CHAPTER 3

Mitigation activities

The compelling challenge of the Decade is to undertake activities that reduce the impact of natural disasters in terms of human suffering and the destruction of public and private property. After reviewing the status of current mitigation efforts in South Africa, a statement of the salient issues surrounding mitigation initiatives is presented.

3.1 Alternative mitigation actions

Mitigation actions can be directed at one or more of the following:

Reduction of the hazard

Flood hazards can be reduced by building a dam to reduce flood peaks. Drought hazards can be reduced by building a dam to store water for use during dry periods. However, the construction of a dam for either or both purposes will introduce another potential hazard should the dam fail during a flood. A good example is the Vaal Dam, which is the key structure in the water supply to the Witwatersrand metropolitan region. This dam also has limited capability to reduce flood damage in Vereeniging, close downstream. Should the dam fail during a flood this would have catastrophic consequences in Vereeniging, and would seriously disrupt water supplies to the Pretoria - Witwatersrand area. Stringent dam safety standards ensure that the likelihood of failure of the dam is very small, however.

Reduction of vulnerability

The vulnerability of communities to floods can be reduced by legislative means such as prohibiting residential occupation in flood prone areas. The reduction of vulnerability to droughts is much more difficult, as the dominant vulnerability is due to poverty. The upliftment of the poor will be a long process, and these communities will remain vulnerable for Decades to come.

3.2 Data bases

Data bases are essential for the quantification of risks and thus the efficient design of risk reduction methods.

South Africa has good meteorological and river flow data bases, extending back to the beginning of the century in some cases. These are essential for the determination of the probability of occurrence of severe, widespread floods and droughts.

Permanent inventories, registers and data bases for agriculture, nutrition and household food security are being developed, but much more needs to be done, including the collection, accessibility and dissemination of more data relating to the social and agricultural impacts and consequences of droughts.

3.3 Droughts

3.3.1 Status of mitigation strategies and measures in respect of droughts

Department of Agriculture

Plans are in place or being developed for the following:

- The development and maintenance of drought relief-related institutional capacity.
- Education and training to promote self-reliance and sustainability in respect of agricultural development and nutrition.
- Two agricultural institutes are involved in drought risk modelling.

☞ Monthly satellite imagery is used to monitor plant growth throughout the country

Department of Water Affairs and Forestry

Water in the semi-arid Southern Africa is a scarce resource and several major river systems have already been fully exploited. The availability of water is restricted to varying degrees at different times and places by weather conditions, by international, technical and financial considerations and by affordability.

The Department of Water Affairs and Forestry is responsible for the development and management of the water resources of South Africa on a national scale. The essence of water resource development is the construction and management of the water supply systems in such a way that essential water supplies can be maintained no matter how severe a drought may be.

The national water management strategy is aimed at the provision of adequate quantities and quality of water for all groups of users at an acceptable cost, and assurance of supply.

The strategy will be implemented in consultation with all user groups. An active partnership with users is fundamental to the strategy in which effective centralised planning provides a framework within which local bodies can deal with local matters. The reactive aspects of the strategy enable the Department to identify alternative compromises so as to best meet demands for economic growth, while the anticipatory aspects seek to influence developments ahead of needs.

3.3.2 National drought management strategy

A national drought management strategy is being drawn up in a participatory manner, drawing upon the experience of the South African National Consultative Forum on Drought. This forum, representing civil society, government, non-government organisations and political parties was formed to address the 1990/92 drought crisis. The underlying causes of vulnerability lay in years of neglect and underdevelopment, especially in rural areas. As a consequence the emerging drought management strategy is underpinned by a long term development approach to address the infra-structural needs of communities and strengthen their coping mechanisms.

The national drought management strategy has the following components.

Overall mission

The minimisation of the detrimental effects of drought on the population, economy and environment of Southern Africa.

Objectives of the operational strategy:

☞ To create **pre-active** structures for the management of endemic drought conditions.

☞ To create and maintain a physical and manpower **infrastructure** for drought relief.

☞ To facilitate **community involvement**.

Agricultural mission

To enable the agricultural and rural communities to play their rightful role in the national economy by minimising their vulnerability to drought.

Objectives of the operational strategy for agriculture:

☞ To establish **permanent structures** for drought conditions.

☞ To ensure an adequate **infrastructure** for effective drought relief.

☞ To reduce the **vulnerability** of rural communities to the consequences of droughts.

☞ General **acceptance** of the drought management strategy for the agricultural sector.

☞ To establish **sustainable agricultural systems** (optimum resource utilisation).

☞ To promote **communication** between all role players.

Water provision mission

To ensure that during drought conditions all communities receive at least the minimum water requirements for human use.

Objectives of the operational strategy for water provision:

- ☞ To provide aid in developing areas in order to restrict the effect of endemic drought conditions.
- ☞ To implement a co-ordinated approach for water provision in South Africa at all levels from the national level to the individual water user.
- ☞ To establish an accessible pool of knowledge and experience on drought relief for all agencies involved
- ☞ To promote effective communication and a spirit of co-operation among all concerned parties.
- ☞ To provide prompt relief during severe drought conditions.
- ☞ To initiate co-ordination of drought management strategies on the subcontinent.

Nutrition and household food security mission

Within the framework of primary health care, to restrict the immediate impacts of drought conditions on the basic needs of humans, with emphasis on household food security and nutrition.

Objectives of the operational strategy for nutrition and household food security:

- ☞ To reduce the vulnerability of developing communities to the impact of drought conditions by promoting self-reliance in respect of their basic human needs.
- ☞ To establish an integrated information system for pre-active identification of drought impacts.
- ☞ To activate existing infrastructures for immediate relief actions.
- ☞ To make all necessary resources and support systems available for relief actions.
- ☞ To monitor the efficiency of relief actions on a continuous basis.
- ☞ To plan relief actions in South Africa and co-ordinate them with the relief actions of neighbouring states on the subcontinent and to monitor the overall situation continuously on the subcontinent and establish procedures for joint interstate relief operations.

3.3.3 Awareness and training

The Department of Water Affairs and Forestry started training programmes for the maintenance of water-related infrastructure that was provided during the recent drought.

3. 4 Floods

3.4.1 Operation of multipurpose dams

The aim of the Department of Water Affairs and Forestry is to operate multi-purpose dams so as to realise the maximum value for the country as a whole. Where dams have a flood peak attenuation capability, this requires the optimisation of the conflicting requirements of a sustained water supply and flood risk reduction. In most cases the adverse consequences of not being able to meet water requirements during droughts are significantly greater than the flood risk reduction benefits.

The Department is currently expanding its real time monitoring system at gauging stations and dams in the Vaal-Orange River system with a view to optimising the operation of the country's largest dams and thereby reducing flood risks and providing flood warnings for downstream areas.

3.4.2 National flood management policy

In 1989, after the severe and widespread floods of the previous two years, the Department appointed a consortium of consulting engineers to prepare a draft revised National Flood Management Policy.

The salient issues which will be addressed in the National Flood Management Policy now being formulated are.

- ☞ Assignment of responsibilities
- ☞ Improved flood preparedness
- ☞ Occupation of floodplains
- ☞ Role of structural flood mitigation measures
- ☞ Publication of information on flood-prone areas

☞ Flood warnings

Extensive discussions were held with many local authorities and other organisations. Unfortunately, the severe floods of 1987/88 were followed by an even more severe drought four years later, and the development of the flood management policy lost momentum. It is hoped that the draft policy will be circulated for comment within the next few months.

3.5 Civil Protection Service

The current International Civil Protection Organisation was developed from an earlier body established in 1931.

It is based on international legal principles established by the Geneva Convention held in 1949, and is well established in most countries abroad. Civil Protection in South Africa has a chequered history. It was first established during the Second World War and was the responsibility of several government departments. It was called Civil Defence, and was subsequently renamed Civil Protection. It is presently under the Department of Local Government and National Housing

Civil Protection, also known as Emergency and Disaster Management in South Africa, is considered as a service to the community by the community, geared towards mitigation preparedness, response and recovery to natural and man-made disasters.

3.5.1 Emergency preparedness and relief

Civil protection structures in South Africa

At national level the responsible minister may declare a state of disaster in terms of the Civil Protection Act, thus activating Civil Protection. The minister is advised by the National Civil Protection Committee on civil protection matters.

The Department of Local Government and Natio-nal Housing is responsible for the general administration and execution of the civil protection policy and fulfils a planning, monitoring and co-ordinating role at national level.

In March 1993 a strategic session was held to discuss the future of Civil Protection in South Africa Participants were from all tiers of government and a wide spectrum of organisations. These organisations included local government organisations, non-statutory organisations such as civics organisations, and non-governmental bodies such as the South African Disaster Relief Agency.

Although the discussions were fruitful, no consensus could be reached as to what the future role and status of Civil Protection should be. However, certain principles that were agreed upon emphasised that Civil Protection -

☞ should address the needs of all communities in South Africa;

☞ should be managed by all tiers of government;

☞ should be more visible in the entire South African society;

☞ should involve all communities in a meaningful way;

☞ should be flexible and adaptable;

☞ should fit the local conditions, whether in a small community or a metropolitan community; and

☞ should be affordable.

It is obvious that Civil Protection will only be successful where there is trust and active participation by the community that it serves.

The roles of the various tiers of government will have to be addressed. It is possible that the roles of the central government and the provincial administrations will be essentially those of establishing policies and providing of funds, and that the implementation will be the responsibility of the local authorities and communities.

Care must be taken to ensure that there are no conflicts of interest between the authority which activates civil protection services and the line functions of other Government departments which also have responsibilities during disasters.

It is expected that many of the outstanding problems will be resolved in the near future.

3.6 Other mitigation activities

3.6.1 Land use planning and building codes

Land use planning such as the prohibition of residential development in flood-prone areas is an effective means of reducing flood risks in these areas. In terms of the Water Act, the 1 in 20-year flood line has to be shown on the layout plans for new township development. It is the responsibility of the local authority to decide on the nature of development in these areas.

As far as agricultural land is concerned, regulations have been promulgated which control agricultural development on floodplains.

These restrictions are efficient methods of reducing risks in developed communities, but are less effective in uncontrolled informal settlements. The same applies to building codes, which are strictly enforced in areas where development is controlled, but are unenforceable in unplanned settlement areas, thereby exposing the occupants to higher levels of risk during floods and other hazards.

It is estimated that there are some 100 000 people in informal settlements below the levels reached by previous floods. The densest concentration of people at risk during floods is the 6 000 people living below the 50-year floodline along the two-kilometre stretch of the Jukskei River in Alexandra near Johannesburg.

3.6.2 Water management

All major water supply projects in developed and urban areas of South Africa are specifically designed and managed to survive the most severe droughts that are likely to occur within the economic lives of the projects. The risks of life-threatening shortages of water in these areas are negligibly small, although the economic risks may be appreciable.

In contrast, rural communities, resettlement areas and informal settlements, lacking infrastructure or adequate water and sanitation service, are at much higher risk during droughts. These communities have to rely on water from springs, groundwater or the perennial flows of local streams or rivers which when they fail suddenly and completely, result in agricultural losses where the water is used for irrigation, stock losses where the water is used for stock watering and health problems where the water is used for human consumption. The costs of providing water from alternative sources are high.

3.6.3 Preparedness, planning, awareness and training

Disaster management training in South Africa is in its infancy and is based on the United Nations Disaster Management Training Programme (UN-DMTP). The UN-DMTP was introduced to South Africa in 1992 with the assistance of the University of Wisconsin's Disaster Management Centre and the Cranfield University's Disaster Preparedness Centre. A number of workshops have been conducted and the local training capacity has gained momentum with the active participation of a major tertiary distance learning institution, the Technikon Southern Africa. Presently 320 future local government officials are receiving training in disaster management as part of a broad spectrum public and development management training programme, with a further 400 candidates commencing training after July, 1994.

3.7 Issues

3.7.1 Research challenges (science, technology, social)

Droughts

Prediction and warning systems must be designed to provide all sectors of the population with information on the location, severity, onset and duration of a severe drought so that they can take actions to lessen the expected effects.

Most important is the urgent need, particularly in the Southern Hemisphere, to get substantially more meteorological observations.

At present, long-range forecasting is a science in its infancy. It is self-evident that research projects intended to increase our understanding of the seasonal variations in rainfall and to develop long-range forecasting techniques are of cardinal importance Various research projects are being undertaken in this regard by the South African Weather Bureau (Department of Environment Affairs) and the Universities of Pretoria, the Witwatersrand and Cape Town

The following recommended actions are under review:

- A high priority must be placed on the further development and implementation of the concepts of the Global Climate Observing System in Southern Africa and the Southern oceans.

- A thorough analysis of the impacts of current climate variability on the South African environment must be carried out before impacts caused by possible climate change are considered.

- Equally important is the effective data collection of poverty levels of communities, especially in vulnerable rural areas, which up to the present have been lacking or at best very scanty. On-going nutrition surveillance systems need to be established which will give early warning information on vulnerable communities and useful information for the planning and implementation of relief measures and means of evaluating the effectiveness of reaching the poorest and most adversely affected households.

Floods

Comprehensive flood studies have been undertaken during the past five years.

The first component of the studies was the determination of the accuracy of existing methods of flood frequency analysis. The analysis showed that there were unacceptably large discrepancies in the results of the methods

The following stage was an attempt to determine the probability of failure of one or more structures along a route based on theoretical considerations alone. This was a desk study that was necessary to establish the line that the rest of the research should take. As expected, this was an intractable analytical problem and further research will have to rely on visual examination of graphically presented data.

The Weather Bureau's district rainfall data were reprocessed into chronological order for all districts. Computer programs were written to present this information graphically on the computer screen and to prepare colour-coded maps. This information proved invaluable in identifying the location, magnitude and areal distribution of severe flood-producing rainfall. It also demonstrated conclusively that extreme floods were the result of wide-area storm events with areas much larger than the individual river basins.

The district rainfall data were also used to determine whether there were significant correlations between severe rainfall in one district and that in adjacent districts. Although the results were less conclusive, they nevertheless provided some new insights into the location of regions that are more prone to severe floods than others.

At this stage there was very clear evidence that large-area, severe flood-producing rainfall was far more frequent than had previously been realised and that there appeared to be some regional grouping.

The next step was to analyse the rainfall on a daily basis rather than a monthly basis to see if more insight could be gained into the relative severity of the rainfall in each of the larger regions. This analysis provided a greater quantitative assessment than was possible using district rainfall. It confirmed the existence of regions that were more flood prone than others, and that the Transvaal Highveld is less prone to floods than other regions in the interior of South Africa

The final aspect was the identification of the meteorological conditions that give rise to flood-producing rainfall and the preferred location of these systems.

Conclusions reached

It was concluded that the necessity for further research would depend on the value that is placed on the need for more sophisticated analytical methods for the determination of design standards for structures across rivers on strategic communication routes.

It was also concluded that the application of the information available could lead to a more cost-efficient determination of the standards required for specific routes and that the information should be published in the form of guidelines for practical applications.

The remaining weak points in determining the economic optimum route location and design standards were:

- The difficulty in quantifying the risk of functional failure of a structure.

- Inadequate knowledge of the links between flood magnitude and the associated velocity fields in a river in flood.

- Inadequate knowledge of the short and long-term effects of the interaction between floods, structures, and river channel morphology.

Widespread, severe floods

The major conclusions reached were:

- No discernible regional characteristics were observed despite wide climatic and topographic ranges - from winter rainfall regions to summer rainfall regions, from subtropical climate to desert climate, from coastal regions to the high interior plateau.

- No discernible differences in the rainfall depth/ area characteristics were observed despite widely different severe flood-producing weather systems.

However -

- clearly discernible relationships were apparent between the severity and geographical extent of widespread flood-producing rainfall from local to regional to subcontinental to global scales;

- clearly discernible non-random grouping of years of above-average and below- average river flow was observed; and

- clearly discernible near-20-year periodicity of annual flows was determined, with a linkage with the double sunspot cycle and a possible forecasting capability.

3.7.2 Acceptable risks

The degree of acceptability of risks by a community will depend on a number of factors. For example, as a result of recent minor floods most of the 6 000 people living below the flood lines in Alexandra are aware of the flood risk. The only alternative available to them to reduce the risk is to move elsewhere. However, years of enforced political policies and extreme poverty have denied them this option. Alexandra is one of the few townships located close to job opportunities and they perceive this benefit as outweighing the risks associated with floods.

The acceptability of risk does not rest only with the individuals at risk, but also with the larger community. For example, a local authority could take the view that as the occupants freely elected to occupy the flood-prone area, the wider community should not have to bear the costs of ameliorative measures. An alternative argument for taking no action is that adequate housing close to employment opportunities will eventually be provided, so no immediate action need be taken. However, the no action scenario cannot be defended on humanitarian or socio-political grounds. Other means of reducing flood- associated risks have to be sought. These would include the frequent presentation of active flood awareness programmes and the development of an efficient flood warning system. The feasibility and costs of implementing these measures will increase as population pressures require the maximum utilisation of land subject to flood-associated risks.

A similar argument applies to impoverished rural communities exposed to drought risks. The ultimate solution is the reduction of poverty, but until this is achieved, short-term ameliorative measures will have to be implemented.

3.7.3 Public health

Disasters often give rise to health problems, particularly diseases associated with the absence or overabundance of water. Waterborne diseases are a major threat in hot climates such as are experienced in parts of South Africa.

3.7 4 Cost effectiveness

The cost effectiveness of disaster mitigation measures will depend on the nature of the risk that is reduced and the number of people who would derive benefit from the proposed measures. A recent example in South Africa is the town of Ladysmith, which is subject to frequent flooding. In January 1994 a flood occurred which was the largest flood experienced since recording began in 1885. No lives were lost, but the economic damage was high and some 400 families had to be evacuated during the flood.

It was decided to construct a dam to reduce the flood risks. The dam will cost several million rand and this is economically justified considering the alternative relocation costs. However, the same amount of money could be more effectively used to develop flood warning systems which could potentially save

hundreds of lives and beneficially serve tens of thousands of occupants of flood-prone areas elsewhere in South Africa.

3.7.5 Responsibilities / Enforcement

Each Government department is responsible for the execution of functions applicable to its field of operation, but co-ordination and co-operation between the various departments occurs on an *ad-hoc* basis.

3.7.6 Mitigation plans

The major mitigation plans envisioned in South Africa are the national flood and drought management proposals that are described elsewhere in this report.

The efforts of the National Rural Development Forum (previously the National Consultative Forum on Drought) are also ensuring grass roots participation in hazard management.

CHAPTER 4

Warning

Warning systems play a prominent role in strategies to protect life and property. After presenting an overview of the existing systems, the capacity and limitations of these systems are considered and evaluated.

4.1 Systems for observing, forecasting and warning

4.1.1 Severe weather conditions

The South African Weather Bureau is responsible for issuing warnings of severe weather to the general public of South Africa and to mariners, aviators, the farming community, foresters, water resources managers and electricity utilities.

General public

A Weather Warning Service has been implemented for providing predictions of extreme weather conditions, such as widespread rains and cold spells, which might affect public activity seriously. In addition, a Weather Watch Service for the provision of short- term warnings and alerts has been introduced in some of the major metropolitan areas. This service aims to provide warnings of shorter-term phenomena, such as severe hail, heavy rain (local flooding) and strong winds, which might lead to structural damage to property.

Shipping

South Africa is a signatory to the SOLAS (Safety Of Life At Sea) Convention and the Weather Bureau is responsible for issuing warnings of severe weather in the METAREA VII area. Warnings are issued for expected gale force winds, high seas, heavy swells and tropical cyclones. The Tropical Cyclone Warning Centre of Météo Réunion supplies an input to these forecasts for the eastern sector of METAREA VII by providing information on expected gales and tropical cyclone development and movement. Forecasts are disseminated by radio and satellite - the latter in compliance with the requirements of the Global Maritime Distress and Safety System (GMDSS). In addition, forecasts of severe weather for METAREA VIII south of the equator are also routed to Coast Earth Stations by the Weather Bureau on behalf of the Indian Government for GMDSS dissemination.

The Commission for Marine Meteorology has recommended the implementation, on a trial basis, of a Marine Pollution Emergency Response Support System to provide, in a globally co-ordinated manner through WMO, meteorological and oceanographic support for the combating of oil spills. The Weather Bureau, in association with other South African organisations, will supply the required support for marine pollution emergency response operations on the high seas for METAREA VII.

Aviation

Routine aviation weather forecasts are prepared for aviators and airlines. Forecasts of severe weather are routinely added to the forecasts.

Farmers and foresters

Forecasts of expected severe weather, focusing particularly on a combination of extreme temperature change, strong winds and heavy precipitation, are routinely issued for the benefit of stock farmers, e.g. angora goat farmers.

During the fire season (June to August/September) forecasts of extreme weather conditions favourable for the development of veld and forest fires are issued routinely to organisations such as the Natal Midlands Fire Protection Association and the Lowveld Fire Association and to the general public.

Water resource managers

Forecasts of the probability of heavy rainfall over large regions are provided for the Department of Water Affairs and Forestry for the purposes of regulating water resources in major dams. In addition this information serves as an input to a Flood Advisory System developed by the University of Pretoria for the Department of Water Affairs and Forestry.

Droughts

The occurrence of the 1991/92 drought once again highlighted the importance of continuous monitoring to provide early warnings of impending water shortages and the vulnerability of communities so that potential impacts can be assessed and response options developed, targeted and implemented in a timely manner.

Long-term prediction systems must also be developed.

4.2 Droughts

Climatic early warning and monitoring systems are being developed relating to water supply, agriculture, nutrition and household food security. These include the use of monthly satellite imagery to monitor plant growth throughout the country.

Expected population increases, especially in lower income brackets, and the increased number of subsistence and small scale farmers will increase the exposure to droughts and greater emphasis will have to be placed on drought warning systems and contingency plans in agriculture.

4.2.1 Drought warnings pertaining to agriculture

Actions include the collection of records to compare cumulative intensifying of drought with the long-term average of each specific area in order to:

- Warn producers and communities as well as government agencies of impending consequences.
- Distinguish between natural rainfall variability and severe droughts, the latter requiring assistance from the State.
- Establish when sufficient rains have been recorded to justify the termination of relief measures.

4.3 Floods

Effectiveness of flood warning systems

The effectiveness of a flood warning and evacuation system will depend on the following:

- The degree of awareness of the public exposed to flood hazards.
- The length of advance warning of imminent damaging floods.
- The accuracy of the warning. In general the earlier the advance warning, the less accurate it will be.
- The availability of plans demarcating areas susceptible to flooding.
- The availability of trained staff in the right position at the right time to provide information and assistance.
- An efficient communication system between the control centre and the staff in the field.

All of the above requirements can be met in well planned municipal areas. The risks are also lower in these areas because of engineered drainage systems and regulations that prohibit the residential occupation of flood-prone areas.

Where unplanned development takes place in flood-prone areas the risks of loss of life and possessions are much higher because of the following factors:

- The occupants are seldom aware of the risks that they face, particularly if they have recently moved into the area.
- No engineered drainage systems are installed and no restrictions on development can be enforced.
- Plans demarcating areas susceptible to flooding are seldom available.
- It is difficult to ensure that trained staff are in position at the commencement of the flood to provide information and assistance.

In these areas there is an even more urgent need to issue advance warnings as early as possible and as efficiently as possible.

Phased warnings

An efficient flood warning system will have three basic phases:

Phase 1

Flood forecast based on weather forecasts. This will provide a long warning but poor accuracy. The authorities should mobilise their staff, but no warnings should be issued to the public. The reason for this is that in many cases a flood will not eventuate and the public will lose faith in the system.

Phase 2

Flood forecast based on rainfall that has already fallen. This will provide a moderate warning period with moderate accuracy. Staff should be sent into the field and precautionary warnings of possible floods should be broadcast

Phase 3

Flood forecast based on observed floods in upstream rivers. High accuracy warnings are possible, but the warning times will be short. Warnings of imminent floods should be issued and evacuation procedures implemented.

Development of flood warning systems in South Africa

In 1989, after the severe widespread floods of the previous two years, the Department of Water Affairs initiated a project to prepare a draft revised National Flood Management Policy.

From information gained during discussions with many local authorities and other organisations, and also from literature studies it soon became clear that the establishment of flood warning systems was the most viable means of reducing the risk of loss of life during floods.

A multi-tiered flood warning communication system is proposed. At national level the system will consist of a computer based dissemination of near real time rainfall data and limited river flow data. These data will be downloaded and processed by the local and regional authorities responsible for flood protection. These systems will also be computer based and will include provision for adding locally observed data and will have limited flood routing and prediction capabilities.

The third tier of communication will be directed at serving communities that do not have access to electronic communication equipment. These flood warning systems will rely heavily on awareness programmes and local observation systems.

On the recommendation of the Department of Water Affairs, the Water Research Commission awarded the University of Pretoria a research contract on the *Proposed National Flood Advisory Service* the purpose of which was: *to collect, process and transfer weather forecasts, warnings of the possibility of heavy rain, details of rainfall during the previous 24 hours, and flood-related warnings and information to any registered user anywhere in South Africa who has access to a telephone and a desktop computer.*

The project was completed in May 1992 and was installed by the Department of Water Affairs on a trial basis in January 1993, but has not yet been implemented..

A further research contract was awarded by the Water Research Commission in 1993 for the development of computer programs for local flood warning systems. This research has been completed, but has not yet been implemented.

4.4 Other hazards

4.4.1 Geological

No seismological warning systems are in operation as the geological formations are stable and earthquakes and their associated destructive effects are rare. However, the Geological Survey maintains a routine seismological monitoring system. There is no volcanic activity in South Africa

4.4.2 Locust infestation

It is compulsory for farmers to report the hatching or presence of locusts immediately. This is a prerequisite for co-operation between farmers and the

government agencies responsible for controlling locust outbreaks. International co-operation is frequently required.

The movement of locust swarms is strongly affected by wind speed and direction. Forecasts of wind given by the Weather Bureau's forecasting services together with real time wind observations from automatic weather stations, contribute to rapid action by various locust control groups.

Locust population counts are undertaken two to three times a season to determine if the numbers are increasing or not. The Department of Agriculture is involved in planning a warning system.

4.5 Access to global, regional, national and local warning systems and broad dissemination of warnings

4.5.1 Meteorological

The South African Weather Bureau has direct access to regional warning systems concerned with tropical cyclones in the Southern Indian Ocean through the Cyclone Forecasting Centre in Reunion.

The Weather Bureau is participating actively in the international GMDSS, and is responsible for the dissemination of weather warnings for Area VII. The Weather Bureau also disseminates weather warnings for the southern part of AREA VIII as an interim measure.

4.5.2 Agriculture

Strategies to access early warning services in certain cases still have to be planned.

4.6 Issues

4.6.1 Dissemination / Communication

A critical aspect of all warning systems is the rapidity of dissemination, the accuracy of the information, and the effectiveness in communicating the information to the people at risk. There is still much to be done in this field in South Africa.

CHAPTER 5

International Co-operation

The status of international co-operative efforts to fulfil the Decade goals is reviewed, including co-operation with other National IDNDR Committees, projects implemented and assistance (technical, financial, training) provided for other countries. Also, issues such as the ability of national agencies to provide assistance for other countries as called for in the UN declaration are discussed.

5.1 Climate monitoring

The Weather Bureau is internationally linked with all meteorological services by means of the GTS and via various other international communications systems.

Similarly, climate data are still exchanged freely between weather services, although commercialisation of some services and the rising costs of satellite data and numerical products are threatening to create certain limitations to this freedom.

In terms of climate monitoring and the exchange of information concerning climatic trends, close contact is maintained with the following weather-related services:

Climate Analysis Centre
Washington, USA

NOAA/USDA Joint Agricultural Weather Facility
Washington, USA

National Climate Data Centre
Ashville, USA

Meteorological Office
Bracknell, UK

Food and Agricultural Organisation
Rome, Italy

Drought Monitoring Centre
Harare, Zimbabwe

Climate Network Africa (Publication)
Nairobi, Kenya

5.2 IDNDR

At present South Africa has no national plan to support the IDNDR because until now it has not been a member of IDNDR. However, this is receiving attention from the newly- formed South African committee of the IDNDR.

5.3 Issues

One of the major concerns in Africa is that in many cases the countries exposed to the greatest disaster-associated risks are those with the least ability to reduce those risks. They have neither the infrastructure, finances and expert knowledge, nor the trained manpower to tackle the problems.

Poverty is the root cause of the problem. There is a vicious circle of poverty and natural disasters that creates further impoverishment and makes the community more vulnerable to the next disaster.

In the past, expert advice from those who do not have experience and knowledge of the many conditions peculiar to the African region has on occasion aggravated the problem or created new problems. This is particularly true of the countries in sub-Saharan Africa. The solutions must come from within the countries themselves, helped by the experience of neighbouring countries with similar problems, and financial assistance from the more affluent overseas countries.

Financial assistance should be directed at finding solutions to the problems and not at treating the symptoms. For example, the financing of a water

supply scheme for a rural area in a semi-arid region may seem to be a worthwhile objective, but it may worsen the problem if the reason for impoverishment is overpopulation, overgrazing and the degradation of the natural environment to the extent that it can no longer support the community.

5.4 Availability of assistance to other countries in the field of natural disaster reduction

South Africa has much to offer to, and much to learn from other countries in sub-Saharan Africa that have similar climates and similar socio-economic conditions. South Africa has the technology, training facilities and hard-won experience in dealing with disaster related problems exacerbated by poverty, political disturbances (now past, it is to be hoped) and the unequal distribution of wealth. There is a great deal of experience that can be imparted through training courses and the exchange of views at specialist conferences in Southern Africa.

5.4.1 List of potential resources, scientific expertise, technology, etc

A pool of knowledge and experience on natural flood disasters, particularly on floods and droughts is available to neighbouring countries in Africa which do not have this information. For example annual short courses on a variety of water related topics including water resource development, rural water supplies, droughts, and flood risk reduction measures have been presented by the University of Pretoria for the past 20 years and have been attended by participants from Malawi, Zimbabwe, Mozambique, Swaziland, Lesotho, Botswana and Namibia.

5.4.2 Requirements for scientific expertise, technology, resources etc

The scientific expertise, experience and technology from other countries will always be welcome in South Africa, and we expect a meaningful exchange of information and expertise with other countries, especially those in the Southern African region. South Africa's sophisticated transport and communications network has already proved invaluable in the delivery of relief to Southern African countries during the past drought.

CHAPTER 6

Overall evaluation and future programme of IDNDR activities

The national goals for the Decade include comprehensive national assessments of risks from natural hazards, with these assessments taken into account in development plans; mitigation plans at national and/or local levels, involving long-term prevention and preparedness and community awareness; and ready access to global, regional, national and local warning systems and broad dissemination of warnings.

6.1 Goals and achievements

South Africa is in a state of political flux at the time of writing this report. It is inevitable that there will be changes in the goals, particularly as they affect the disadvantaged sectors of the community that are the most vulnerable to natural and other disasters.

6.2 National goals for the Decade

The following national goals are envisaged for the rest of the Decade:

Disaster relief, prevention and mitigation are primarily Government responsibilities. The impending change in South Africa's structures of governance, in combination with poverty, rapid urbanisation, high unemployment, and a high level of expectation on the part of the majority of the population for immediate delivery, will predispose South Africa to a period of crisis intervention that could last a decade or longer.

For South Africa to survive and move beyond this state, requires the existence of a developmental disaster management approach that includes both environmental and conservation issues. To facilitate such capability the following are necessary:

- A clear commitment to training and financing individuals capable of undertaking the different aspects of disaster management at local level.
- Setting out clear guidelines for co-operation and collaboration between government and non-government structures and a commitment by the Government to shoulder the greatest portion of the financial responsibility.
- Establishing the necessary legislative framework and guidelines at national level to ensure proper co-ordination between the elected structures and the military and security State apparatus.
- Eliminating the plethora of bureaucratic mechanisms that obstruct rapid response and engagement in such endeavours by the public at large. What is required is co-ordination between all spheres of government that is speedy, comprehensive and capable of producing results.
- Providing incentives, by mechanisms such as taxation through which the private sector can undertake social investment programmes that will assist in disaster relief.
- Any disaster relief effort should involve full community participation in the planning, needs assessment, monitoring and implementation phases.
- The lessons learnt from local communities in coping with hazards will be actively sought and included in hazard management.
- It is of vital importance that the government at national, regional and local authority levels use

the information at its disposal to feed into an early warning system that is accessible to the public.

- ☞ Disaster relief should serve all people, particularly the poor, vulnerable and defenceless.

To achieve these national goals, a national policy conference on disaster management will be held during the second week of October, 1994 to coincide with the International Day for Natural Disaster Reduction.

6.2.1 National assessment of risks

Part of finding appropriate solutions is to identify the greatest threat. South Africa has the expert technology and data bases required for accurately quantifying the frequency and magnitude of natural hazards.

The methodology and experience for quantifying the vulnerability of communities to these risks is less satisfactory.

6.2.2 Ready access to global and other warning systems

South Africa has a sophisticated international communication network and through it ready access to global warning systems. Regional warnings can readily be made available to other countries that do not have these facilities.

6.3 Present national plans for natural disaster reduction

The climatic extremes of the past Decade have given rise to two major national initiatives to reduce the impact of future droughts and floods. Nevertheless, much remains to be done. Membership of the IDNDR will give additional momentum to existing plans.

6.3.1 Droughts

The complexity of drought makes communication of information between different drought structures of the utmost importance. The Weather Bureau has two important functions in this regard. In terms of long range outlooks, it is, in conjunction with other research institutes, testing and developing predictive models and techniques It also maintains close links with international organisations, such as the Climate Analysis Centre, which issues global climate assessments and outlooks.

In the short term the Weather Bureau maintains a Climate Monitoring System (CLIMOS) which makes possible rapid identification of emerging weather related problems, such as drought or flood susceptible situations. Information and advice are disseminated to various co-ordinating centres.

6.3.2 Floods

The acceptance of the draft national flood management policy, together with the implementation of the national, regional and local flood warning systems already developed, will go a long way towards resolving the present unsatisfactory state of avoidable high risks of loss of life, loss of possessions, damage to personal property, damage to structures and the interruption of communications and services, and the resulting personal distress and social, political and economic problems.

6.3.3 Other hazards

Other hazards, although important locally, are less predictable and less amenable to planned national action.

6.4 Goals and achievements

6.4.1 Steps towards achieving the three main Decade targets in respect of drought:

The following steps are proposed:

- ☞ Comprehensive national assessments of the risks of natural hazards, with these assessments taken into account in development plans.

- ☞ Implementation of the proposed national drought management strategy.

- ☞ Maintaining permanent inventories, registers and data bases for water supply, agriculture, nutrition and household food security.

- ☞ Implementation of mitigation plans at national and/or local levels, involving long-term prevention and preparedness and community awareness.

- ☞ Provision of ready access to global, national and local warning systems and wide dissemination of warnings.

- ☞ Development plans still have to be developed to ensure that the targets set out are achieved.

- ☞ Concerning mitigation plans, the Government department will be responsible for ensuring that all participants are prepared and that they know exactly what is expected of them in such situations. The public will be made aware of any inputs from their side through the media during a disaster. For the present the welfare cadre will have to rely on other line function departments in this respect.

6.4.2 Legislation introduced and enacted in relation to natural disaster reduction

The following are the principal Acts relating to natural disaster reduction:

Civil Protection Act, 1977

Fund Raising Act, 1978

Water Act, 1956

Agricultural Pests Act, 1983

Conservation of Agricultural Resources Act, 1983

Agriculture Credit Act, 1966

Agriculture Development Fund Act, 1993

Agriculture Financing Act, 1993.