.
- **Storage of crops** is the traditional method adopted by crop farmers since the beginning of civilisation, an example being the biblical seven-year drought in Egypt. Storage of crops was traditionally at family or small community level, but has now spread to national and international level. If the storage is provided at higher than small community level, payments have to be made to the supplier. This involves the capability to pay, which in turn involves the storage of wealth.
- **Storage of wealth** is a more sophisticated form of storage, but requires the generation of wealth during times of plenty for use in times of scarcity. The capacity to store wealth is directly related to the ability to generate wealth. It involves various degrees of wealth management which is very difficult for individuals in lower income groups to achieve.
- **Risk assessment.** All methods of storage, be they of water, crops or wealth, require an assessment of the risks of the undesirable events occurring. This in turn requires an assessment of the probable magnitude and duration of the worst case that can reasonably be expected to occur within a specified period of time. For example once in fifty years on average in the case of national water supplies.
- **Insurance.** Risks can be reduced by the purchase of insurance cover, which is another form of wealth management. This is only available to the more affluent members of society unless State aided insurance is available.
- **Forecasting.** Risks can also be reduced if the possibility of the adverse event occurring in the immediate future can be predicted with a reasonable degree of accuracy.

### ***16.2 Social impact studies and public participation***

Social impact studies are gaining increasing importance in project planning and execution.

- The planning should be broken down into separate phases. These are social impact studies versus environmental impact studies, and a sustainable society versus a sustainable environment. Note that these are not commensurate objectives in that the full achievement of one objective can only be achieved at the expense of the other.

Decisions will have to be made on the extent to which one objective will have to be sacrificed to achieve the other. The role of the analyst is to present a range of scenarios and their benefits and consequences from which the decision maker can select the most appropriate compromise solution.

- Social impact studies are designed to meet three objectives. (1) To understand the social environment in which the development will occur, and estimate positive and negative effects of the development. (2) In the case of positive effects to formulate proposals on how these can be improved and optimized. (3) For negative effects to recommend ameliorative measures and formulate mitigation plans. (4) To continually monitor and review any changes in direction and action.
- Public involvement is essential but complete inclusivity and consensus are unlikely to be achieved.



## 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 21<sup>st</sup> 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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