March 2003 Cut-off Low: Consolidated Report

Department of Social Services and Poverty Alleviation of the Provincial Government of the Western Cape

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the United Nations Food and Agriculture Organisation
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Disaster Mitigation for Sustainable Livelihoods Programme (DiMP)
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Executive Summary

Background

In the third week of March 2003, a powerful weather system swept across the South Western Cape triggering widespread loss, damage and human hardship. With national attention focused on the Montagu-Ashton area, a national state of disaster was declared by the State President on 4 April, in the Magisterial Districts of Montagu, Robertson and Swellendam.

The weather system, a powerful 'cut-off low', is attributed with three deaths in Hermanus and Knysna, as well as major impacts on agriculture and the roads network. An estimated R212 million in direct economic losses were attributed to the weather system and the riverine floods that followed. Moreover, hundreds of rain-affected households were temporarily evacuated, and in the months following the extreme weather event, significant increases in child illness were recorded in health facilities in the areas affected by the cut-off low.

The Department of Social Services and Poverty Alleviation of the Provincial Government of the Western Cape, along with the Provincial Development Council and the United Nations Food and Agricultural Organisation took the initiative to co-finance research that recorded the March 2003 cut-off low and related floods. Due to the multi-sectoral character of the disaster event, a multidisciplinary team was formed for this research.

Comprising specialists in climate research, flood hydrology, land-use, social risk assessment, disaster management and disaster impact analysis, the team compiled an extensive report on the March 2003 cut-off low. The report is intended to illustrate the interrelationships between the physical aspects of the hazard process (i.e. the cut-off low and floods), patterns of social vulnerability and the role of intervening institutional mechanisms to mediate the impact of extreme weather events. Each chapter of the report is also written to provide in-depth detail for specialists with sector-specific interests. Moreover, the report is also viewed as a general methodology guide for those tasked with carrying out post-disaster assessments.

Conclusions

The cut-off low was an extreme weather event

Extreme flooding was recorded

Weather and flood impacts occurred at different times in different geographic areas, reflecting the path of the weather system

Parts I and II confirm the significance of the natural hazard processes that triggered this disaster occurrence. The South African Weather Service identified the March 2003 cut-off low as a potential extreme weather event in the days immediately preceding 22–26 March. Unfortunately, for reasons presented in Parts II and IV, the advisories and warnings did not activate preparedness measures in the areas subsequently affected. It is also significant to note that the advisories and warnings were issued during a long holiday weekend that began on Friday 21 March. The first deaths attributed to the weather system were recorded in Hermanus on Sunday 23 March and serious rain and flood damage were reported in Montagu on Monday 24 March (the first day at work after the three-day weekend).

The weather system, as it crossed the Western Cape, was indeed extreme. Heavy rainfalls were recorded in Montagu, Ashton and Barrydale. Gale-force winds were recorded in the Southern Cape. Unseasonally low temperatures were recorded from Montagu (10^{o}C) to Port Elizabeth (5.9^{o}C). This combination of heavy rainfall, strong winds and cold temperatures resulted in a diversity of impacts on infrastructure, the agricultural sector, livestock, electricity services and people – depending on which elements were vulnerable and exposed to the weather system.

One of the consequences of the heavy rain was riverine flooding, reflected in the Montagu, Buffelsjags, Duiwenhoks, Brand, Touws, Karatara and Keurbooms River areas, at levels considered 'rare', and classified as 20-year or greater floods. The severity of the floods was related to levels of development in the flooded areas, with significant losses incurred in the Kogmanskloof River Catchment. This is related to the proximity and density of development to the rivers concerned.

An important finding in this research refers to the temporal and spatial differences in the timing of the weather and flood impacts – which reflected the movement of the weather system. While heavy precipitation was falling over Montagu on 23–24 March, similar levels were only recorded in the Southern Cape a day later. However, these rain impacts were further compounded by river run-off from the upper catchments.

People living in poorly constructed homes were most affected

There was no uniformity in identification of areas or communities affected

Some communities received relief and recovery assistance – some managed on their own

As Part III describes, the people who were most affected by the extreme weather event were those residing in poorly constructed homes. These were either unable to resist the rain, or had storm-water drainage capabilities that could not manage surface run-off. Generally, it was these 'weather affected' households who received emergency relief and subsequently registered for Social Relief. Only 12 households of the 772 applicants for Social Relief were directly affected by riverine flooding.

In the absence of institutional arrangements that would have resulted in the uniform identification of areas affected by the weather event/flooding, or identification of specific communities or households that were seriously affected, there was great unevenness in the institutional responses to humanitarian needs. As a result, communities and households who experienced similar weather or flood impacts received different levels of external assistance. In not one of the municipalities visited was one designated person responsible for assessing/consolidating disaster-related impacts on people and households – to provide a comparable profile of human losses to that provided on damaged infrastructure by the municipal engineer.

Similarly, different communities had varying expectations/understandings with respect to their eligibility for Social Relief. This resulted in many households not applying for Social Relief to replace water-damaged property. In these communities, rain or flood-affected households managed their losses alone or, in the case of many farm-workers residing on farms, repaired their homes with the farmer's assistance.

Disaster management action is 'caught between two Acts'

The limited to non-existent institutional arrangements to manage the disaster incident could be effectively addressed with the new legislation

Interim measures can be taken to strengthen disaster management capacity while the new legislation is being implemented

While it is agreed that the disaster incident was generally well-managed, this was largely attributed to strong local knowledge and personal relations, rather than robust institutional arrangements. Many of the less well-managed aspects of the incident could be explained as a result of the legislative vacuum caused by disaster management 'falling between two Acts'. The Disaster Management Act, 2002, which was promulgated in January of that year, is considered to be one of the finest pieces of disaster management legislation in southern Africa and is far removed from its precursor, the Civil Protection Act, 1977. It provides for an integrated and co-ordinated disaster management policy that focuses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters and post-disaster recovery; the establishment of national, provincial and municipal disaster management centres; disaster management volunteers; and matters incidental thereto.

The Civil Protection Act, however, focuses solely on post-disaster response and recovery, thereby essentially ignoring risk reduction, but also in that it does not provide clear guidelines for effective institutional arrangements or enable rapid decision-making and response. It creates great confusion by not allocating clear responsibilities in terms of decision-making and disaster declarations and does not provide adequately for the active participation of all relevant stakeholders.

Unfortunately, despite the fact that the new Disaster Management Act has been promulgated, it will (in terms of Section 65) only come into operation on a date still to be decided by the State President. Until that date, those sections of the old Civil Protection Act which were assigned to a province still apply. Strictly speaking, therefore, until such time as Sections 2, 2A, 3, 4, 5, 6(1) and 7 of the Civil Protection Act are repealed by the province concerned, they remain effective.

Despite this, however, in other provinces substantial progress has been made in introducing certain aspects of the Disaster Management Act that are not in conflict with the existing legislation. In other words they have taken the approach of applying the 'spirit of the law' rather than the 'rule of the law' in order to meet their constitutional commitments, the requirements for Integrated Development Plans (hereafter referred to as IDPs) as set out in the Municipal Systems Act, 2000 and to apply relevant aspects of the policy proposals in the White Paper on Disaster Management, 1999 in the interests of the communities they serve.

The triggering event for widespread disaster loss was the March 2003 cut-off low, not riverine floods

Losses were widespread across multiple sectors and communities

The human impact of the disaster was under-assessed

While the disaster event is popularly referred to as the 'Montagu Floods', the triggering event was the cut-off low identified by SAWS the preceding week as a potentially endangering weather system. It is possible that communities/areas which bore significant impacts generated directly by the severe weather did not receive the appropriate attention because they did not conform to the definition of being 'flood-affected' – even though the weather system itself was an extreme event.

The direct economic losses sustained as the result of severe weather and flood damage exceeded R210 million, the majority of which will be borne by the private sector, primarily farmers. However, the general area affected by the March cut-off low is exposed regularly to heavy rain events. In addition, it is repeatedly exposed to recurrent riverine flood risk. The sizeable losses reported in this event underline the urgent need to revisit the management of weather and flood risks in the affected area, especially when repeated weather and flood events result in costly and ongoing 'patch-up' and 'repair' interventions.

The findings also illustrate the cumulative impacts of multiple hazards on 'downstream' areas at risk. While there is no doubt that the Montagu-Ashton area sustained significant losses, communities in downstream coastal zones were affected simultaneously by swollen rivers due to upstream run-off, heavy rains (because of heavy rains falling one day later on the South Coast than on the Boland) and gale-force winds.

Lastly, one of the most striking limitations of this impact review was its inability to determine representative impacts on people and households across the areas affected. However, indirect indicators drawn from health facilities in the officially disaster-affected area, have indicated serious health consequences for young children in those communities. The significant increases in both the frequency of paediatric consultations and in the severity of respiratory illness treated, suggest that the full human impact of this event, especially on young children, was under-assessed in the areas exposed to the extreme weather event.

Post-disaster research can accurately 'capture' and consolidate otherwise lost information on disaster events

Disaster research can provide a platform for change, building on lessons learned

This case-study, implemented immediately following a significant disaster event, illustrates the value of collecting information on a complex event before details of the event are forgotten. South Africa is highly disaster-prone. However, the level of documentation of nationally declared disasters is very low. This directly affects our ability to inform policy with facts, generate locally relevant training and education efforts that use South African case-studies or to make cost-benefit decisions about investments in disaster prevention and mitigation. The funds made available for this research approximate 0.05% of the total direct economic losses sustained. Yet, they have generated multi-sectoral findings with potential to inform policy across a range of sectors and services.

The research process itself played a critical role in facilitating a 'debriefing' especially for front-line responders, and for drawing 'lessons learned' from the field before these were forgotten.

In many instances, the research process itself has initiated positive changes with respect to disaster management at local levels, supporting the spirit of the legislation recently promulgated but not yet implemented. In the same way, it has generated a wealth of material to support professional training programmes and the development of simulation exercises that are based on real experience and robust physical science, rooted on realities in South Africa – not Bangladesh or the Philippines or other countries which supply many of our current training/resource materials.

Recommendations

Strengthen capacities to anticipate and manage impending weather and flood threats

(relevant to the generation of robust and useful information on hazard/risk processes by physical and environmental scientists and engineers)

- *Simplify the messages* to increase understanding and emphasise likely impacts rather than weather characteristics.
- Revisit the tone, content and method of communication for severe warnings, so that they contain a *greater sense of urgency*.
- Introduce a *'code' system* to highlight different levels of potential weather-induced danger.
- In the event of a severe weather warning, contact a targeted, limited number of *individuals responsible for key decision-making* rather than depending on mass communication of the warning by sms.
- *Actively involve representatives of the Cape Town Weather Office* in debriefing sessions related to the March cut-off low and subsequent disaster management planning consultations.
- Use rainfall and hydrological data at the time of a flood event to determine areas affected. This information will identify focused areas for more detailed investigation based on the intensity (magnitude) of the event.
- Give priority to identifying areas subject to flooding through comprehensive hydrological studies in the South Western areas of the Western Cape.
- Give priority to improving the development and utilisation of flood plains and flood prone areas (including the management of trans-boundary risks).

Strengthen institutional capabilities for more effective emergency responses and post-event recovery processes that support vulnerable communities
(specifically for service providers supporting at-risk or marginal communities and households in disaster-prone areas)

- Improve the effectiveness of emergency responses with:

    - Preparedness planning, including the early warning and monitoring of extreme weather hazards and dissemination of warning information to communities at risk.
    - Identification of all communities/households affected by the hazard's impact through a comprehensive assessment – especially those that are most vulnerable.
    - Provision of timely and appropriate emergency assistance (i.e. confirmation of availability of possible evacuation facilities, transport arrangements, blankets, mattresses and relief food, community security services, and provision of black plastic bags for securing belongings).

- The disaster management plans developed by the local authorities should strengthen the early warning of communities by:

    - Improving the quality of and access to relevant severe weather warnings. This also includes appropriate relief committees and farming associations working with identified at-risk communities.
    - Strengthening community capacity to monitor changes in the intensity of an extreme weather hazard, providing indicators for securing their belongings, and potential evacuation.

- Strengthen and standardise methods for identifying and assessing affected communities/ households by:

- Conducting on-site assessments for all vulnerable communities/households affected by the weather event and its consequences.
- Focusing on the impacts to livelihoods and not solely on impacts to infrastructure, to provide a more sensitive indicator of need.
- Developing standard procedures and guidelines for determining affected households and communities, to be implemented by both local authorities as well as humanitarian assistance organisations.
- Designating one position responsible at municipal and provincial levels for consolidating information on the extent of disaster impacts on households and individuals.
- Establishing a multidisciplinary provincial monitoring mechanism to verify communities/households identified as 'disaster affected', as well as those who may have been overlooked. This oversight function applies to the determination of emergency relief as well as access to Social Relief.

- Support measures that reduce long-term vulnerability and support post-disaster recovery by:

  - Undertaking research to examine the role of post-disaster Social Relief in replacing lost assets, supporting household recovery and reducing disaster vulnerability.
  - Ensuring, wherever possible, that decision-making to determine those households eligible for Social Relief is informed by the Department of Social Services and Poverty Alleviation office(s) most familiar with the areas/communities affected.
  - Encouraging the local authorities in the affected municipalities to establish Disaster Management Advisory Forums, as recommended in the newly promulgated Disaster Management Act.

Adopt immediate strategies and measures to strengthen institutional capacities in disaster management
(most relevant to those involved in provincial and local government)

- Implement an interim strategy to initiate the phasing in of key provisions of the Disaster Management Act to address the current critical shortcomings of the Civil Protection Act until the Disaster Management Act becomes effective, by ensuring that:

  - Each district municipality appoints a suitably senior person in their employ as the interim focal point for disaster management for the municipality until the appointment of a Head of the Centre is made in terms of the Act.
  - In the event of a non-security-related disaster threatening to occur or occurring in the area of the district, the interim Head of the Centre assumes responsibility for the establishment of a disaster operations centre at a pre-identified, suitable venue and for the overall co-ordination and management of the event.
  - The municipal managers of the local municipalities (or the person who is appointed as the Chief or Acting Chief of Civil Protection in terms of Sections 12 and 14 of the Municipal Structures Act) represent their municipalities in the disaster operations centre and undertake the co-ordination and management of events in their respective areas.
  - Each district municipality immediately establish an Interdepartmental Disaster Management Committee (comprising relevant key personnel for the purposes of co-ordinating *internal departmental planning*) and District Disaster Management Advisory Forums, and initiate interim disaster management structures in the

ward context in communities known to be at risk. Consideration should be given to investigating innovative mechanisms whereby funding can be made available nationally to kick-start the establishment of district disaster management centres and the appointment of heads of those centres with immediate effect
- Lead functional agencies for the various operational activities associated with disaster management and the allocation of responsibilities be urgently identified in terms of co-ordination and the establishment of Joint Operations Centres for the tactical management of field operations at the scene of incidents.
- An intensive campaign is initiated to sensitise the aforementioned role-players with regard to their responsibilities in terms of the Act. A key consideration in this process of sensitisation is to focus on communities at risk.

- Ensure that disaster management and disaster risk-reduction planning are informed by reliable and robust risk and vulnerability assessments by:

  - Drawing national attention to the need for funding to conduct thorough risk and vulnerability assessments to inform and focus disaster risk planning where this is most urgently required.
  - Encouraging district municipalities (as an interim measure) to prepare a high-level strategic plan (in order to assist municipalities to fast-track the process and to ensure standardisation, a template should be provided for the purpose) that will set out the overall arrangements for disaster management in the district, which will include:
    - a qualitative risk profile supported by priority strategies for reducing the risks identified in the profile and accompanying implementation plans included as annexures to the plan which will be integrated into the IDP;
    - the institutional arrangements for disaster management for the district and clear allocation of roles and responsibilities;
    - the arrangements for the dissemination of early warnings;
    - procedures for the activation of the plan and for the classification and declaration of a state of disaster; and
    - standard operating protocols for key role-players of municipal departments.

- Strengthen communication capabilities for more effective disaster response and recovery by:

  - Installing communication mechanisms, which are linked to an interim reporting centre, in communities identified to be at risk.
  - Identifying disaster management focal points in communities at risk.
  - Disseminating information to those focal points on the mechanisms and procedures for reporting of events in their communities which are threatening to occur or have already occurred.
  - Considering the installation of NEARNET radios for this purpose in those communities.
  - Commissioning research to explore the possibilities and options available toward the introduction of a national emergency radio communication system, which will allow interagency communication for the purposes of disaster management

- Disseminate lessons learned from this case-study relevant to the development of the national disaster management framework, specifically recommending:

With respect to the Disaster Management Act's institutional arrangements:

- The establishment of municipal disaster management advisory forums. In the event that a municipality decides not to exercise the option to establish a forum for the purposes of disaster management, municipalities should be required to identify alternative existing structures to pursue the intentions of the Act with regard to the role of forums.
- Attention to the issue of primary responsibility for each of the activities associated with disaster management by identifying lead functional agencies.
- The establishment of adequate capacity for disaster management and the provision of guidelines for the minimum requirements in terms of the establishment of disaster management centres.
- The development of clear guidelines for the appropriate placement of the function in the hierarchy structures of municipalities.
- The formulation of guidelines for the introduction of mechanisms for monitoring and managing cross-boundary risk in both municipal and provincial contexts.
- The inclusion of clear guidelines for the establishment, infrastructure and operation of provincial and municipal disaster management centres.

With respect to disaster management planning:

- The development of a comprehensive planning framework with accompanying guidelines to ensure standardisation and integration of disaster management plans.
- The development and inclusion of clear guidelines for procedures to be followed for the format and content of severe weather warnings and the mechanisms for the dissemination of early warnings and responses.
- Initiation of a nationally co-ordinated community awareness programme to inculcate risk-avoidance behaviour for commonly encountered hazards through public-private sector partnerships and in conjunction with the media.

With respect to disaster response and recovery:

- The formulation of guidelines and standardised procedures for conducting damage and needs assessment, including initial assessments and sector specific follow up assessments.
- The development of a model for a national Incident Management System to ensure standardised approaches and the clear identification of roles and responsibilities.
- The possible establishment of Disaster Assessment Response Teams.
- The inclusion of clear guidelines for the development of a policy on appeals for donations and on criteria for the management and distribution of humanitarian relief.
- Specifications on minimum requirements in terms of emergency communication.
- Development of guidelines which include minimum requirements for the recording of information on disasters.
- The routine undertaking of post-disaster reviews in order to learn lessons and add value to disaster management planning (e.g. this case-study).

Strengthen capacities to record and track disaster-related impacts to better inform both disaster management and development planning
(relevant to both disaster management and social/health service providers)

- Put in place mechanisms in the areas affected by the March 2003 cut-off low to enable the assessment and strengthened management of extreme weather and flood-related risks.
- Establish assessment procedures/guidelines for identifying and tracking impacts on disaster-affected individuals, households and communities, especially those most vulnerable, in order that these impacts are not overlooked or underestimated.
- Improve health surveillance mechanisms in clinics serving the weather and flood-affected communities to track patterns in child illness (especially respiratory illness) that may follow extreme weather events and floods.
- Actively disseminate weather and flood risk GIS/impact information consolidated in the course of this case-study with the provincial government departments concerned, as well as affected municipalities, so it serves as a practical platform for future disaster management and development planning.
- Establish standard impact reporting procedures for those municipalities and government departments that do not yet use a uniform system. This includes the standardisation of hard-copy and electronic formats, and clear designation of a provincial focal point to consolidate these (or out-sourcing arrangements).

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Abbreviations and Acronyms

ºC degrees Centigrade

ACVV Afrikaans Christelike Vroue Vereeniging (Afrikaans Christian Women's Organisation)

AMF Peaks Annual Maximum Flood Peaks

ANC African National Congress

CBOs Community Board Organisations

CDSM Chief Directorate of Surveys and Mapping

CSAG Climate Systems Analysis Group

DA Democratic Alliance

DIMP Disaster Mitigation for Sustainable Livelihoods Programme

DM Disaster Management

DM Plan Disaster Management Plan

DMA District Management Area

DMAF Disaster Management Advisory Forum

DMC Disaster Management Centre

DMF Disaster Management Framework

DMIS Disaster Management Information System

DSS & PA Department of Social Services and Poverty Alleviation

DWAF Department of Water Affairs and Forestry

ENPAT Environmental Potential Atlases

EWS Early Warning System

FAO Food and Agriculture Organisation

hPa hecto Pascal

HOC Head of Centre

IDP Integrated Development Programme

JOC Joint Operations Centre

km Kilometre

LOCOC Local Co-ordinating Operations Centre

MAG Montagu Ashton Gemeenskap (community)

mm millimetre

MRF Medium Range Forecast

ms metres per second (windspeed measurement in)

MTO Mountain to Ocean

NCEP National Centres for Environmental Prediction

NGO Non-Governmental Organisation

PDC Provincial Development Council

RDP Reconstruction and Development Programme

SAAF South African Air Force

SABC South African Broadcasting Corporation

SAPS South African Police Service

SAWS South African Weather Services

sms short messaging service

UCT University of Cape Town

UIF Unemployment Insurance Fund

Part I: Background, Conceptual Framework and Methodology

1.1 Introduction and Context

The March 2003 cut-off low that triggered widespread damage and hardship across the Western Cape provides an important case-study for South Africa. It clearly underlines the interplay between extreme weather and conditions of environmental, agricultural, infrastructural and social vulnerability. Part I of this consolidated report provides the general and institutional context for the study, as well as an overview of the research methods used.

Section 1.1 gives a brief overview of the endangering weather system, its impacts and the general profile of the areas officially identified in the declaration of state of disaster.

Section 1.2 introduces the conceptual framework for the study and key terms.

Section 1.3 clarifies the geographic of for the case-study.

Section 1.4 describes the overall research approach and methods used.

Section 1.5 states ethical considerations that are reflected in the report.

Section 1.6 outlines the study's limitations.

Section 1.7 presents the overall structure of the report.

1.1.1 The extreme weather system and its consequences

On Thursday 20 March 2003, the Cape Town office of the South African Weather Service issued its first weather advisory concerning a powerful approaching weather system. The system, which eventually developed into an intense 'cut-off low',[1] was forecasted to pass over the south western areas of South Africa during the public holiday long weekend celebrating Human Rights Day that began on Friday 21 March.

Between 23 and 24 March, the cut-off low triggered flooding and other rain-related impacts across the Southern Cape and adjacent interior. This resulted in the formal declaration of a state of disaster in the Magisterial Districts of Swellendam, Montagu and Robertson on 4 April 2003.[2] Altogether, direct economic losses exceeding R200 million were reported in weather-affected areas, in both declared and undeclared states of disaster, across the Western Cape. Of this, approximately R90 million was borne by commercial farmers, who already had experienced several years of harsh drought conditions prior to the March 2003 event.

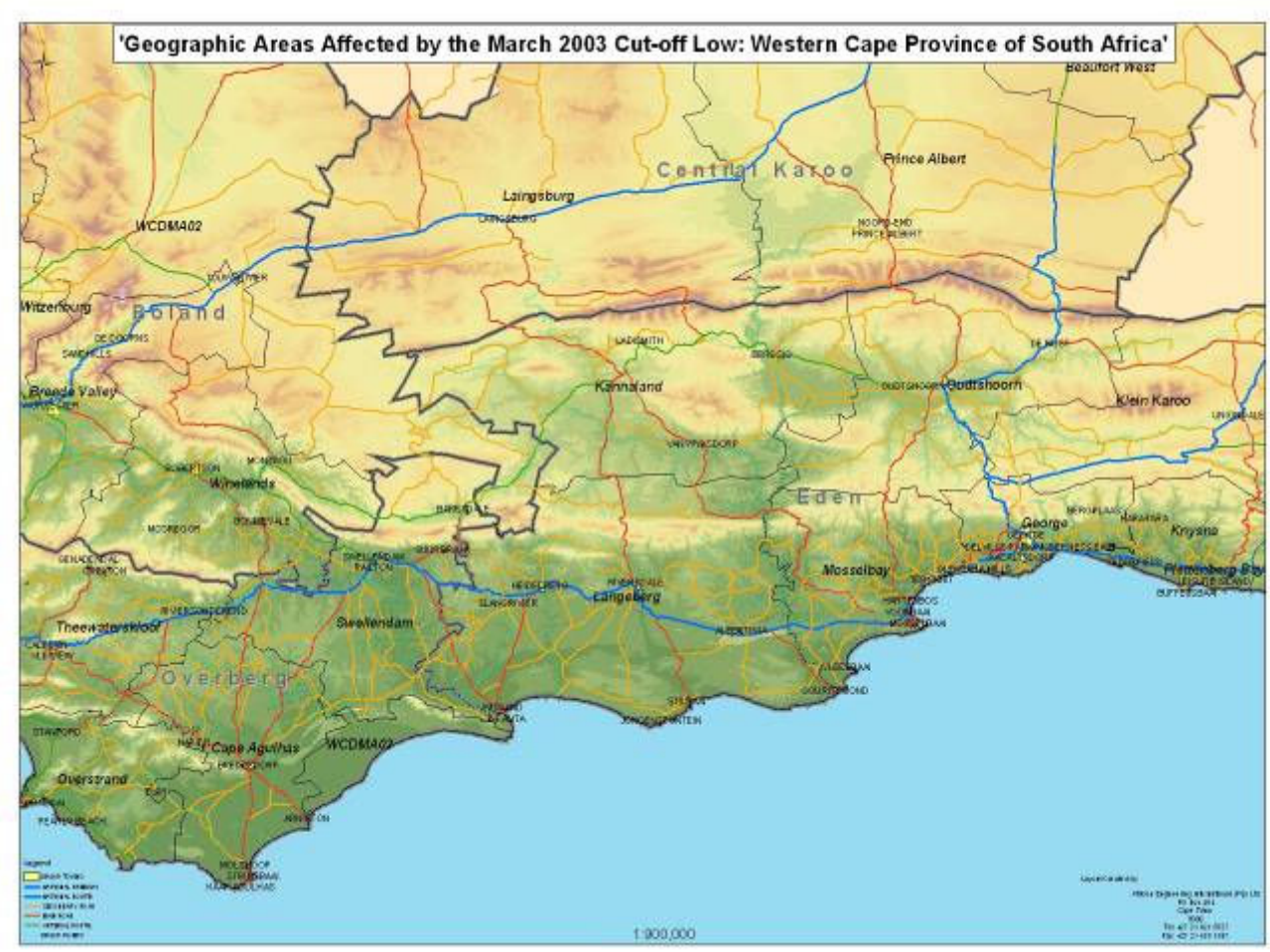
1.1.2 General overview of areas that reported significant disaster impacts, as well as those specifically classified as experiencing a 'state of disaster'

[1] A 'cut-off low' is a 'closed low in the upper air, supported by a low-pressure system on the surface' (SAWS report). In other words, it is atmospheric circulation that becomes separated from the main flow/system, and often results in heavy rainfall, gale force winds and other severe weather.

[2] Government Gazette, Republic of South Africa, No. 24693, Department of Provincial and Local Government, Government Notice No. 486, Declaration of State of Disaster.

The March 2003 cut-off low triggered serious impacts and losses across much of the Western Cape of South Africa in the area represented in Figure 1.1.2.1. Administratively, this consists of the Boland, Overberg and Eden District Municipalities, with a total population estimated at 1 103 060 people.[3]

Figure 1.1.2.1: Geographic areas affected by the March cut-off low, Western Cape



Within this overall area affected by the powerful weather system, however, a 'state of disaster' was declared by the President only for the Magisterial Districts of Montagu and Robertson, within the Breede River/Winelands Municipality, and the Magisterial District of Swellendam, within the Overberg District Municipality. This specific area is highlighted in Figure 1.1.2.1.

These specific magisterial districts lie within the highly productive agricultural Boland and Overberg Districts, with a population in excess of 722 176.[4]

The Breede River/Winelands Municipality leads horticultural production in the Western Cape, with wide-ranging outputs in viticulture, deciduous fruit and vegetables. Together with the Overberg, it produces more than 72% of the Province's fruit crop. The Overberg is also a significant field-crop producer, and produces 85% of the Western Cape's barley crop.[5]

[3] South African Statistical Services, 1996 Census.
[4] Provincial Development Council (1996), The *Western Cape: A socio-economic profile,* (pp. 23–24).
[5] Provincial Development Council (1996), *The Western Cape: A socio-economic profile*, (pp, 23–24).

In addition to its agricultural output, the Breede River/Winelands Municipality generates significant income from both local and international tourism. The town of Montagu is located on the R 62 providing a direct road link to Oudtshoorn, approximately 200 km to the east in the Little Karoo. This area is famous for its ostrich farming industry and hosts its popular Klein Karoo Arts Festival annually between March and April.

In the context of the March 2003 cut-off low disaster, the active agricultural season had almost concluded in the Breede River/Winelands area, with the harvesting of both fruit and grapes close to complete. However, the month of April was expected to bring many tourists to the area, with the week-long Klein Karoo Arts Festival scheduled to begin on 28 April, and five statutory holidays planned over the forthcoming month.

1.1.3 The March 2003 cut-off low and its relevance to disaster management policy

On Saturday 22 March, the Weather Service upgraded its initial advisory to a 'Severe Weather Warning'. On Monday 23 March, 178 mm rainfall was recorded by the official SAWS rainfall station in Montagu. This rainfall, the highest recorded for one day in more than 23 years, triggered riverine flooding and severe rain damage to infrastructure, commercial farms and hundreds of low-income homes. It resulted in the evacuation of more than 500 households in Montagu as well as the local Primary School. Significantly, floodwaters sweeping down the Kogman's River severed the critical 11 km road link between Ashton and Montagu known as the 'Kogmanskloof Pass'.

The extreme weather system, extending further than 800 km, moved east overland until 25 March, resulting in continued rainfall, gale-force winds and low temperatures. In its trail were left road infrastructure damage valued at R18 million in the Eden District Municipality, a damaged sewage treatment system in Heidelberg, significant farm losses across much of the Western Cape – including thousands of dead livestock – and damaged electricity infrastructure in Kannaland. In Hermanus, two women drowned when a strong wave swept them into the sea (23 March)[6], and in Knysna, a man lost his life (24 March)[7] when similarly endangering winds caused a tree to crush him.

In this context, the March 2003 cut-off low occurred just two months after the promulgation of the Disaster Management Act. The new legislation recognised the urgent need for strengthened capabilities in disaster management, with a specific emphasis on disaster prevention and mitigation, and a focus on reducing the vulnerability of disaster prone areas, communities and households. However, despite this new legislation, the provisions of the new Act had not been formally implemented at the time of the disaster.

This extreme weather event provided an excellent opportunity to identify key priorities for inclusion in the forthcoming National Disaster Management Framework. Moreover, in a context of growing climate variability, and concerns about the likely increase in extreme weather such as this, the March 2003 cut-off low was viewed as a case-study for identifying vulnerability conditions that should be prioritised in the implementation of the Disaster Management Act.

1.1.4 Institutional arrangements for the research and terms of reference

This case–study was co-financed by three organisations concerned about the interplay between community/household vulnerability and institutional supports that avert or reduce

[6] Die Burger, 25 March 2003.
[7] IOL, 25 March 2003.

unnecessary disaster loss. The Department of Social Services and Poverty Alleviation of the Western Cape Provincial Government, the United Nations Food and Agriculture Organisation and the Provincial Development Council of the Western Cape jointly supported this research that would deliver a comprehensive disaster event report containing:

- A description and analysis of weather conditions that triggered the flooding.
- An overview of the catchment, river-flow, land-use and run-off characteristics that may have exacerbated the event.
- A history of past flood or related events.
- A description of existing organisational arrangements related to disaster management, including risk reduction and IDPs, emergency preparedness, response and recovery.
- A description and chronology of the event from the SAWS initial weather warning (Friday 21 March) to Thursday 26 March.
- A description of measures taken to anticipate and manage the event, including search and rescue, emergency relief, logistics, security and communication.
- A description of impacts on people (evacuated, homeless, livelihoods), infrastructure damaged and destroyed, disruptions to telecommunications, electricity, road and other lifeline services, damage and destruction to agriculture, and environmental impacts.
- Relief impacts in costs and supplies.
- Conclusions that incorporate considerations of future more extreme climate events, and their implications for disaster management and sustainable development planning.
- Maps, graphs, tables and photographs illustrating the points above.

This consolidated report is accompanied by two additional documents, one focused only on the social risk aspects of the disaster, and a second document that proposes specific priorities for inclusion in the National Disaster Management Framework.

A third report, available from FAO in December 2003, will compare and contrast livelihood strategies and institutional support mechanisms recorded in this research with those from a similar case-study in Mozambique.

1.2 Conceptual Framework for this Study

In the past, severe weather events such as the March cut-off low and its consequences would have been understood as a ‘natural disaster’, or ‘Act of God’. However, international best practice now views disasters as an interplay between natural or other threats *and* conditions of socio-economic, environmental or infrastructural vulnerability. A disaster only occurs when a *vulnerable* household, community, city, province, business, ecosystem or physical structure is subjected to a *hazard or shock* which it *cannot withstand* or from which it *cannot recover without external assistance.*

Normally, a ‘hazard’ is viewed as an external phenomenon *with potential to cause harm*, while vulnerability refers to the *internal characteristics* of the household, community or area that increase the likelihood of loss. In this context, it is no longer appropriate to state that a storm ‘caused’ the flood, but rather to state that the storm ‘triggered’ the resulting flood.

In this conceptualisation, any specific level of *disaster risk* faced by a household, community or area is shaped by *both* hazard and vulnerability conditions, and can be broadly understood as the probability of losses which a household, community or municipality cannot resist or recover from without external assistance.

With respect to the March cut-off low disaster, the *hazard* is understood as the weather system, characterised by heavy rain, strong coastal winds and cold temperatures.

With respect to this research report, vulnerability is viewed as those characteristics likely to increase the probability of loss with respect to river systems, agriculture, physical infrastructure and critical services, as well as human well-being and health status.

The research presented below seeks to identify those risk conditions that increased the likelihood of loss, as well as the household/community responses and institutional mechanisms that reduced the severity of the weather event.

1.3 Geographic Focus for the Study

1.3.1 General scale and scope of research

The study team experienced considerable difficulty in defining the geographic limits of this research. This occurred because the administratively defined 'disaster-affected' areas neither coincided with the scale of the weather event nor the range and extent of infrastructural, hydrological, agricultural and other impacts reported.

While it was clear that the Montagu-Ashton areas were significantly affected by the extreme weather event, an audit of losses across the Western and Southern Cape indicated comparable impacts also occurred in areas extending to the Klein Karoo and low-lying coastal zones. Moreover, due to uneven assessment processes to track direct impacts on households outside the officially declared zones, it was not possible to determine whether comparable losses to low-income and informal households occurred outside the formally declared disaster-affected areas.

In addition, while it is likely that other impacts were observed in the Eastern Cape due to the intensity of the weather system, these areas were not included in the research.

Figure 1.1.2.1 above represents the overall area assessed with respect to the scale of the extreme weather system, extent of hydrological impacts (i.e. riverine flooding), range of reported agricultural and infrastructural impacts, as well as disruptions to electricity services.

1.3.2 Specific focus on formally declared disaster areas

The geographic area specifically identified as 'disaster-affected' is represented in Figure 1.1.2.2. This zone includes the towns of Ashton, Montagu and Robertson in the Breede River/Winelands Municipality within the Boland District Municipality, as well as the Swellendam Municipality, which is located in the Overberg District Municipality.

Figure 1.1.2.2 Magisterial Districts declared as a 'State of Disaster', 4 April 2003 (see map manually inserted overleaf, and electronically available on p. 65 as Fig. 3.1.4.1)

1.4 Methods Used

The multidisciplinary nature of this study demanded the identification of a skilled team with capacity to work across disciplines as well as give in-depth attention to their respective professional fields.

It also called for the use of a wide range of data-collecting, consolidating and analytic instruments and processes.

1.4.1 Defining the technical requirements of the research team

Disaster risk nomenclature would classify the March 2003 cut-off low and its impacts as a 'hydrometerological disaster'. This automatically underlined the need for skilled capabilities in analysing the triggering *climate conditions*, as well as technical skills in evaluating the event's *flood hydrology and relevant land-use* changes that may have exacerbated its impacts. In addition, the capturing of the institutional dimensions of the incident, including measures taken in advance to reduce the likelihood of negative impacts, required skilled technical input on *disaster management*. With respect to determining the extent of impacts, including human, agricultural and infrastructural, it was essential to have capabilities in household and *social vulnerability* assessment, as well as research capabilities to identify, *record and consolidate losses* across multiple sectors and administrative jurisdictions.

Recognising these complementary dimensions resulted in the identification of a skilled team to implement the research by 28 March 2003, only four days after the first identified impacts of the extreme weather event.

This team comprised climate analysis researchers, land-use specialists, a skilled hydrologist, a disaster management specialist, social vulnerability research and disaster loss consolidation teams and a GIS support partner.

The Disaster Mitigation for Sustainable Livelihoods Programme at UCT acted as secretariat for the research, and finalised the co-financing arrangements with the organisations who sponsored the case-study.

1.4.2 Streamlining data collection and analysis

There were several early methodological priorities. These involved determining a uniform geographic scope for the study, as well as processes that allowed subject specialists to focus on their specific areas, as well as provide interdisciplinary feedback to other team members.

a) Defining the geographic scope

Newspaper reports and the early visualisation of the weather system's extent, combined with disaster relief feedback from the South African Red Cross Society guided decisions with respect to the scope of the research. This resulted in the inclusion of weather-related impacts across the Boland and Overberg Districts as well as those reported from the Southern Cape and Klein Karoo, with specific attention on effects on infrastructure, agriculture and electricity services.

However, recognising the limited time and resources available, teams examining the institutional management of the incident and the social dimensions of the disaster agreed to limit their focus to the formally declared disaster-affected areas in the Breede River/Winelands and Swellendam Municipalities.

b) Defining fieldwork requirements

The research team gave priority to fieldwork to ensure accuracy of its results. More than 45 person-days of field research took place for eight of the team members who collected information related to the land-use, flood hydrology, institutional arrangements and social risk dimensions of the extreme weather event.

Prior to each team's field travel, sector-specific resource people were identified in the towns to be visited, meetings scheduled and data collection instruments developed. All fieldwork was completed by 28 May.

c) Developing an iterative research method

The research demanded an iterative research method. This involved constant reviewing of newspaper and government reports, climate analysis findings and feedback from specific sectors to identify potential gaps in information gathering.

One example of this is illustrated in the collection of impact data within the Kannaland Municipality before these were officially reported. Preliminary rainfall and wind-field analysis suggested that the Klein Karoo was significantly affected by heavy rains and strong winds. Subsequent contact with the Municipal Engineer and Eskom representatives in this area confirmed that considerable losses had indeed occurred. This information was further corroborated by the analysis of the area's flood hydraulics and reports from the agricultural sector.

d) Ensuring research team consultation

Two consultations were conducted, which involved all team members. The first was conducted before fieldwork began in April, and defined the scope of the research. The second, conducted on 29 May, provided an opportunity for all team members to present their preliminary findings. This forum also provided a platform to identify inter-sectoral relationships as well as remaining research gaps.

1.5 Ethical Considerations

In order to ensure confidentiality of information provided by a wide range of resource people and institutions, individuals consulted in the course of this study will not be referred to by name, but rather by official designation or as representatives of specific organisations.

1.6 Limitations of Research

Although every attempt has been made to capture the events surrounding the March 2003 cut-off low correctly, it was impossible to consult with all those involved. It is clear that in the areas affected, many 'ordinary citizens' evacuated school children, ran soup kitchens, and provided help to neighbours as well as those in need. Unfortunately, it has not been possible to contact everyone directly involved.

Similarly, although the research was directed at the 'formally declared disaster areas', it is clear to all members of the research team that significant, if not comparable, impacts were felt in other areas of the Western Cape. Unfortunately, time and resource constraints prevented an in-depth review of other towns and rural communities that were also affected.

A significant limitation to the accuracy of the research was access to current demographic and income statistics for the areas studied. In a number of communities, low-income housing projects have been implemented in recent years. Unfortunately, these developments did not exist when the 1996 census was undertaken. Therefore, there was a lack of recent baseline socio-economic data that would have particularly informed the social risk assessment.

Lastly, one of the major constraints to the implementation of the research was the consistently uneven management of incident recording/tracking documentation, along with lack of streamlined processes for recording impacts/loss. In the absence of clear and streamlined recording systems, both with respect to incident management, as well as with respect to tracking loss, all members of the research team spent considerable effort attempting to 'recreate' the incident. This especially applied to reproducing the institutional links that either enabled or constrained an effective response. This may have resulted in unintended misinterpretation of the information collected.

1.7 Structure of this Report

This report is structured in the following way:

Part I introduces the *background, conceptual framework and methods* used in this research.

Part II provides an overview of the *'biophysical' aspects of the disaster event*, specifically the meteorology, flood hydrology and land-use characteristics that contributed to its severity.

Part III examines *patterns of social vulnerability* and impacts in the officially declared disaster areas.

Part IV addresses the *institutional arrangements* and responses to the disaster incident.

Part V focuses on the *direct economic impacts* of the event by 'counting the costs'.

Part VI provides an *overall synthesis of the disaster event*, and makes *suggestions for future action*.

Accompanying appendices provide examples of *data collecting instruments* and summary tables, as well as a list of people contacted.

Part II: The March 2003 Cut-off Low: Extreme Weather,[8] Flood Hydrology[9] and Land-use[10]

2.1 Introduction

The scale, distribution and severity of the disaster losses were shaped in part by the powerful character of the weather system. Across the Western Cape, impacts also reflected the significant role of sudden riverine flooding and land-use patterns.

Part II examines the 'biophysical' characteristics of the March 2003 cut-off low, and is divided into six main parts:

Section 2.2 presents an overview of climatic history for the areas that were disaster-declared and its relationship to recorded rainfall in the 2003 cut-off low.

Section 2.3 describes the characteristics of the March 2003 cut-off low (including precipitation, wind and temperature outcomes) and areas that were directly affected.

Section 2.4 outlines the steps taken to disseminate early warning information by the South African Weather Service.

Section 2.5 details the flood hydrology of the weather event, including the severity of river flooding.

Section 2.6 discusses issues around changes in land-use, with specific reference to the Kogmanskloof Catchment.

2.2 Historical Climatology

2.2.1 Montagu and Swellendam/Breede River: Historic rainfall pattern compared

The Karoo is characterised as a dry, semi-arid region due to the small amounts of annual precipitation it receives. However, it has sustained a wide range of agricultural practices, including crop production, viticulture and sheep farming.

a) Montagu

Figure 2.2.1.1 depicts Montagu's rainfall pattern from 1883 to1995, provided by the KMNI website. It shows that rainfall above 60 mm/month occurs within the 95th percentile. Absent from this data range is March 2003, which has the record value of 241 mm/month, with 178 mm falling in a single day (23 March 2003).

[8] Suzanne Carter, Climate Systems Analysis Group, UCT.
[9] Dirk van Bladeren, SRK Consulting.
[10] Dan Rogatshnig and Peter Holmes, Dept of Environmental and Geographical Science, UCT.

Figure 2.2.1.1: Montagu's historical precipitation pattern

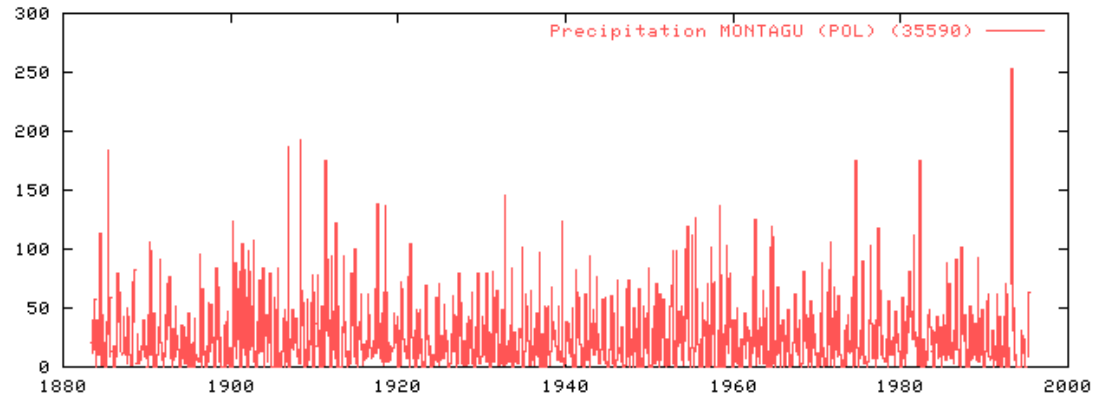
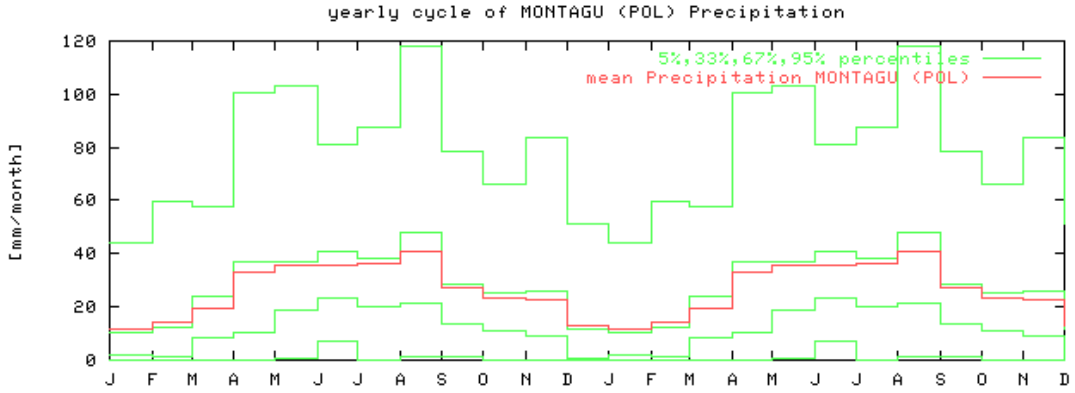
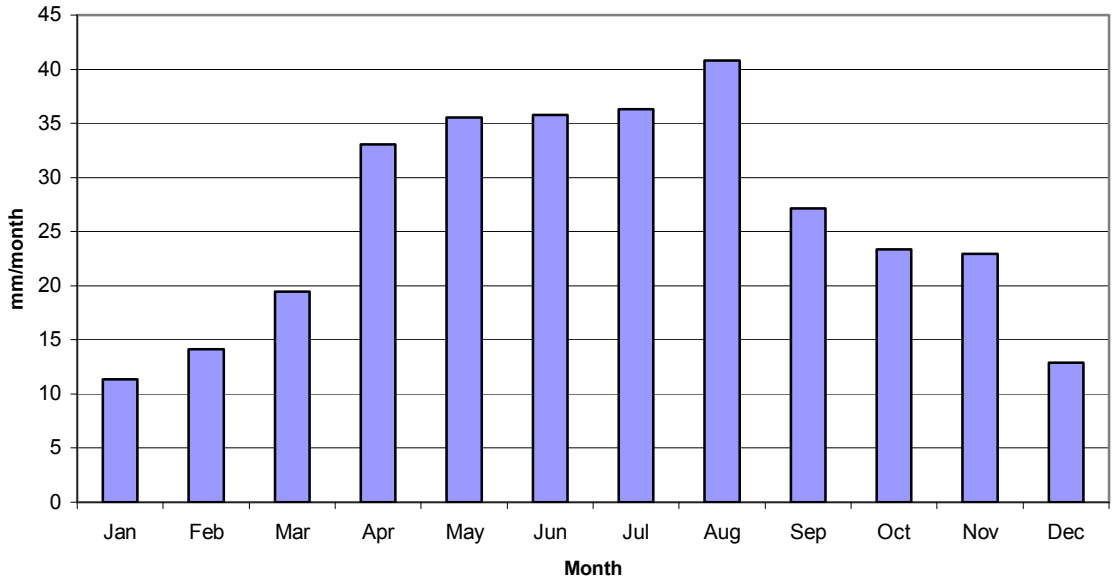


Figure 2.2.1.2: Montagu's mean precipitation pattern



From the SAWS rainfall station data for Montagu (1980–2003), there have been a number of other intense precipitation events (over 50 mm/day) in the recent past. There tends to be a recurrent April deluge of up to 80 mm/day, as seen in the record from 1980 to 2003. Rainfall of over 100 mm/month has occurred in August in 1981, April in 1982, 1987, 1993, and 1998, December 1995 and in March 2003. A similar event to the one in question occurred on 11/12 April 1993, when 144 mm fell over the two days (80 and 64 mm respectively). However, with respect to daily records, 23 March has the highest daily total of 178 mm for the 23-year reporting period. This indeed confirms its status as an extreme precipitation event.

Figure 2.2.1.3: Montagu's monthly average precipitation curve



From the monthly averages plotted above, we see that the average rainfall in March (1883–1995) is 19.43 mm/month. April indicates the start of the wet winter season, with a large increase in average monthly precipitation.

Figure 2.2.1.4: Montagu's March and April precipitation curves

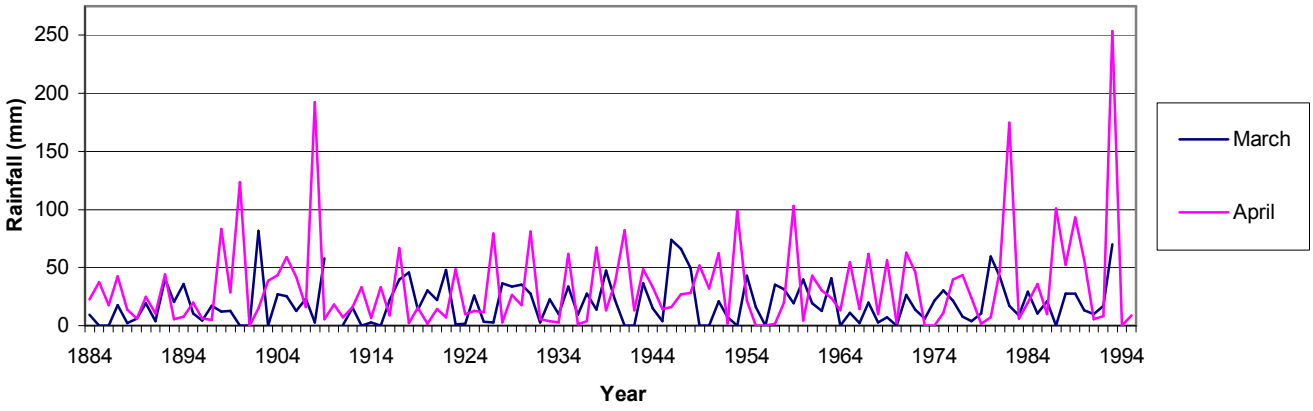


Figure 2.2.1.4 confirms that 1993 was a year with a similar pre-winter heavy precipitation event in the daily rainfall data set (1980–2003). Other March precipitation peaks of over 50 mm/month occurred in 1902, 1909, 1946, 1947 and 1980.

a) <u>Swellendam/Breede River</u>

Swellendam is situated further down the Breede River, where runoff effects may have been more important to consider than actual rainfall. As the average monthly rainfall is much greater in this area (70.9 mm is the March average), the vulnerability to flooding and storm damage was less there than for the upper reaches of the catchment.

Figure 2.2.1.5: Precipitation recorded at Swellendam

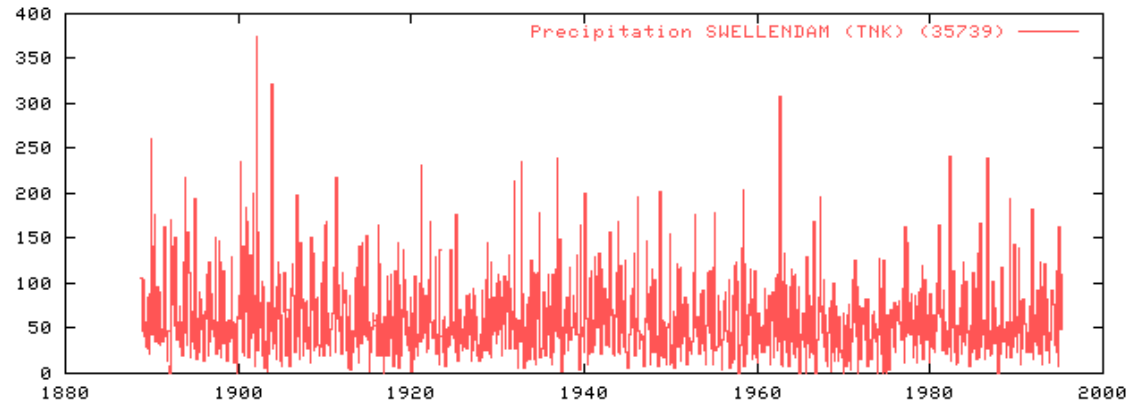
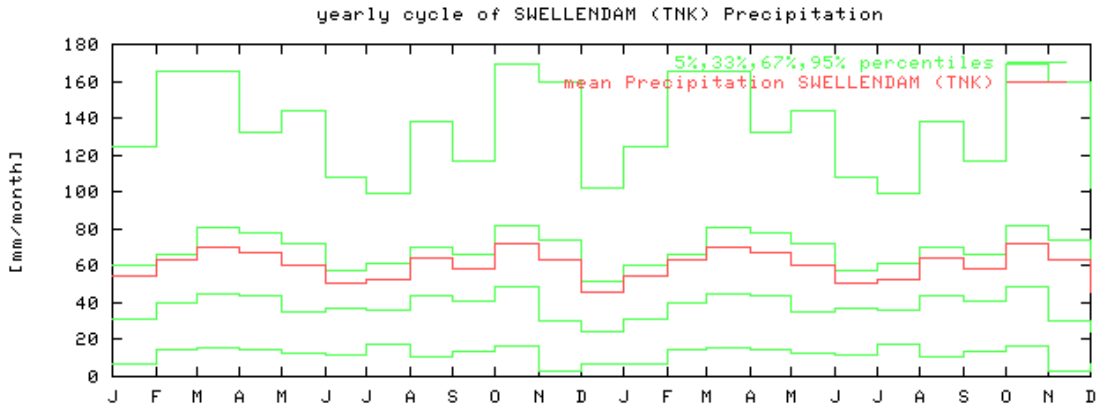
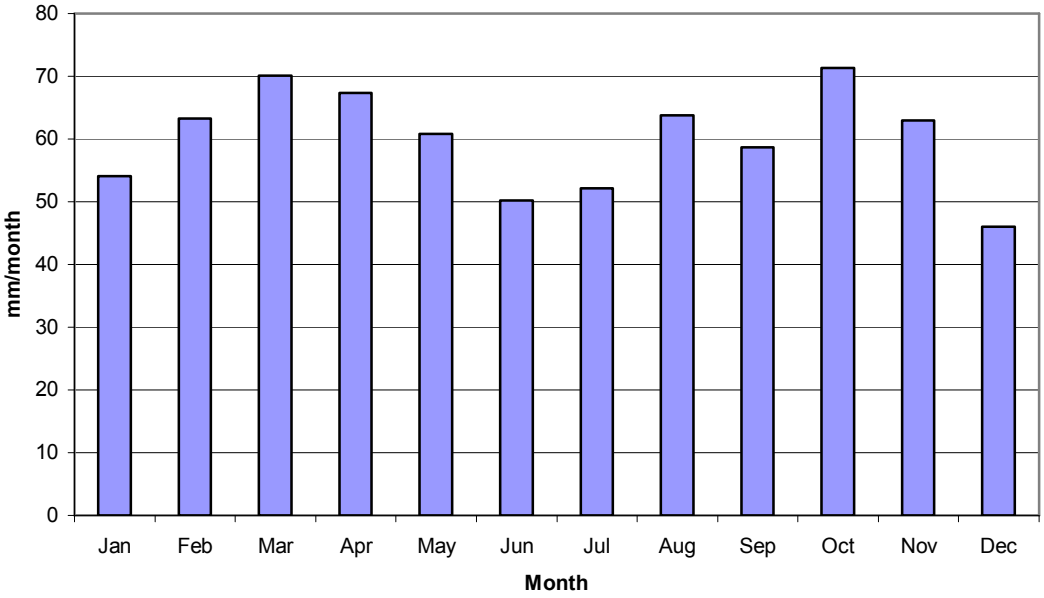


Figure 2.2.1.6: Swellendam's historical precipitation and mean precipitation pattern



The rainfall for the month of March 2003 was 191.2 mm, roughly 50 mm less than the Montagu station. In 2000, 205 mm fell in March, therefore this amount of rainfall is not as anomalously high as it would be in other areas. The Swellendam Bontebok Park Station received 184.5 mm during March 2003.

Figure 2.2.1.7: Swellendam's monthly average precipitation curve



From a comparison of Figures 2.2.1.3 and 2.2.1.7, it is apparent that Swellendam has a different dipole rainfall pattern[11] to Montagu, in which March is a wetter month than April (this indicates that Swellendam is possibly better adapted to heavy rainfall in March than is Montagu).

Ashton received a mere 86 mm of rainfall, although this value is the highest total for March in the last 23 years. Barrydale Kliendoornrivier Station received 170 mm. This monthly total is higher than any other month in the past 23 years.

All of the above-mentioned stations reflect the April 1993 heavy rains; therefore, it is likely that they are all affected in the same way by extreme precipitation events.

Table 2.2.1.1: Daily rainfall 22–25 March 2003 (mm)

Station name	22 March	23 March	24 March	25 March	Total
Montagu		178	60	3	241
Ashton		38	40.5	1.5	80
Barrydale	2	116.5	40.5		159
Swellendam	25.5	78.5	54	2	160

Other rainfall data comes from the dam rain gauges along the rivers. While Section 2.5 presents greater detail with respect to dam rain gauge recordings, the summary data below shows that 24 March was the wettest day associated with the extreme weather event. Although these figures are recorded for 24 March, most of this rain fell on the evening of 23 March, so was not included in 24 March's totals.

Table 2.2.1.2: Rain gauge measurements from selected dams (mm)

[11] There are two peaks in the annual rainfall curve.

Dam Rain Gauge	22 March	23 March	24 March	25 March	Total
Keisiedoorns on the Keisie river			180		180
Pietersfontein dam			120		120
Poortjieskloof dam			210		210
Keerom dam			150		150
Buffelsjags dam			71	64	135
Buffelsjags dam	17	105	200++	112	434++
Korinte Vet dam			116	68	184

2.2.2 Tracking and mapping recorded daily rainfall: 22–25 March 2003

While the Montagu-Ashton area of the Breede River/Winelands Municipality received exceptionally heavy rainfall, the cut-off low also produced large quantities of rain that fell in the Southern Cape and adjacent interior. To represent this information spatially for the Western Cape Province as a whole, the following method was used.

Daily rainfall data recorded at weather stations around the Western Cape for the period 22 March through to 25 March were converted to rainfall surfaces using the Spatial Analyst Tool (ArcGis & ArcVIew)[12]. Stations recording rainfall were included; those that did not record any rainfall on each day were excluded.

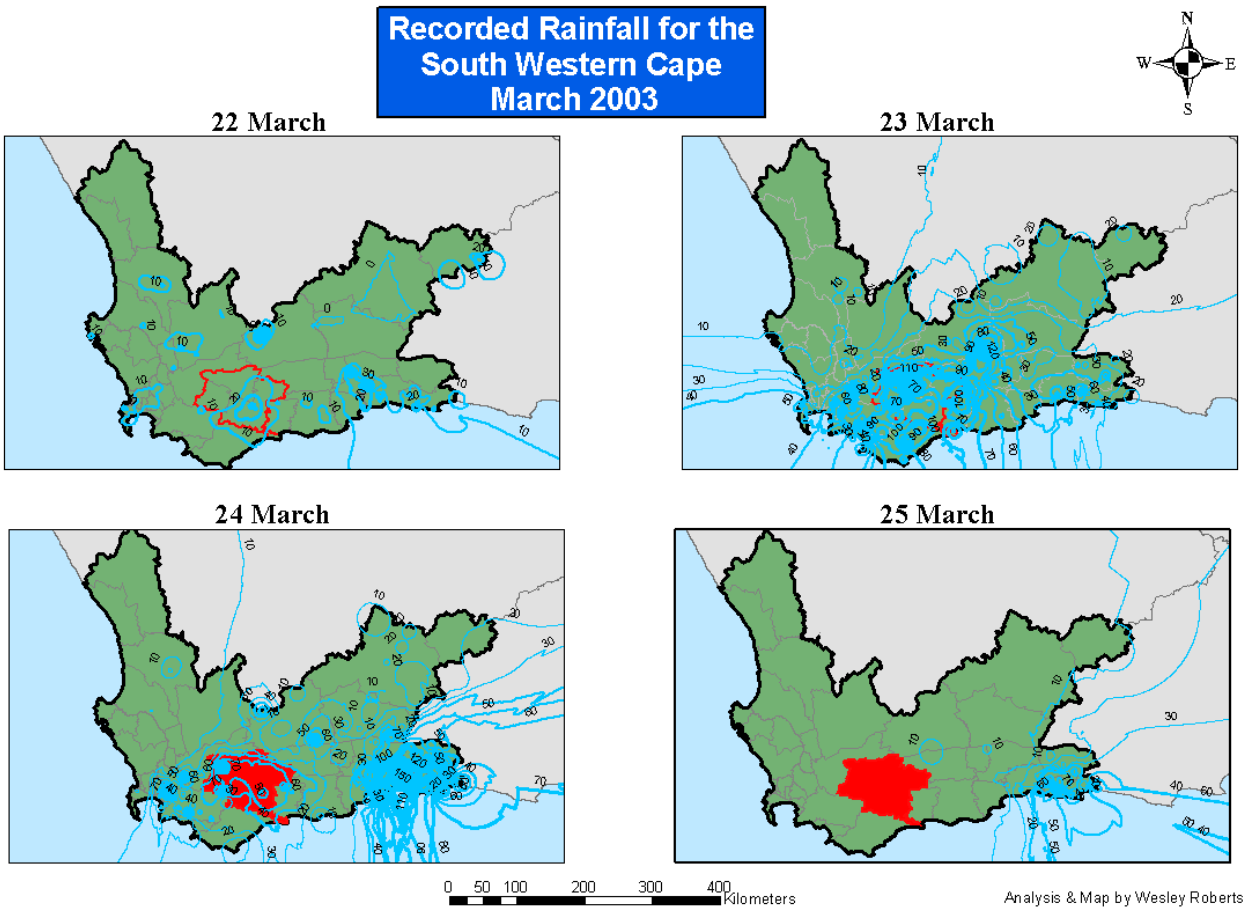
The rainfall surfaces were created using the Inverse Distance Weighted Method. This method implements the assumption that places/locations that are close to one another are more alike than those that are far apart. Those measured values closest to the predicted location will have more influence than those that are further away. Hence the name Inverse Distance Weighted. Default values and parameters were used.

Rainfall contours for each of the four days were then created from the daily rainfall surfaces. Contour intervals were set at 10 mm intervals. GIS data from ENPAT was used to create a map of the disaster area. Provinces of South Africa were included for contextual purposes. The Western Cape boundary and all magisterial districts were also included.

The declared disaster area, Swellendam, Montagu and Robertson were combined into one as they were declared the so-called disaster area. Rainfall contours were then added to the map using a graduated thickness symbology.

Figure 2.2.2.1: GIS analysis of precipitation event

[12] ArcGIS and ArcView Software are trademarks and copyrights of ESRI.



The four-day composite map (Figure 2.2.2.1) displays the disaster area in red and the rainfall contours (isohyets) in blue. The numbers in black represent daily rainfall for specific contours.

While these figures indicate that rainfall was concentrated over the declared disaster area on 23 March, heavy rains were experienced outside the declared disaster area on the 24 over Knysna and Sedgefield.

2.3 The March 2003 Cut-off Low: Detailed meteorological report

2.3.1 The extreme weather system: Onset, spatial extent, duration and severity

a) Onset, duration and spatial extent

On 23 and 24 March 2003, a strong and persistent cut-off low resulted in the flooding of the Montagu/Ashton area, in addition to multiple impacts from strong winds and very low temperatures. This report is intended to provide an overview of the synoptic forcing driving the event and the environmental conditions enhancing the effect.

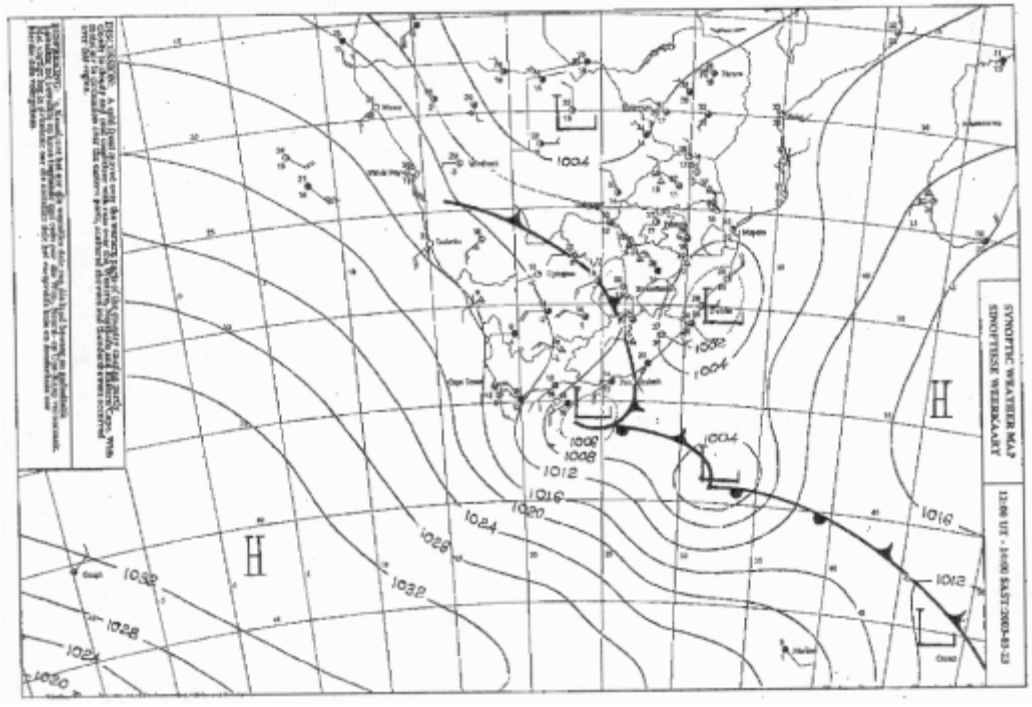
Definitions of a cut-off low:
"A closed low in the upper air supported by a low-pressure system on the surface" (SAWS report).
"A cold upper-level low that has become displaced out of the basic westerly flow of the jet stream. It usually lies to the south of the jet … creating a slow-moving area of unstable weather" (http://www.krdotv.com/WeatherDef.asp).
In simpler terms, circulation which becomes detached from the predominant flow/system, often resulting in heavy rainfall, gale-force winds and other severe weather.

From the synoptic charts (from SAWS) of the preceding week, it was evident that there was another less intense cut-off low a few days earlier, on the 18 and 19 March. A second cut-off low developed shortly afterwards moving slowly over the Cape South Coast and adjacent interior from 22 to 25 March. During this period, extensive flooding occurred, damaging much infrastructure.

On 21 March a large cold front moved towards South Africa. On 22 March the front crossed the South Coast and the low closed itself, or became a 'cut-off low'. A series of fronts then joined up with the cut-off low to the east. An extensive low-pressure trough had been developing over the interior during the same period, bringing moist tropical air further south.

On 23 March (Figure 2.3.1.1), the cut-off low intensified and record rainfall was recorded over much of the south coast and into the interior.

Figure 2.3.1.1: March 2003 – Synoptic chart showing surface weather conditions

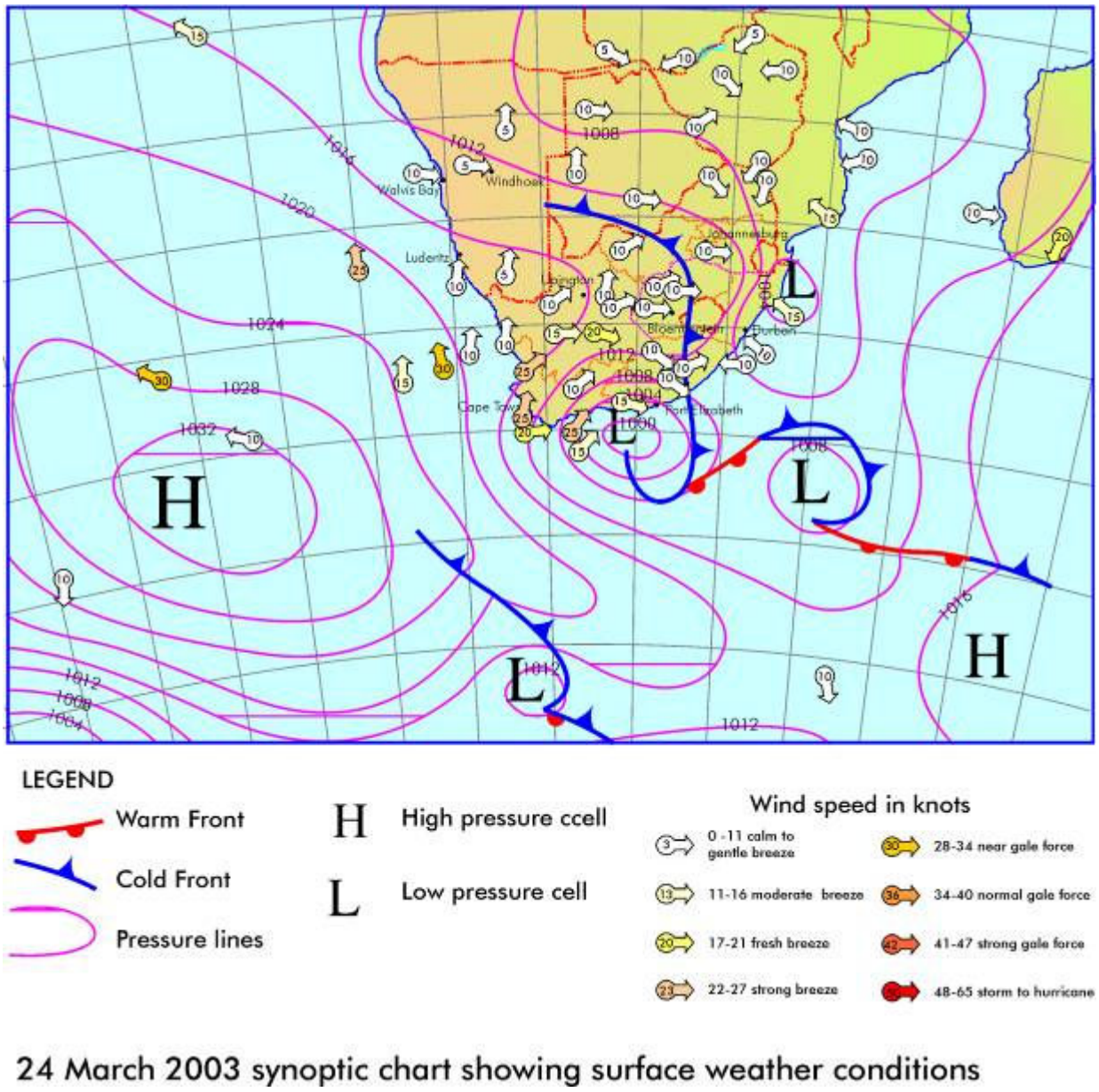


By 24 March (Figure 2.3.1.2), the low dropped in pressure to 1000hPa with strong cyclonic rotation. In the upper atmosphere at the 500hPa geopotential height[13] (Figure 2.3.1.3), the intensity of the low can be seen more clearly. The great concentration of the isobars,

[13] The 500hPa geopotential height map shows the synoptic forcing better than a surface map, due to less interference by surface processes.

indicating a strong gradient[14], is centred slightly offshore over the south coast border between the Western and Eastern Cape.

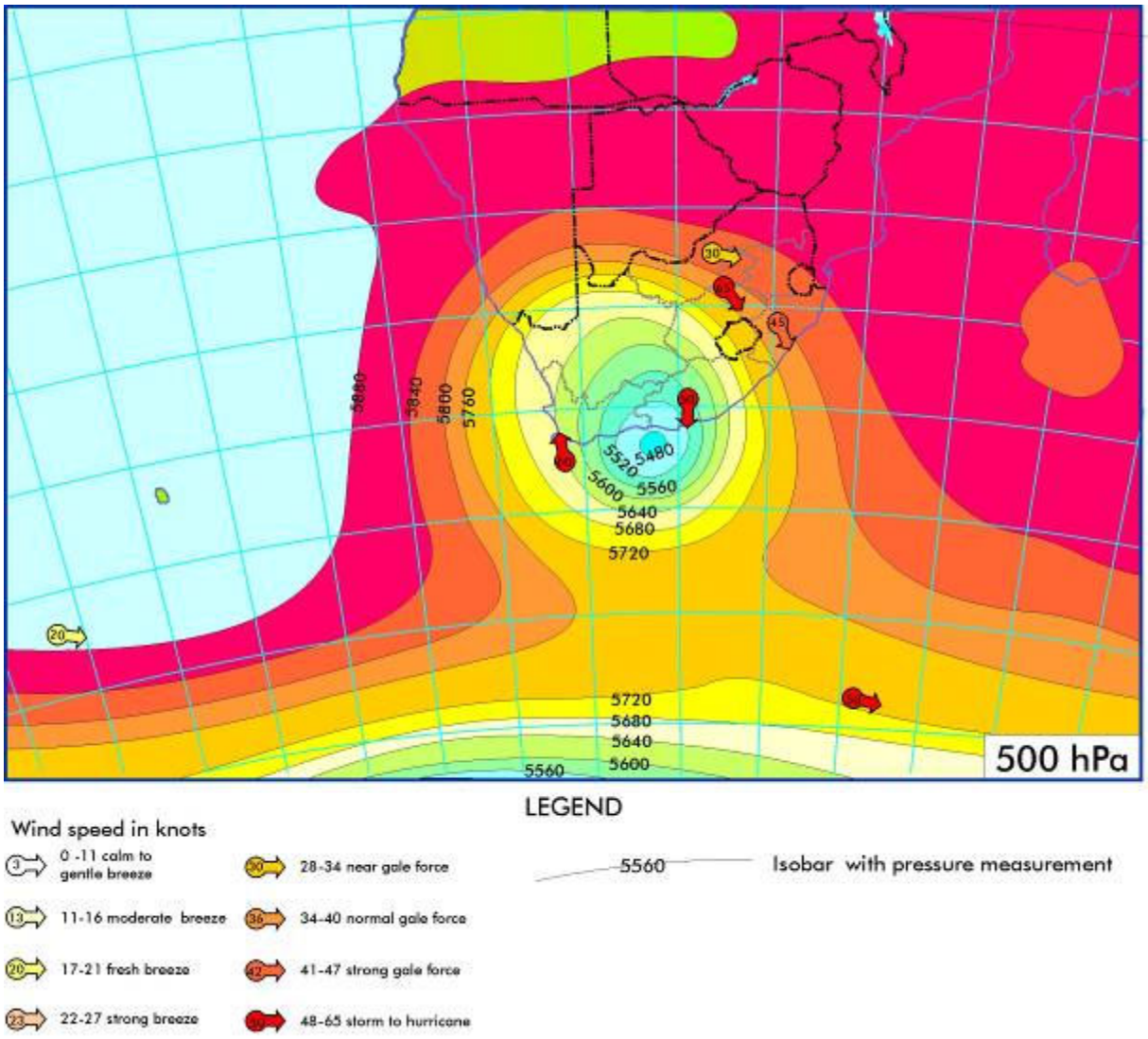
Figure 2.3.1.2: Synoptic chart showing surface weather conditions



24 March 2003 synoptic chart showing surface weather conditions

Figure 2.3.1.3: 24 March 2003 – 500hPa geopotential height

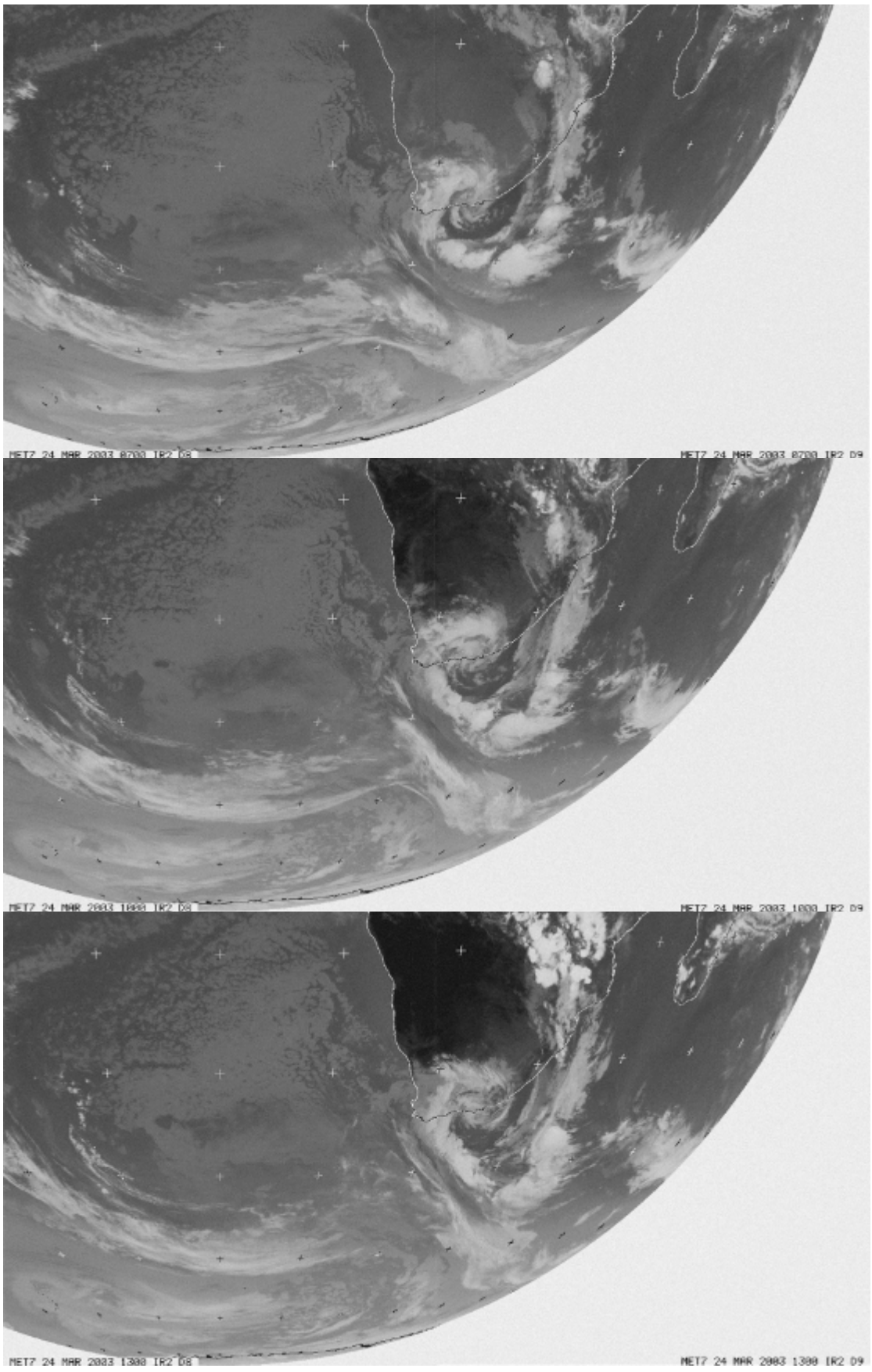
[14] This generally is associated with gale force winds and a very large difference in pressure between the centre and the outskirts of the low.



Upper air expression of Cut off low - 24 March 2003

The development of this powerful weather system is best represented by viewing infrared satellite images generated between 22 and 25 March 2003. Figures 2.3.1.4–2.3.1.6 depict the storms' formation during some of the heaviest rains. The size of the system is approximately 800 km in diameter.

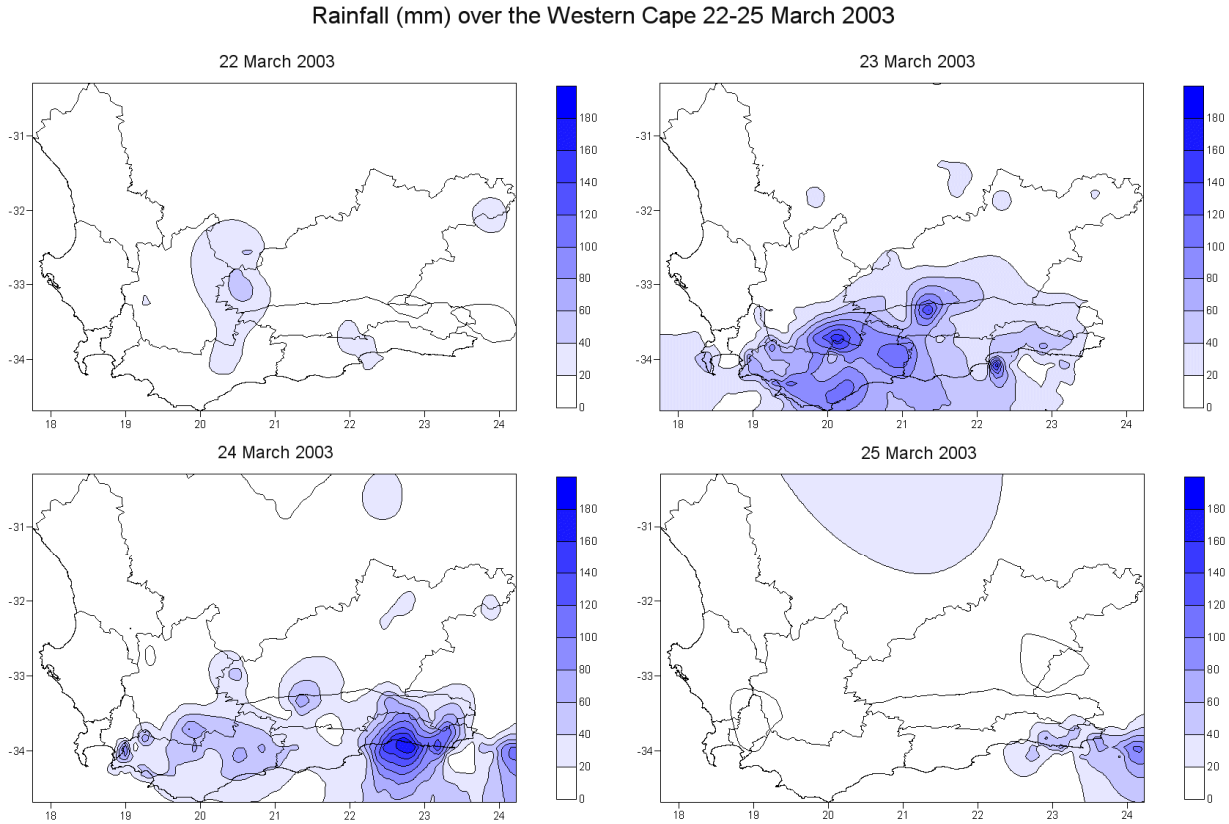
Figures 2.3.1.4–2.3.1.6: Satellite images of the cut-off low on 24 March 2003 (07:00, 10:00 and 13:00)


MET7 24 MAR 2003 0700 IR2 D8
MET7 24 MAR 2003 0700 IR2 D9
MET7 24 MAR 2003 1000 IR2 D8
MET7 24 MAR 2003 1000 IR2 D9
MET7 24 MAR 2003 1300 IR2 D8
MET7 24 MAR 2003 1300 IR2 D9

From 24 March, a 'ridging high'[15] began developing in the South Atlantic which eventually moved the stationary cut-off low into the Indian Ocean by 26 March.

Daily rainfall totals from all the stations in an area were collected and then, by joining areas with the same amount of rain, an isohyet map was generated (Figure 2.3.1.7). From these maps we can spatially determine the areas receiving the most rainfall. Progression of the system is then plotted each day – showing the changed location of rainfall and the changing intensity. The map of 23 March depicts peak intensity of rain over the declared disaster area and in patches to the east of it. By 24 March it had shifted to the south coast, centred over Knysna and Sedgefield. By 25 March the system had moved into the Eastern Cape.

Figure 2.3.1.7: Isohyets map of flood event



b) Intensity/severity of the weather system

Areas most critically affected were those where the effect of topographical uplift caused intensive orographic rainfall.[16] Steeper slopes also experienced increased runoff, in addition to the heavier rainfall. The Ashton/Montagu area was one of the most vulnerable to the combined effects of heavy rain and mountain runoff.

Extremely cold temperatures were responsible for much crop damage. The Eastern Cape was affected on 22 March, when the cut-off low passed over this area. The high ridging in after the cut-off low was responsible for the influx of cold polar air, which resulted in uncharacteristically low minimum temperatures.

[15] The term used to describe a high pressure cells' movement as it comes in behind a low.
[16] Rainfall is always more intense on the windward side of the mountain. This is called the 'orographic effect'.

‘Port Elizabeth experienced the coldest minimum for the month of March, overnight on the 23/24 March 2003. At 02h23 this morning (24th), the mercury dropped to 5.9 °C. The previous record was 7.0 °C, measured on the 12th March 1962. The closest other March minimum temperature, was 7.5 °C, which occurred on the 25th March 1963.’ (Garth Sampson, SAWS)

The Climate System Analysis Group (CSAG) provided analysed data for the pressure fields in the upper atmosphere, winds, surface temperature, moisture flux and divergence. These were derived from the Medium Range Forecast (MRF) data sets produced by National Centres for Environmental Prediction (NCEP) in the USA. Although these are forecast values, they have been seen to be fairly accurate. The resolution of this data set is 1° x 1° grid cells. The spatially interpolated plots from MRF data can be more helpful than the point values available from weather stations and balloon ascents in determining overall synoptic patterns. Plots of the March 2003 average, the event average (23–25 March 2003) and the anomaly between these were created to gauge the intensity of the event. Specific attention was given to those characteristics of the weather system likely to trigger significant impacts in the study area. These included:

- Geopotential heights (pressure).
- Surface temperatures.
- Wind speed and direction.
- Moisture flux.
- Divergence.

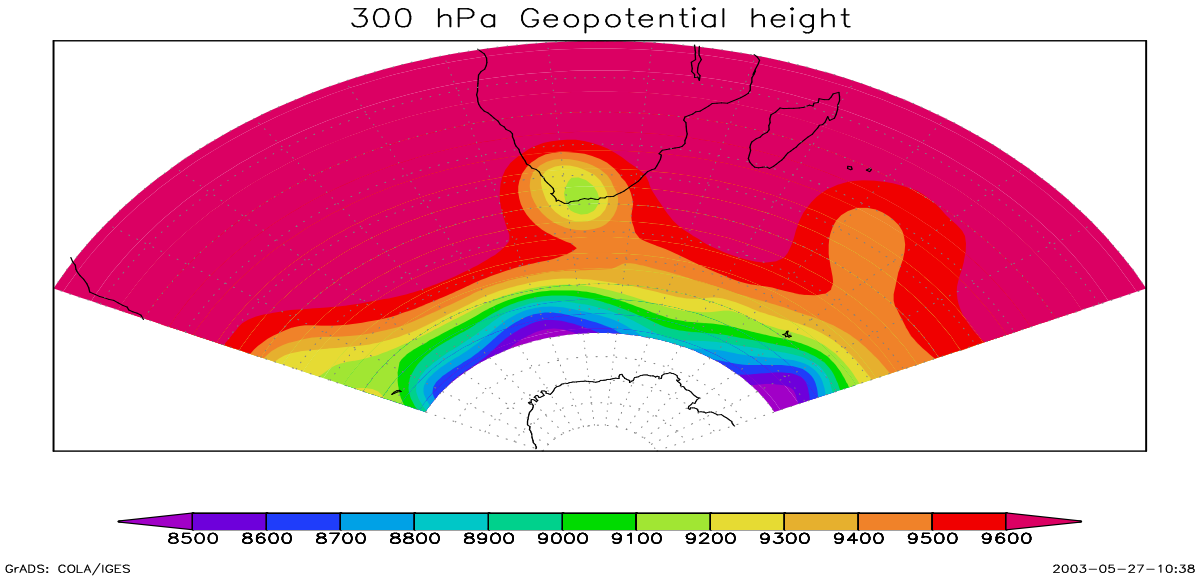
Geopotential heights

The upper atmosphere 500hPa level demonstrates a characteristic cut-off low. The pressure gradient is very strong, inducing instability in the system. There is also an expression of surface lows, as would be expected.

Figure 2.3.1.8 shows the 300hPa geopotential height for midnight 23 March. The jet stream is depicted to the south and the cut-off low is pinched off from it. The jet stream is ‘a narrow current of high-speed winds, typically thousands of kilometres long, hundreds of kilometres in width, and a few kilometres in depth, that occurs in the upper troposphere and lower stratosphere’.[17] Winds must have a speed of at least 25–30 metres/second to be considered as part of a jet stream. A cut -ff low is therefore only visible in the upper atmosphere where it is disconnected from the jet stream. The 300hPa level is near the top of the troposphere, and therefore captures the jet stream activity well.

Figure 2.3.1.8: Midnight 23 March 2003

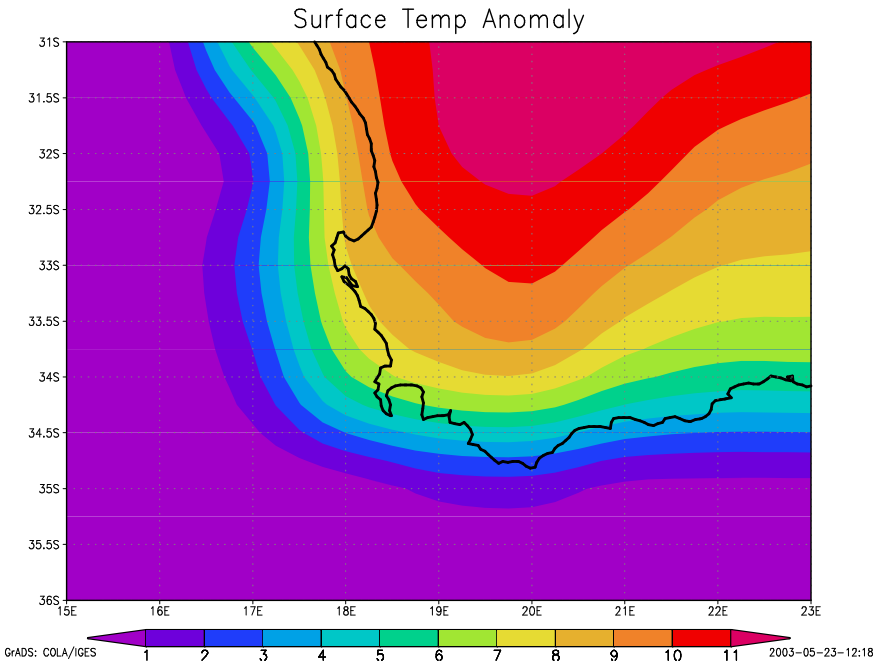
[17] Dunlop, S. (2001) *Oxford Dictionary of Weather.* Oxford University Press.



Surface temperatures

Many of the losses to agriculture were the result of the severe decrease in temperature. The interior experiences greater decreases in temperature – probably related to continentality effects (coastal areas have fewer extremes due to amelioration by the ocean).

Figure 2.3.1.9: Temperature anomaly for 23–25 March 2003

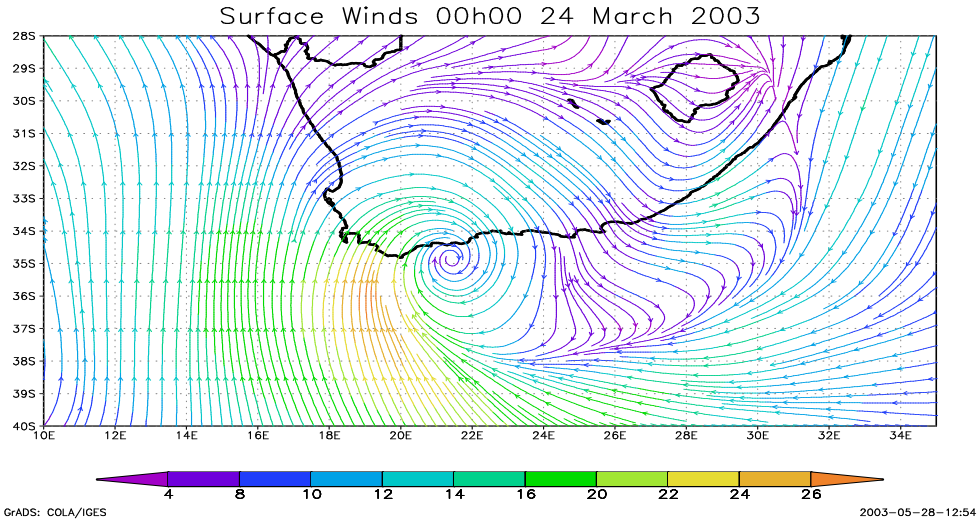


The anomaly (Figure 2.3.1.9) is such that higher numbers indicate greater difference between monthly average and event. Therefore, over the Montagu area there was a 6ºC drop in daily average temperature. On the night of 23/24 March the surface temperature over Montagu was roughly 10ºC.

Winds

Wind damage resulted from the gale-force winds associated with the system. Winds of up to 23.8 ms^{-1} (Figure 2.3.1.10) came in from the southwest, hitting the Cape south coast. The centre of the low was situated below the border between the Western and Eastern Cape.

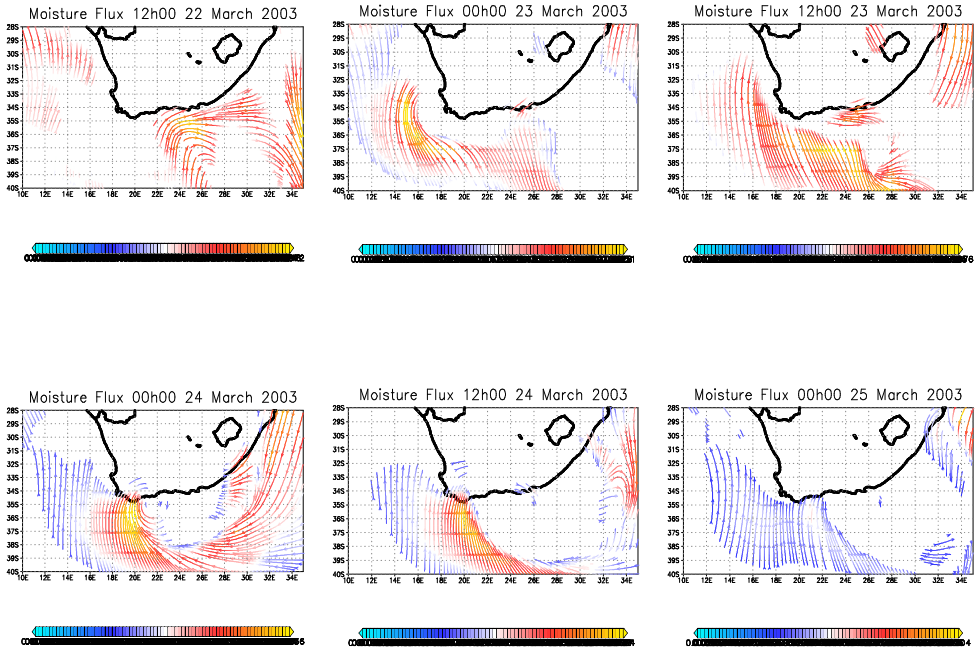
Figure 2.3.1.10: Surface winds at point of maximum intensity



Moisture flux

During the period of the event (defined as 23–25 March 2003) double the amount of moisture entered the system compared with the monthly average (Figure 2.3.1.11). The specific humidity was recorded at 2 m above surface, therefore this is the near surface moisture transport. The colour bar refers to the moisture (highest values in red) and the arrows denote speed (the longer the arrow, the faster the wind) and direction. The moisture is brought to the coast and then falls as rain. Arrows on the interior are in blue meaning that they have little moisture in them and move at slower speeds off the interior once they have released rains.

Figure 2.3.1.11: Moisture transport during the event

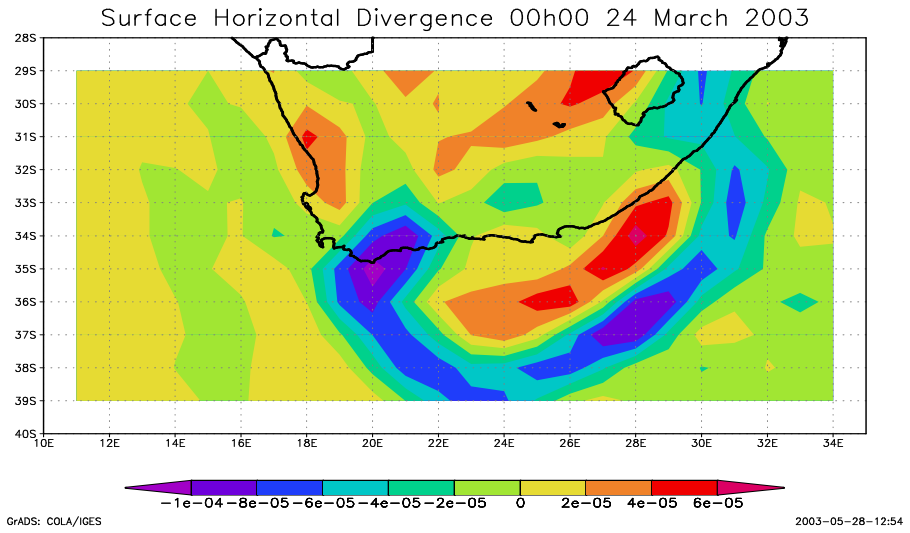


Divergence

At the surface there was much convergence[18] of air, which caused it to rise. This is one of the prerequisites for rain, the other being presence of moisture (confirmed by moisture flux). Figure 2.3.1.12 shows convergence concentrated off the Agulhas coast. Along the southeast of South Africa the squall line can also be seen to show major convergence of air.

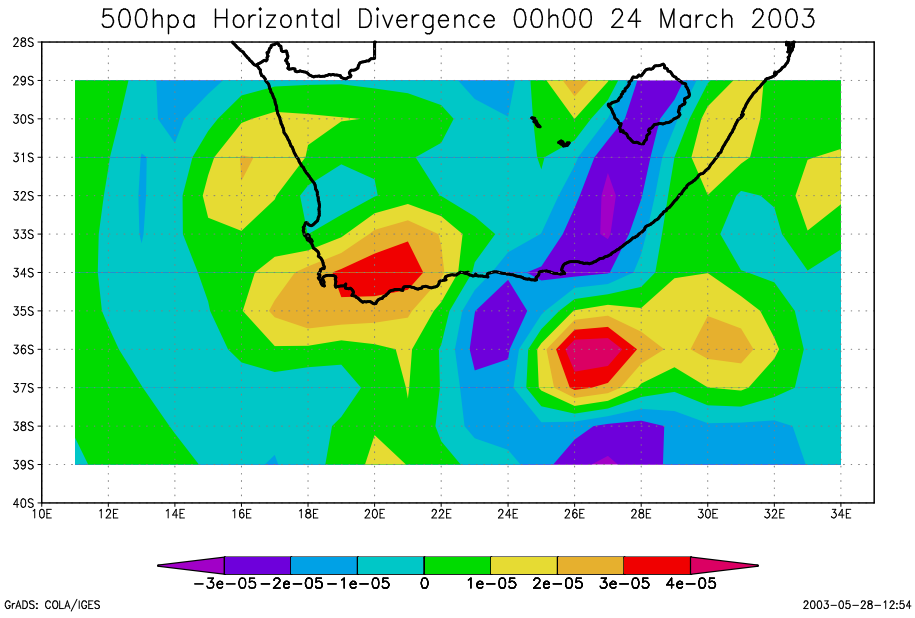
[18] Convergence refers to the accumulation of mass (in this case, air) resulting in vertical motion.

Figure 2.3.1.12: Surface divergence at peak intensity



In the upper air (500hPa), shown in Figure 2.3.1.13, there is divergence[19] of air (positive values) strengthening the surface convergence process and perpetuating the system. The displacement of the divergence slightly east of the surface expression of convergence is due to upper level movement being faster than surface movement.

Figure 2.3.1.13: Upper air divergence at peak intensity



[19] Divergence refers to the dispersion of mass, resulting in horizontal movement of the air.

Analysis of the variables presented above confirms that the extreme event occurring on 23/24 March 2003 was indeed due to a severe cut-off low.

This powerful system triggered significant decreases in daily average temperature and gale-force winds, as well as considerable localised precipitation and flooding. The impacts that followed are further described in Section 2.5 and Parts III and V.

2.4 Severe Weather Warnings: Information Dissemination

The South African Weather Service (SAWS) is responsible for the production and dissemination of severe weather warnings. Forecasters determine the probability of the onset of the severe weather system and attempt to determine what impacts this will have in terms of rainfall, winds, ocean swells and other outcomes. These warnings are disseminated by both the Pretoria Head Office and the local Weather Office (in this case-study, the Cape Town Weather Office).

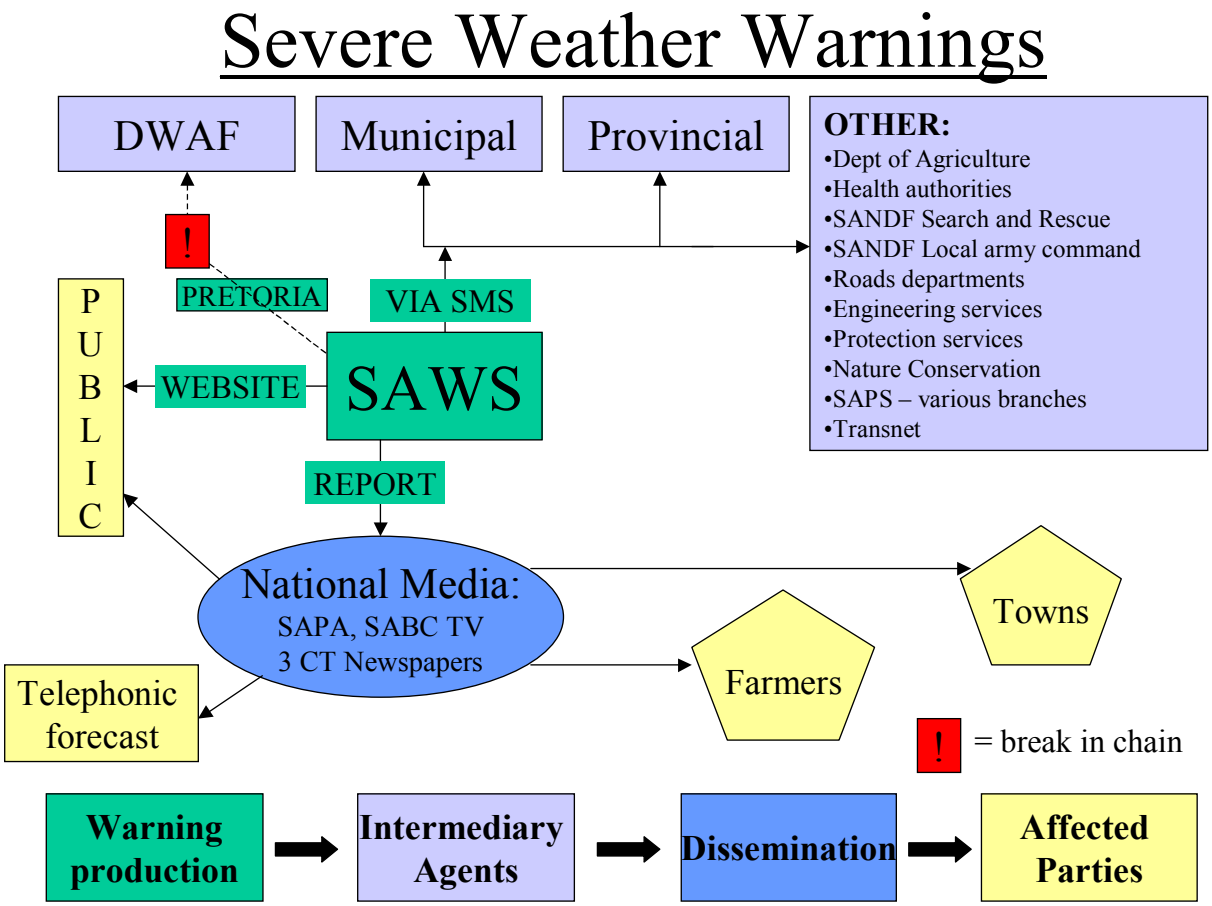
2.4.1 The role of the Cape Town Weather Office

With respect to the severe weather event of 23/24 March 2003, it was determined that a particularly severe cut-off low was likely to develop off the Cape south coast. As a long weekend was approaching, an advisory report (Appendix B) was placed on the SAWS web page on Thursday 20 March. It was also released for the local media, SABC TV and three of Cape Town's leading newspapers, advising holidaymakers to be prepared for bad weather. The advisory was then upgraded to an official warning on the 22 March (Saturday) at which point a number of provincial, municipal and other essential services were contacted in the form of a short messaging service or 'sms' (Appendix B).

Once again, this was disseminated to the media, in this instance as a warning message. The first and subsequent warnings and advisories are contained in Appendix B. The operations of warning production and dissemination are summarised in the schematic chart below (Figure 2.4.1).[20]

[20] The Cape Town Weather Office is eager to receive feedback from users of its forecasts and warnings in the hope of improving these. The Weather Office has expressed interest in participating in provincial/municipal debriefing sessions after events like the March 2003 cut-off low.

Figure 2.4.1: Flow of severe weather warnings from the South African Weather Service



2.4.2 The role of the National Weather Office in Pretoria

The Pretoria SAWS office disseminates its own warnings at the national level. The organisations contacted include the Department of Water Affairs and Forestry (DWAF), Eskom, Telkom, Cellular networks and other lifeline services. The method of contact is via the SAWS computer network, which downloads forecasts directly to DWAF. However, SAWS recently identified a problem with downloading these messages. With respect to the cut-off low that triggered heavy rains and subsequent flooding, a download flood warning was sent to DWAF on Saturday 22 March, outlining the expected rainfall's timing, duration and amount.[21] However, it was not confirmed whether this download was successful. The Pretoria office also disseminated targeted e-mails to specific individuals in key organisations. However, the details of this list were unknown when this report was compiled. Efforts are currently underway at SAWS to introduce an improved system that monitors and tracks these e-mailed messages. Telephonic warnings were also available via the public helpline phone number.

The general public and other affected parties rely on the national media and the response of the intermediary agencies to be notified of the risks a severe weather event poses.

[21] Personal communication, Mnikeli Ndabambi.

2.4.3 Suggestions for strengthening disseminating warning information

The comprehensive nature of the meteorological component of this report reflects the interest and support of the Cape Town Weather Office in this research initiative. There is a strong willingness to improve the quality and accessibility of the weather warnings issued.

There is a pressing need to *simplify the messages* to increase understanding and emphasise likely impacts rather than weather characteristics. The weather warnings sent out by SAWS are full of jargon (or inaccessible language), which can make them difficult to understand for some end users who have non-specialist backgrounds. Perhaps the emphasis of such messages should be impact related (e.g. the possibility of flooding, wind damage, etc.) instead of just describing details of the weather event itself.

This case-study suggest that it is necessary to revisit the tone, content and method of communication for *severe warnings, so that they contain a greater sense of urgency*. The tone of the sms message is perhaps not of sufficient urgency to induce responses from recipients. A personal phone call can communicate the severity of the situation to those in a position to bring about a response. A list of five key players for disaster management could be contacted rather than mass communication by sms. Although an sms message is a very efficient method of disseminating information, perhaps it is more appropriate to also make key phone calls to municipal managers of affected areas, with the expectation that they in turn should communicate the message to their colleagues. Accountability for response to weather warnings should also be explicit.

In this context, there may be real value in introducing a 'code' system to highlight different *levels of potential danger*. End users have also commented that they receive so many warnings that do not affect them, that they tend to discard the message. A code of severity for the warning (e.g. low, moderate, high likelihood of risk) would help to inform end users of the 'threat factor'.

Based on the March 2003 cut-off low, the following five measures are recommended to strengthen the effectiveness of weather warning dissemination:

- *Simplify the messages* to increase understanding and emphasise likely impacts rather than weather characteristics.
- Revisit the tone, content and method of communication for severe warnings, so that they contain a *greater sense of urgency*.
- Consider introducing a *'code' system* to highlight different levels of potential weather-induced danger.
- In the event of a severe weather warning, consider personal phone calls to say five *individuals responsible for key decision-making*, in addition to more focused communication by sms.
- *Actively involve representatives of the Cape Town Weather Office* in debriefing sessions related to the March cut-off low and subsequent disaster management planning consultations.

2.5 Flood Hydrology and Hydraulics

2.5.1 Introduction

The heavy rainfall that accompanied the cut-off low as it moved across the Western Cape resulted in several rivers experiencing record floods. Flooding recorded for the Kingna, Kogmanskloof, Boesmans, Buffelsjags, Duiwenhoks, Brand and Touws rivers had return periods greater than 20 years. The extreme flood event experienced on the Touws River was however due to the breaching of the 80-year-old Bellair Dam.

Damage to infrastructure was severe and several bridges and roads were washed away. Areas adjacent to the Kingna River in Montagu were flooded in an event that may be considered the largest since 1906.

However, river flooding is not a rare event in this area of the Western Cape. Historical flood events similar to the March 2003 event, as reported by Kovacs (1983), Du Plessis (1984) and Van Bladeren (2000) also occurred in the years listed in Table 2.5.1. [22]

Table 2.5.1: Recorded flood events in this area of the Western Cape, 1867–1996

Date	Area affected
October 1867	The area between Swellendam and Port Elizabeth. The Gamtoos river rose by 70 feet
May 1885	Severe flooding in Outshoorn and the Gourits river
September–October 1905	Severe flooding for the whole period from Hermanus to East London and into the interior
May 1916	South Western Cape interior
June–July 1921	Western Cape including the Breede and Berg rivers
June 1925	Western Cape (same as 1921)
June–July 1941 & 1942	Western Cape (same as 1921)
May 1954	Western Cape and Little Karoo
January, March, April and May 1981	The January flooding is referred to as the 'Laingsburg floods'
June 1991	Breede river in flood
July 1993	Flooding in the Western Cape
October and November 1996	Flooding in the Western Cape (October) and south coast rivers and interior in November

[22] Kovacs, Z.P.; Documentation of the January 1981 Floods in the South Western Cape. TR 116. Department of Environmental Affairs (DWAF), Pretoria, 1983.
Du Plessis, D.B.; Documentation of the March-May 1981 Floods in the South Eastern Cape. TR 120. Department of Water Affairs (DWAF), Pretoria, July 1984.
Van Bladeren, D.; Flood Event Database for the Western Cape. Report for the Department of Water Affairs – Western Cape Region. SRK Consulting, report no. 283742, 2000.

The above events are only a small fraction of the number of floods that have impacted on the Western Cape.[23] It is clear from these events that flood risk is a recurrent concern in this area.

As much of the infrastructural damage associated with the cut-off low was the result of severe flooding in the Boland, Overberg and Eden Districts of the Western Cape, this section will focus on the hydrology and hydraulics of the March 2003 floods. It will also discuss selected flood impacts. This will be addressed in the following seven sections.

Section 2.5.2 describes the field research methods used.

Section 2.5.3 describes methods used for estimating flood peaks.

Section 2.5.4 provides information on flood frequencies (return intervals) for 40 sites in the Western Cape, including information on the March 2003 flood event.

Section 2.5.5 interprets flood peaks and frequencies for key catchments affected by the March 2003 flood event.

Section 2.5.6 provides information on flood volumes and hydrographs.

Section 2.5.7 presents general observations on the impact of the flood event.

Section 2.5.8 provides conclusions and recommendations related to the flood hydrology of this area.

2.5.2 Field research methods

Field research consisted of gathering data from DWAF regional offices in George, Worcester and Bellville. Further information regarding gauging stations and dams was obtained from the Directorate of Hydrology in Pretoria. A field visit to the Montagu area also took place.

The data gathered included the gauge heights recorded at DWAF flow gauging stations and dams. Two slope-area sites for indirect discharge estimations were also identified on the Kingna River just upstream from Montagu and on the Kogmanskloof River at Loftus bridge. Flood levels were also surveyed at the railway bridge at Ashton to provide comparisons with the 1981 flood. DWAF has surveyed the sites with the results to be available later.

2.5.3 Statistical analysis of flood peaks

The estimation of flood peaks is important in that it provides information regarding the *impact of the flood event* (scale) and, if analysed statistically, also information regarding the probability of a specific flood peak. This is usually described as *the return period*. This section will briefly describe the methods used to determine flood peaks and the method used to assign the return period to each flood peak. The results from this event are compared with previous events.

Flood peaks were estimated using the following methods:

- *Gauging stations*. The flood peaks at gauging stations were determined using the gauging station discharge table and the recorded flood levels for the gauging station.

[23] A severe flood in the area in June/July 1822 resulted in aid being allocated of 300 000 pounds.

The flood levels at several sites, however, exceeded the limits of the discharge tables and indirect methods were applied to extend the tables. These included using previous indirect estimates such as slope area methods (described below), log-log extensions of the discharge table where the excendence was not too large, or by applying the Chezy equation to cross-section data contained in the calibration or correspondence files of the gauging station held by DWAF in Pretoria.

- *Dams*. The dam level was related to the spillway level and the discharge table for the dam spillway. This provides the outflow peak if the dam spilled. To determine the actual inflow peak into the dam, the capacity tables needed to be obtained. These, together with the time stage record during the event, were used to determine the inflow peak. The method that will be applied is referred to as level pool routing. No routings have been done to date.

- *Slope-area methods*. This method uses the sections and flood levels surveyed after the event to estimate the peak discharge using both uniform and gradually varied flow. These surveys are still outstanding.

- *Bridge contraction*. This method uses the afflux of the water level upstream of a bridge, the bridge and channel geometry to calculate flow. The rail bridge at Ashton would be a good example.

Current data for 40 sites are presented and summarised in Table 2.5.4.

2.5.4 Flood frequencies (return period)

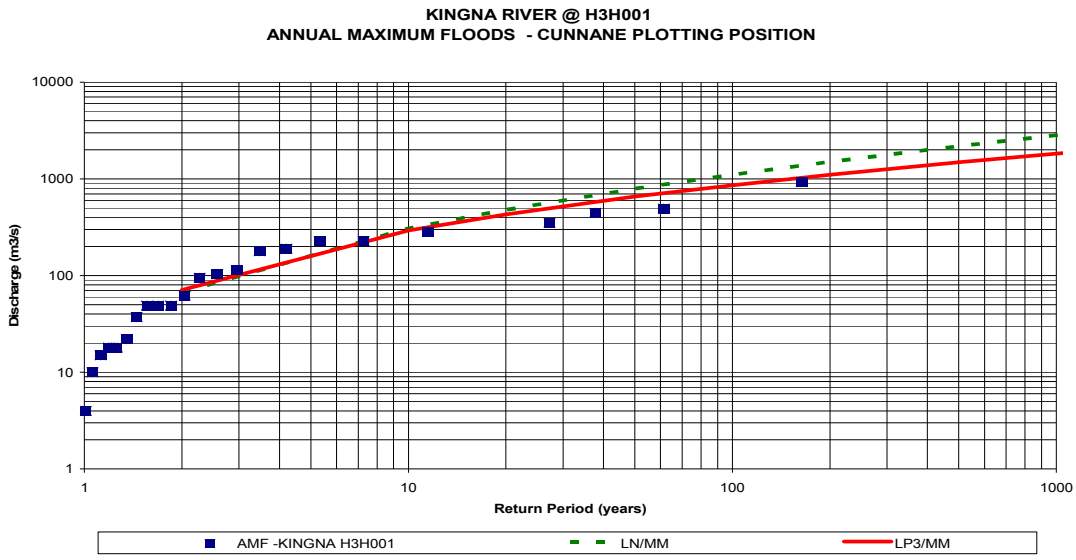
The return period was estimated using the station records of annual maximum floods. In some instances the records of stations that have been closed were added and merged with sites currently open. The analysis was done using the REGFLOOD programme (Alexander)[24] and the distributions used were the Log-Normal and/or the Log-Pearson Type 3. Due to time constraints and no additional data, the return period for the event at Bellair Dam was estimated using the RMF method (Kovacs).[25] This method is conservative considering that the flood is the largest recorded in the 80-year record at the dam.

The results for the event are shown in Table 2.5.4. Return periods are provided in the range between 2-, 5-, 10-, 20-, 50-, 100- and 200-year flood. Should a peak however be close enough to a specific return period, that return period is adopted. The 2-year flood relates to a 50% probability of the estimated flood occurring in any one year, 10-year flood to a 10% probability, etc.

The probability plot (using log-log scales) for the Kingna River (H3H001) in Montagu, shown in Figure 2.5.4.1, illustrates the application of the methods. The 2003 flood is plotted at 164-year using the Cunnane plotting position. Using the LP3 distribution the return period is estimated at between 100 and 200 years. The LN estimates the return period between 50 and 100 years. The flood was thus assigned a return period between 50 and 100 years.

[24] Alexander, WJR (1990) *Flood Hydrology for Southern Africa*. SANCOLD, Pretoria.
[25] Kovacs, Z (1988) *Regional Maximum Flood Peaks in Southern Africa*. TR 137. Department of Water Affairs, Pretoria.

Figure 2.5.4.1



Other information provided in Table 2.5.4 includes:

- Gauging station number. For example, H3H011, Kogmanskloof River gauging station. H3 refers to the drainage region, H refers to the type of gauging which is a river flow gauging station in this instance (for a dam the H would be replaced by a R and at a flood site such as slope area sites or bridge this is an F) and 011 is a number assigned to the site between 001 to 999.
- River name, as provided by DWAF.
- Catchment area in square kilometres.
- Gauge height in metres above the structure low notch or gauge zero. For dams this is the water level in the dam. At slope area sites the figure will be negative and indicates the water stage rise above the river bed.
- Date of the peak.
- Time of the peak.
- Previous maximum flood peaks and year of occurrence.

Table 2.5.4

Table 2.5.4 Summary of Flood Data – March 2003 Western Cape Floods

No.	Site	River	Place	Catchment Area (km2)	GH (m)	Method	Discharge (m3/s)	Date	Time	Return Period (years)	Previous Max	Notes
1	H3H005	Keisie	Keisiedoorns	76	1.93	G	36	24/03/2003	12:36:00	5	120 (1981)	Rainfall 180mm (24/3).
2	H3R002	Pietersfontein	Pietersfontein dam	116	15.86	D	0	27/03/2003	11:00:00		667 (1981)	Rainfall 120mm (24/3). Dam did not spill.
3	H3R001	Groot	Poortjieskloof dam	94	22.34	D	58	25/03/2003	02:30:00		100 (1962)	Rainfall 210mm (24/3). The dam was empty before the flood event.
4	H3H001	Kingna	Montagu	593		SA, G	920	24/03/2003		50-100	445 (1934)	Flood peak is provisional estimate. Awaiting final levels.
5	H3F001	Kogmanskloof	"Loftus" bridge	1001		SA, B	1330	24/03/2003		20-50	1460(1981)	Slope-area and bridge site. Estimate is provisional based on estimate at railbridge and 1981 flood characteristic. Awaiting results of survey.
6	H3H011	Kogmanskloof	Goudmyn	1201	4.30	B	1100	24/03/2003	10:36:00	20-50	1210 (1981)	Weir out flanked on both sides. Flood peak estimated at railway bridge upstream. The flood level was 0.6m above the soffit level of the bridge (1981 was 1.03m).
7	H4H015	Houtbaais	Schufberg	25	1.43	G	55	24/03/2003	11:05:00	20	59 (1993)	
8	H4R003	Konings	Klipberg dam	54	17.53	D		24/03/2003	20:00:00			
9	H4H016	Keisers	Vrolykheid	117	2.70	G	113	24/03/2003	10:48:00	20	102 (1983)	
10	H4H018	Poesjesnels	Le Chasseur	237	2.20	G	115	25/03/2003	15:36:00	10	237 (1981)	
11	H4H019	Vink	De Gorree	204	1.58	G	38	24/03/2003	14:00:00	5	29 (1998)	
12	H4R002	Nuy	Keerom dam	377	26.76	D	119	25/03/2003	00:30:00			Rainfall 150mm (24/3)
13	H4H020	Nuy	Doorn River	622	1.96	G	41	25/03/2003	14:12:00	10	52 (1996)	
14	H5H003	Boesmans	Bosjesmans River	25	2.84	G	160	24/03/2003	10:00:00	50	100 (1981)	
15	H5H004	Breede	Secunda	7253	6.33	G	1085	24/03/2003	12:48:00	5	1825 (1941)	
16	H6H005	Baviaans	Genadedal	24	1.45	G	25	24/03/2003	12:12:00	10	157 (1981)	
17	H6H009	Riviersonderend	Reenen	2007	1.55	G	134	26/03/2003	19:24:00	2	1393 (1986)	
18	H7H005	Hermitage	Swellendam Forest	9	1.03	G	26	24/03/2003	04:48:00	5	38 (1998)	
19	H7H006	Breede	Swellendam	9842	5.04	G	1528	25/03/2003	01:00:00	10	2360 (1942)	
20	H7R001	Buffelsjags	Buffelsjags dam	601	9.30	D	589	24/03/2003	23:30:00	20-50	572 (1981)	Rainfall at dam 71mm (24/3) and 64mm (25/3)
21	H8R001	Duiwenhoks	Duiwenhoks dam	148	26.87	D	410	24/03/2003	07:15:00	50-100	279 (1996)	Rainfall at dam 17mm(22/3), 105mm(23/3), 200mm+(24/3) & 112mm+(25/3)

Table 2.5.4 (Con) Summary of Flood Data – March 2003 Western Cape Floods

No.	Site	River	Place	Catchment Area (km2)	GH (m)	Method	Discharge (m3/s)	Date	Time	Return Period (years)	Previous Max	Notes
22	H8H001	Duiwenhoks	Dassjes Klip	790	8.67	G	786	24/03/2003		50-100	451 (1991)	Recorder hut flooded
23	H9R001	Korinte	Korinte Vet dam	37	16.76	D	37	25/03/2003	00:30:00	10	76 (1981)	Rainfall at dam 116mm(24/3) & 68mm(25/3)
24	H9H005	Goukou	Farm 216	228	3.76	G	386	25/03/2003	05:55:00	10	796 (1991)	Recorder hut flooded
25	J1R004	Brand	Miertjieskraal dam	757	13.66	D	433	24/03/2003	08:00:00	50	125 (1981)	
26	J1H018	Touws	Okkerskraal	5837	7.04	G	5391	25/03/2003		>100	3650 (1981)	Highest since 1981
27	J1H019	Groot	Buffelsfontein	12493	5.71	G	1716	25/03/2003		20-50	11000 (1981)	
28	J2H005	Huis	Zoar	253	1.46	G	58	24/03/2003	05:00:00	20	236 (1981)	
29	J3H017	Kandelaars	Paardendrift	348	3.47	G	147	25/03/2003	06:12:00	5	224 (1981)	
30	J3H011	Olifants	Warmwater	10927	2.51	G	201	26/03/2003	19:42:00	2	2620 (1996)	
31	J4H002	Gourits	Die Poort	43451	6.19	G	2608	25/03/2003	09:00:00	10	11400 (1981)	
32	J4H003	Weyers	Weyers River	95	1.72	G	109	25/03/2003	01:30:00	5	254 (1991)	
33	K1H004	Brandwag	Brandwacht	215	3.44	G	120	25/03/2003		10	156 (1981)	
34	K1H005	Moordkuil	Banff	198	5.40	G	308	25/03/2003	07:30:00	20	267 (1991)	
35	K3R002	Swart	Garden Route Dam	36	29.99	D	27	25/03/2003	00:00:00	2	165 (1996)	
36	K3H003	Maalgate	Buffelsdrift	145	4.15	G	179	25/03/2003	07:30:00	10	250 (1963)	
37	K4H002	Karatara	Karatara Forest Reserve	22	3.03	G	287	25/03/2003	04:12:00	50-100	190 (1981)	
38	K6H001	Keurbooms	M'Kama	165	4.64	G	659	25/03/2003	08:00:00	50-100	475 (1996)	
39	K6H018	Keurbooms	Keurbooms Mouth		4.21	G		25/03/2003	15:06:00			
40	K7H001	Bloukrans	Blaauw Krantz	57	2.10	G	107	25/03/2003	16:36:00	2-5	365 (1981)	

2.5.5 Interpretation of results

The preliminary results in Table 2.5.4 are interpreted by catchment.

a) Kogmanskloof River (H3)

The Kogmanskloof River includes the Keisie and Kingna Rivers, with the town of Montagu at the confluence of the two rivers. The Kingna River was the main contributor to the flooding in March 2003. In January 1981, the Keisie River was the major contributor. Both the Pietersfontein and Poortjieskloof Dams on the Keisie and Kingna Rivers were empty before the event and filled up during the event. Only the Poortjieskloof Dam spilled. These dams thus provided some attenuation to the final flood magnitudes experienced downstream at Montagu. During the 1981 flood, the Pietersfontein Dam spilled by 667m^3/s.

Survey results of flood levels at the railway bridge at Ashton indicate that the 1981 flood was the larger event. The return period of the flooding is estimated at 50–100 years for the Kingna River at Montagu and 20–50 years in the Kogmanskloof River. Figures 2.5.5.1 and 2.5.5.2 show a chronological plot of the floods in the two rivers.

Figure 2.5.5.1

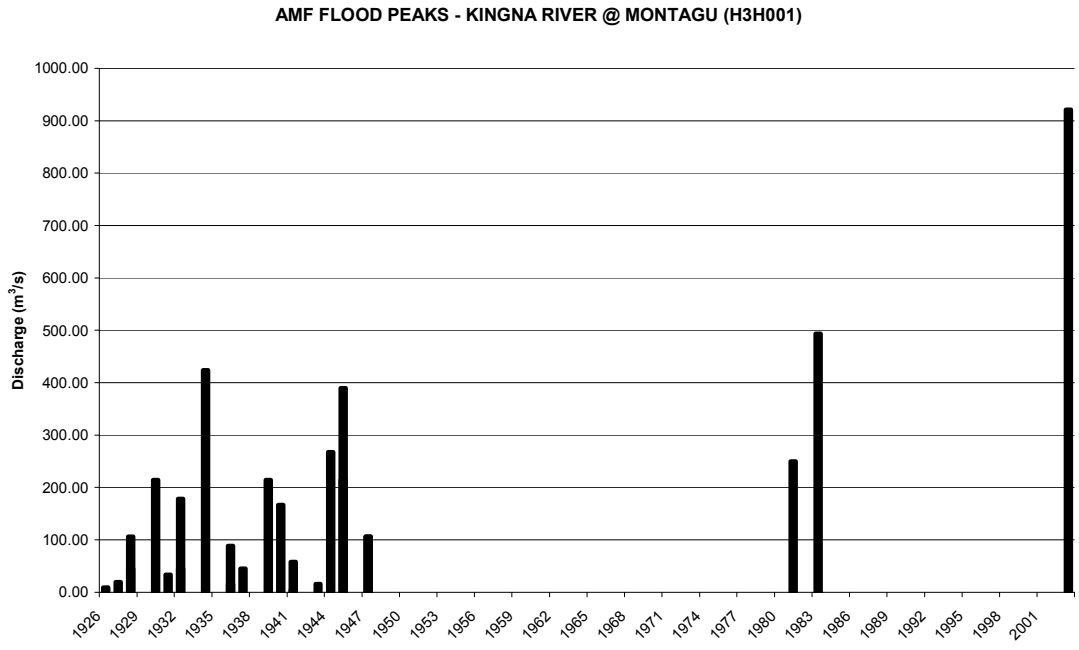
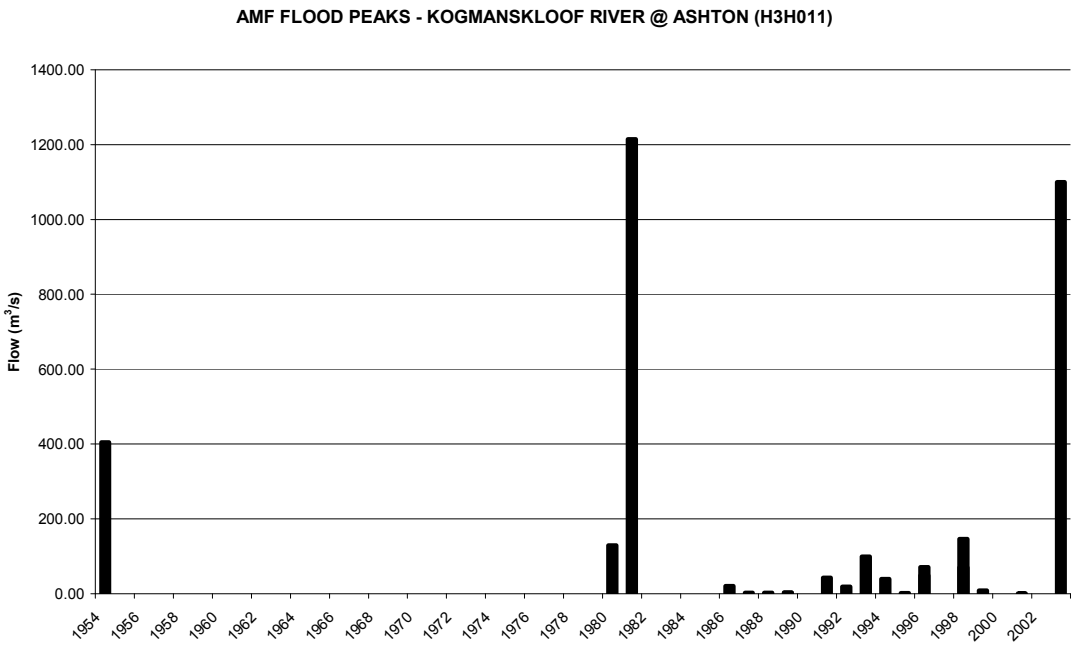


Figure 2.5.5.2



b) Breede River and tributaries (H4, H5, H6 and H7)

The Breede River upstream from the Kogmanskloof River confluence did not experience any flooding during the event and, as such, the flooding only affected the lower reaches of the Breede River. Other rivers that contributed to the Breede River flooding were the Keisie, Vink, Riviersonderend, Buffeljags (confluence is downstream of Swellendam) and Nuy Rivers (regions H4, H5, H6 and H7).

The flooding in the lower Breede River was in the order of a 5–10 year flood. Figures 2.5.5.3 and 2.5.5.6 show the chronology of flooding of the lower Breede River from Secunda (downstream of Kogmanskloof river confluence) to Swellendam.

Figures 2.5.5.4 and 2.5.5.5 show the chronology for the Keisers and Boesmans Rivers, both of which experienced maximums.

Figure 2.5.5.3

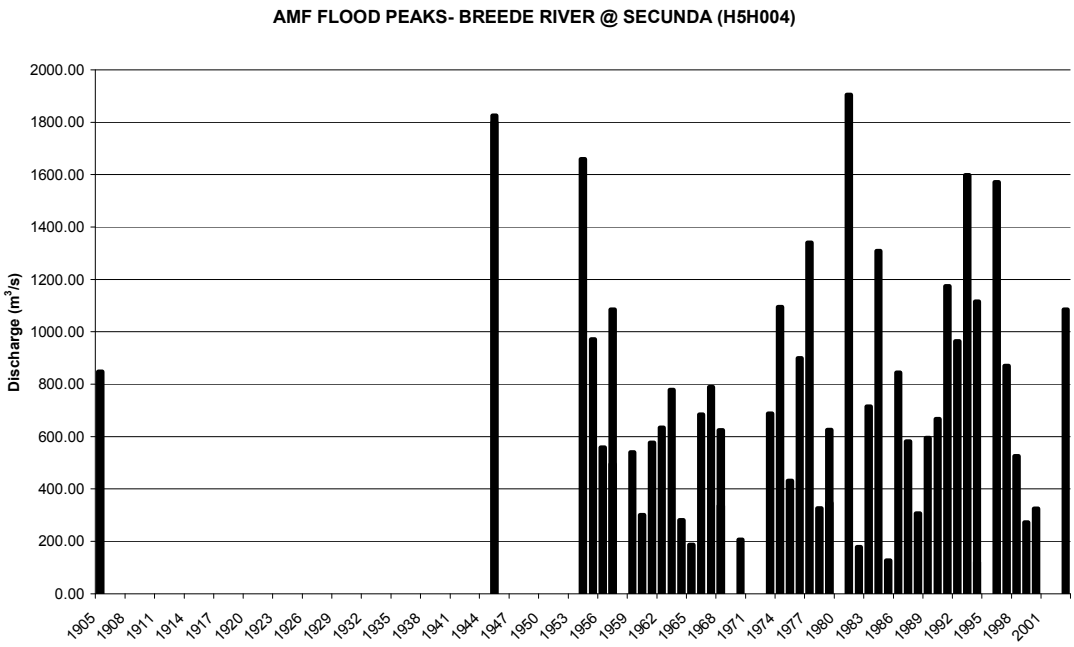


Figure 2.5.5.4

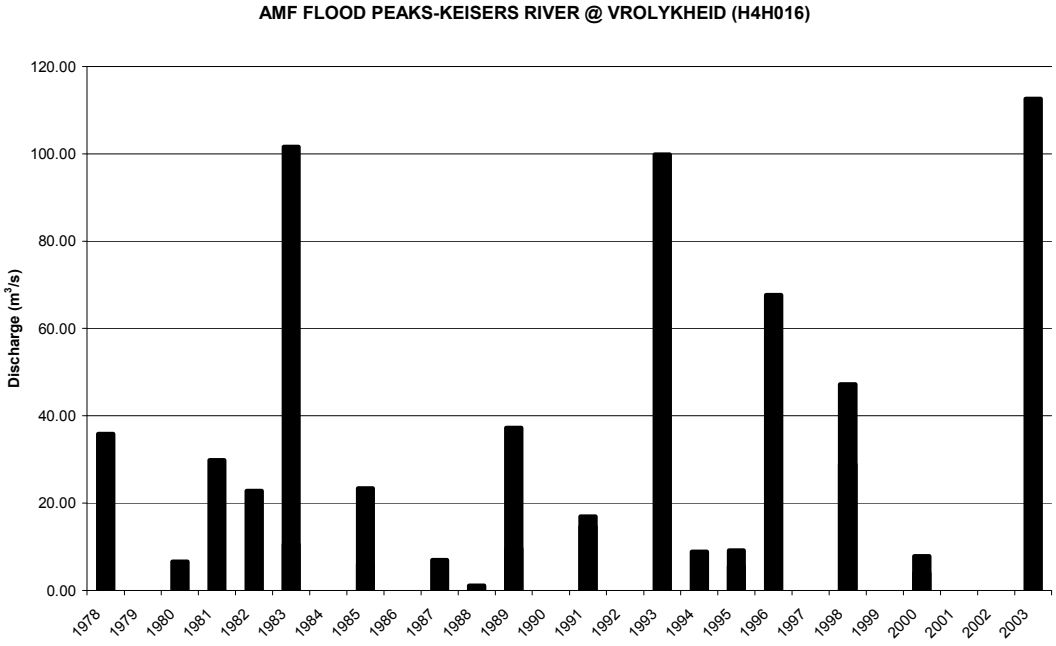


Figure 2.5.5.5

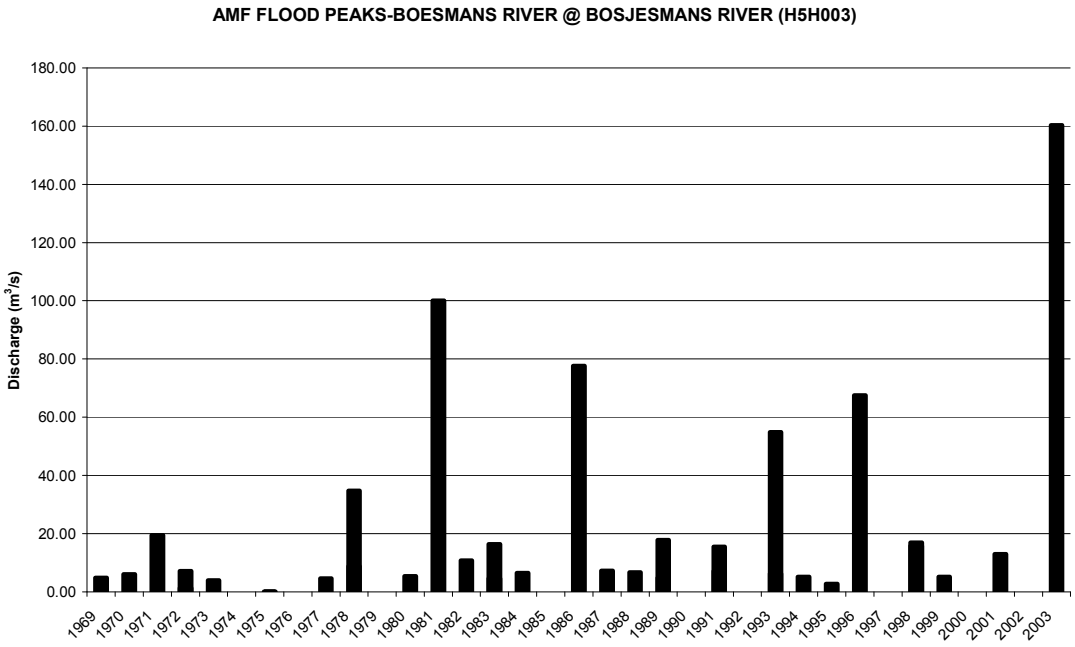
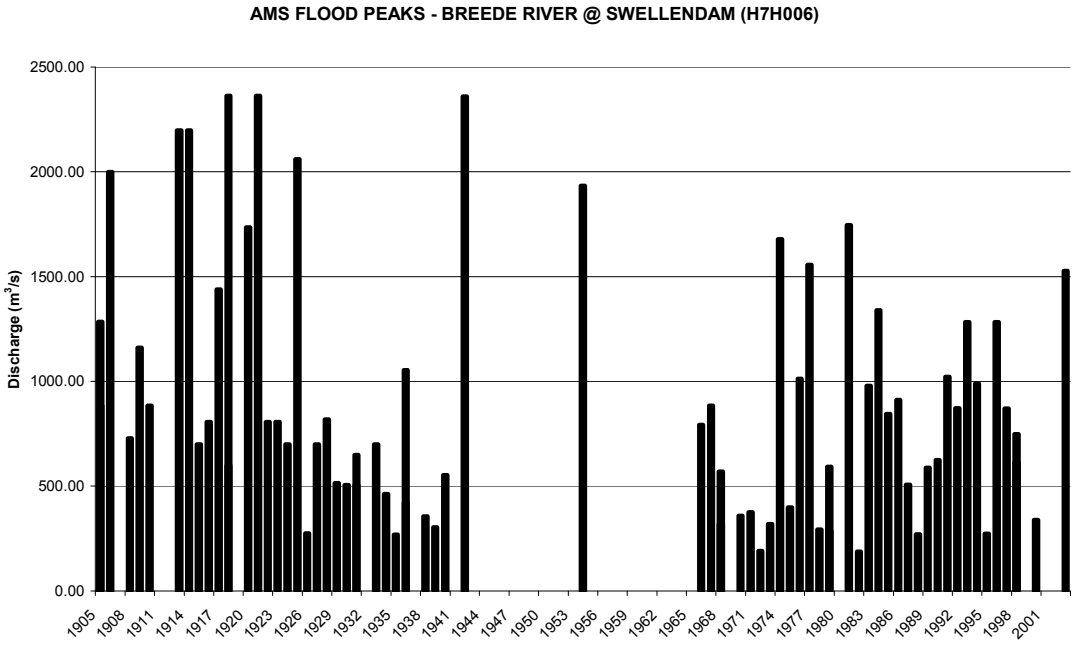


Figure 2.5.5.6



c) Buffelsjags and Duiwenhoks Rivers (H7 and H8)

Both these rivers had maximum floods based on the available flood records. The return period for the floods was 20–50 years for the Buffelsjags River and 50–100 years for the Duiwenhoks river. Figures 2.5.5.7 and 2.5.5.8 show the chronology of flooding events.

Figure 2.5.5.7

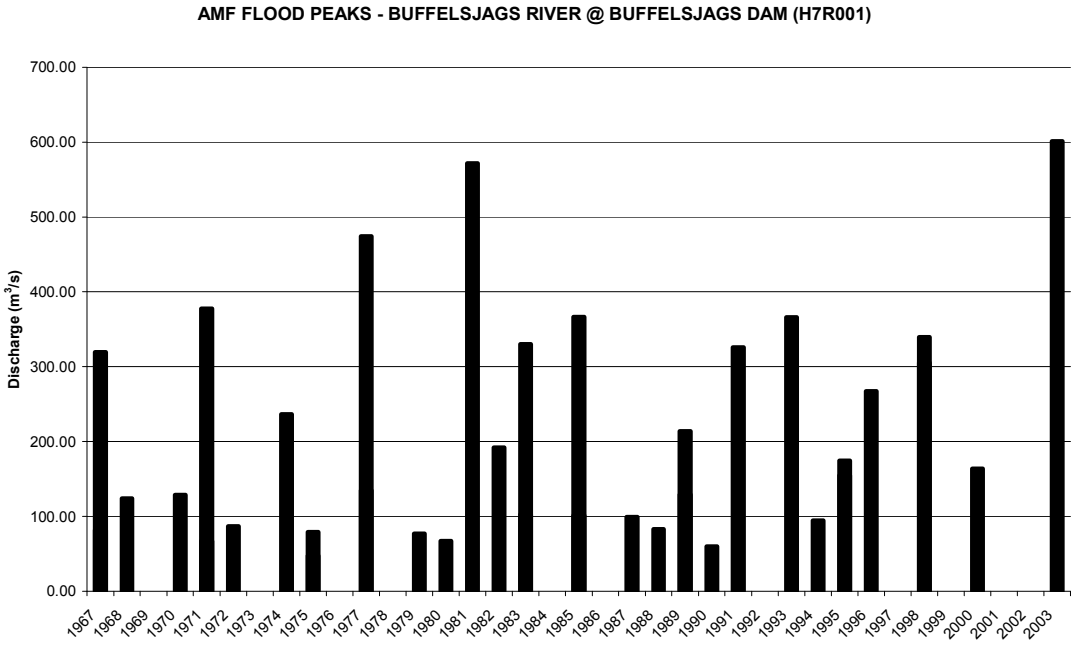
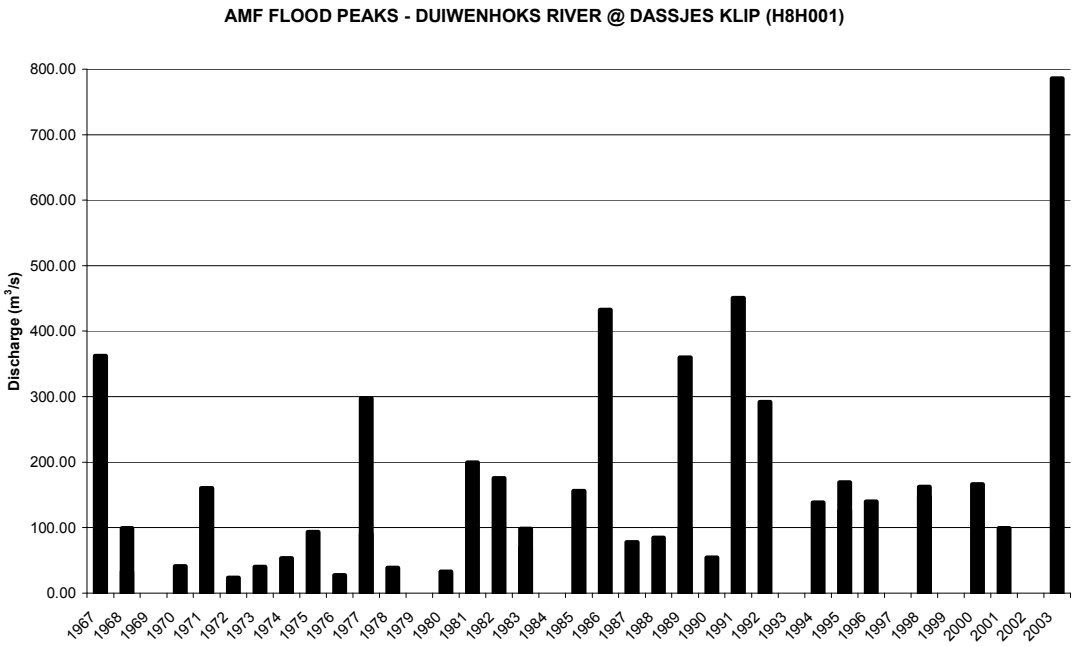


Figure 2.5.5.8



d) Bellair Dam and Drainage Region J

The breaching of Bellair Dam was the most significant event in drainage region J. The dam break peak on the Touws River downstream was in the order of a 100-year flood and reduced to a 20–50-year event after Touws/Groot River confluence. By the time that the flood reached the Gourits River it reduced to a 10-year event. Other rivers were also in flood and contributed to the flooding of the Touws and Groot Rivers; the most notabe was the Brand River that had an outflow peak in the order of a 50-year flood at Miertjieskraal Dam. Figures 2.5.5.9 (Touws River downstream from Bellair Dam), 2.5.5.10 (Groot River) and 2.5.5.11 (Gourits River) show the chronology of flooding events.

Figure 2.5.5.9

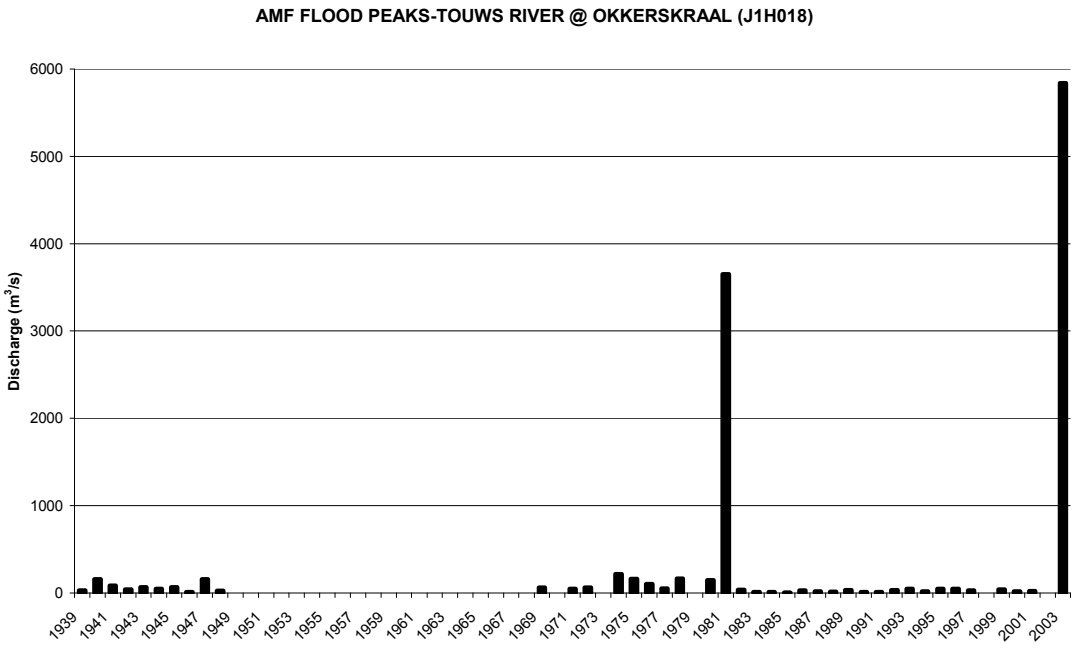


Figure 2.5.5.10

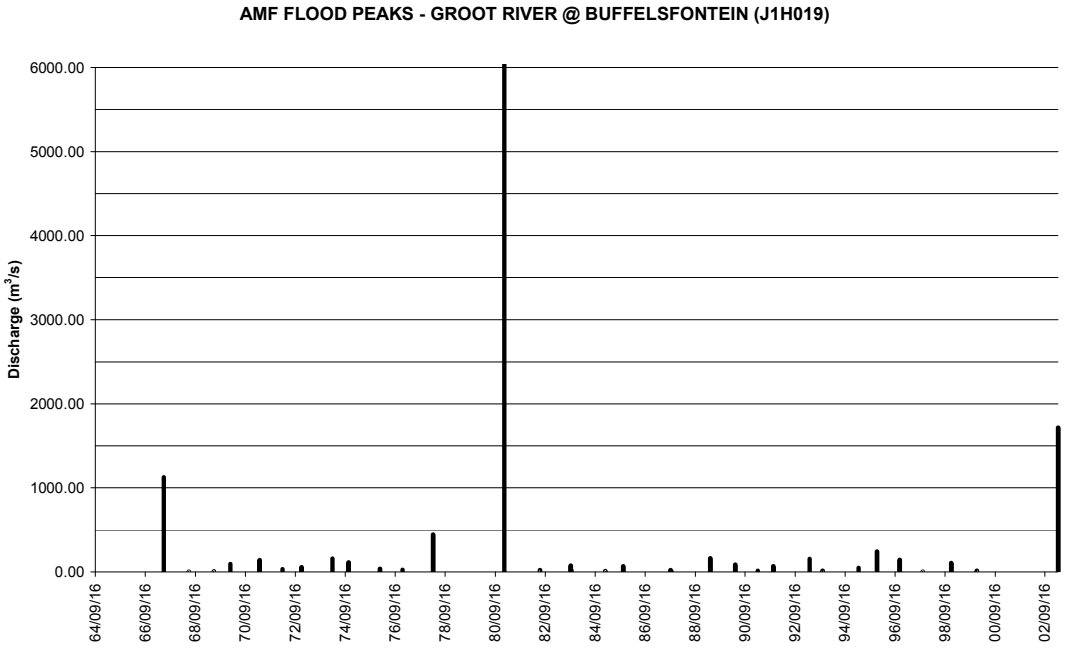
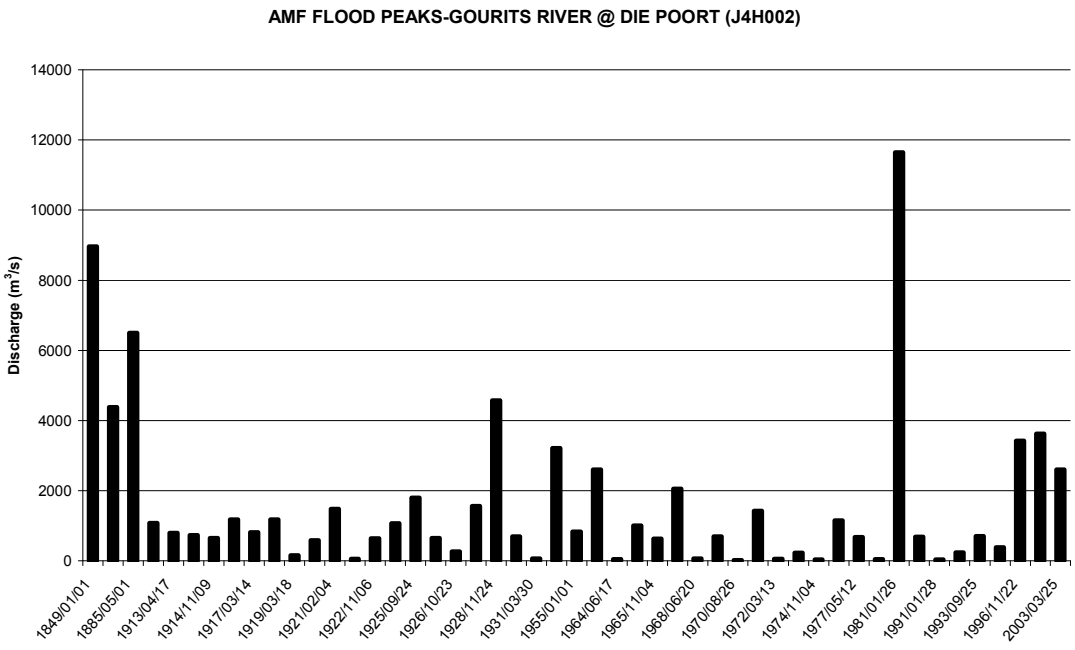


Figure 2.5.5.11



e) South Coast rivers (regions K4 and K6)

Although the declared disaster area was in the Breede River Valley, the flooding along several coastal rivers was extreme in terms of flood peaks. The fact that few developments were affected or reported upon resulted in these areas not being included. The flooding chronology in three of these rivers is shown in Figures 2.5.5.12, 2.5.5.13 and 2.5.5.14.

Figure 2.5.5.12

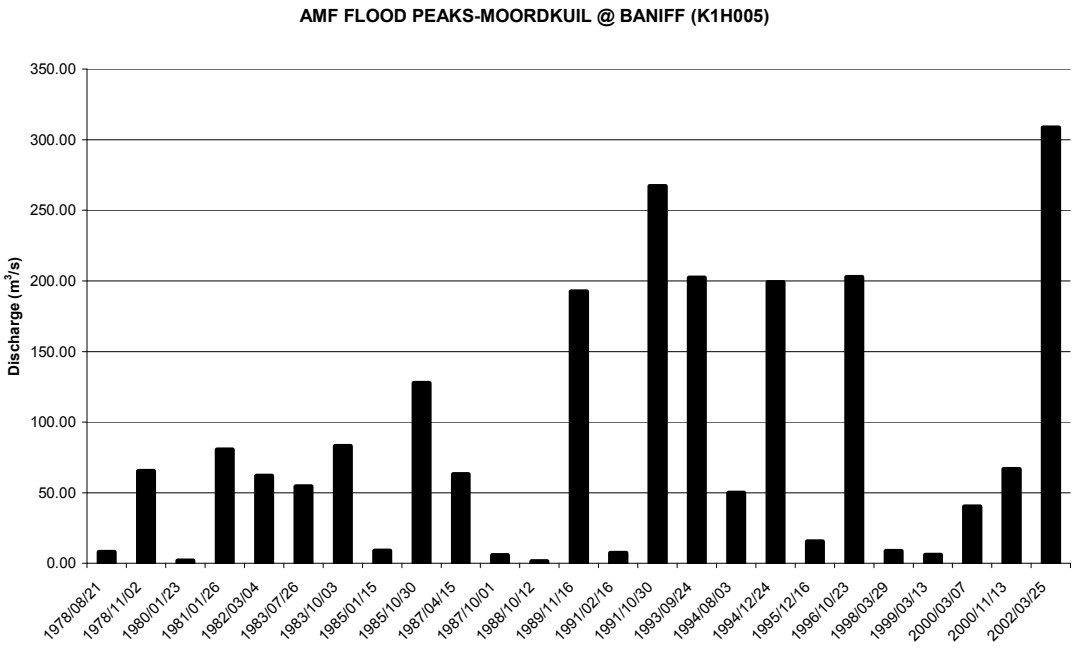
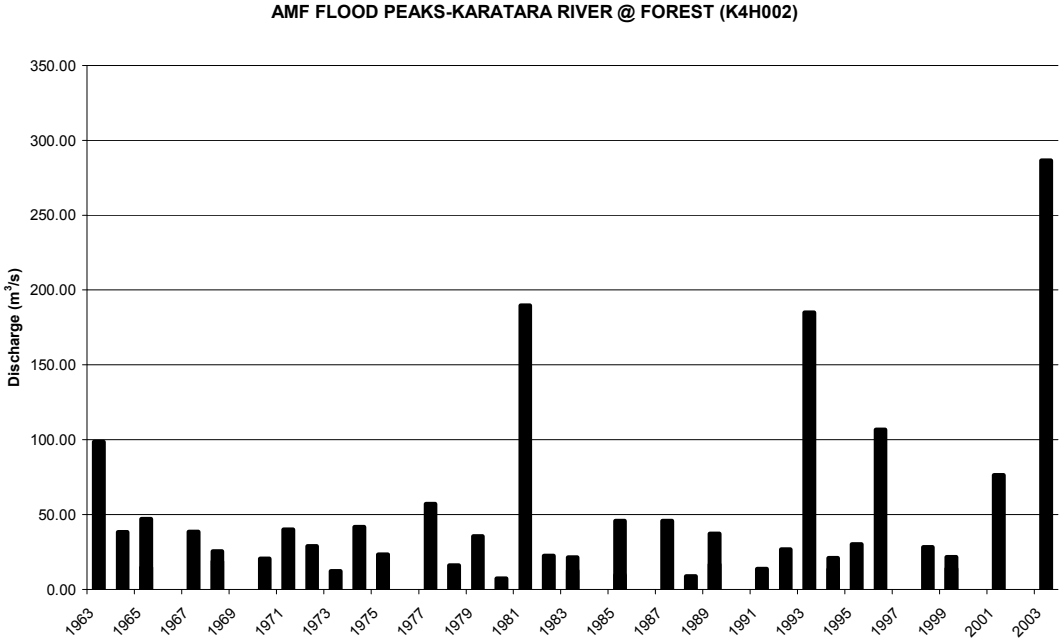
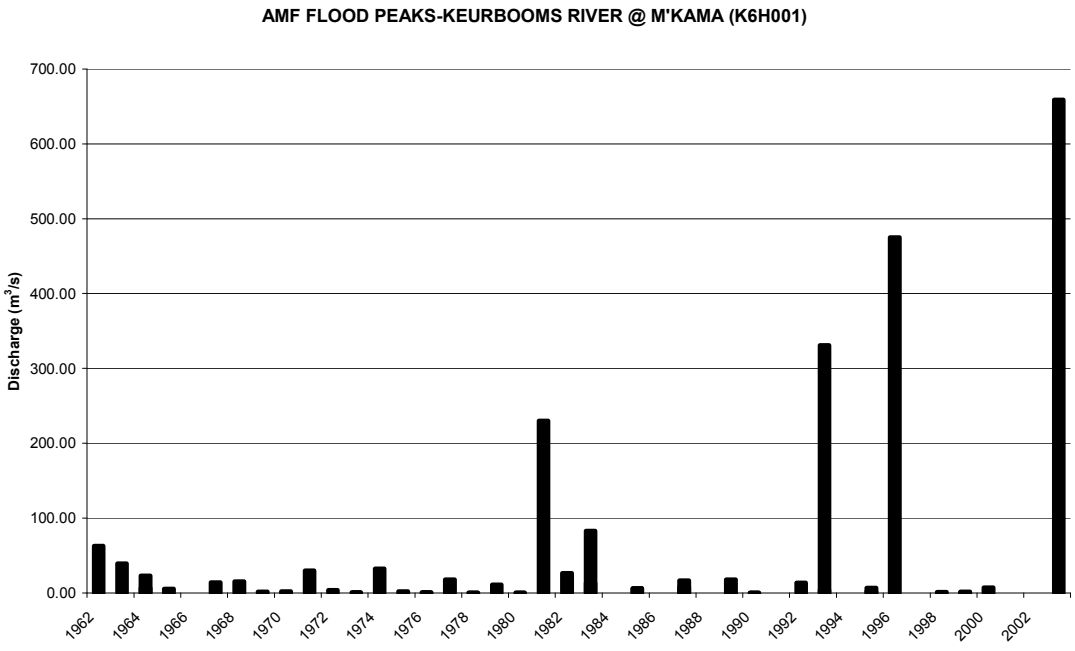


Figure 2.5.5.13



Figures 2.5.5.14



The graphs presented above, along with Table 2.5.4 illustrate the significance of riverine flooding across the Breede River, Overberg and Eden District Municipalities. In this context, the severity of reported flood impact was strongly influenced by prevailing levels of development and infrastructure in the affected areas.

2.5.6 Flood volumes and hydrographs

Preliminary flood hydrographs for selected rivers at gauging stations and dams are presented for the event.

(a) Kogmanskloof catchment

Figures 2.5.6.1 and 2.5.6.2 show the hydrographs for Poortjieskloof and Pietersfontein dams. Both dams were near empty and as such attenuated the floods significantly. Pietersfontein Dam did not overflow.

Figure 2.5.6.1

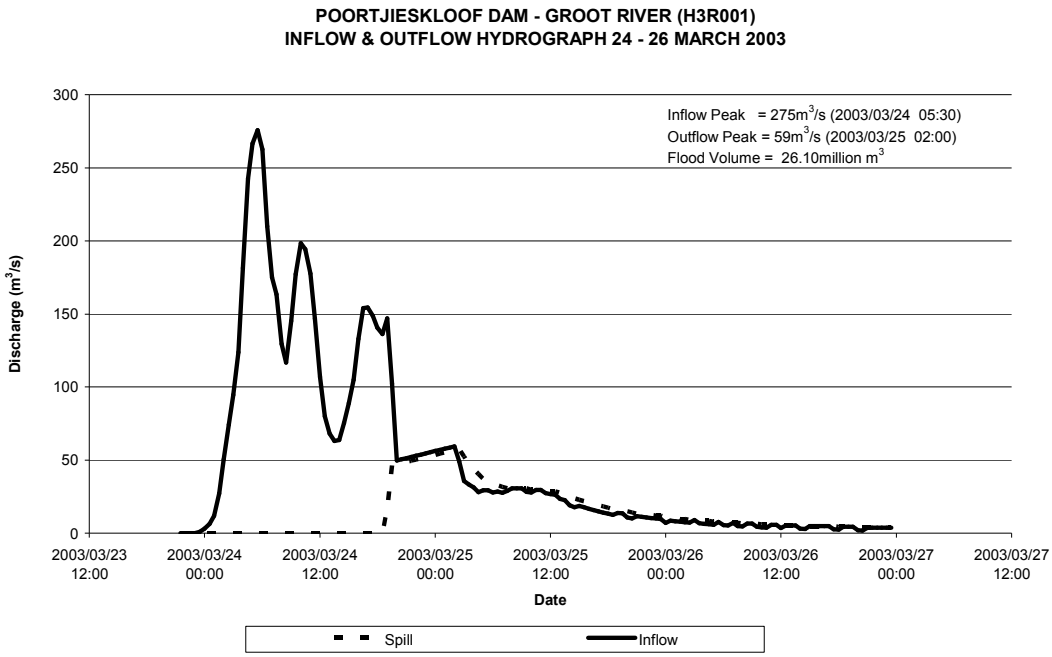
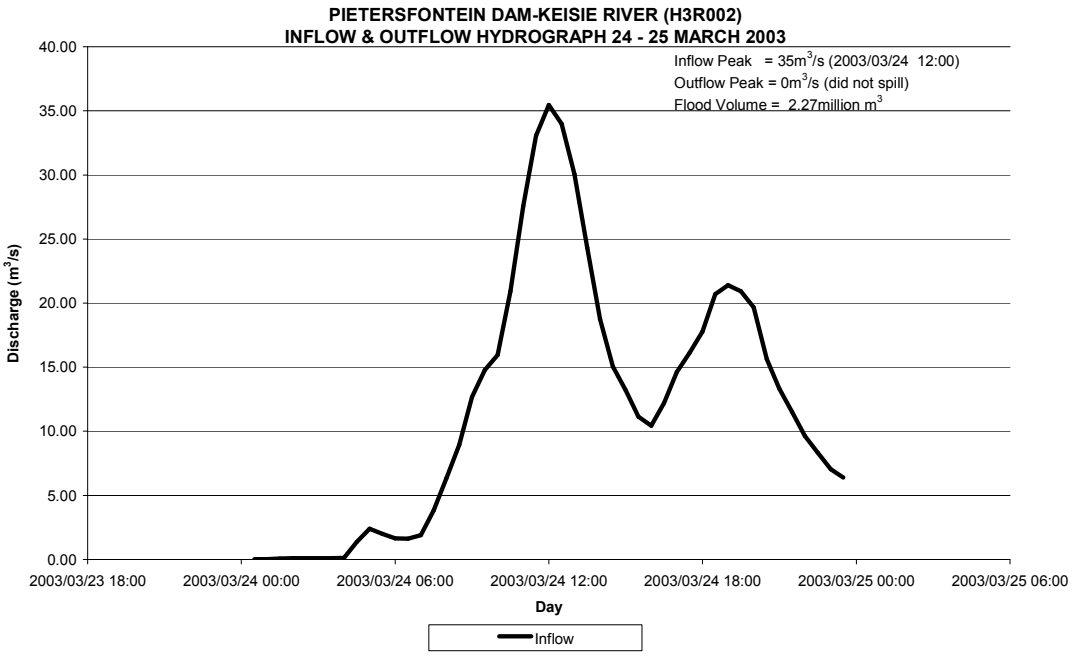

POORTJIESKLOOF DAM - GROOT RIVER (H3R001)
INFLOW & OUTFLOW HYDROGRAPH 24 - 26 MARCH 2003
Inflow Peak = 275m3/s (2003/03/24 05:30)
Outflow Peak = 59m3/s (2003/03/25 02:00)
Flood Volume = 26.10million m3
Discharge (m3/s)
300
250
200
150
100
50
0
2003/03/23 12:00
2003/03/24 00:00
2003/03/24 12:00
2003/03/25 00:00
2003/03/25 12:00
2003/03/26 00:00
2003/03/26 12:00
2003/03/27 00:00
2003/03/27 12:00
Date
Spill
Inflow

Figure 2.5.6.2


PIETERSFONTEIN DAM-KEISIE RIVER (H3R002)
INFLOW & OUTFLOW HYDROGRAPH 24 - 25 MARCH 2003
Inflow Peak = 35m3/s (2003/03/24 12:00)
Outflow Peak = 0m3/s (did not spill)
Flood Volume = 2.27million m3
Discharge (m3/s)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
2003/03/23 18:00
2003/03/24 00:00
2003/03/24 06:00
2003/03/24 12:00
2003/03/24 18:00
2003/03/25 00:00
2003/03/25 06:00
Day
Inflow

(b) Lower Breede River valley

The flood hydrographs for Konings (Klipberg Dam), Poesjesnels, Nuy, Boesmans, Baviaans and Breede Rivers are shown in Figures 2.5.6.3 to 2.5.6.6. The hydrographs for the Breede River essentially show the flood for the Kogmanskloof River. The Breede River upstream from the Kogmanskloof River confluence did not have any flow of significance during the event.

Figure 2.5.6.3

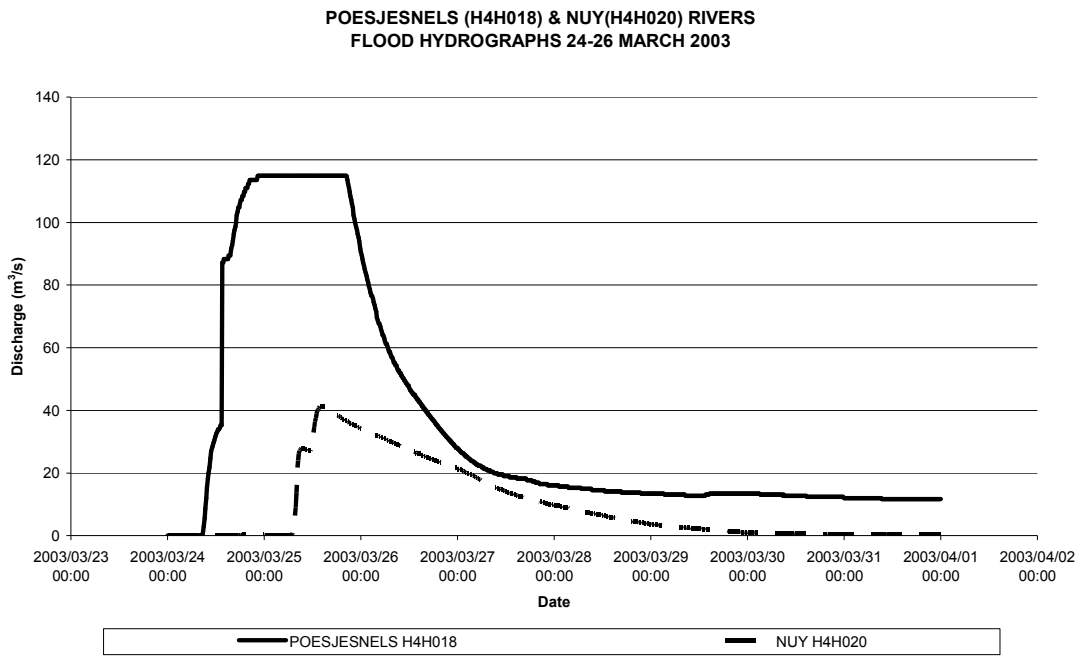


Figure 2.5.6.4

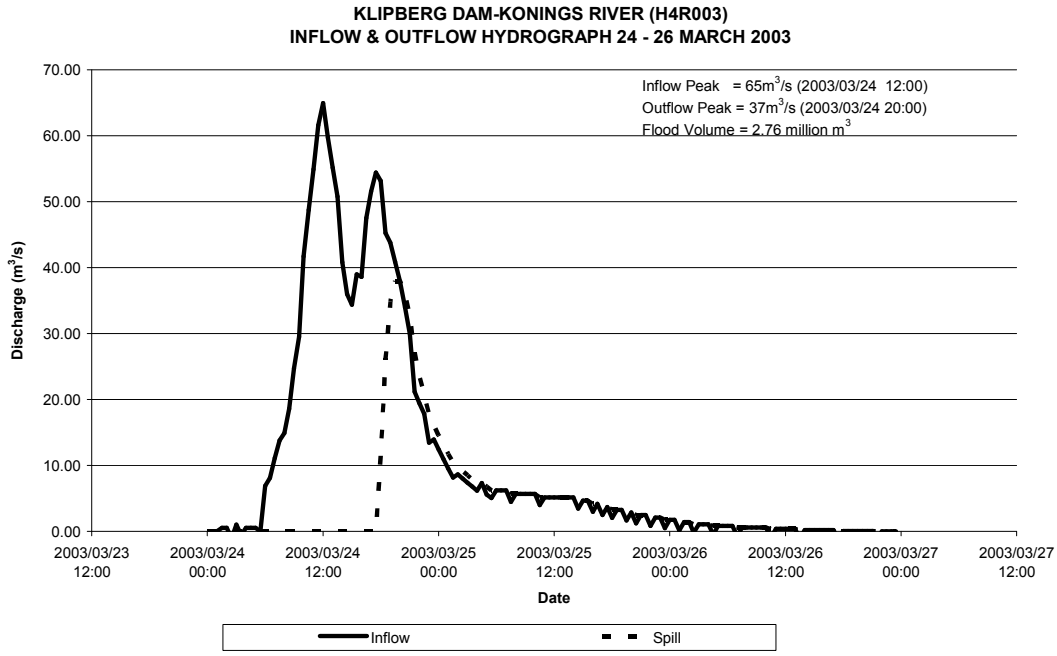


Figure 2.5.6.5

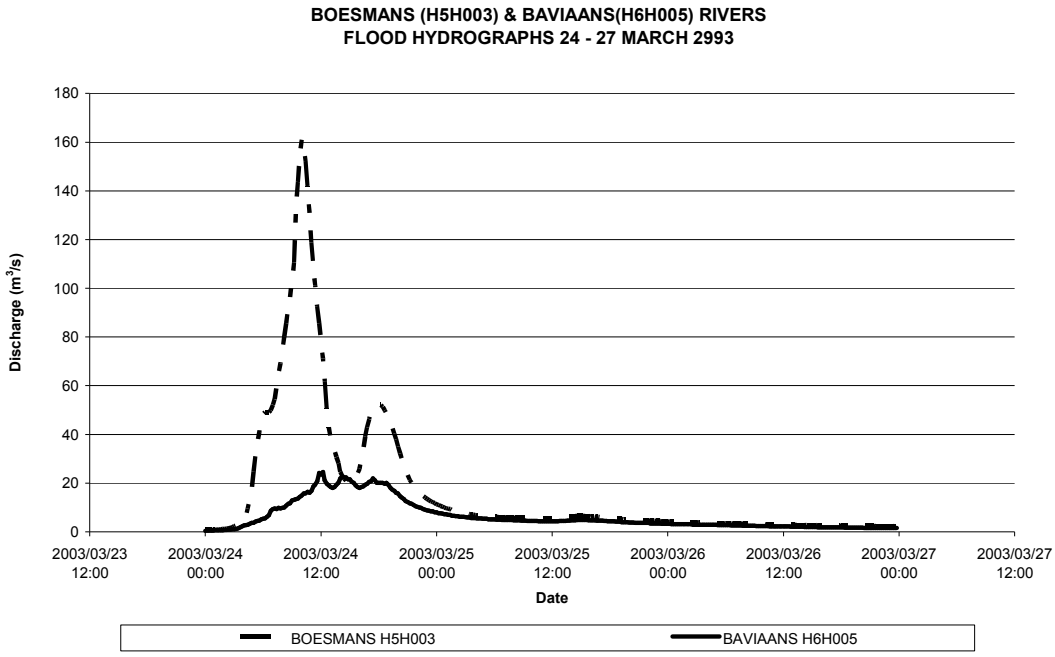
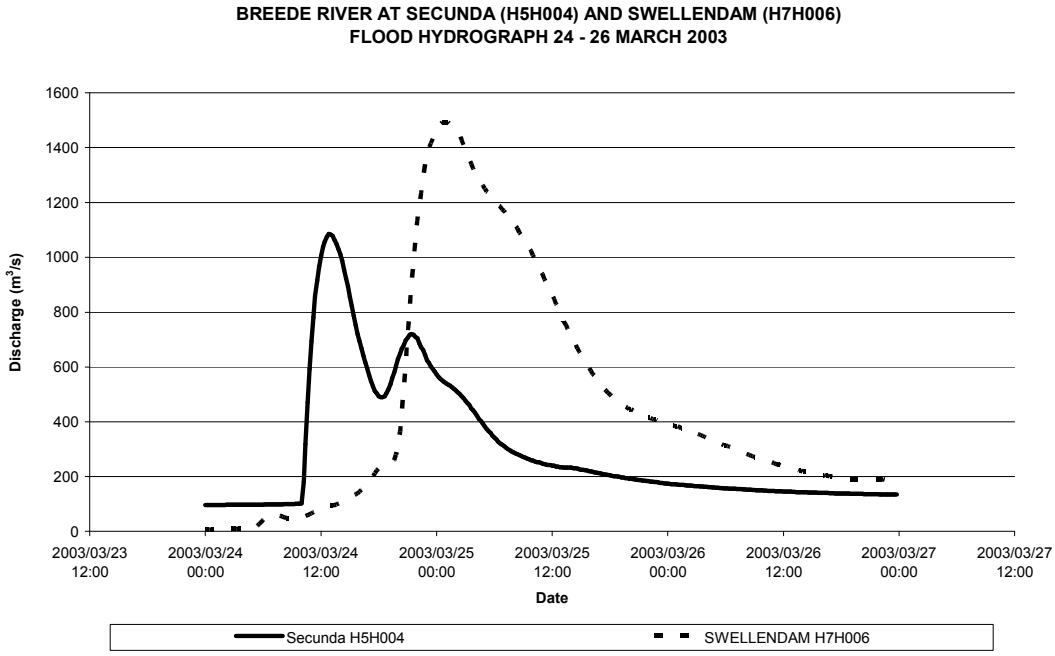


Figure 2.5.6.6



(c) Buffelsjags, Duiwenhoks, Goukou and Korinte Rivers (Regions H7, H8 and H9)

The hydrographs for the Buffelsjags, Duiwenhoks and Korinte-Vet Dams and the Goukou River are shown in Figures 2.5.6.7 to 2.5.6.10. Both the Buffelsjags and Duiwenhoks Dams were essentially full and as such did not provide any attenuation. The Korinte-Vet Dam was not full, and significant flood attenuation occurred.

Figure 2.5.6.7

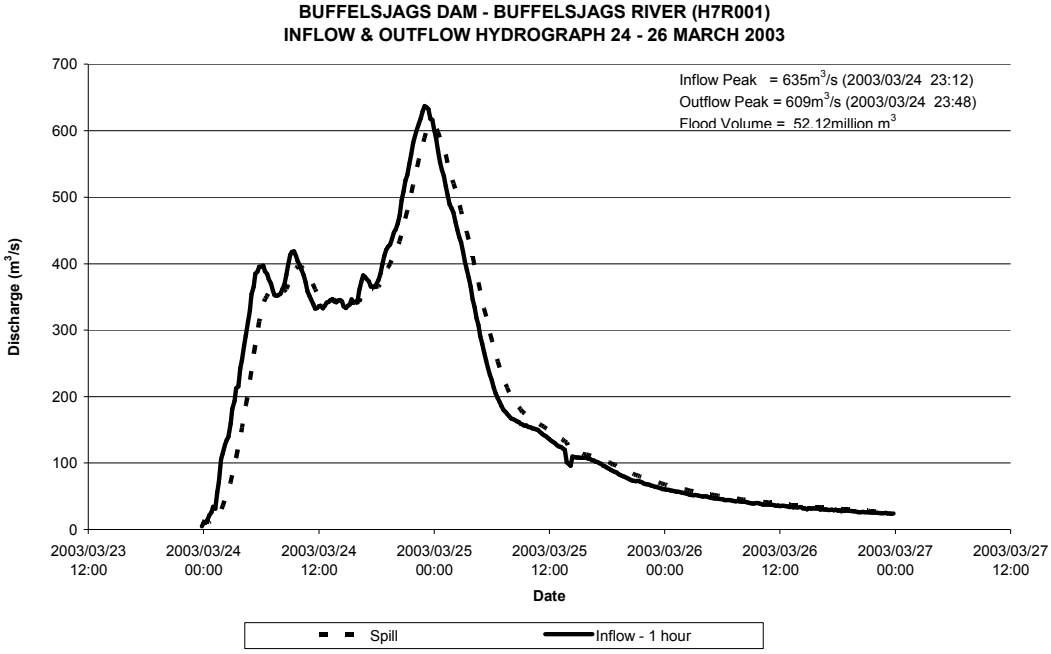


Figure 2.5.6.8

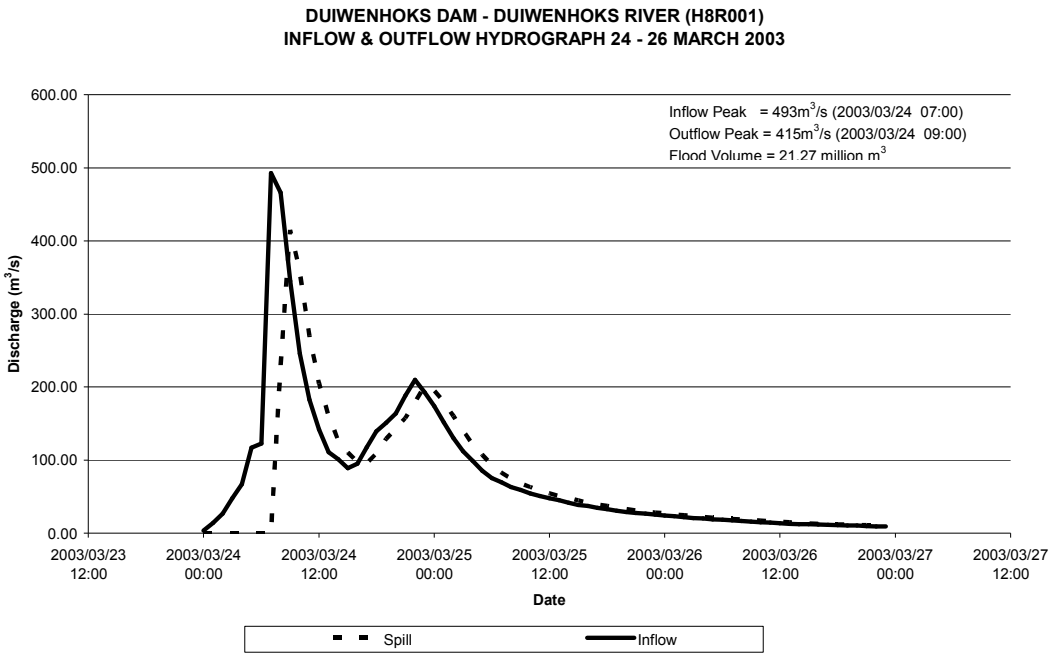


Figure 2.5.6.9

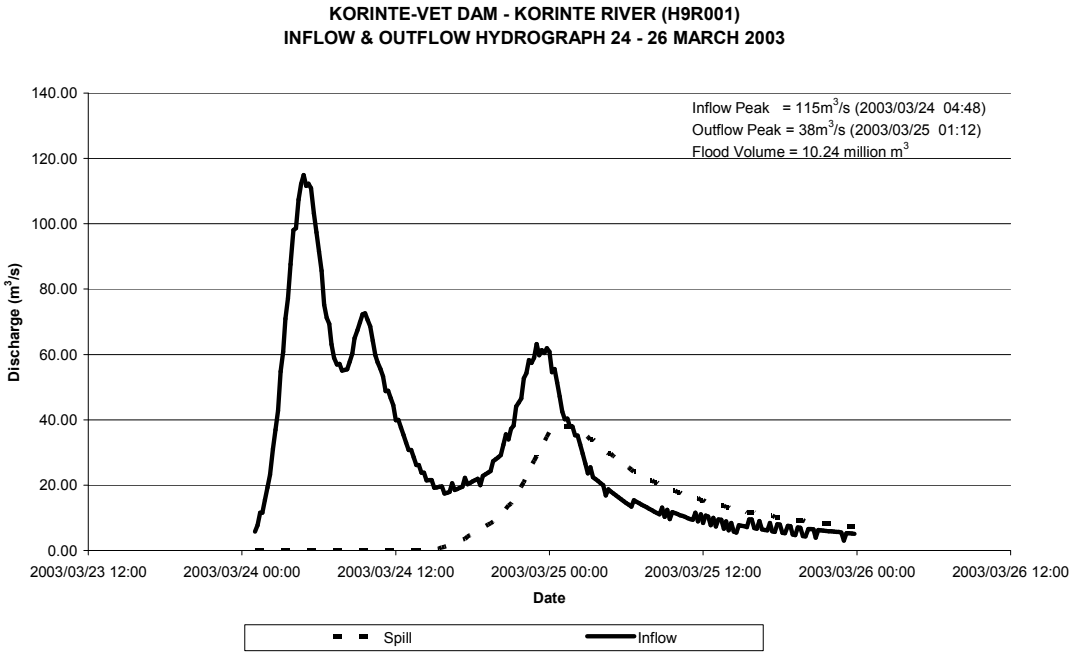
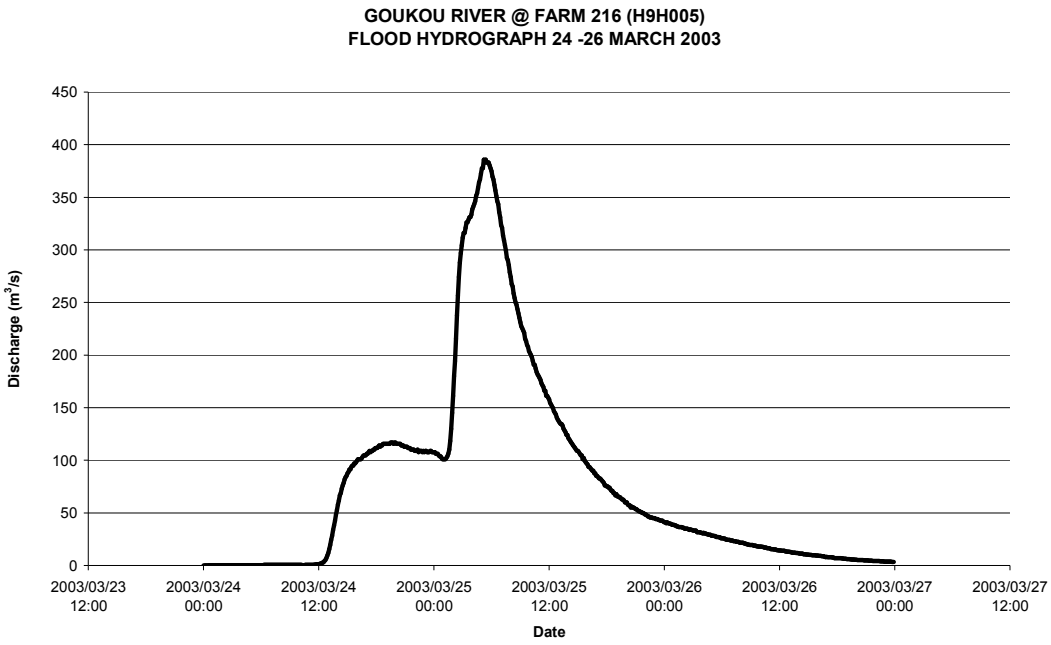


Figure 2.5.6.10


GOUKOU RIVER @ FARM 216 (H9H005)
FLOOD HYDROGRAPH 24 -26 MARCH 2003
Discharge (m3/s)
450
400
350
300
250
200
150
100
50
0
2003/03/23 12:00
2003/03/24 00:00
2003/03/24 12:00
2003/03/25 00:00
2003/03/25 12:00
2003/03/26 00:00
2003/03/26 12:00
2003/03/27 00:00
2003/03/27 12:00
Date

(d) Bellair Dam, Huis and Gourits Rivers (Regions J1, J2 and J4)

Figures 2.5.6.11 to 2.5.6.13 show the flood hydrographs for Bellair Dam and the Huis and Gourits Rivers. The hydrograph for Bellair Dam was generated using the logger data that was available prior to the dam failing. From the hydrograph it would appear that the dam failed after the maximum inflow occurred. The outflow peak was however still rising when the dam failed. The maximum level on the logger was 15.73 m. The spillway level is 14.23 m and the non-overspill crest (NOC) 16.07 m. The failure of the dam is subject to further investigation. From the logger data the dam failed at 19h00 on 24 March and by 20h00 the failure was complete. The flood wave (10–11 million m^3 or a flood peak in the order of 2 900 m^3/s which is close to the RMF) downstream overflowed the gauging stations at J1H018 and J1H019 on the Touws and Groot Rivers, and no hydrographs are available for these stations. The station at J4H002 on the Gourits River includes the dam break peak and peaks from other rivers like the Brand River that were also in severe flood.

Figure 2.5.6.11

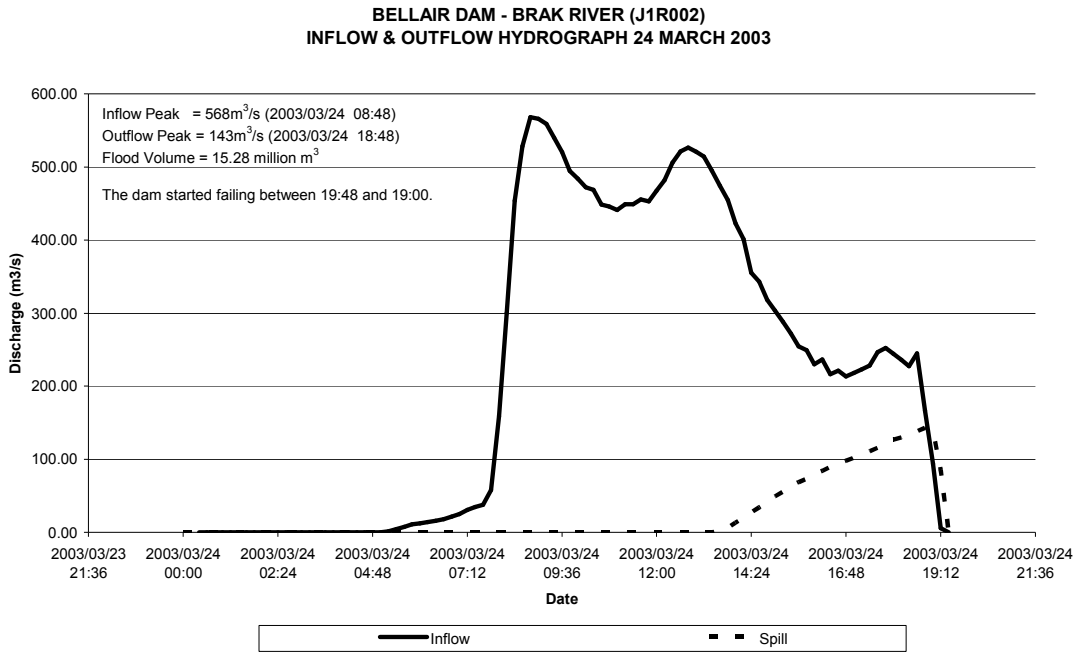


Figure 2.5.6.12

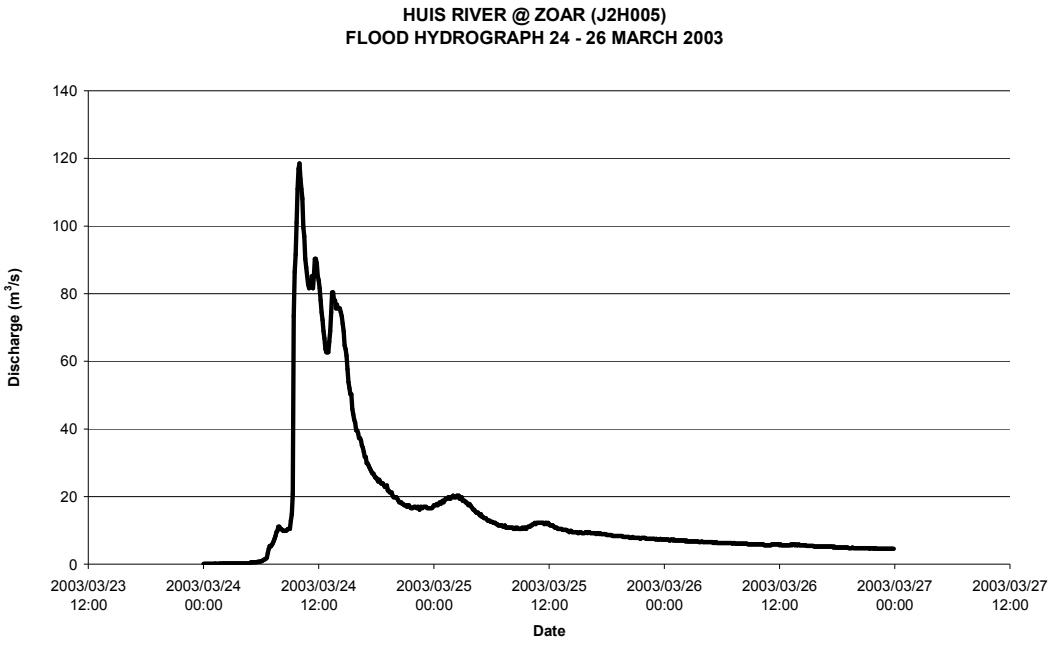
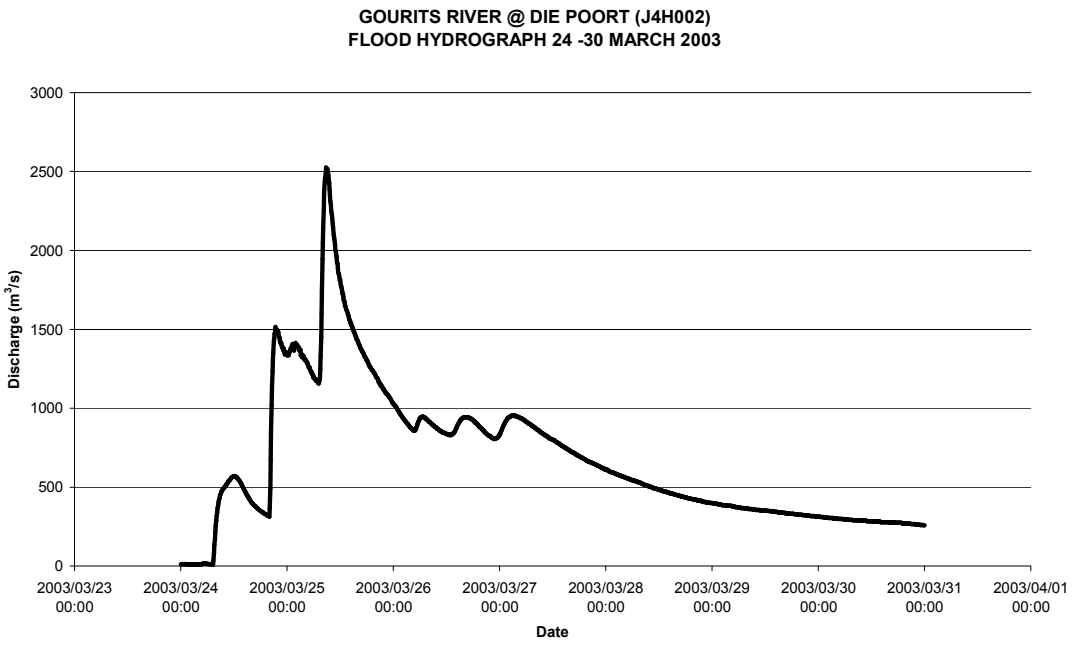


Figure 2.5.6.13



(e) South Coast rivers (regions K1, K4 and K6)

The coastal rivers also experienced severe flooding and the flood hydrographs for the Moordkuil, Karatara and Keurbooms Rivers are shown in Figures 2.5.6.14 to 2.5.6.16.

Figure 2.5.6.14

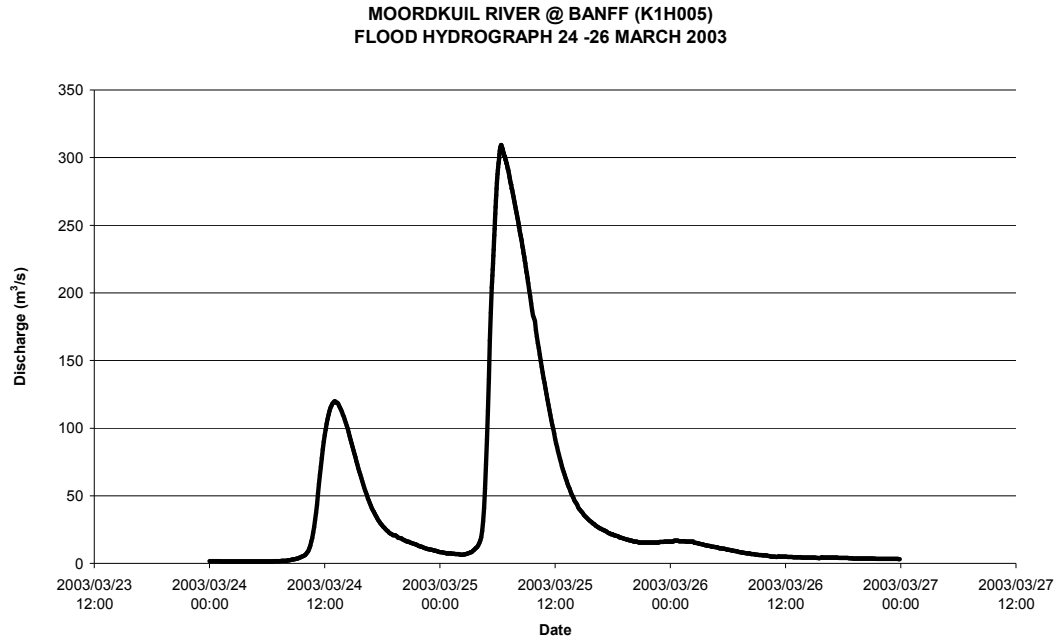


Figure 2.5.6.15

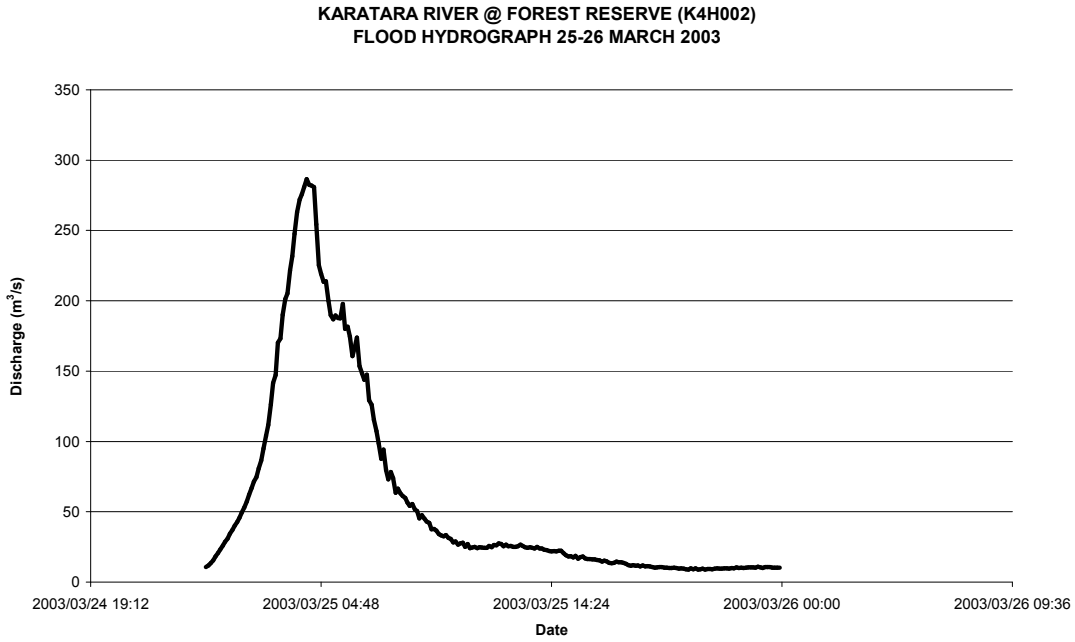
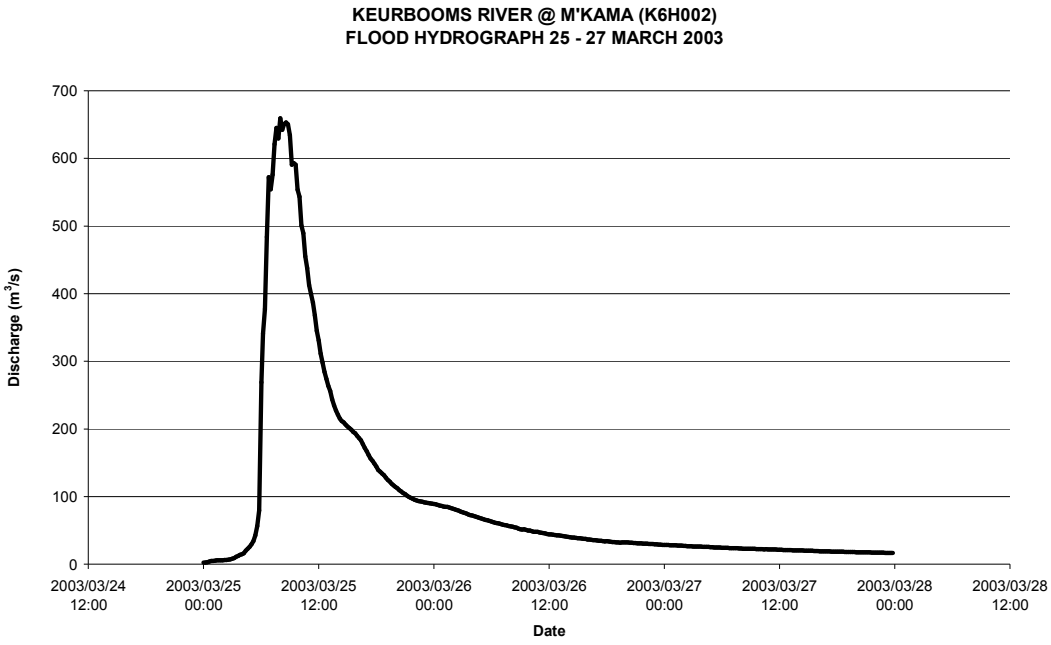


Figure 2.5.6.16



2.5.7 General observations regarding the impact of the flood event

The flood as an event had impacts on the environment, infrastructure, social vulnerability conditions, economics and health.

With specific reference to the impact of flooding on physical infrastructure, the floods washed away several bridges, water supply lines, sewers and one dam. The modes of failure were:

- *Bridges*. Failure due to overtopping, scour of embankments and debris loading.
- *Water supply/sewer lines*. Failure due to washing away of the infrastructure due to scour.
- *Dam*. Mode and reason for failure not yet confirmed.

The failure of infrastructure that crosses rivers is due to the alignment of the infrastructure to the river, restriction of the free waterway and the level at which the structure crosses the river. The bridge at the Kingna/Keisie River confluence is an example. The river both overtopped the structure and outflanked it as the river widened during the flood.

With respect to environmental impacts, these were not significant. However, during the field visit the presence of dense reed beds was cited as contributing to structural failures and elevated flood levels. The reeds apparently have become an issue of concern during the past 20 years. Hydraulically, the presence of reeds along river banks would result in greater

flow resistance and higher flood levels. They also contribute to debris loads on structures that extend across rivers during flood events.

2.5.8 Conclusions and recommendations

a) Conclusions

Flood event

With respect to the flooding triggered by the March 2003 cut-off low, in the Montagu, Buffelsjags, Duiwenhoks, Brand, Touws, Karatara and Keurbooms River areas, this can be considered rare and classified as 20-year or larger floods.

Although some dams attenuated the floods, the use of or reliance on dams to attenuate floods should not be assumed. This is shown by the little or no attenuation provided by the Buffelsjags and Duiwenhoks Dams. Dams in South Africa are generally used for water supply and as such are operated as close to the full supply level as possible.

Flooding that impacted the same general area occurred in 1822, 1867, 1885 1905, 1916, 1921, 1925, 1941, 1945, 1954, 1981, 1991, 1993 and 1996.

Relationship between flood impact and level of development

The severity of the flood impact on human activity was related to levels of development in the flooded areas. Although the Kogmanskloof, Duiwenhoks and Keurbooms Rivers all experienced relatively extreme flood events, the direct economic losses and damage were greatest in the Kogmanskloof River Catchment. This is related to the proximity to the rivers concerned of development and the density thereof.

b) Recommendations

The following recommendations relate to hydrology, hydraulics and management of floods in watercourses and rivers. In this context, particular attention should be placed on documenting previous flood events in terms of rainfall, hydrology and impact. This will enable authorities to be more proactive in disaster management by identifying areas at risk of flooding and the magnitude of expected flood events. Moreover, this will strengthen sustainable development planning in flood-prone areas.

Based on this case-study, it is recommended that:

- The documentation of flooding events should use rainfall and hydrological data at the time of the event to determine areas affected. Although this information may be sparse, it will provide focus areas for more detailed investigation based on the intensity (magnitude) of the event.
- Efforts should be taken to identify areas subject to flooding through comprehensive hydrological studies in this part of the Western Cape.[26]

[26] These should include the full range of flood events from the 2-year event to the regional maximum flood (RMF). Hydraulic modelling of the flood should take account of all factors that impact on flood levels such as bridges, vegetation and obstructions (buildings, fences, etc.).

- By applying the hydrological data, the sequence of flooding can be established. This can allow identification of areas needing evacuation, as well as access and escape routes.
- Greater attention should be given to improving the development and utilisation of flood plains and flood-prone areas (including the management of trans-boundary risks). This requires policies based on sound flood management plans.

2.6 Land-use/Land-cover Change in the Kingna River Catchment, Montagu

2.6.1 Introduction

The high levels of surface runoff and riverine flooding that occurred in Montagu raise important questions about the role of changed land-use[27] and land-cover patterns in increasing the frequency and severity of flooding in such areas. Natural land-cover has various properties that help to regulate the flow above and below the Earth's surface (De Sherbinin, 2002).[28] For example, reducing the vegetation cover, especially on steep slopes, means that less water is intercepted or held in the soil by plants during a rainfall event (Davies & Day, 1998). [29]

The 'hardening of a catchment', as a consequence of urban development, also affects its hydrological behaviour. Specifically, an increase in impervious area reduces the ability of soils in urban areas to absorb water falling as rain (Davies & Day, 1998). The elements that contribute to a hardening of a catchment include the construction of roofs, paths, tarred roads, pavements and parking lots (Davies & Day, 1998).

This section examines changes in the character of the Kingna River Catchment, extending from the town of Montagu to the Poortjieskloof Dam in the southeast, to determine whether changes in land-use/land-cover increased the severity of the March 2003 flood event in the Montagu area.

Section 2.6.2 describes the methods used for comparing changes in land-use from 1960–1999.

Section 2.6.3 presents findings and interpretation of results.

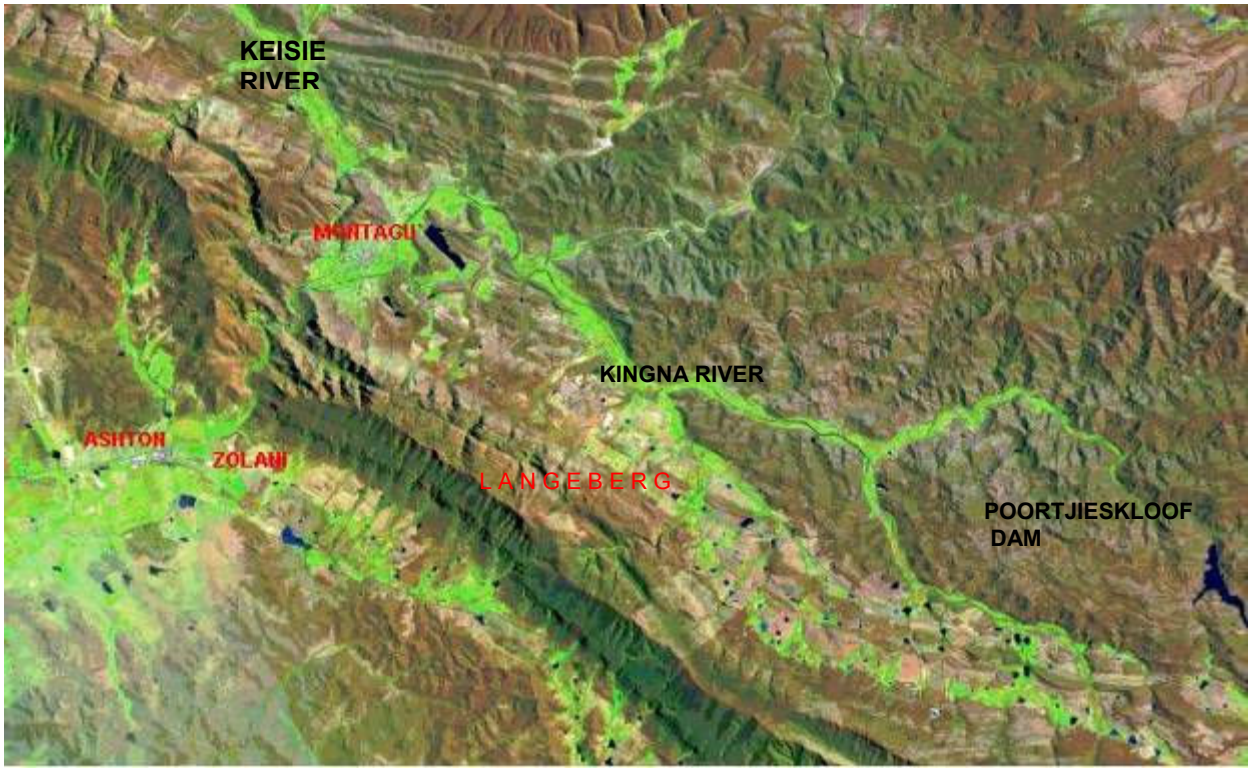
Section 2.6.4 identifies important limitations in the use of aerial photography to monitor changes in land-use.

Figure 2.6.1:Landsat image of the study area

[27] 'Land-use' is the term used to describe human uses of the land, or the immediate actions that modify or convert land-cover. 'Land-cover' refers to the natural vegetative cover types that characterise a particular area, and are generally a reflection of the local climate and land-forms (De Sherbinin, 2002).

[28] de Sherbinin, A. 2002. A Guide to Land-Use and Land-Cover Change (LUCC). A SEDAC and IGBP/IHDP Project.
http://sedac.ciesin.columbia.edu/tg/

[29] Davies, B. and Day, J. 1998. Vanishing Waters. UCT Press: Cape Town.



2.6.2. Methods used

Two sets of aerial photographs, supplied by the Chief Directorate of Surveys and Mapping (CDSM), were used to determine the nature and extent of land-use and land-cover in the Kingna River Catchment. The oldest viable set was taken in 1960 and the most recent set was taken in 1999 (see Table 2.6.2). These two photograph sets were used for the analysis.

Table 2.6.2: Aerial photograph sets used for analysis

	1960		1999	
Scale	1: 36 000		1: 50 000	
Job No.	444		1025	
Date	December 1960		07 June 1999	
Flight strip	2	3	11	12
Photo No.	2526–2522	2762–2755	2685–2682	2694–2698

A 0.5 cm grid was applied manually to both the 1960 and 1999 photograph series. Two land-use classes were chosen – urban area and cultivated land. The extent of the land-use classes were then calculated according to the number of cells that defined them. A 50% rule was applied to individual cells when determining the total area occupied by a particular land-use class. For example, if a cell was occupied by less than 50% of a given land-use class the cell was not counted, and if a cell was occupied by more than 50% of a given land-use class the cell was included in the total area calculation for that land-use class.

2.6.3 Results and their interpretation

The time-series analysis revealed that the town of Montagu (which accounts for the only urban area in the catchment) had increased in area by 112.6% from 5.76 km² in 1960 to 12.25 km² in 1999 (Figure 2.6.3.1). In the same 39-year period, land under cultivation remained relatively stable, decreasing by 0.74% or 0.85 km² from 114.6 km² in 1960 to 113.75 km² in 1999 (Figure 2.6.3.2).

Figure 2.6.3.1:
Change in land–use: Urban area

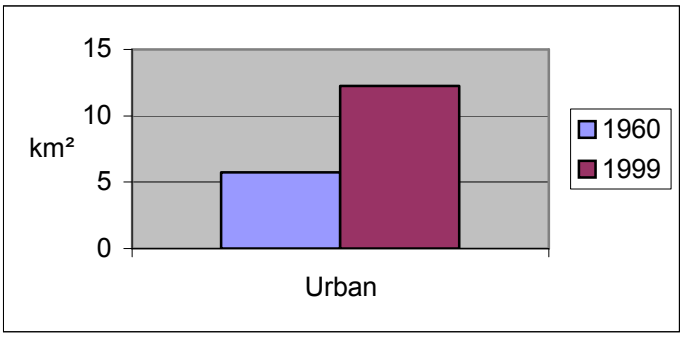
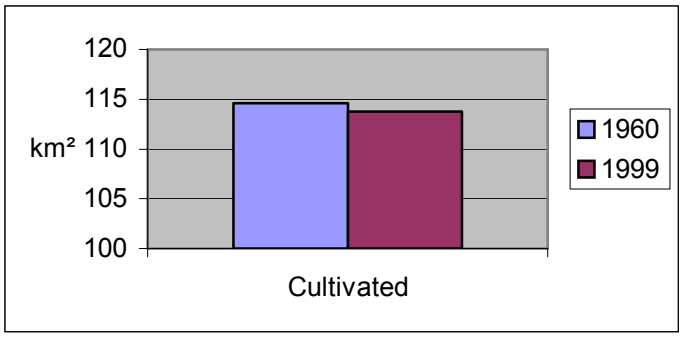


Figure 2.6.3.2:
Change in land-use: Cultivated area



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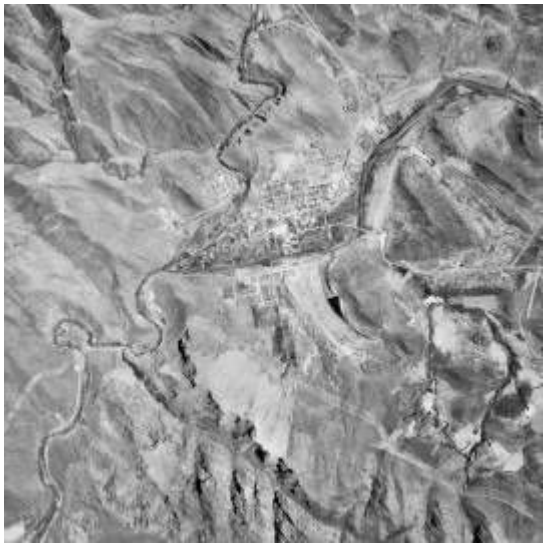
Although urban areas constitute only a small percentage of the total catchment area, the urban development that has seen Montagu double in size over the 39-year period is indeed significant. In particular, as a result of its location at the confluence of the Kingna and Keisie Rivers, the increase in urban area has made the town more vulnerable to flood impacts. The town has expanded across both the Kingna and Keisie Rivers and with it the network of water, sanitation and electricity supply infrastructure. This has significantly increased the potential for loss, both to human life as well as property and services. The construction of bridges and roads across both rivers has also increased the potential for serious primary infrastructural damage.

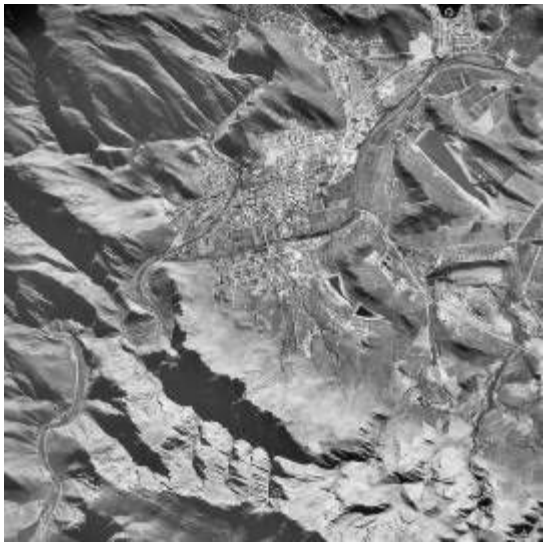
However, from a catchment-wide perspective, the analysis showed, that land-use change was negligible. Although the town of Monatgu expanded significantly, no significant wholesale change occurred elsewhere in the Kingna River Catchment.

2.6.4 Limitations of aerial photography for analysing land-use change

Figure 2.6.4.1:
Montagu, December 1960

Figure 2.6.4.2:
Montagu, June 1999





While the use of hard-copy aerial photographs for the purpose of analysing land-use change demonstrated a significant increase in the urban area occupied by Montagu, it also had several key shortcomings, specifically:

- The coarse resolution of aerial photography made it difficult to discern discreet land-use classes (e.g. degraded land).
- The grey-scale colour made it difficult to correctly identify features.
- Distortion of the area and location of a particular feature differed in both respects, from one image to another.
- The shadow cast by the sun at the time the photograph was taken differed between the two sets of images. In addition, the 1960 set was taken in winter, while the 1999 set was taken in summer.

However, the analysis of the aerial photography highlighted the need for further research into other possible land-use issues that may have contributed to the flooding, including for instance, the nature and extent of land degradation within the catchment. These could not be readily analysed using aerial photographs.

Similarly, this analysis was unable to fully examine issues relating to the management of the riparian zone along the Kingna River, especially the development of reed banks, which may have increased the severity of the flood event.

Part III: Social Risk Assessment

3.1 Introduction, Identification and Methodology

3.1.1 Introduction

The March 2003 extreme weather event, defined as a cut-off low, moved over the southern eastern interior of the Western Cape, resulting in heavy rain and strong winds, which triggered flooding and storm-water runoff. The impacts to poor and marginalised communities/households, triggered by this extreme event, were diverse, with the greatest losses experienced by low-income housing residents whose houses lacked structural integrity.

Whilst the event had been profiled as a flood event, and indeed cases were reported, flood affected households only accounted for 12 of the 772 applications for Social Relief. The remaining applications for Social Relief were largely for households that had been rain-affected, through their walls and roofs leaking. On 4 April 2003 the Montagu, Roberston and Swellendam Municipalities were declared a national disaster area. As a result, assessments were untaken by the research team in all poor settlements within the declared disaster area to determine the nature and extent of the impacts and how the community perceived and/or experienced the event. Focus was given to strategies utilised by the community to either cope or adapt to the shock of an extreme weather event. In this context, communities who did not apply for Social Relief, but fell within the domain of the extreme weather event, were also assessed.

The development of a robust social research methodology, therefore, required clear parameters for identifying the geographic area of study, as well as criteria for identifying communities/households affected within this area. This section describes the methods used to gather information on the social dimensions of the disaster on vulnerable households and communities.

Section 3.1.2. outlines the criteria used to identify communities/households as 'disaster-affected'.

Section 3.1.3 describes the parameters used for defining the geographic area of study.

Section 3.1.4 reflects on the challenges encountered in identifying communities as 'disaster-affected'.

Section 3.1.5 gives an overview of qualitative and quantitative research methods used.

Section 3.1.6 presents the limitations of the research.

Section 3.1.7 presents the ethical considerations of the research.

Section 3.1.8 presents the structure of the report.

It should be noted that for the purposes of this research, 'disaster-affected' communities were only identified within the administrative limits of the formally declared disaster area. The research team was well aware of the widespread nature of reported infrastructural, agricultural and social impacts, including those falling 'outside' the formally declared disaster

area. However, time, budget and other constraints precluded in-depth research into communities falling outside the formally declared areas.

3.1.2 Criteria for identifying communities/households as 'disaster-affected'

Two criteria were applied so that the research process captured both the actual impact/experience of the extreme weather event in poor households, even if they had not been identified as 'disaster-affected' by municipal or other services, *and* the impact/experience of the extreme weather event in poor households/communities that had already been institutionally defined as 'disaster-affected' by assistance agencies. The test criteria applied were:

a) Was this household/community affected adversely by the weather event and too poor/vulnerable or marginalised to withstand/recover from the impacts/losses without outside assistance, but was not formally identified as 'disaster-affected' by formal assistance agencies?

b) Was this household/community formally identified by authorities or other external assistance agencies as being adversely affected by the weather event and provided with external assistance?

a) Communities/households identified by uniform hazard and vulnerability criteria (but not formally identified as 'disaster-affected')

In conducting the assessment, communities were identified as at-risk and affected in terms of the relationship between the hazard, natural weather phenomena and particular conditions of vulnerability.

In terms of hazard criteria, the 'event' was defined in terms of identifiable impacts directly attributable to the weather event, specifically flood damage, rain damage, runoff damage and isolation of areas due to flooding or infrastructural damage.

Vulnerability was broadly defined in terms of the poor and marginalised, representing conditions of economic vulnerability, but similarly social-political conditions such as political representation, ability to generate change or a household's/community's perception of its risk.

It was believed that this interplay between the hazard and particular conditions of vulnerability would result in the generation of a consistent risk profile of affected communities, as well as allow for differentiation between communities' reported impacts and experiences.

b) Communities/households that were formally identified as 'disaster-affected'

From the outset of the research, it was recognised that profile had been given largely to the BKS housing developments of Ashbury in Montagu and Suurbraak near Swellendam, as they had reportedly been the most affected by the weather event and had the highest number of applications for Social Relief.

The low number of Social Relief applications in the other settlements posed a critical issue around whether these communities were less affected or whether other intervening factors influenced their not applying for Social Relief. Potential factors that affected the number of

applications from different communities exposed to the same weather event included community representation/advocacy with municipal authorities, poor risk identification by the municipality, and different perceptions of the event/community experience and accompanying expectations of institutional support.

For this reason, it was imperative to conduct assessments in all of these settlements to ascertain the specific conditions of vulnerability that increased community risk to this extreme weather phenomenon.

In the case of Ashbury, considerable data already existed on the community as a result of needs assessments conducted by the Disaster Relief Committee established in Montagu. In Bonnievale, a report was generated by the Housing Department on the riverine communities, and in Suurbraak a report on the event was generated by the local Health and Welfare Committee.

According to the Worcester District Office of the Department of Social Services and Poverty Alleviation (DSS & PA), reporting of communities affected by extreme weather events is the core responsibility of the local authority, which is largely informed by its local councillors and by site visits that they should be mandated to do. The research team was advised that the DSS & PA is only mandated to offer Social Relief or independently assess the situation after a municipality reports households that have been 'disaster affected'.

It was reported that representatives of the DSS & PA were unable to contact communities in disaster-affected areas without a request for assistance by the local municipality or local councillor. In the case of McGregor, this was significant as it was only three weeks after the event that the DSS & PA was notified by the ANC Women's League that the communities were affected and required Social Relief. At this stage the Worcester District Office of the DSS & PA intervened.

3.1.3 Parameters for geographic area of study

The study area was defined by the nationally gazetted declared disaster area under the Civil Protection Act (1977) to include the municipalities of Roberston, Montagu and Swellendam. Within this 'disaster' demarcated area, focus was given to vulnerable and marginalised settlements as well as farm workers still living on farms along flood-affected rivers within the field site.

Settlements profiled within the study area included low-income housing developments, informal settlements and old clay-brick houses. Within the declared disaster area, the major housing developments for poor communities were identified, namely Ashbury, McGregor, Suurbraak, Happy Valley, Smitsville, Zolani and Nkqubela, the latter two of which are reported in the 1996 census as the poorest and possibly most economically marginalised.

Farm-worker housing along flood-affected rivers primarily included homes along the perennial Breede River, as well as the non-perennial Kingna, Kogmans and Konings Rivers. According to farmers in the region, and confirmed by the flood hydrologist, the Kogmans and Kingna Rivers reflected the highest above-average river flow. The Kingna River had not burst its banks as high in over 100 years.

3.1.4 The challenge in identifying communities as 'disaster-affected'

Identifying communities at risk and ‘disaster-affected’ was challenging in that officially recorded impacts on communities understated the actual extent of weather-related impacts in similarly affected communities that were not formally identified as ‘disaster-affected’. Below is an overview of four categories of community/household that were identified as affected. These are: flood-affected households; rain-affected communities; storm-water runoff-affected communities; and isolated communities and households. The overview highlights the challenges in identifying communities affected by the cut-off low, which impacted in different ways depending on the underlying conditions of vulnerability within each community.

Figure 3.1.4.1: Declared disaster area showing all major settlements’ precipitation values and number of Social Relief claims


ZIMBABWE
LIMPOPO
BOTSWANA
NAMIBIA
MPUMALANGA
NORTH WEST PROVINCE
GAUTENG
FREE STATE
KWAZULU NATAL
NORTHERN CAPE
EASTERN CAPE
WESTERN CAPE
DECLARED DISASTER AREA
LEGEND
Declared Disaster Area
Physical
Elevation
900 m and above
600 - 899 m
0 - 599 m
Perennial river
Seasonal river
Hazard profile
Extremely heavy rain
Moderate rain
Rain affected households
Mountain runoff
Stormwater flooding
Riverine flooding
No of Social Service compensation claims
WORCESTER
LAINGSBURG
MONTAGU
LADISMITH
SWELLENDAM
ROBERTSON
SWELLENDAM
HEIDELBERG
CALEDON
BREDASDORP
DE HOOP
De Doorns
Worcester
Robertson
Ashton
Montagu
Ashbury
Zolani
Happy Valley
Bonnievale
Mc Gregor
Barrydale
Smitville
Swellendam
Suurbraak
Buffeljags
Heidelberg
Witsand
Napier
Bredasdorp
Waenhuiskrans
Greyton
Genadendal
0 10 20 30 40 km
N
Location Map of the Declared Disaster Area
23 March 2003

a) Flood-affected households

The poor, vulnerable and marginalised communities most severely affected by the flooding event, in terms of overall losses, were primarily the riverine residents living alongside the Kingna River in the town of Montagu. They also included farm workers' homes positioned near the Kingna River, although the latter were less common. Flooded households in Montagu were easy to identify as they were positioned within the town, and the town's established Disaster Relief Committee had record of them. Farm workers' houses along the rivers that were affected were however more difficult to identify as there had been no reported cases or claims for Social Relief. The DSS & PA in Worcester underlined that these households were the most difficult to identify, in-part because of the need to consult first with farmers. However, although the DSS & PA had reached out to farm workers via farmers' unions with a dedicated day for farm workers to register for Social Relief, there had been low turnout. With no/few active farm workers' unions, workers often relied entirely on the support of farmers who in most cases were not aware of the Social Relief process.

For this reason, farmers were contacted directly through Agricultural Associations in Montagu, Ashton, McGregor, Swellendam, Bonnnievale and Barrydale. In Montagu and Ashton 50 farm workers were interviewed, the majority of whom lived in Ashbury after moving off the farms over the last three years.

b) Rain-affected communities

Rain-affected households were primarily identified in terms of their applications for Social Relief, with secondary identification done through site observations and interviews in all the towns within the declared disaster area. This was to ensure that all communities who were affected by the rain event were identified and not only those who applied for Social Relief. Within these towns, focus was given to low income housing developments, informal settlements, and older poor settlements. The households identified as affected by the heavy rain of the event were predominately low income houses that had leaked through the roofs and walls and mud brick houses which had collapsed, causing damage to household belongings, such as TVs, fridges, hi-fis, washing machines, carpets, mattresses, blankets and clothing. In some cases houses structurally failed, as in Ashbury, where three houses collapsed, and in Suurbraak, where an old mud brick house's roof collapsed.

Three housing areas were profiled in the Social Relief registration, namely BKS low income housing in Ashbury, Suurbraak mud brick and low income houses near Swellendam and clay houses in McGregor. In Ashbury, 227 families evacuated their houses and in Suurbraak 109 families evacuated to local community halls. In McGregor, Zolani, Nkqubela, Smitsville and Bonnievale no one formally evacuated their homes. Table 3.1.4.1 cross-references the number of Social Relief claims with the number of people evacuated from their homes, providing an initial indicator of the communities reported as rain-affected.

Table 3.1.4.1: Number of Social Relief claims compared with the number of people formally evacuated

Town	**Settlement**	**No. of Social Relief claims**	**No. of people formally evacuated**
Ashton	Zolani	0	0
Barrydale	Smitsville	0	0
Bonnievale	Happy Valley	0	0
McGregor	**McGregor**	**40**	**0**
Montagu	**Ashbury**	**530**	**227**

Robertson	Nkquebela	0	0
Swellendam	Buffelsjags	0	0
Swelledam	**Suurbraak**	**201**	**109**
Total		**772**	**336**

The DiMP assessments however also identified the communities of the low income housing developments of Zolani in Ashton, Nkqubela in Robertson, Happy Valley in Bonnievale, Smitsville in Barrydale and Buffelsjags in Swellendam as sharing common impacts with the households who applied for Social Relief, namely Ashbury in Montagu, Suurbraak in Swellendam, and McGregor.

The impacts were identified in terms of rain leaking through roofs, walls becoming saturated and surface runoff entering through the foundations. In many cases, front doors also swelled and could not be closed. However, despite similar reported impacts, these communities indicated different responses to the event, as well as expectations for institutional support. This was defined in terms of their ability to cope, evacuation assistance and registration for Social Relief.

This posed a critical dilemma in terms of identifying communities that were affected, as it pivoted not only on the impact of the event, but on coping abilities of each community to internally deal with the event. The highly contrasting claims for Social Relief, despite similar reported impacts, illustrate differing abilities to cope with the event. In Zolani there were only three claims for Social Relief while in Ashbury there were over 530 claims, posing the question of whether these two communities, only ten kilometres apart, were affected differently.

c) Storm-water runoff-affected households

Households affected by storm-water runoff were identified through the applications for Social Relief and cross-referenced against site observations and interviews within the declared disaster area. In the majority of cases, households affected by storm-water runoff/ flooding as a result of blocked drains or mountain runoff reported these impacts directly to the municipality. The exception, however, was Nkqubela informal settlement where there were no official reports of runoff-related damage and loss. Field research, however, identified the informal settlement with 462 dwellings as seriously affected by mountain runoff, which had not been reported. In one case a women's informal house collapsed as a result of the mountain runoff. Another low income household was identified as storm-water run-off affected, but this was also not reported.

Fortunately, as the majority of runoff impacts had been officially reported to local authorities, the process of identifying affected households was made easier and could be undertaken largely through Social Relief claims.

d) Isolated communities and households

Identifying communities or households that may have experienced isolation was problematic as this was a *secondary impact* of the disaster, experienced with respect to people's livelihood security. Secondary and indirect impacts of disasters are often more significant to long-term livelihood security than *direct property damage, loss and destruction.* In this context, they are often obscured by preoccupation with more visible direct hazard impacts. Secondary impacts on livelihood security were ascertained through interviews with farm and factory workers.

The concept of 'isolation' has been applied to include communities/households who were cut off from critical services such as health, sanitation, water and electricity and social support networks.

3.1.5 Description of data-collecting methods and instruments

A range of qualitative and quantitative methods were used to assess the impact of the cut-off low on vulnerable and marginalised communities within the declared disaster area. Field information was collected by three researchers in the declared disaster area between 22 April and 16 May 2003.

a) Qualitative methods

Interviews and focus-group discussions were held with community members, key institutional role-players, farm workers and farmers within the declared disaster area. Site observations were conducted in all the settlements within the declared disaster area, to complement the interviews and focus-group discussions. Documents either written by or submitted to the municipality were reviewed. These included reports written by the Housing Department in Bonnievale and the Health and Welfare Committee in Swellendam.

In conducting the interviews a semi-structured interview questionnaire was used. In the majority of cases people welcomed the engagement, which greatly assisted in the interview process. The intensity of the event as experienced was further highlighted by the fact that many people had not spoken about what had happened (in one case a woman whose house was flooded still had not spoken with her children five weeks later).

The qualitative research methods used included:

- Community interviews and focus-group discussions.
- Interviews with representatives of key local institutions.
- Interviews with farmers and farm workers.
- Site observations of physical disaster impacts.
- Review of disaster documentation and photographs.

Community interviews and focus-group discussions

In each of the settlements, approximately 30 household interviews were conducted, with the assistance of a local community facilitator.[30] Facilitators were identified through key

[30] Number of residents interviewed in each settlement:
Ashbury: 25 interviews were conducted in BKS, Old Ashbury, Skerpieonkop and three informal dwellings in Mandela Square
Happy Valley: Ten interviews were conducted with RDP residents
Farm workers: 50 farm workers were interviewed in six focus-group discussions
McGregor: 15 residents were interviewed from the old mud houses, three residents from an informal dwelling and five residents from RDP houses
Montagu riverine households: interviews were conducted with eight households
Nkqubela: 25 interviews were conducted with informal settlement residents and ten interviews with low income housing residents
Smistville: 30 residents from low income houses were interviewed
Suurbraak: 100 residents were interviewed in a focus-group discussion
Zolani: 30 residents were interviewed in low income houses and 'sak' houses

institutional role-players in each settlement and included local councillors, members of local committees and in some cases local residents.

In Suurbraak, a formal focus-group discussion was held with 100 community members at the local hall, facilitated by a local community member. This contrasted with other informally arranged focus-group discussions, which usually comprised five or six people in the affected settlements.

Interviews with representatives of key local institutions

Institutional interviews were conducted with local councillors, active NGOs, municipal workers, clinic staff, chairpersons of local committees and social workers.

This included representatives from the Worcester District Office of the DSS & PA, Breede River/ Winelands Municipality in Montagu, the Monatgu, Ashton Gemeenskap (MAG) Centre in Montagu, and the Afrikaans Christilike Vroue Vereenging (ACVV) in Montagu.

Other individuals consulted included local councillors in Nkqubela, Zolani and Happy Valley, a nurse from the Suurbraak Clinic, the Chairperson of the Health and Welfare Committee in Swellendam, a Community Development worker from Swellendam, the Head of Housing in Bonnievale and a representative of the SAPS in Montagu.

A focus-group discussion was also conducted with the Disaster Relief Committee, including representatives of the MAG Centre, ACVV, Breede River/Winelands Municipality, Development Forum, Worcester District Office of the DSS & PA and a community representative.

Interviews with farmers and farm workers

Farm workers were accessed through Agricultural Associations in Montagu, Robertson and McGregor. Associations were contacted in Bonnievale, Barrydale and Swellendam, but were not interviewed due to time constraints and assurances from the Associations that these areas were not seriously affected. An initial focus-group discussion was conducted with six farmers of the Montagu and Ashton Agricultural Associations, to introduce the research, with a preliminary discussion of impacts on agriculture and potential impacts on employment for farm workers. A second focus-group discussion was held with eight farmers of the McGregor Agricultural Association.

Two researchers and a facilitator visited eight farms in the Montagu and Ashton area, where both the farmers and their workers were interviewed. Simultaneous interviews with farmers and farm workers had been organised in advance by the local Agricultural Association. Focus-group discussions were held with the farm workers, with 50 farm workers being consulted. As the majority of workers interviewed were subsequently found not to be residing on the farms, but living in low income houses, any future studies on disaster impacts on farm workers should focus more specifically on workers actually residing on the farms. A local facilitator was used to assist with these focus-group discussions.

Interviews were also conducted with the Unit Manager of the Tiger Brands canning factory and the Director of Ashton Canning Factory in Ashton, which both sustained damage from the weather event that had implications for local employment.

Site observations of physical disaster impacts

In order to cross-reference community and institutional interviews, site observations were conducted in each settlement within the declared disaster area. During the site observations photographs were used as the predominant method for recording the damage/impact to low income houses and old mud brick homes.

Review of disaster documentation and photographs

All documentation and photographs related to communities/households identified as affected were consolidated and reviewed. The extent of written documentation was however limited to Bonnievale and Ashbury.

b) Quantitative methods

The primary quantitative method used was to assess the extent of the social impact triggered by the extreme weather event. This was achieved by reviewing the needs assessment forms and Social Relief applications completed in Ashbury, Montagu.

A selected sample of 265 post-disaster needs assessments completed by the Disaster Relief Committee in Montagu and Social Relief application forms were compared to assess differing reported impacts by Ashbury residents in Montagu. A sample of 265 was chosen as it reflected half of the registered applications for Social Relief.

3.1.6 Limitations of the research

As research was undertaken in the context of a post-disaster event, it was viewed as capturing experience and, therefore, time constraints, combined with absent baseline information precluded a conventional, sociological structured sampling methodology. The research was not perceived as a disaster audit, but as a case-study undertaken with the intention of informing policy. Therefore, a decision was made to use an ethnographic model, which assumed a more investigative style, using semi-structured interviews and site observations. For this reason, the findings of this research cannot be quantified, but where possible, mention is made of the number of people interviewed and their respective designations.

3.1.7 Ethical considerations

In the interests of confidentiality, all informants are referred to by title rather than by name.

3.1.8 Structure of the report

Section 3.1 introduces the challenges and criteria for identifying communities/households as ‘disaster-affected’, an overview of the data-gathering methods and instruments, methodology, limitations of the research and ethical considerations.

Section 3.2 describes the emergency response, institutional support and later Social Relief of identified communities/households within the declared disaster area.

Section 3.3 describes the experiences of communities/households not identified by local institutions as affected, but who experienced similar impacts to those communities/households identified for relief. Insight is presented into the reasons for a weak/absent institutional response and how this was counterbalanced in one settlement by the establishment of a committee to later apply for social relief.

Section 3.4 presents a synthesis of the research findings with relevant suggestions/recommendations for increasing the resilience of these at-risk communities.

3.2 Emergency Responses to the Event, Institutional Support and the Role of Social Relief in the Recovery Process

3.2.1 Background

The unexpected severity of the weather event and its consequences, compounded by absent institutional co-ordinating bodies, meant that the immediate response and evacuation of affected households largely depended on key individuals within institutions and informal social networks. Whilst a joint operations centre (JOC) was established in Robertson to co-ordinate the overall event, the specific co-ordination of affected communities was not standardised, resulting in local institutions assuming co-ordinating roles in terms of evacuation and temporary relief, such as food and blankets. As a result, the approach to the emergency response and relief was not uniform.

This is best illustrated in Ashbury and McGregor where, despite similar community and household impacts/losses, institutional support contrasted graphically. Households in Ashbury were formally evacuated to halls and a local crèche, where they were subsequently provided with emergency shelter and registered for Social Relief. In contrast, the residents of McGregor were not provided with institutional support during the evacuation process, but later applied for Social Relief.

In this context, the action of formal evacuation generally triggered access to emergency assistance, relief support and Social Relief, but was not necessarily a determining factor, as illustrated in the case of McGregor.

This lack of uniformity in emergency response, institutional support and later Social Relief is explored in Section 3.2. Particular attention will be given to communities/households who applied for Social Relief.

Section 3.2.2 describes the event and the role of local institutions in facilitating the evacuation and housing of affected communities/households, who were formally recognised as disaster-affected and who later registered for Social Relief.

Section 3.2.3 examines the role of local institutions and informal social networks in providing relief assistance to these communities/households.

Section 3.2.4 describes communities affected by the event, that applied for Social Relief, but were not formally evacuated. In all cases these households contacted the municipality or DPSS and PA directly to inform them that they were affected.

Section 3.2.5 presents an overview of the Social Relief process, highlighting the role of local institutions in promoting long-term sustainable recovery.

3.2.2 Emergency response to the event and evacuation of affected households

Within the declared disaster area, the communities/households who were formally recognised as disaster-affected were those who were formally evacuated. This primarily reflected households at risk of flooding. However, it also included rain-affected households within the settlements of Ashbury and Suurbraak. Within these two settlements, active involvement of key members from the community and local institutions assisted with the emergency response, evacuation and temporary shelter of affected households.

In another example, the Tiger Brands factory provided temporary accommodation for factory workers who could otherwise not travel to work in Ashton from Montagu, which was cut off due to the Kogmanskloof Pass being closed.

In this section, the following communities/households' *evacuation process* is described, providing insight into the *role of local institutions/organisations* in facilitating/supporting the evacuation process and subsequent temporary housing:

- Riverine communities/households of Montagu and Bonnievale and farm workers living on large-scale commercial farms along the Kogmans River in Ashton.
- Rain-affected communities/households in Ashbury and Suurbraak.
- Isolated Montagu factory workers who were provided with temporary accommodation in Ashton.

3.2.2.1 Riverine communities

Riverine households faced the highest risk in terms of potential loss of lives and household belongings, often without any preceding formal warning. In two instances, households on the Breede River in Bonnievale and farm workers along the Kogmanskloof River in Ashton received warnings from farmers and residents upstream that the river was rising. The response to this warning, 'uncoordinated' in the formal sense, was managed by key individuals who took the initiative to respond rapidly and evacuated the households at risk.

However, in one instance where ten riverine households were flooded in Montagu, no warning of any sort was issued or received. As a result, people living in these houses had no option but to exercise their own life-saving judgment, climbing out through windows to barely escape the rising floodwaters. It was only these residents in Montagu who experienced flooding of their houses with a consequent loss of household property.

The following focuses on the experience of riverine flooding by Montagu and Bonnievale residents, together with those living alongside the Kogmans River.

a) <u>Montagu riverine households</u>

Ten Monagu riverine households, living within 50 metres of the Kingna River, and less than one kilometre from the confluence of the Kingna and Keisie, were evacuated with assistance from friends, farmers and the Montagu SAPS on Monday morning, 24 March.

According to one riverine resident, she appreciated the seriousness of her predicament only when she saw her large pot plant disappearing down the river. By the time she had got

dressed, the river was so high that she could only climb out of the window of her house to escape. Her house was eventually flooded by 1.5 metres.

Another resident living closer to the confluence of the Kingna and Keisie Rivers, reported that his house was flooded to the ceiling, with half-a-metre of silt deposited inside. The owner of the farm on which this occurred reported that they realised 'the situation was serious' when he saw his labourer's fridge 'floating down the river'.

Residents explained how it was literally a 'matter of timing', with the water rising so quickly that they could have drowned if still sleeping.

One farmer retold how the water was moving so quickly and with so much force that it uprooted six-metre-high trees along the river. Two farmers living close to bridges crossing over the Kingna River explained that the excessive amounts of debris caused the bridges to be blocked, resulting in the damming up of the river. However, another farmer's explanation was that the flooding was not solely because the river dammed up at the bridges, but that this was compounded by an extremely high and quickly moving river. He explained how this contrasted with the situation in 1981 when the river flooding was largely the result of water backing up.[31]

In Montagu, many of the houses are positioned within 50 meters of the Kingna riverbed, which the river normally flows down as a small trickle during the winter and which is dry during summer. However, on 24th March, the Kingna River burst its banks and flooded as far up as Long Street, an event that had never previously been recorded. As a result, those people who were directly flood-affected had no time to remove their furniture or clothes from their homes and left with only a few belongings they could carry. The majority of these residents stayed with relatives or friends until the water receded enough for them to begin cleaning their homes.

One man whose house was completely flooded was still cleaning his house and repairing damage six weeks later. The mud that was deposited was the most problematic as it was a fine silt which was difficult and time-consuming to clean up. In the interim he was living in the garage of the farm owner, who provided him with a bed and tables. Mattresses were donated to him and other riverine flood-affected households by local churches and the Disaster Relief Committee who were co-ordinating the relief distribution. The remaining households returned home five days later after they had cleaned out their homes.

The extent of the repairs to the structures ranged from the replacement of doors and windows to ceilings and guttering, depending on how high the water rose. In the most severe case, a labourer needed to replace his doors, windows and ceiling – but fortunately – was able to do this with the farmer's support.

As the majority of these labourers' cottages were situated on farmers' property (mostly smallholdings), the farm owners attempted to claim from their household insurance to have their workers' houses repaired. While one farm owner, whose house was also flooded, hoped that his claim would be successful, he was not optimistic, as the worker's house was an outbuilding. In the interim he, like most farmers, provided support by purchasing doors and windows.

[31] In 1981 the Kingna River which passes these labourers cottages, was not as severely flooded as the Keisie River. The flooding that year of these riverine households was explained in terms of the backing-up of the Keisie into the Kingna as it entered the Kogmanskloof river.

Other support from farmers to help with recovery was reflected in providing compassionate leave and paying for additional labourers to help with cleaning up. This was found to be a pattern in all the households that were interviewed along the river.

At the time of the research, one man however, was still sleeping on a mattress that was saturated with silt. It was a double bed mattress, few of which were donated by the Red Cross, churches and farmers. Another reported that his only relief assistance was the Disaster Relief Committee's last blanket, but this was as he only returned to his home a week after the relief had been distributed.

A further compounding impact of the flooding on riverine households was that their electricity was cut off for as long as a month, resulting in their relying on gas and open flames. For the first week this was not problematic as they were not in their houses, but had obvious cooking and lighting implications later.

b) Bonnievale riverine households

In Bonnievale, three farm labourers' cottages had to be evacuated when the Breede River rose to within a metre of their houses, washing away their pigs and cows and further threatening to flood their houses. Fortunately, the river receded without entering their homes. The community was evacuated with support from the SAPS and the local authority's Department of Housing, which received a warning from the Van Louveren wine estate 16 km upstream, whose cellars were severely flooded when the Bree River entered the Breede River. Ironically, the farm owner whose farm the houses were built on was absent and could not support the evacuation of these houses.

These three households, comprising 19 people, were temporarily housed in the Bonnievale Community Hall until the Breede River receded the following day. During this time, they were provided with mattresses, blankets and food, which had been donated by local grocery stores and churches. As the women were evacuated during the day, their husbands did not know where their wives and children had gone when they returned from work. The local authority took the responsibility to inform the husbands, who then joined their families at the hall.

According to these residents, who have been living in these houses for approximately 17 years, they have never seen the Breede River so high. Besides the heavy rain, the increasing number of reeds in the Breede River is believed to be a major contributing factor in decreasing the size of the riverbed, causing the river to break its normal banks.

c) Kogmans riverine residents

Workers in Ashton were evacuated to higher ground when an early warning sent from farmers in Montagu indicated that the Kogmans River would rise further at a rapid rate. The workers spent the Monday morning and afternoon up the road from the farm at a safe house, organised by the farm owner. The workers returned to the farm that evening as the waters had not flooded their cottages, but they still decided to sleep in the barn in case the river rose later that night. As there was no significant damage to the workers' cottages on the Ashton farms visited, the workers were able to help begin the recovery and repair process to the damaged vineyards and orchards.

3.2.2.2 Low income housing communities/households of Ashbury and Suurbraak

The large informal evacuations of households in Ashbury, Montagu and Suurbraak near Swellendam were co-ordinated by key individuals within these communities and local institutions. Residents were further assisted by local bus companies, which transported families to halls and crèches.

In Ashbury, young residents in their early 30s assisted people to a local crèche and later to halls organised by the Breede River/Winelands Municipality in Montagu. In Suurbraak, staff from the local clinic, school and church co-ordinated the evacuation to the local hall.

In both locations, residents left with the few possessions they could carry, such as blankets and dry clothing, as there was no time or space to transport belongings. There was, however, one exception where a woman living in an old mud brick house in Suurbraak, whose roof had collapsed, was assisted in transporting her belongings to a neighbouring house that was not damaged.

Field research indicated that the people most severely affected with respect to the loss of household assets were those who were unable to remove or secure their belongings prior to evacuation. This contrasts with those individuals/household members who stayed in their homes and were able to better protect their televisions and radio systems from water damage. Despite staying at home, it was still difficult to protect mattresses, carpets and bedding from the rain. In many instances, these household items were so badly damaged that they had to be discarded.

a) Ashbury evacuation

Temporary accommodation was required for households from Ashbury, particularly for the Ashbury housing development residents, whose houses were inadequate to withstand the heavy rain. It was reported that roofs and walls leaked to such an extent that residents chose to seek shelter at Kabouterland, an Ashbury crèche, and three town halls in Montagu. For the majority of BKS residents, this was the first rain they had experienced while living in their new homes, compounding the impact of their belongings being wet. The majority of people reported that their blankets, mattresses and furniture were wet as a result of leaking roofs and walls.

By Monday evening (24 March) the evacuation was already underway, but due to the inadequate supply of blankets at the evacuation shelters, many people returned to their wet homes that night. One woman whose house structurally collapsed was forced to evacuate from her home on Monday morning and was temporarily sheltered at Kabouterland until Thursday when she was provided with an army tent. Her home was one of three houses in the Ashbury housing development that collapsed.

On Monday night, 228 families were housed at Kabouterland. According to the director of MAG, the emotion of those sheltering together in the town halls was one of anguish. This was driven by the realisation that their houses were substandard and they felt that they had been negotiated a ‘bad deal’. For many people, the significance of the event was less the impact of the heavy rain, and more the realisation that their houses were ‘substandard’. This awareness was compounded by a fear that their houses could structurally fail, resulting in major damage.

On Tuesday 25 March, food relief was provided by the ACVV, which ran the soup kitchens at both the town halls and Kabouterland. That evening, the director of the MAG centre offered

temporary shelter at the centre to those staying at Kabouterland and the halls, as it had rooms which were more suitable than the open venues available. On Wednesday night (26 March), the MAG Centre provided shelter to 49 families, most of which remained for the following three days while their belongings dried out. During that time, people were encouraged to return to their homes to dry out their clothing and belongings.

There were, however, many members of the community who felt they could not evacuate to temporary shelter, as the doors to their homes would not lock, leaving their homes insecure. This was due to the structural design of many BKS houses, in which the roof ended over the door, with no guttering. As a result, the rainwater came into direct contact with the door, causing it to swell. One community member described how she made a choice to sleep in her wet bed, opting against evacuating from her house. The director of the MAG centre negotiated with the SAPS to increase the number of patrol officers in Ashbury and similarly negotiated with the neighbourhood watch to sleep at Kabouterland in an attempt to curb any possible threat of break-ins or violence.

Other people, who lived in Mandela Square (a small cluster of informal dwellings next to Ashbury) were transported by a local bus company on Monday evening to Kabouterland and town halls.

b) Suurbraak evacuation

In Suurbraak, 109 families from low-income houses and informal dwellings were evacuated on Sunday night (23 March). This evacuation, coordinated by the local clinic, church and Suurbraak School, was undertaken with the assistance of local bus companies. These families were temporarily housed for three days at the local hall and church until they could return to their homes.

As the low-income houses at Suurbraak, built under the supervision of the municipality, had not been plastered or sealed, the walls became saturated from the extreme rains. Moreover, as the roofs were also not attached correctly to the walls, with the heavy winds, these became detached, causing water to enter the dwellings. Most residents of informal dwellings in Suurbraak also evacuated from their homes, due to water entering their dwellings through ground seepage and runoff, as informal structures do not have foundations or cement floors. By the Sunday evening, the dwellings became so wet that Suurbraak residents began to fear for their safety and needed evacuation.

On Sunday night when the community was first evacuated, they were provided with gymnasium mats to sleep on, blankets and food. People reported not having much privacy in the hall and stated that it was uncomfortable. Most people were not afraid of theft, as there is not a high crime rate in Suurbraak, although there were instances of women and children evacuating to the hall while the men remained at home.

On Monday night (24 March) rooms were made available at the local church for families from the hall.

As in the case of Ashbury residents, those evacuated were not able to take their belongings with them on the buses when they left their houses due to limited time and available space. Those who stayed in their homes were obliged to sleep in the drier parts of their houses.

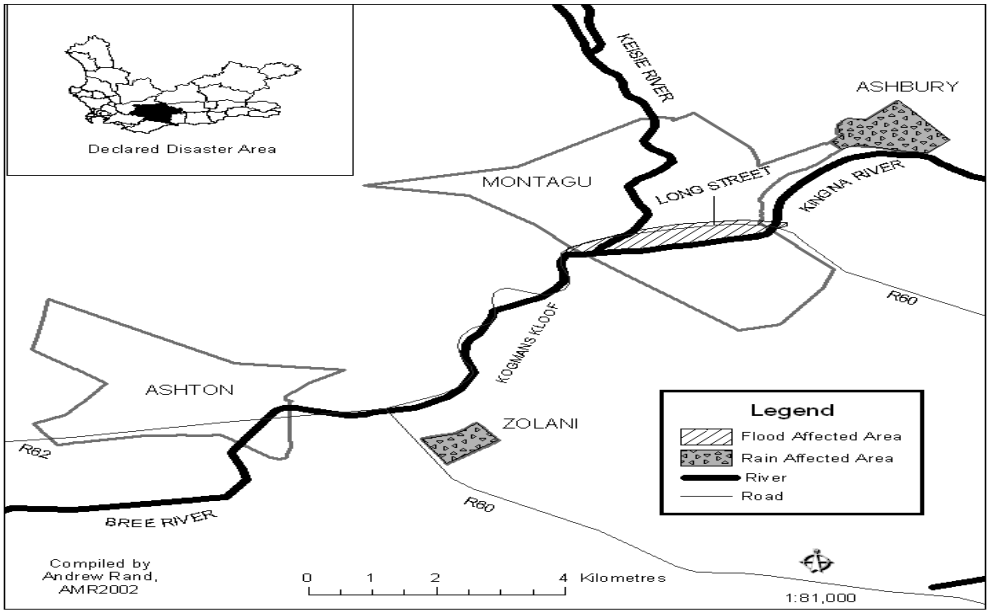
One elderly couple living in a mud brick house had to be encouraged to leave their house after they were found lying on their bed with water lapping at the mattress. They had been afraid to leave their house, although one of its walls had collapsed and it had become

endangering. Although she was offered accommodation at the hall, the elderly woman decided to stay with her daughter who lived next door. The house had been her home for 70 years and, according to both her and her husband, was constructed before they were born. In all her life she had never experienced a weather event of this magnitude.

3.2.2.3 Isolated factory workers: Temporary housing for permanent workers

The Ashton Canning Factory and Tiger Brands Canning Factory, both in Ashton, provided temporary accommodation to their permanent workers from Montagu. With the Kogmanskloof Road closed for 11 days, workers were faced with the option of riding a bicycle through the 6 km kloof to work, travelling approximately 200 km by bus or finding alternative accommodation in Ashton.

Figure 3.2.2.3: Montagu and Ashton, with surrounds



Twenty-four permanent workers at the Tiger Brands factory were housed in a local hotel where they were provided with a daily budget of R200, costing the factory approximately R30 000. However, seasonal workers from Montagu were not provided with accommodation and had to rely on family and friends living in Ashton, Robertson or Bonnievale.

One woman described how she had to live with a relative in Ashton until the Kogmanskloof Pass was reopened after the floods. This was a traumatic experience for her, as she lived in Ashbury and could not see her husband or be together with her child on her child's birthday. Furthermore, being a seasonal worker, she was not compensated for days of missed work

and thus had to endure the situation until the roads were repaired, as the cost of taking the alternative route to work was too expensive.

3.2.3 The role of local institutions in co-ordinating community relief

While the evacuations lacked formal coordination, the need for emergency relief called for some form of coordinating mechanism to oversee and streamline the distribution of food, mattresses, clothing and blankets to identified households. Similarly, a mechanism was required to assist with registering weather-affected households for Social Relief. Only in Ashbury and Suurbraak, was this reflected in the spontaneous establishment of relief coordination committees. In no other areas/settlements were comparable structures established.

This section explores the role of local institutions in co-ordinating community relief in Ashbury and Suurbraak, focusing particularly on:

- The establishment of the Disaster Relief Committees in both settlements, and an examination of the role played by the DSS & PA in facilitating the establishment of these structures.
- A description of the process of distributing relief in both settlements.

3.2.3.1 Co-ordinating community relief: The establishment of Disaster Relief Committees

Before the amalgamation of the municipalities in December 2000, a committee in Montagu had been convened under the Civil Protection Act to co-ordinate operations during a crisis. However, with the amalgamation of municipalities, a new Civil Protection Plan had not been put in place and many of the staff from the previous committee had left. As a result, there were neither structures for emergency response, nor mechanisms for the co-ordination of relief assistance.[32]

This section examines the steps taken in establishing the Montagu and Suurbraak Disaster Relief Committees and their consequences for ensuring the timely provision of humanitarian relief.

a) <u>The Montagu Disaster Relief Committee</u>

Overall district co-ordination was undertaken by the Boland District Disaster Management Officer. However, as there was no formal co-ordination mechanism in Montagu to manage the incident, the SAPS took the lead in evacuating flood-affected communities. As the Ashbury settlement fell outside of the SAPS mandate, the evacuation of this settlement was co-ordinated informally, with the assistance of young community members who arranged for a venue and support for the first night (Monday 23 March). Earlier that day, 400 Ashbury residents had marched to the municipal offices in Montagu to formally complain about the poor structural integrity of their houses.

[32] For more detail on the amalgamation of the municipalities and its implications for institutional arrangements for disaster management, refer to Part IV of this report.

On Tuesday morning (25 March), social development workers from the DSS & PA, who were visiting the municipality, were requested by Ashbury residents to address the community. They were approached directly after the community identified their government car at the municipal offices in Montagu.

On Tuesday afternoon, the social development workers advocated the establishment of an inclusive co-ordination body to assist with the relief efforts in Ashbury. They suggested the inclusion of representatives from the local authority, relevant local organisations (such as MAG, the ACVV and the Development Forum) and community representatives. As a result, a committee was established, convening the next morning to strategically plan the co-ordination of the relief, under the guidance and supervision of the Worcester District Office of the DSS & PA.

The committee consisted of representatives from the MAG Centre, the ACVV, Provincial Social Services from Worcester, two community members, the Breede River/Winelands Municipality Health Department and the Development Forum. Community representatives were elected directly from the crowd present. The inclusion of the MAG Centre on the committee was a result of its involvement in the temporary housing of the community, while the ACVV was included because of its support during the evacuation and provision of food through the soup kitchens. The involvement of the local authority eventually occurred as the result of considerable pressure being applied by the community, resulting in the identification of a formal representative.

The Disaster Relief Committee's main function was to co-ordinate the distribution of blankets, mattresses and food. In addition, a subcommittee was established to carry out a needs assessment in Ashbury to determine who should be targeted for food relief.

In addition, the Disaster Relief Committee also contributed towards facilitating the Social Relief process by helping community members to complete the forms and, assisted by the DSS & PA, to verify the applications.

The measures taken by the social development workers in Montagu reflected a level of initiative that went well beyond a social development worker's expected responsibilities.

b) <u>The Suurbraak Disaster Committee</u>

The Disaster Committee was established under the guidance of the Health and Welfare Committee and consisted of a health worker, the local pastor and a development official, and was legitimated by the Swellendam Municipality. The Disaster Committee was thus an integrated, expanded version of existing health and development committees.

One of the roles undertaken by the committee was to provide temporary shelter to the affected households and assess the overall impact of the disaster in the community. This assessment, undertaken on Sunday night and Monday was criticised as being incomplete and unrepresentative of the community, as many people were reportedly away at work when the assessment was conducted by the local clinic. Although incomplete, the information gathered formed the basis for a needs assessment, and assisted in identifying households that were not evacuated but had been affected.

By Tuesday, the committee, having made a complete list of those affected, began the task of co-ordinating the immediate relief process, with the assistance of non-governmental organisations, the Department of Correctional Services and the resources of the Swellendam Municipality.

On the Thursday afternoon (27 March), the Premier of the Western Cape arrived in Suurbraak by helicopter, where he addressed the community, confirming that they would be supported and that they could expect R500 payouts from the DSS & PA as in the form of Social Relief for their losses. Subsequently, the Committee began the process of consulting with the community on how best the funds, received for Social Relief, could be spent. This was finally realised in the establishment of a Building Committee, under which 60 households purchased cement and bricks to weatherproof their homes against extreme weather events. This is discussed further in Section 3.4 on the role of Social Relief in the recovery process.

c) The consequences of institutional arrangements for the distribution of relief

The respective processes adopted by local government to formally recognise these two committees reflects two contrasting approaches to governance in times of disaster. Moreover, it also underlines the importance of establishing clear institutional arrangements to ensure timely distribution of humanitarian assistance to needy households in times of crisis.

In Ashbury, the Municipal Manager of the Breede River/Winelands Municipality did not formally recognise the Disaster Relief Committee that was established on 26 March. This resulted in 700 food parcels being withheld due to a lack of institutional clarity concerning what structure was responsible for the distribution of relief. Unfortunately, one of the consequences of this institutional uncertainty was that the Provincial Government only formally recognised the Committee ten days after the disaster, leaving many Ashbury residents without food over the intervening weekend.

This contrasted markedly with Suurbraak, where the municipality supported the committee by ensuring that they were provided with the necessary resources, such as blankets, mattresses and food.

3.2.3.2 The process and procedures for distribution of food relief, blankets and mattresses

The absence of established institutional arrangements for the distribution of disaster relief in both Ashbury and Suurbraak had clear consequences for the timeliness and effectiveness of humanitarian assistance to the affected communities. This section describes the respective processes followed to provide relief assistance to weather-affected households in both settlements. The urgency for timely relief support is underlined when located in the context of fragile household livelihood strategies that depend heavily on weekly wage payments, which were suspended during the weather-induced disruption to the local economy.

a) Relief distribution in Ashbury

Many of the weather-affected households in Ashbury live in chronic conditions of poverty and livelihood insecurity, surviving from one unpredictable weekly wage to another. Food insecurity is a constant pressure in the months outside the farming season, as most seasonal workers are unemployed. The heavy rains, flooding and disruption of road links had powerful impacts on already vulnerable households with fragile livelihood strategies.

This was reflected in two ways. First, seasonal workers who were unable to work during the week beginning Monday 24 March, had no income to buy food for either the weekend or the following week. By Thursday 27 March, their situation had become desperate. This was

further exacerbated by the spoiling of any perishable food that had been refrigerated due to electricity outages from 24 to 27 March. Moreover, the provision of free food through soup kitchens was discontinued after Wednesday 26 March.

It was only the following Wednesday (2 April) that food parcels were distributed to needy households. In the interim, the Disaster Relief Committee sought food from elsewhere by contacting the South African Red Cross in Cape Town, as well as other organisations that could supply them directly. This, however, was clearly insufficient to meet the local needs.

Field interviews indicated the following with respect to the distribution of relief items and food parcels in Ashbury:

- Tuesday 25 March: The leader of a political party is reported to have handed out 150 food parcels to Ashbury residents during his site visit where he addressed the community. It was uncertain what criteria were used to distribute these parcels.
- Wednesday 26 March: Last day for soup kitchens.
- Thursday 27 March: The Disaster Relief Subcommittee co-ordinated by the ACVV conducted a needs assessment throughout Ashbury. In its door-to-door assessment, the ACVV assisted households to complete standard needs assessment forms. That night the forms were submitted to the Health Department of the Breede River/Winelands Municipality, where they were sorted by street name and further categorised in terms of need. The department worked through the night sorting and reviewing the assessments, eventually determining household eligibility for food relief.
- Friday 28 March: The Disaster Relief Committee requested that the estimated 700 food parcels stored in the municipal offices be released so that the committee could begin distribution. The municipality, however, refused to release the food parcels, as it did not formally recognise the committee.
- Saturday and Sunday 29–30 March: The SAPS distributed 100 food parcels to farm workers isolated on farms along the R62 to Barrydale with the help of a 4x4 club.
- Monday 31 March: The municipality is reported to have distributed bread to Ashbury residents, but refused to release the food parcels. The DSS & PA representatives again consulted with the municipality, and discussions took place with respect to dissolving the existing committee in favour of a new committee established by the municipality.
- Wednesday 2 April: The original Disaster Relief Committee received formal recognition from Provincial Government. Food parcels were transferred to the committee from the municipality for distribution.

Food parcels were donated by a range of local chain stores such as the OK, Pick ‘n Pay and Spar to the Breede River/Winelands Municipality offices in Montagu. The high media profile of the event in three of Cape Town’s newspapers and two other local newspapers in the Boland, resulted in the donation of food parcels, mattresses, tents, blankets and clothing. One clothing donation came from as far field as the Limpopo Province.

The distribution of the food relief was done according to criteria determined by the Disaster Relief Committee (those households with a monthly income of less than R600 and households whose income was disrupted due to being cut off from their places of employment, such as in the case of farm workers). All those who worked in the town of Montagu were excluded. Local community facilitators were used to cross-validate household forms, especially in instances where people had stipulated that they did not need food despite reporting low income.

b) Relief distribution in Suurbraak

From the Monday morning, after two days of heavy rains, the municipality began providing food to the 109 affected residents who had to evacuate to the school hall. The Department of Correctional Services began providing blankets, while the ACVV and other local non-governmental organisations provided additional food, blankets and accommodation. On the Wednesday, the community was notified that they would begin with registering for Social Relief and would receive their food parcels at the local primary school.

During the heavy rains, a major water pipe burst, resulting in the loss of the town's only water supply for two weeks. In the interim, water was provided by the Swellendam Municipality, which trucked water in twice daily until the pipes were reconnected on 11 April. Some residents were inconvenienced by the disruption to water services. To reduce the risk of illness caused by a limited supply of safe water, a health inspector visited Suurbraak daily to monitor potential health hazards. The Committee also encouraged residents to take health precautions, and met with residents in the mornings and evenings, when they were collecting water from the truck.

3.2.4 Communities/households who were not formally evacuated, but applied for Social Relief

While the majority of households who filed for Social Relief were initially identified through the evacuation of rain-affected communities, a limited number of additional households also registered for weather-related losses. In McGregor, 40 households applied for Social Relief five weeks later after watching the news that reported the disaster assistance process. In Smitsville, Barrydale, affected households reported directly to the municipality, who subsequently contacted the DSS & PA. In Zolani, Ashton, affected households were informed by a local social worker that they could apply. In Zolani, the Disaster Relief Committee assisted with these applications.

In these three examples, the households approached the authorities directly themselves, as the municipalities had not conducted formal needs assessments within these settlements. The lack of uniformity in assessment, and reliance on individual households reporting their losses to local authorities, meant that in the weather-affected poor settlements, there were many other households who did not register for Social Relief, but who did sustain significant losses. This is examined further in Section 3.3.

3.2.4.1 McGregor

The residents of McGregor who were severely affected by the extreme weather event on 23 March, were mainly residents of old Cape Dutch style mud brick houses. There were a few affected residents staying in low-income houses, along with residents of two informal dwellings that were flooded by the river.

In the old Cape Dutch style houses the heavy rains caused severe damage to the thatched reed roofs, in some cases causing them to collapse completely. Normally, light rains cause the reed roofs to swell, preventing water from leaking into the homes, but with the heavy rain, and being the first heavy rains since the previous winter, the roofs were not able to seal and caved in under the weight of the swollen reeds. Leaking was so severe that it caused the walls, built from mud and hay, to become saturated and in some cases collapse. This resulted in flooding within the houses, damaging/destroying mattresses, television sets,

refrigerators, washing machines, carpets and beds. This was the experience for most affected residents living in the old mud brick houses.

Residents of low-income houses also complained of wet walls and floors. While the structural integrity of their homes was not threatened, they still experienced damage to their household belongings.

Two houses flooded when the river burst its banks, sending water into informal dwellings, destroying all possessions. These two houses were situated closest to the river, in the lowest part of the street and thus exposed to riverine flooding. According to the residents of these dwellings, there was no warning of the river rising or the coming heavy rains.

Forty of these households filed for Social Relief from the DSS & PA due to the above impacts, but only after intervention by a local councillor three weeks after the heavy rains. No disaster relief committee was formed during the event and consequently there was neither an evacuation nor the distribution of food relief. The complete lack of institutional support, in this instance, underlined the importance of informal social networks for emergency food and shelter.

When affected residents learned from a news-broadcast that the area had been declared a national disaster and that they were entitled to apply for Social Relief through the DSS & PA, they approached the Municipal Offices in Mcgregor. The residents reported that they were 'turned away' and told that the 'compensation forms were only for the farmers'. This possibly reflected a misunderstanding of simultaneous but different assistance processes, as indeed, farmers were – at the same time - submitting insurance claims to the Department of Agriculture. Eventually, the local councillor contacted the Worcester District Office of DSS & PA directly to inform it of the affected households.

The ability of the residents to recover from the impacts and to repair their homes depended largely on what they earned and the nature of the damage they sustained. As most of those affected were relatively poor, they were less able to repair damage to their homes, increasing their vulnerability to future rains and health risks. The damage to their homes, assets and livelihoods possibly increased their vulnerability to further impacts from the approaching winter rains.

3.2.4.2 Smitsville, Barrydale

Five households applied for Social Relief after reporting storm-water drains overflowing, and causing flooding in their homes. These households independently approached the local councillor, who contacted the municipality, which subsequently contacted the DSS & PA.

3.2.4.3 Zolani, Ashton

In Zolani, three Social Relief claims were filed by residents living in the older part of the settlement. In all three cases, residents reported water entering their houses as a result of blocked storm-water drains. One of the applicants, a pensioner who has been living in Zolani since the 1970s, reported that his backyard house was flooded with water that entered through the street. As this structure was not raised, the water accumulated and mud flowed in from the street, filling the rooms with approximately 30 cm of water and silt. His family who were staying in the backyard house had to move into the main house due to the flooding. The applicant believes that the reason the water entered his backyard dwelling was that the

council had not cleared the drains and therefore the runoff on the tarred roads had nowhere else to go.

The research team also met this man's daughter, who worked at the local clinic as a social worker. It seems that it was her knowledge of the Social Relief process that enabled her father to seek Social Relief for damage sustained.

3.2.4.4 Buffelsjags

Five households applied for Social Relief when storm-water drains overflowed resulting in the flooding of their homes. Buffelsjags is built in the vicinity of a marshland, affecting the effectiveness of the storm-water runoff. These households contacted the local councillor who reported their losses to the Swellendam Municipality, who were already actively involved in Suurbraak less than 50 km away.

3.2.5 The role of local institutions in the Social Relief process

In Suurbraak and Ashbury the Disaster Committee and Disaster Relief Committee respectively played active roles in assisting residents with the application and subsequent use of the Social Relief, in encouraging residents to opt for longer-term recovery plans. In Suurbraak, the formal establishment of the Building Committee following the payouts was designed to encourage residents to collectively pool their finances to purchase building materials to weatherproof their homes. The committee was successful in having 60 of the 143 low-income households sign up for the project, with a collective R88 000 being pooled in a fund that was co-managed by the Disaster Committee, Swellendam Municipality and local residents. In Ashbury, residents were encouraged through site visits by the Disaster Relief Committee before and after the disbursements, and persuaded to spend their Social Relief wisely on weatherproofing their homes.

The Social Relief process in the nationally declared disaster area was recognised by these committees as having short- and long-term consequences in the process of recovery. In turn, this was highly dependent on the individual choices of households to either replace household belongings or repair household structures. The household belongings purchased to replace those damaged by the rains, and the food secured by the residents, suggests that the Social Relief recipients are mitigating their short- term losses through immediate recovery efforts. The purchasing of building materials such as cement, bricks and sand, however, suggests an effort to reduce one of the underlying conditions generating their vulnerability – the poor structural integrity of their homes, such as inadequate plastering of walls.

In this section the following will be explored:

- The role of local committees in facilitating the use of the Social Relief assistance, with particular reference to the establishment of the Suurbraak Building Committee.
- The challenges of achieving long-term sustainable recovery in Ashbury, where addressing immediate needs is given preference in the greater purchasing of household belongings and food.

3.2.5.1 The role of local committees in facilitating the use of Social Relief payouts

The disbursement of Social Relief for affected households and communities within the nationally declared disaster area was finalised on 30 May 2003. Payments were facilitated simultaneously by the 'Allpay' service provider at the two community halls in Suurbraak and McGregor and at the Methodist Church in McGregor, from 08:00-12:00. Individual payments of R2 000 were provided to 772 recipients, with an overall amount of R1 544 000.00 provided in Social Relief payments. In Table 3.2.5.1 the number of Social Relief payments distributed in Ashbury, Suurbraak and McGregor are profiled.

Table 3.2.5.1: Social Relief payments

Settlement	Compensation payouts	Amount in rands
Ashbury/Montagu	530	1 060 000.00
McGregor	40	82 000.00
Suurbraak	201	402 000.00
Total	**772**	**1 544 000.00**

In the short term, the Social Relief payments were handled efficiently and quickly (for those communities initially identified as eligible for Social Relief) and were greater than affected households and communities had expected. It was reported that this was one of the most expeditious payouts from the Social Relief Fund in the Western Cape.

In Suurbraak, on the day the community received the payments, a meeting was convened by the Disaster Committee, local residents and the Swellendam Municipality to establish a committee that would provide a framework for the residents to repair their houses. In Suurbraak one the main problems with the low income houses was that the walls were neither plastered nor sealed with a water-resistant paint, increasing the permeability of the brick walls to rain. To address this, a Building Committee was established, comprising the Disaster Committee, elected residents and representatives of the Swellendam Municipality.

The function of the committee was to source building materials, which included 400 bags of cement, bricks, sand and water-resistant paint. All these materials were bought in bulk to save overall costs. The Swellendam Municipality facilitated the building and provided technical assistance from the engineering department in the municipality. To complement this, local builders in Suurbraak were asked to volunteer their expertise. The municipality also provided storage for all the building materials, which were delivered to Suurbraak on 19 June, and facilitated transportation from the storeroom to various points within Suurbraak. It was intended that the community begin rebuilding on Monday 23 June 2003.

This case illustrates how collaborative partnerships between the local residents, local institutions and the local authorities can strengthen community ownership of risk in constructive and capacity-building ways that achieve long-term risk reduction. However, it is important to note that the majority of Suurbraak residents did not join the Building Committee. In contrast, they opted to replace household belongings such as carpets and cupboards as well as pay-off municipal debts and purchase needed food. This highlights the challenge in achieving long-term sustainable recovery in poor communities, where the priority is often the replacement of damaged household belongings. While this does address immediate or short-term needs, it is less effective in reducing vulnerability over the long-term. These challenges are explored below, in the light of the Ashbury payment process.

3.2.5.2 The challenges of achieving long-term sustainable recovery

With the farming season ending in late March, many seasonal workers find themselves unemployed until the season begins again in October/November. During this time, many workers find themselves without any permanent form of income. Moreover, as they are not entitled to Unemployment Insurance Fund (UIF) payments, they often depend on pensions and child or disability grants. The Social Relief disbursement, therefore, occurred at an opportune time for households who would otherwise have been without income.

Households living in such conditions of chronic vulnerability - exacerbated by seasonal livelihood insecurity - had many pressing and immediate needs. As a result, their priority was understandably for short-term relief/recovery, rather than long-term vulnerability reduction. This is illustrated in Ashbury where few recipients used the Social Relief assistance to buy building materials to weatherproof their homes and reduce the risk of possible future losses when it rains.

While recipients of Social Relief reimbursements did address the need for immediate recovery by replacing lost household goods and securing food,[33] this came at the expense of reducing infrastructural vulnerability and the sustainable protection of household assets.

This is best reflected in a consideration of the needs assessments conducted in Ashbury, where people's reported losses in the needs assessments were compared with the Social Relief forms and then finally against what people spent the R2 000 Social Relief reimbursement on. A baseline sample of 265 households was taken from the Disaster Relief Committee needs assessments and Social Relief forms, with the data on household expenditures derived from interviews with community members and local shops in Montagu, namely Mont Spar, WPK and Pep stores. Interviews with these stores were seen as essential, as local newspaper reports stated that recipients had largely purchased alcohol with their Social Relief support.

Tables 3.2.5.2(a) and 3.2.5.2(b) compare reported damage to household belongings and household infrastructure in the needs assessments conducted by the Disaster Relief Committee with losses reported in the DSS & PA claims of 265 Ashbury residents. The needs assessments indicated that that the experience of being rain-affected, and living in wet, damp conditions was initially the most urgent concern. This was reflected in 78% of the households reporting food as their most pressing need, and many others reporting damage to household infrastructure. In comparison, a review of Social Relief claims, completed later, indicated that damage to household belongings was viewed as a greater priority.

Table 3.2.5.2(a): Reported damage to household belongings in the needs assessment compared with Social Relief claims in Ashbury

Needs Assessment		**Social Relief claims**	
Food	78%		
Wet mattress	7%	Mattress	57%
		Cupboard/wardrobe	61%
Wet clothing	7%	Clothing	8%
Wet carpet	4.5%	Carpet/mats	65%
Wet blankets	26%	Bedding/blankets	16%
Furniture	6%	Furniture	17%
		Electrical appliances:	

[33] This contradicts a local newspaper report, which stated that most residents used their Social Relief payouts to purchase alcohol.

		Stove	20%
		Fridge	10%
		Kettle	13%
TV	1%	TV	15%
		Radio/Tape/CD	8%
		Crockery	12%

This further substantiates reports from the local shops in Montagu, which reported that people mostly purchased household goods such as 'Novulon' flooring, two-plate stoves, food, clothing and bedding. Of the cases reported, only four people purchased fridges. Furthermore, 229 bags of cement were bought (sourced from the WPK in Montagu).[34] In Table 3.2.5.2(b) the reporting of damage to household structure in the needs assessment is compared with the Social Relief claims and illustrates the difference in household needs during and after an event, but calls into question the long-term sustainability of household recovery.

Table 3.2.5.2(b): Reported damage to household structure in the needs assessment compared with Social Relief claims in Ashbury

Needs Assessment		**Social Relief claims**	
Wet walls	41.5%	Walls are wet/cracked	12%
Leaking roof	34%	Leaking roof	9%
Swollen door	20%	Swollen door	10%
		Broken window	2%

The long-term implications of reduced purchasing of building materials could result in increasing the vulnerability of these households to not only extreme weather events, but also normal seasonal winter rainfall. As it is reported that houses leak every winter and that this is an ongoing problem, which is made more acute and more obvious by the extremeness of the rains, the long-term implications for simply managing normal winter rainfall are similarly problematic. In this context, the short-term extreme event highlights an ongoing, long-term problem, while itself placing incredible strain on household capacities to cope and recover.

3.3 Communities Who did not Apply for Social Relief, but Experienced Extreme Weather Impacts

3.3.1 Background

The absence of standardised assessment procedures resulted in a number of communities not being identified as 'disaster-affected'. This is despite their sustaining similar impacts and losses to those communities/households who were evacuated and/or applied for Social Relief. Similarly, in these settlements, marginalised political representation and weak or inactive community organisations resulted in limited community access to the local

[34] This was calculated for non-account holders, which would exclude building contractors or local farmers who were also doing repairs. A non-account holder is generally a once-off buyer.

authorities. This meant that weather-affected communities relied solely on existing social networks – their families, friends and farmers.

One factor was that affected communities had different levels of understanding about Social Relief and, as a result, some did not apply. This is best illustrated in Zolani, where the community was only aware of one official to approach. Furthermore, community knowledge of the Social Relief process was limited. The low expectations of external support noted in Zolani were consistent across all settlements within the range of the cut-off low, resulting in uneven application patterns for Social Relief despite similar reported impacts.

These limited expectations developed as the result of previous 'small weather events' that triggered impacts that had largely been unassisted. In the majority of these settlements, communities reported being affected by winter rain after they first moved into their houses between 1997 and 2000, but then had 'adapted' to the repeated impacts of winter rains. [35] This is illustrated in March 2003 by reports that people slept in their wet homes, covering their bedding and belongings in black plastic bags.

Therefore, it is not surprising that households did not expect any external assistance in response to the extreme weather event in March 2003. In addition, the chronic and 'everyday risks' [36] faced by these communities, and compounded by their limited access to institutional support, explains why they did not seek assistance during this crisis. It is also possible that these communities/households did not apply for Social Relief due to limited awareness of their entitlement to external support in times of emergency.

Section 3.3.2 includes an overview of communities not reported as 'disaster-affected', but that experienced similar impacts to those communities who were evacuated or applied for Social Relief. Furthermore, the structural and non-structural mitigation strategies utilised by communities/households within the field site are described. Particular reference is made to the robustness of these strategies to increase the resilience of these at-risk communities to extreme weather events and in the later recovery process.

In section 3.3.3 the reasons for absent/weak institutional support to these communities/households is explored in the context of socio-political vulnerability, and how this was counterbalanced by the later establishment of the Disaster Management Committee in Zolani, to contest the Social Relief process for identifying and including communities/households as affected.

3.3.2 An overview of communities/households not reported as affected

Communities living in conditions of chronic vulnerability, often unsupported by local institutions, will often demonstrate an inherent ownership of risk. In these cases, communities may develop household/community risk-management strategies to reduce the impact of an external shock. These mitigation strategies are structural and non-structural. Structural mitigation refers primarily to infrastructural strategies and actives that minimise the

[35] This is unlike the Ashbury residents, who first moved into their homes as late as December 2002, and had possibly never experienced winter rain in a low-income housing development.

[36] 'Everyday risk' refers to the conditions of vulnerability that communities live in on an everyday basis. Recurrent, small and medium events occurring as a result of this vulnerability, express the potential for an extreme event or 'disaster'. Most communities/households have only developed mitigation strategies able to withstand these small and medium events, with the impact of an extreme event resulting in a 'disastrous' experience.

potential for a hazard to trigger losses or negative impacts in a household/community. Non-structural strategies refer to household/community activities and capabilities that reduce the vulnerability conditions responsible for driving disaster-related losses.

In this section, the experience of communities/households of the impacts of the March 2003 cut-off low will be profiled in the context of the mitigation strategies taken to reduce the impact. The robustness of these strategies, designed for normal winter rain, will be explored to provide insight into whether they were successful in averting damage in the light of the extremes of the weather event.

3.3.2.1 Zolani: residents and back yard dwellers

The low income housing residents of Zolani generally remained in their homes overnight despite experiencing impacts such as wet bedding, furniture and mattresses. As they had experienced leaking in their homes over the previous four winters, they had 'adapted' to this rain pattern. In addition, based on past experience, they did not anticipate any support from local institutions, including the municipality. One community member commented that the rain was 'worse than normal winter rain', which she reported as being 'much softer'. Many residents expressed that they 'simply had to survive'. According to a leading community member, no one apart from a single parliamentarian assessed the settlement's situation.

There are three low income developments in Zolani, completed between 1995–1997 and 1999, as part of a local housing scheme for Zolani residents who are predominately seasonal workers in the Ashton Canning and Tiger Brand factories and, intermittently, on local farms. These houses, like those in Ashbury, lack structural integrity as indicated by the various types of impact experienced by both communities.

Zolani residents first reported their leaking roofs, damp walls and cracking foundations and walls in 1999. Informants from Zolani told of how they lost belongings, such as TVs and radios due to rain entering their houses in the winter of 1999. However, such losses have increasingly been minimised, as residents have proactively developed strategies to limit the damage of rain.

Miitigation strategies to reduce the impact of the rains include residents covering belongings with black bags given to them by the municipality to dispose of rubbish. One man living in a low-income house told of how he pulled black bags over his bed and slept with only his head sticking out. Others told of how they pushed their furniture away from the walls, which were allowing water through, and then covered their furniture with black bags. Other people reported that their carpets and cupboards were damaged. There were also several cases where tenants have cretestoned their interior walls, and siliconed bolts on the roof, which are otherwise water permeable. One unique case observed was a man who had constructed his own ceiling, which had evidently not leaked. However, as the research team could not confirm that these 'mitigation' strategies were widespread in the community, it cannot be assumed that the community as a whole was affected less by the heavy rains.

Of the 30 households assessed, seven sought temporary shelter with their parents who lived in the *sakhuise*, mud brick houses built by the community and dating back to the 1960s. These houses are maintained regularly and are said to be more resistant to rain than the low-income houses. However, most people said that there was not enough space in the *sakhuise* to accommodate their immediate family, as the houses were already occupied by other family members. Some people also expressed fear of theft should they leave in the

middle of the night. A large proportion of houses were fitted with burglar bars or security gates, possibly confirming claims by residents of high levels of crime.

3.3.2.2 Farm workers living on farms

The Western Cape Department of Agriculture estimates indicate that damage to farm cottages amounted to a total of R681 000. Interviews with farmers and farm workers indicate that storm-water runoff from the mountain slopes was more responsible for damage to farm-worker houses than that triggered by riverine flooding. Three cases were encountered where no applications for Social Relief had been made, as farmers had provided relief/reconstruction assistance and planned to claim back these repair costs through their insurance programmes.

In many respects, workers who are still resident on farms are less vulnerable to poor quality housing, as the initial structure is of a far higher standard than the low-income houses provided by the government. In addition, the farmer takes responsibility to maintain and repair the houses, as was the case with the flood and rain damage that occurred in this extreme weather event.[37]

In one case, a resident farm worker had the experience of being isolated on the farm without support of any kind. The farmer was away for the long weekend and as she was the only worker who lived on the property, she and her granddaughter were alone when the heavy rains began on the Sunday night. She and her granddaughter were awoken at four o'clock on Monday morning by flood waters which had come from the mountain above her cottage and had filled the inside of the cottage up to the level of her bed. As the farmer was only expected back on Tuesday, and the other workers were at their homes in Ashbury, she had nobody to help her. Moreover, as she and her granddaughter were both sick, they stayed on the bed surrounded by water all Monday and slept in the barn on Monday night in case the water rose further**.**

This account illustrates the vulnerability of isolated people, particularly the elderly. The research team acknowledges that this particular experience of isolation was the only example reported, in that the farmers interviewed extended themselves fully to protect the well-being of their workers.

However, in this telling example, there were no support networks for the woman and her granddaughter. Moreover, as the farm road to Montagu was flooded, she was stranded, isolated and scared. This case could have been more severe as there was no form of communication or support.

3.3.2.3 Happy Valley, Bonnievale

Site observations indicated damp walls on unplastered houses, which suggests that some residents may have experienced some minor impacts, especially in the low-income houses.

[37] One opinion explaining the conditions of farm worker cottages was offered by a social worker who has worked on farms in the area. It was proposed that the relationship between the workers and the farmer determines the condition of the houses. In some cases, the farmer does not provide adequate housing, while in other cases, farmers have provided high quality housing. Exposure to the elements and extreme weather events is thus dependent on the nature of the relationship between the farmer and the residents.

As there were no reported impacts, there was no institutional emergency response, or impact assessment by the municipality. Any discomfort or damage experienced by the residents would have been managed by the residents, or dealt with through the means of informal support networks that were already operating in Happy Valley.

3.3.2.4 Smitsville, Barrydale

Residents of Smitsville in Barrydale experienced the same types of rain damage to their low-income homes that were observed in Ashbury, Zolani, Nkqubela and Suurbraak. Although the intensity of the rainfall was greater in places like Suurbraak and Ashbury, the damage to the homes in Smitsville was nevertheless significant and residents expressed discontent over the quality of their homes. Many residents reported that they were forced to move to drier parts of their homes, which are fortunately larger than the low income houses in Ashbury or Zolani, which average at 16 m^2 as opposed to the 36 m^2 in Smitsvillle. However, ten residents reported a lack of institutional support during and after the extreme weather event. The five Social Relief claims filed by residents were for damage caused by flooded storm-water drains, but these were made only after the affected residents went to the municipality and presented the issue.[38] Again, residents relied on informal social support networks within the community for immediate relief and recovery assistance.

In Smitsville, households were identified that had only plastered the rain exposed side of their houses, as they could not afford to complete the entire dwelling.

3.3.2.5 Nkqubela, Roberston

Nkqubela residents, like those of Zolani, remained in their houses during the severe weather event despite many reported cases of flooding in both the low-income houses completed in 1999 and informal dwellings. The 460 informal settlement dwellers were most severely affected with water runoff entering their houses through the floors, and leaking roofs. In some informal dwellings the water reached 15 cm, damming up inside the houses. One woman, living in the informal settlement, reported that it is ‘like living outside’.

The clay-based soil does not allow for easy infiltration of water and results in rapid runoff, which is aggravated by the absence of formal drainage systems. Many informal dwelling residents dug furrows around their dwellings to assist with runoff. However, with no foundations or concrete floors, the water entered the dwellings rapidly. The majority of the dwellings were constructed with corrugated iron, which was only sunk into the ground as deep as 15 cm, often not sufficient to stop the flow of runoff. Despite these efforts, which are normally effective during light winter rainfall, the extreme runoff from the mountain rendered the furrows ineffective.

These types of interventions are designed to withstand normal winter rainfall, but in this case were not sufficient to withstand the impact of an extreme weather event. Many residents in Nkqubela stated that the furrows where insufficient to withstand the heavy runoff, causing their informal dwellings to flood. In these cases, the structural interventions were not robust enough to withstand the shocks of an extreme weather event, resulting in subsequent impacts.

[38] Source Swellendam Municipality

In one case, a woman's informal dwelling completely collapsed due to the extreme runoff from the mountain. She then sought temporary accommodation with friends until she rebuilt her house six weeks later. For other informal residents, the opportunity for evacuation was almost non-existent, with no halls or community structures besides the local clinic and Peace Centre, which were both too small. One woman, who is living in an informal dwelling with ten other people, reported that as there was nowhere for them to go, they were forced to remain in rain-soaked dwellings, sleeping on black bags and a wet mattress. When this household was visited five days after a normal rain, the floor to their dwelling was still so wet that they had to light small fires to dry out the clay floor.

General reported household losses included the damage of wardrobes, where the base had either rotted or collapsed because of the water, wet mattresses and bedding, and in one case, a television being destroyed. With no support from any of the relief agencies, this highly economically vulnerable community had no option but to sleep on wet and rotting mattresses, and hope that warm weather would follow, so that their possessions would dry out. The strategies of these informal residents suggest an internalisation of risk over time, which is a further contributing factor towards these communities not defining the impacts of the extreme weather event as 'unusual' or warranting external assistance.

The low-income houses affected were those that were positioned in a dip at the bottom of a hill where runoff collects. One household reported ankle-deep water entering the house. The women next door had to evacuate her household belongings, as her house was completely flooded. Many residents from the low income-housing scheme in Nqkubela have tried to avert such events by constructing porches to prevent runoff from entering through the doors. However, this largely depended on their financial situation and was not consistent in all households in the dip.

3.3.3 Exploring the non-identification of affected communities/households

The field research in these poor communities 'significantly affected' by the extreme weather, but not identified as 'officially affected', indicated high levels of prevailing socio-political vulnerability. In this context, socio-political vulnerability refers to communities/households who are vulnerable to external shocks due to lack of recognition by or access to formal support institutions/mechanisms, particularly at a municipal level. In the context of the extreme weather event, limited access to formal support mechanisms had significant implications for households not being identified for either emergency assistance or Social Relief.

In this section, the following are explored:

- Identification by the municipality of affected households/communities.
- Perceived stature of political representatives and advocacy organisations such as local councillors and committees.
- Absence of farm worker unions resulting in workers relying heavily on farmers.
- Implications for the role of the DSS & PA.

a) <u>(Non)Identification of communities/households as 'disaster-affected'</u>

This extreme weather event illustrates how the absence of uniform procedures and disaster assessment guidelines for local authorities can result in a haphazard determination of affected communities and households.

This was reflected in uneven patterns of both emergency assistance, as well as dissemination of information by local authorities about the availability of Social Relief.

The absence of unambiguous disaster assessment guidelines and needs determination criteria resulted in the arbitrary identification of some communities/households as 'disaster-affected' to the exclusion of others who experienced similar impacts. Moreover, it created ambiguity with respect to which communities/households were justifiably entitled to emergency assistance, resulting in some communities being viewed as 'opportunistic' or 'undeserving'.

This lack of uniformity in disaster assessment processes and criteria resulted in the affected communities/households depending heavily on the levels of representation of their local councillors or active institutions to voice their concerns institutionally.

b) Perceived limited stature of community representatives

Field research indicated that the political/community representatives of those communities adversely affected by the extreme weather event believed they had limited stature or influence over decision-making within local council structures. In the context of the disaster event, they believed that this severely constrained their ability to advocate for emergency assistance for their constituents.[39]

In the absence of political representation through formal processes, the affected communities that did receive formal assistance achieved this through collective political mobilisation as a community, often outside formal institutional arrangements, which is best illustrated in the case of Ashbury where 400 residents marched to the municipal offices to report their impacts.

c) Absence of farm worker unions, and reliance on farmers

Farm worker unions in the Montagu, Robertson and Swellendam municipalities played a marginal role mainly because workers are not well aware of the benefits of being unionised and similarly fear being dismissed for playing an active role. A growing trend in the agricultural sector is the move towards contractors, who are hired for specific tasks such as picking or pruning, replacing individual seasonal contract workers. This has further limited the involvement of unions, as contractors' agreements are not signed with individual seasonal workers, but with a specific contractor. Moreover, farmers may often discourage or obstruct union access to permanent workers, who still to a large degree are living on the farms. Although farmers are not allowed to prevent access, workers may be discouraged. In some of the interviews, workers were reluctant to discuss unions.

The implication of this limited institutional representation is that workers depend on the farmers to represent their concerns. In the case of this extreme weather event, farm workers who were affected relied almost solely on the support of the farmer for the emergency response and later recovery. While in most cases, where worker's houses were damaged or destroyed, compensation could be claimed by the farmers from their insurance policies, household belongings could not be compensated for. In the majority of cases, farmers were not aware of the Social Relief process and so could not facilitate their workers applying. One suggestion from a farmer whose worker was affected, but did not apply for Social Relief, was

[39] Interviews conducted with local councillors in the Breede River/Winelands Municipality.

to distribute a message to farmers through the farming associations. There were exceptions of farmers who assisted their workers in applying for Social Relief through the Disaster Relief Committee established in Montagu, having been informed through workers living in Ashbury who knew of the process.

d) Implications for the role of the Department of Social Services and Poverty Alleviation

In the event of a disaster occurrence affecting poor households, the DSS & PA is notified by either the local authority or local councillors of the affected communities. While the DSS & PA is a key role-player in supporting disaster affected poor households, it is not automatically authorised to take a more directive role in identifying affected communities and co-ordinating relief. These responsibilities rest primarily with local municipalities who are primarily tasked with promoting socio-economic development and risk reduction in their areas of jurisdiction.

3.3.4 Challenging the Social Relief process: the Disaster Management Committee in Zolani

The non-identification of Zolani as affected by the March cut-off low was taken up by Zolani residents following the Social Relief disbursements made to Ashbury residents on 30 May 2003.

The Zolani residents approached the local councillor to complain that they had been unjustly excluded from the Social Relief process, stating they had experienced similar impacts from the extreme rain.

This issue was then taken up by the councillor, who facilitated the establishment of the Disaster Management Committee, that included 14 members from the community. The Worcester District Office of the DSS & PA attended the first Disaster Management Committee Meeting. At the second meeting of the Disaster Management Committee, a letter of appeal to the National Disaster Management Centre was drafted, which included a loss register of all households affected. In a door-to-door assessment conducted by the Committee, a loss/impact assessment was undertaken of 1 336 residents' dwellings, cross-listed with their identification numbers. An appeal was prepared and submitted to the DSS & PA, but to-date, there has been no feedback.

3. 4 Synthesis and Recommendations

3.4.1 Research synthesis

The social risk assessment of poor and marginalised communities affected by the cut-off low in March 2003 presents an excellent case-study to explore the constraints and opportunities in incident management of an extreme weather event, the support for post-disaster recovery and the role of local institutions within the context of reducing the vulnerability of at-risk communities to hydrometeorological hazards.

The case-study is also timely, given the recent promulgation of the Disaster Management Act, and its call for uniform efforts to 'reduce the vulnerability of disaster prone communities, areas and households'. The incoming Act also calls for:

- The development of disaster management plans to be developed for all spheres of government.
- Measures that place emphasis on disaster prevention and mitigation.

- Identification of communities at-risk and measures that reduce the likelihood of loss from disaster occurrences.

The research undertaken in the areas affected by the March cut-off low underlines the critical importance of both local institutions and informal networks in mediating the impact of this extreme weather event. However, it also highlights significant shortcomings, particularly in the institutional arrangements with respect to the support of poor households and communities affected by the event.

While two communities (the BKS housing development in Ashbury and Suurbraak near Swellendam) were evacuated, provided with relief and registered for Social Relief, many other settlements and households were not even assessed. This omission extends beyond the area formally declared as 'disaster-affected' to communities in the Southern Cape who were not included in this study.

Among the priorities identified by this research is the urgent need for the development of a uniform procedure and assessment guide for provincial as well as municipal role-players to improve and standardise the identification of disaster-affected households and communities. The development of a uniform process and assessment guide would allow for their use/application by local, provincial and national authorities as well as by any humanitarian assistance agencies called upon in emergencies, and would ensure greater equity to those affected. Similarly, it would ensure that disaster-affected areas, communities and households are not prematurely or arbitrarily excluded because of the absence of transparent assessment and identification processes/criteria.

Conclusions and recommendations generated by this research are grouped into two major categories:

- Those relating to the incident itself and management of the extreme weather event, including *early warning, identification of at-risk communities and institutional assistance for affected communities/households*.
- Those relating to the *support for post-disaster recovery of affected communities/households*, including the role of Social Relief and support for household coping strategies, which may rely on families, farmers or friends.

Each cluster includes both technical recommendations and suggestions for strengthening institutional arrangements to improve the effectiveness of action.

3.4.2 Emergency responses to the event, institutional support and the role of Social Relief in the recovery process

Formal institutional co-ordination of communities/households affected by the March cut-off low was absent, resulting in the haphazard response of key local institutions and community members. This included the absence of any formal warnings to residents that an extreme weather event was approaching. As a result, there was no monitoring of the impacts that were triggered by rain, flooding or storm-water runoff. Therefore, communities/households were not directly identified by the local authorities and relied on local institutions to provide emergency assistance and relief. Due to the inconsistent pattern of official response to affected communities, it is clear that the number and distribution of claims for Social Relief, were in this case, an inappropriate measure of the true scale and extent of household disaster impacts. This was particularly clear for those communities not formally defined

'disaster-affected' but who internally self-reliant and managed the weather and related impacts through their own capabilities and resourcefulness.

In this section, the following recommendations are presented (each of which is further elaborated in the following sections):

- The preparation for and response to an incident and the emergency management of its associated impacts (at a minimum) require attention to the following institutional processes:
  - Preparedness planning, including the early warning and monitoring of extreme weather hazards and the dissemination of warning information to communities at risk.
  - Identification of all communities/households affected by the hazard's impact through an assessment of impacts on not only infrastructure, but on households, especially those that are most vulnerable.
  - Provision of timely and appropriate emergency assistance to affected communities/ households.
- These processes are essential institutional prerequisites for effective incident management. If the preparatory steps are undertaken in advance, losses to poor households and poor communities will be reduced.

3.4.2.1 Early warning and monitoring of extreme weather hazards: The role of local institutions and communities

In order to minimise the impact of an extreme weather hazard, early warning and monitoring are essential to guide the pre-disaster planning and emergency response. Without adequate warnings, communities/households are often caught unaware, as illustrated by the Montagu riverine community, with a limited opportunity to avert losses. In other cases where households were at-risk of flooding, warnings were issued informally through social networks, such as in the case of the farmers in Ashton who received warnings from farmers in Montagu and Bonnievale, where the owners of a wine cellar 16 km upstream notified the police who subsequently evacuated the riverine households.

Other residents living in at-risk conditions, such as Nkqubela informal settlement residents living on the mountainside, or the Ashbury residents in Montagu, were not issued with warnings of an approaching cut–off low.

Furthermore, monitoring of these settlements was not undertaken by the local authorities, and progressive impacts to infrastructure and livelihoods were not identified as the cut-off low progressed. The implications of the lack of monitoring were that the later identification of communities affected depended on either community members or local institutions informing the local authorities.

With respect to communities living in close proximity to rivers or mountain slopes or in structurally weak houses, it is recommended that the disaster management plans developed by the local authorities need to give priority to strengthening the early warning of communities by:

- *Improving the quality of and access to relevant severe weather warnings issued by the South African Weather Service*. This includes informing appropriate relief committees and farming associations working with identified at-risk communities who can assist local institutions and communities to monitor the hazard and take appropriate emergency action if required.

- *Strengthening community capacity to monitor changes in the intensity of an extreme weather hazard, providing indicators for securing their belongings, and potentially evacuating should the need arise*. By empowering the community to monitor the changing behaviour of the weather hazard, one reduces the risk of being caught unprepared.

With respect to measures taken by institutions/committees to prepare and plan for a potential emergency, it is suggested that the local disaster management plan specifies the actions to be taken by different role-players in the event of a severe weather warning being issued, which includes:

- *Advance identification of communities/households at-risk of adverse weather impacts*.
- *Confirmation of availability of possible evacuation facilities, transport arrangements, blankets, mattresses, relief food and community security services.*
- *Provision of black plastic bags for securing belongings.*

These suggestions are by no means exclusive and it is recommended that institutions/committees collaboratively design strategies with the community prior to the emergency.

3.4.2.2 Identification and assessment of affected communities/ households

A consequence of the lack of a formally co-ordinated emergency response was that no standardised approach to assisting or evacuating households was applied within the declared disaster area. This resulted in significant shortcomings in the formal identification of households and communities that were affected by the weather event. This highlights a major flaw in the response process, which results in the lack of uniform representation of communities affected and in need of external assistance.

Therefore, it is recommended that all poor and marginalised communities/households within the range of the extreme weather hazard be assessed during and after the event, taking into consideration impacts to infrastructure and livelihoods. Focusing simply on communities who alert institutions to their crisis will not be sufficiently inclusive, with a high risk of excluding communities/households who are marginalised politically or for other reasons.

The following recommendations are made. With respect to identifying and assessing affected communities/ households:

- *On site assessments need to be conducted for all vulnerable communities/households affected by the weather event and its consequences (including flooding)*.
- *Assessments should focus on the impacts to livelihoods and not solely on the impacts to infrastructure*, such as damaged household belongings, to provide greater indicators of need. Loss or damage of household belongings is a relative concept and may not be appropriate in communities/households who have relatively less to lose, but will experience the shock on their livelihoods to a far greater degree. This may also provide insight into secondary/indirect impacts, such as being isolated from work or the loss of perishable food due to an electricity failure, which will impact on households' food security.
- *Urgent attention must be given to the development of standard procedures and guidelines for determining affected households and communities*, which can be

implemented by both local authorities as well as humanitarian assistance organisations. This includes *the clear designation of one position responsible at municipal and provincial levels for consolidating information on the extent of disaster impacts on households and individuals*. Current institutional arrangements allow for rapid tracking of disaster impacts to physical/municipal infrastructure (i.e. through the office of the municipal engineer); however, no comparable arrangements exist for monitoring and consolidating the extent/distribution of impacts on households or affected communities.

- Consideration must be given to the *establishment of a multidisciplinary provincial monitoring mechanism to cross-verify communities/households identified as 'disaster-affected'*, as well as those who may have been overlooked. This overview function applies to the determination of relief as well as access to Social Relief.
- *Social Relief claims to the DSS & PA should be cross-verified to ensure that communities and households are not unfairly excluded from the Social Relief process*. If, for instance, the DSS & PA receives reported impacts from local authorities, a knowledge of community livelihoods will provide the opportunity to anticipate the strains these impacts could place on community households and whether or not these communities would have the capacity to cope and recover without external support.

3.4.2.3 Emergency assistance of affected communities

Once communities have been assessed, the necessary emergency assistance needs to be provided to those affected. Depending on the extent of the impact, communities/households may require evacuation assistance, support in securing their household belongings, and temporary relief through the provision of food parcels, blankets, mattresses or clothing. This needs to be co-ordinated by a representative committee, ideally established prior to the event and which would have participated in the pre-disaster planning.

With respect to providing targeted emergency assistance to disaster-affected households, and to avoid 'opportunism' by households not affected, it is suggested that:

- *Criteria should be established to determine who is most in need*.
- *These criteria need to be standardised within the assessment procedure, and should account for impacts to livelihoods.* In cases where lives are at risk from structural failure of buildings, injury or chronic illness, priority should be given to them first. Priority should also be given to the elderly and child-headed households.

3.4.3 Vulnerability and institutional support for post–disaster recovery

For most households affected by the March cut-off low, there were no institutionalised response measures and assistance for recovery. The reliance on informal social networks for relief and assistance in the recovery phase is not only confined to disasters. It is a strategy employed by residents of poor communities on a daily basis and has been internalised within households and communities as a livelihood strategy. In most cases the only formalised support in the post –disaster recovery is in the form of Social Relief.

The role of the Department of Social Services and Poverty Alleviation in providing assistance for recovery can form a critical part of these livelihood strategies in poorer communities and a possible future role for the Department of Social Services and Poverty Alleviation in post-disaster relief and recovery.

Recommendations for institutional support in the post –disaster recovery process:

- *Shifting the orientation of Social Relief towards long-term recovery processes.*
- *Supporting and strengthening informal social networks.*

3.4.3.1 Shifting the orientation of Social Relief towards long-term recovery processes

The issue of post-disaster Social Relief in the recovery process is extremely complex. The Building Committee established in Suurbraak illustrates the shift in orientation from addressing immediate or short-term needs, to long-term recovery and risk-reduction through the weather-proofing of their homes. However, with entrenched poverty and political marginalisation, achieving this reorientation will be challenging, especially when communities face between six and nine months of unemployment with limited opportunities in the farming sector.

Similarly, the use by disaster-affected households of Social Relief funds is not well studied. Its role as a potential 'disincentive' to reasonable levels of risk ownership at household and community levels has also not been examined.

Therefore, it is suggested that:

- *Research is undertaken to examine the role of post-disaster Social Relief in replacing lost assets, supporting household recovery and reducing disaster vulnerability*, with the intention of improving the future targeting and effectiveness of Social Relief mechanisms.
- *Wherever possible, decision-making to determine those households eligible for Social Relief should be informed by the DSS & PA office(s) most familiar with the areas/communities affected.*

3.4.3.2 Informal social networks and coping strategies

During and after the extreme weather event, most of the affected communities and households were not assisted by institutional emergency responses or provided with access to Social Relief, as they were not initially identified as being affected. These communities and households relied on the informal social networks provided by friends, families and farmers to cope with and recover from the impacts they experienced.

When local institutions and communities design and implement risk-reduction strategies and disaster preparedness plans, these informal social networks need to be acknowledged, profiled and included in strategic planning, with the appropriate provision of external support.

With respect to informal social networks and local copings strategies, it is suggested that:

- *The local authorities in the affected municipalities establish Disaster Management Advisory Forums, as recommended in the newly promulgated Disaster Management Act.* This will allow for greater inclusivity of both institutional, as well as private sector and civil society role-players in preparedness and risk-reduction planning.

Part IV: Institutional Arrangements and Management of the Flood Event[40]

4.1 Introduction

In Part III, the impact of the extreme weather event was explored with respect to its particular effects on poor households. That part of this report illustrated the critical role that local institutions play in mediating conditions of risk in vulnerable communities living in disaster-prone areas. Part IV further explores the contribution of local institutions in anticipating and managing the flood incident in the Boland, Overberg and Eden District Municipalities during the period 24–26 March 2003.

In addition to its immediate contribution to the 'completeness' of the case-study, this review of institutional responses to the weather event and associated consequences has potential to inform the development of the National Disaster Management Framework.

Moreover, it can usefully contribute to the development of a strategy for the immediate implementation of priority actions that will enable local government to bridge the current legislative vacuum between the Civil Protection Act, 1977 and the new Disaster Management Act, 2002. The strategy and accompanying guidelines generated by this research will assist provinces and municipalities to commence the phasing in of key issues of the Disaster Management Act in this interim period, yet still remain within the legislative confines of the Civil Protection Act.

Part IV is divided into six sections:

Section 4.2 introduces the policy context for the research.

Section 4.3 presents the methodology used.

Section 4.4 provides a more detailed policy and legal context for the institutional response.

Section 4.5 provides reports on fieldwork conducted and findings generated.

Section 4.6 provides conclusions and proposes recommendations.

4.2 The Policy Context

Part IV aims to identify and describe to what extent circumstances preceding and following the floods in the abovementioned districts could add value to the drafting process of the National Disaster Management Policy Framework. The study also aims to explore how circumstances would have differed in the context of the Disaster Management Act No. 57 of 2002. In this way, it is aimed at proposing interim solutions to the current legislative dilemma[41] by identifying immediate priorities for the administration of disaster management in the local sphere until the Disaster Management Act comes into operation.

[40] Pat Reid, Pat Reid Consulting.
[41] This specifically refers to the ambiguous legal context for disaster management detailed in greater depth in Section 4.4.

4.3 Research Methodology

4.3.1 Overview of methods

In order to achieve the aims and objectives, and taking into account the variables in this component of the overall study, a thorough literature review was undertaken prior to fieldwork. In addition, both quantitative and qualitative methods were used.

The literature review and desk-top study provided a good understanding of the history of previous events of a similar nature which had occurred in the area, their predictability and the chronology of the actual event being studied. It also established the current status of institutional arrangements and planning for disaster management. In addition, it defined the criteria for demarcating the parameters of the geographic area of this section of the study, as well as contributing to the identification of the units of analysis.

The use of the qualitative method allowed for the inductive identification of recurring themes which emerged from the semi-structured interviews and focus-group discussions.

4.3.2 Identification of the study area

Although the extreme weather event was relatively widespread in areas of the Western and Southern Cape and the adjacent interior, the formal declaration gazetted on 4 April 2003 identified only Montagu, Robertson and Swellendam as disaster areas. In terms of demarcation, these three areas fall within the boundaries of the Boland and Overberg District Municipalities. In the process of conducting the literature review and during initial consultations, it became apparent that the effect of demarcation on the disaster management arrangements was a key issue. Taking this as well as the aim and objectives of the study into account, it was clear that the geographic boundaries for the study from an institutional and disaster response perspective should be in district municipality context, and would therefore involve the Boland and Overberg District Municipalities.

However, during further investigations and studies of impacts it emerged that for the purposes of this section the inclusion of the Eden District Municipality into the scope of the study would add considerable value.

Accordingly, the study was conducted in the following areas:

- Boland District Municipality.
- Eden District Municipality.
- Overberg District Municipality.

4.3.3 Identification of units of analysis

In view of the fact that the focus of the study was directed towards understanding the uniqueness of what was a particular, *unusual* event in all its complexities, key institutional role-players responsible for disaster management planning as well as role-players from the emergency and essential services in both the local and provincial spheres, who were actively involved in the management of the response, were identified to participate in the semi-structured interviews and focus-group discussions.

In total, 18 senior officials representing national, provincial and local government departments, and a media representative, were interviewed. The interviewees were:

- Provincial Disaster Management Officials
- Municipal Managers
- Disaster Management focal points at district municipalities
- Officers of the SA Police Services
- Officers of the SA National Defence Force
- Officers of the South African Air Force
- Official of the Emergency Medical Rescue Services of the Western Cape
- Official of the Social Services Department of the Western Cape
- Municipal Housing Official
- Official from SA National Parks
- Fire and Emergency Services Personnel
- Local Media representative

4.3.4 Data collection

The following questions framed the semi-structured interviews and focus-group discussions:

a) Was the existing legislative framework adequate to enable the effective administration of disaster management for the area?
   - If yes, how? If no, why?

b) Would a disaster management policy framework have had a significant impact on the management of this disaster?
   - If no, why? If yes, how?

c) Were appropriate institutional arrangements for disaster management in place in the affected municipalities prior to the disaster?
   - If yes, were these structures effective for managing the disaster?
   - If no, is there a definite need for such structures?

d) Was there provision in the institutional arrangements for multidisciplinary and multi-sectoral stakeholder participation?
   - If yes, was it effective?
   - If no, should there be provision for such stakeholder participation?

e) Were there established channels for liaison between the three spheres of government for the purposes of disaster management?
   - If yes, did they work effectively?
   - If not, why, and how could they be improved?

f) Were there effective disaster management plans in place and did they provide adequately for disaster risk reduction, emergency preparedness and response and recovery?
   - If yes, how? If no, why?

g) Was the incident management aspect of the disaster response effective?
   - If yes, why? If not, how could it have been improved?

h) Was the provision of disaster relief and recovery operations effective in the affected communities?
   - If yes, how? If not, why?

i) Were arrangements for communication and information management in place?
   - If yes, were they effective? If not, why?

Fieldwork included on-site inspections to review damage to physical infrastructure to roads and bridges within the area of the Boland District Municipality. The siting of the RDP housing settlement at Ashbury was also inspected.

A comprehensive review of maps of the areas affected enabled the researcher to define the geographical area of the study. An assessment was conducted of the applicable legislation in order to establish the policy and legal context for the study. Official reports of the event, photographs, records of weather warnings issued, damage estimates and minutes of post-disaster meetings of role-players enabled the researcher to develop insight into the chronology of events and the extent of damage to physical infrastructure in terms of costs. The study of the aforementioned documents also provided background to the focus of the post-disaster assessment and the basis for the declaration of a disaster.

A study of press reports in regional newspapers proved valuable in capturing the event in 'real time' context, whilst the local newspaper recounted previous events and an historical account of the Bellair Dam. A study of local news reports over the past decade also contributed to the assessment of predictability by virtue of the number of articles focusing on the issue of reeds and debris choking the rivers.

Discussions with fellow researchers, research team meetings and a review of Part III of this report provided the opportunity to identify key issues and to corroborate findings with regard to important aspects of the institutional arrangements and management of the disaster response and recovery.

4.3.5 Data analysis

Notes of the participants' responses were meticulously recorded by the researcher. During the process of transcribing the notes, the researcher was able to identify and cluster recurring themes, and to build any additional, emerging themes into the interviews and focus-group discussions which followed. The emerging themes were compared to the findings of other sections of this report to identify important cross-cutting issues. The findings were then consolidated, and key issues identified which could add value to the development of the National Disaster Management Framework. A further analysis was conducted to establish which provisions of the Disaster Management Act could be implemented as an interim strategy to address immediate priorities for disaster management without compromising the legislative imperatives of the Civil Protection Act.

4.3.6 Ethical considerations

All of the respondents were eager to participate in the interviews and the focus-group discussions. Discussions were conducted in a relaxed and unthreatening environment, resulting in a high level of participation and interaction. There was no reluctance whatsoever on the part of the participants to voice their frustration at the fact that the protracted implementation of the Disaster Management Act was a major contributing factor to the difficulties they had experienced. They were without exception keen to volunteer opinions and theories on institutional arrangements and planning for disaster management which should be introduced as a matter of priority. The understanding of key concepts and the grasp of the intentions of the Disaster Management Act were impressive. Nevertheless, in recognition of their right to confidentiality, the respondents have not been identified by name in this report.

4.4 The Policy and Legal Contexts for the Institutional Response to the March Cut-off Low

Managing disaster risk, emergency preparedness and rapid and effective disaster response and recovery are dependent on adequate institutional capacity backed by good enabling legislation and political will. Disaster management requires effective planning, clear authority and allocation of roles and responsibilities, decisive decision-making and co-operative institutional arrangements that allow for the involvement and active participation of all role-players from across the sectors and within the disciplines of all three spheres of government, as well as from the private sector and communities. When a disaster occurs or is threatening to occur, co-operation and co-ordinated actions are not only critical elements for a rapid and effective response and recovery and the optimal utilisation of resources, but are fundamental to the saving of lives and property and to the protection of the environment.

4.4.1 Legislative competency

The primary responsibility for disaster management in South Africa rests with the government. In terms of Section 41(1)(b) of the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996, hereafter referred to as the Constitution) all spheres of government are required to 'secure the well being of the people of the Republic'. According to Part A, Schedule 4, disaster management is a functional area of concurrent national and provincial legislative competence. However, Section 156(4) of the Constitution provides for the assignment, by agreement and subject to any conditions, of the administration of any matter listed in Part A, Schedule 4, which necessarily relates to Local Government, if that matter would most effectively be administered locally and if the municipality has the capacity to administer it.

Apart from the fact that local government is required under Schedules 4 and 5 of Part B of the Constitution to provide for functions that are closely allied to disaster management, Section 152(1)(d) also requires that local government 'ensure a safe and healthy environment'.

The government's disaster management policy not only pursues these constitutional obligations but also aims to give effect to the right to life, equality, dignity, environment, property, health care, food, water and social security in terms of the Bill of Rights of the Constitution.

It is common cause that the impact of poverty is a pivotal factor in the progression of vulnerability to hazards. This is of particular relevance in the South African scenario, with the huge legacy left by apartheid of desperately impoverished and disadvantaged communities who, as a result, are extremely vulnerable to disaster. It is within these local communities that the smaller but much more frequent disasters occur and where the costs in terms of loss of life and property and the associated financial burden are painfully borne.[42]

There is little doubt, therefore, that in order to ensure effective integrated and co-ordinated disaster management, the actual implementation and planning must be focused in the local government sphere. Accordingly, in terms of the Disaster Management Act, the disaster management function is assigned to district and metropolitan municipalities.

[42] The White Paper on Disaster Management, 1999.

The Disaster Management Act is clear evidence of the government's commitment to sustained efforts for effective disaster management in all three spheres of government. The Act is considered to be one of the finest pieces of disaster management legislation in southern Africa and is far removed from its predecessor the Civil Protection Act. It provides for an integrated and co-ordinated disaster management policy that focuses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters and post-disaster recovery; the establishment of national, provincial and municipal disaster management centres, disaster management volunteers and matters incidental thereto.

The Civil Protection Act is fundamentally flawed not only in that it focuses solely on post-disaster response and recovery, thereby essentially ignoring risk reduction, but also in that it does not provide clear guidelines for effective institutional arrangements or enable rapid decision-making and response. It creates great confusion by not allocating clear responsibilities in terms of decision-making and disaster declarations, and does not provide adequately for the active participation of all relevant stakeholders.

Unfortunately, despite the fact that a new Disaster Management Act has been promulgated, it will (in terms of Section 65) only come into operation on a date still to be decided by the State President. Until that date, those sections of the old Civil Protection Act which apply to a province still operate. Strictly speaking, therefore, until such time as Sections 2, 2A, 3, 4, 5, 6(1) and 7 of the Civil Protection Act are repealed, they remain effective.

4.4.2 Responsibility for the administration of Disaster Management (Civil Protection) in the municipal sphere

In terms of the Civil Protection Act

In terms of Section 3(1) of the Civil Protection Act, the provincial legislature is assigned the powers to make ordinances in connection with any matter other than a matter which requires or entails armed action or the prevention or combating of crime, relating to civil protection including:

(a) for protection of persons and property, and the rendering of assistance to persons in the province with a view to or in connection with a state of emergency or disaster; and

(b) the combating of civil disruption in the province in a state of emergency or disaster.

Accordingly, Western Cape Provincial Ordinance 8 of 1977 was promulgated on 22 July 1977, giving effect to Section 3(1) of the Civil Protection Act. In terms of Section 3(2) of the abovementioned Ordinance, a local authority is required, with the approval of the Member of the Executive Council of the province responsible for local government and for the purpose of exercising or performing any power, function or duty conferred or imposed on it in terms of or under the ordinance, to appoint

(a) a suitable person in its service, or

(b) if in the opinion of the local authority, there is no suitable person in its service, any other suitable person to be the Chief of Civil Protection and the local authority may, or if the Member of the Executive Council of the province responsible for local government

either generally or specially directs shall, delegate any or all of such powers, functions or duties to such persons.

In addition, Section 3(3) makes provision for the appointment of one or more Deputy Chief/s of Civil Protection and Section 3(4) provides for delegation of powers, functions and duties in the event that the Chief or Deputy Chiefs are absent or unable to exercise their responsibilities.

In terms of Section 4(1) of the ordinance, the Member of the Executive Council of the province responsible for local government may appoint as many committees as he/she may deem necessary or expedient to report to him/her or to advise him/her on any matters which he/she refers to any committees.

Generally speaking, in this regard, the majority of municipalities elected to appoint the Municipal Manager (formerly referred to as the 'Town Clerk') as the Chief of Civil Protection.

<u>In terms of the Disaster Management Act</u>

As opposed to the provisions of the Civil Protection Act, the Disaster Management Act makes very explicit provisions for the administration of disaster management in local authorities. It requires every metropolitan and every district municipality to establish a Disaster Management Centre and to appoint a person as the Head of the Centre (hereafter referred to as HOC). This is a designated position, with the appointment being made subject to the applicable provisions of the Local Government: Municipal Systems Act, No. 32 of 2000. The functions of office are very clearly spelt out in this act.

In addition, the Act provides the option of the establishment of a Municipal Disaster Management Advisory Forum to ensure the active participation of all the relevant role-players and stakeholders. The terms of reference and composition of the Forum are also clearly defined in the Disaster Management Act.

4.4.3 Demarcation

The effect of demarcation on the administration of disaster management in the local sphere may at first sight appear to be far-reaching. This may be so in the light of the fact that the original municipalities and Transitional Representative Councils (hereafter referred to as TRCs) were disestablished with the newly demarcated boundary of a re-established local municipality absorbing part or all of one or more former municipal areas as well as parts of rural areas of former TRCs.

However, in terms of Sections 12 and 14 of the Municipal Structures Act, No. 32 of 1998, the Member of the Executive Council (hereafter referred to as MEC) responsible for Local Government in a province was required by notice in the Provincial Gazette to make provision for transitional measures to facilitate the disestablishment of an existing municipality and the establishment of a new municipality. The new municipality superseded the existing municipality and became the successor in law to the disestablished municipality. By implication, therefore, in the event that an existing Town Clerk who was also Chief of Civil Protection was appointed as the interim Municipal Manager of the new municipality, then that person would automatically become the interim Chief of Civil Protection for the new municipality.

If this was not the case, then the new municipality was required to make interim service delivery arrangements and where necessary would have had to appoint acting officers including the Chief of Civil Protection.

Unfortunately, however, the rationalisation of disaster plans and other arrangements for disaster management is not quite as straightforward an issue in that any plans and committees which did exist were formulated in the context of the former boundaries and, therefore, are generally fragmented and no longer applicable or relevant to the newly demarcated boundaries.

4.4.4 Current approaches elsewhere in South Africa

In a number of the provinces substantial progress has been made in introducing certain aspects of the Disaster Management Act which are not in conflict with the existing legislation, despite the fact that the Disaster Management Act has not yet officially become effective. In other words, they have taken the approach of applying the 'spirit of the law' rather than the 'letter of the law' in order to meet their constitutional commitments, the requirements for the Integrated Development Plans (hereafter referred to as IDPs) as provided for in the Municipal Systems Act and to apply relevant aspects of the policy proposals in the White Paper on Disaster Management, 1999 in the interests of the communities they serve.

4.5 Fieldwork and Findings

Key considerations relevant to jurisdictions and responsibilities from an institutional and response perspective for the study area are reflected here as background information. This section introduces the district municipalities in which fieldwork took place and findings were obtained.

Section 4.5.1 introduces the Boland, Overberg and Eden District Municipalities.

Section 4.5.2 reviews the effect of disaster management policies and the legislative imperatives relevant at the time of the event in the municipalities concerned.

Section 4.5.3 consolidates findings on measures taken with respect to disaster risk reduction.

Section 4.5.4 reviews institutional arrangements in the context of disaster response measures taken.

Section 4.5.5 describes general institutional arrangements for disaster management in the affected areas.

4.5.1 Overview of District Municipalities consulted

a) Boland District Municipality

The Boland District Municipality's (Boland DM) area of jurisdiction comprises five local municipalities and a District Management Area (hereafter referred to as DMA). The five local municipalities are:

- Breederiver/Winelands Municipality
- Breedevalley Municipality
- Drakenstein Municipality
- Stellenbosch Municipality
- Witzenberg Municipality

The DMA is located in the rural area to the northwest of the town of Barrydale.

In the case of this event, the places which were the most severely affected in the Boland DM's area were Montagu and Ashton, which are within the boundaries of the Breederiver/Winelands Municipality and the DMA in which the Bellair Dam is located.

From the institutional and response perspective, therefore, the collection of data was confined to the arrangements and responses in the Breederiver/Winelands Municipality and the Boland District Municipality.

Semi-structured and focus-group interviews were conducted with SA Police Services representatives from Robertson, Montagu and Swellendam; the Provincial Emergency Medical Rescue Services; 22 Squadron of the SA Air Force at Ysterplaat; the Disaster Management Officer of the Boland District Municipality; and the Municipal Manager of the Breederiver/Winelands Municipality.

b) Eden District Municipality

The Eden District Municipality's (Eden DM) area of jurisdiction comprises seven local municipalities and a District Management Area (DMA).

The seven local municipalities are:

- Oudtshoorn Municipality
- Kannaland Municipality
- Langeberg Municipality
- Mossel Bay Municipality
- George Municipality
- Knysna Municipality
- Plettenberg Bay Municipality

In the case of this event, the areas which were the most severely affected in the Eden District Muncipality were within the areas of jurisdiction of the Knysna Local Municipality at Buffelsbay and Sedgefield, the George Local Municipality at Maraisplaas and Borchers, and the Langeberg Municipality at Riversdale. Only one report was received of a roof blowing off a dwelling in the DMA within the district municipality's jurisdiction.

From the institutional and response perspective, therefore, the collection of data was confined to the arrangements and responses in the areas of the Local Municipalities of George and Knysna and the Eden District Municipality.

Semi-structured and focus-group interviews were conducted with SA Police Services representatives; a representative of the SA National Defence Force; an official from the Housing Department of George Municipality; a representative of the Fire and Emergency Services of Eden District Municipality who also carries the responsibility for Disaster

Management; a representative of the Fire and Emergency Services of the Knysna Municipality; a representative of Social Services based at George; a representative of SANParks; and the Municipal Manager of the Knysna Municipality.

c) Overberg District Municipality

The Overberg District Municipality's (Overberg DM) area of jurisdiction comprises four local municipalities. The four local municipalities are:

- Cape Agulhas Municipality
- Swellendam Municipality
- Overstrand Municipality
- Teewaterskloof Municipality

Informal settlements generally considered to be at risk in the area include those at:

- Bredasdorp and Swellendam: Small informal settlements and RDP housing schemes.
- Caledon: One small informal settlement and much RDP housing.
- Villersdorp: Large informal settlement – high risk area mostly due to domestic fires but also surrounded by an area that is subject to veld fires.
- Grabouw: Five large informal settlement/squatter camps at high risk to disasters. There are frequent fires of considerable magnitude. No land use planning and random settlements render access for emergency services almost impossible. The risk of low-level flood is slight due to the settlements being high up on slopes. Forests in the area are owned by MTO (formerly SAFCOL now Mountain to Ocean).
- Hermanus: Massive squatter camp which is better organised and, therefore, less at risk to fires, which is partially attributed to an active Housing Department.

The impact in this event was concentrated in the Swellendam and the Suurbraak areas. The main damage at Suurbraak was to the water pipeline which supplies drinking water to Suurbraak Town. There was also damage to roads and riverine dwellings. Fortunately, however, the households had the capacity to cope using their own resources. The only damage which really gave cause for concern was to the water pipeline and the roads.

A watch was kept on the rising level of the river by people living on the other side of the river but they were eventually cut off, mainly due to runoff from the surrounding hills. Water did run through RDP houses which had to be evacuated. There had been veld fires on the slopes previously but these were not as a result of a lot of alien vegetation. However, it warrants further study particularly in relation to stabilising capacity. This is especially so in the area between Suurbrak and Barrydale where there have been previous rockfalls in the Tradouw Pass. The veld is young (2–3 years old) and the flooding was attributed to saturation. There was a history of heavy rain over the previous period but on this occasion it was sustained heavy rain over short period which caused the problem. The rest of the damage was due to rivers washing over roads and blocking drainage points. Some 'poor housekeeping' relating to debris and choking of the riverbeds may have exacerbated matters to a limited extent.

The Bellair Dam was formerly in the area of jurisdiction of the Overberg District Council but is now in Boland District Municipality's area.

Although the riverine development along the Breërivier (which enters the sea at Witsand) was built above the flood line of 1981 (Laingsburg floods), the Breërivier was affected by what happened upstream and this together with the tidal push caused the problem.

From the institutional and response perspective, therefore, the collection of data was confined to the arrangements and responses of the Overberg District Municipality.

Semi-structured interviews were conducted with SA Police Services representatives from Swellendam and the Chief Fire Officer/Disaster Management Officer of the Overberg District Municipality.

4.5.2 The effect of disaster management policies and the legislative imperatives relevant at the time of the event

The Western Cape Provincial Government contends that the Disaster Management Act is unconstitutional in that disaster management is reflected as a concurrent national and provincial competency and, therefore, its assignment to local government amounts to an 'unfunded mandate'. Correspondence in this regard was directed to the National Disaster Management Centre by the provincial government in which concern was raised regarding the financial implications for municipalities who did not have the capacity to implement the requirements. A proposal was put forward for the postponement of the date on which the Disaster Management Act was scheduled to come into operation by one year to allow the shortcomings identified to be addressed. Accordingly, the disaster management arrangements in the province are being applied strictly according to the law. In effect, therefore, in terms of the Civil Protection Act, responsibility for civil protection arrangements rests with each of the local municipalities in each district, with the district municipality only carrying responsibility for the DMAs.

4.5.3 Disaster risk reduction

From the point of view of predictability it can be seen from Section 2.5 of this report that there is evidence of flooding having occurred in the same general area in 1822, 1867, 1885 1905, 1916, 1921, 1925, 1941, 1945, 1954, 1981, 1991, 1993 and 1996.

Despite this, in terms of disaster risk reduction, no scientific study had been commissioned to assess and guide the management of the flood risk in the area, or any other prevailing hazards for that matter.

Without exception the respondents expressed their frustration at the lack of legislative imperatives, which was delaying attention being given to critical issues for risk reduction and effective planning.

Respondents interviewed in the area of the Boland District Municipality indicated that there was major concern regarding the choking of the rivers by debris and reeds that were impeding the natural flow of the rivers. This was particularly stressed in the Montagu area in the case of the Keisie and Kingna Rivers, and was viewed as a strong risk factor for flooding.

Efforts had been made on numerous occasions to initiate the clearing of the debris and reeds from the riverbeds. This is borne out by the numerous reports carried in the local newspaper (The Montagu Mail) on these initiatives in the period 1997 to 2002. According to the officials and the news reports, difficulties were experienced in reaching a compromise between conservation of nature and the elimination of the reeds. A permit was eventually obtained on 30 July 2000 but with a provision restricting the manner in which the reeds could be removed. There was considerable difference of opinion amongst the relevant

departments and officials on how the matter should be tackled. In March 2002, work eventually started on the process, which was hampered, however, by an extremely limited budget.

In the case of the Eden District Muncipality, the interviews focused on the flooding which took place in the Wilderness/Sedgefield area of the Knysna Municipality; in the areas of Maraisplaas, Borchers, Golden Valley and the Conville informal settlement in the George Municipality; and at Riversdale in the Langeberg Municipality.

According to the officials participating in the focus-group interview, the problem of flooding at Sedgefield could have been averted by opening up the mouth of the Swartvlei River, which the Parks Board (SANPark) had refused to do. This they regarded as poor decision-making. There was confusion as to who actually had the final say in the matter and they attributed this to the lack of clear identification of roles and allocation of responsibilities. According to the group, the community eventually took the matter into their own hands and opened the mouth using manual means, which resolved the problem, but not before houses were flooded. The affected houses are built in the flood plain and this was also attributed to poor planning and a lack of regulatory control. They expressed the opinion that there definitely needed to be disaster management input into development projects. There also needed to be a holistic investigation into floodplain management for the area. They expressed concern that there was no regional representative for the Department of Water Affairs and Forestry in the area.

According to the representative of the Wilderness National Park, there are two areas that have the greatest potential for placing communities at risk:

- The Touw River system
- The Sedgefield Estuary

The problems in the case of the Touw River system are as a result of the artificial opening of the mouth because of the development that has been allowed on the flood plain. The railway bridges also compound the problem because due to the collection of debris under the bridges when flooding occurs beaver dams are created. In an effort to address the problems, the Council for Scientific and Industrial Research (CSIR) conducted extensive studies in 1978 and 1983[43] and laid down recommended guidelines for the opening of the mouth of the river to reduce the effect of flooding on developments in the area.[44] The purpose of the guidelines was to try to strike a balance between a necessary natural phenomenon and the possible impacts resulting from human manipulation which basically constituted poor planning. The Sedgefield Estuary was included in the same study.

Concern was expressed regarding the impact in the case of a 'black Southeaster' event occurring simultaneously with a spring tide – particularly during holiday seasons when there is a massive influx of population into the area and a related lack of co-ordinated and integrated planning.

From the point of view of disaster risk-reduction planning, the lack of emergency preparedness measures and the lack of mechanisms for rapid and effective assessments can be directly associated with the fact that there was such an inordinate focus on the impact

[43] Hydrological study of the Swartvlei Valley Estuary, 1978.
Estuaries of the Cape, 1983.
[44] Wilderness National Park. Proposed procedure for the management of the Touw River Mouth, 1994.

the flood had on roads and infrastructure – particularly in influencing the declaration of a disaster – that the awareness and assessment of the impact on vulnerable communities and their ensuing needs was neglected. This is evidenced by the fact that in the majority of cases evacuations and assessments were conducted in an ad hoc and unco-ordinated manner or left to the communities themselves. Inevitably this lack of preplanning led to disputes and dissatisfaction amongst those affected with the manner in which relief was distributed. The involvement of communities in the planning process, particularly those communities known to be most at risk, is of fundamental importance.

Section 7(2) and 7(2)(b) of the Disaster Management Act establishes the reduction of vulnerability and disaster prevention and mitigation as core principles for disaster management in South Africa. However the Civil Protection Act only makes provision for reactive measures to disasters that have already occurred. There were therefore no legal imperatives in terms of the Civil Protection Act for the municipality in this instance to implement initiatives for disaster risk reduction. On the other hand, however, there is a requirement in this regard in terms of Section 26(g) of the Municipal Structures Act, which specifies the inclusion of disaster management plans as a core component of Municipal IDPs. More detailed discussion on the issue of planning appears in Section 4.5.5(d) of this report.

4.5.4 Disaster response

Due primarily to the changes brought about by demarcation and 'being between two Acts', there was uncertainty in the local sphere as to who was actually legally responsible for the management of the event. *This is considered a major issue that requires urgent attention*.

Initially, in the case of both the Boland and Eden District Municipalities' areas, the SA Police Services took over the management of the disaster response but these ad hoc actions were taken because there were no specific guidelines and role identification with regard to the responsibilities of the different municipalities. According to the respondents, no one wanted to take responsibility.

Eventually, when it was realised that five towns could be cut off in the Boland DM area, it was agreed that it was in fact a matter for Disaster Management to take control of, and the Disaster Management Officer for the Boland District Municipality was contacted. After discussion, it was decided to establish a Joint Operations Centre (JOC) at the Swellendam Commando Headquarters which is located in Robertson. Contact was established with the Municipal Manager of the Breederiver/Winelands Municipality who later joined the JOC and assumed command.

There was consensus amongst the major role-players that although the police had to take on primary responsibility and play the co-ordinating role, this was not how it should be. An urgent need was expressed unanimously by the representatives interviewed from the SA Police Services and the Emergency Medical Services as well as the Municipal Manager and the Disaster Management Officer for the District Municipality for the introduction of the new Disaster Management Act as soon as possible so that roles and responsibilities can be allocated and clearly defined.

The areas of Montagu and Ashton were officially gazetted as disaster areas on 4 April 2003. The declaration of the state of disaster was initiated by the Municipal Manager of the Breederiver/Winelands Municipality who made a recommendation directly to the Provincial Disaster Management Office for the area to be declared a disaster area. The basis on which

the decision was made for applying for the declaration was based largely on the disruption to the economy of the area and the impact on infrastructure.

In the case of the Wilderness/Sedgefield event according to the Park Manager extreme pressure was placed on the Park Management by the residents to open the mouth of the Sedgefield Estuary prior to the levels reaching those recommended in the guidelines.

The standard operating procedures are for the park rangers to take regular readings of the water levels. These readings are taken at the river mouth at sea level. The rate at which water is coming down the river is monitored simultaneously. The situation had been monitored and the forecast, which had been received from George, was a 70% chance of rain – no reference was made to heavy rain or flooding. On Monday 24 March although the levels were acceptable they were being carefully monitored and by approximately 17h00 the rangers at Wilderness warned that preparations should be made to open the mouth of the Touw River. The mouth was subsequently opened at 19h00 that evening.

The bulldozer which is used for the purposes of opening the mouth has to be taken by low bed trailer which can only be effected during daylight hours. Therefore, in view of the fact that drainage usually takes about four hours, the decision was taken to monitor continuously and then go through to Sedgefield early the following morning. In terms of the recommended guidelines, consideration should only be given to opening the mouth at Sedgefield when the water is at 3 metres above sea level and to reject anything below that. At 23h00 the level at Sedgefield was 1.4 metres.

As a precaution, the campers in the park at Wilderness were warned to move away from the lower lying areas or alternately to move into the chalets at the park. Some opted to do so but others remained. The night-watchman was briefed to monitor the situation. At 01h00 on Tuesday 25 March, the Park Manager at New Rest received the first call to say the water was rising and the river was beginning to flood. The situation continued to deteriorate and the Park Manager was notified of this at 04h00, by which time the water was waist deep in the park. The NSRI was called in to evacuate the rondavel area in the park and the guests were taken by boat to the NSRI station where they sheltered. By this time a number of properties in the area were flooded and the mouth of the Touw River was fully open.

The first reports of problems at Sedgefield were received at 07h30, at which time the level was measured at 1.8 metres. In view of the delay in getting the bulldozer transported to Sedgefield, the decision was taken to start opening manually and then to finish off with the bulldozer. This was effected between 09h00 and 09h30, by which time the water had reached a level of 2.8 metres, which was still within the guidelines. Houses were flooded and there was damage to the sewerage works, and water and electricity supplies were affected. The problem at Sedgefield is that the affected houses are built within the flood lines and according to the manager, although they were originally built on ‘stilts’, subsequent owners have closed in the ground-level areas to create more living space.

The respondents participating in the focus-group interview, and the SA Police services in particular, expressed concern at the absence of decision-making which had created great difficulties. Again there was confusion as to who was actually legally responsible. The SA Police Services maintained that Disaster Management should have been the facilitating agent but, due to the fact that Council of the District Municipality regarded disaster management as an unfunded mandate, the district municipality was not prepared to accept responsibility, maintaining that disaster management was still the responsibility of each of the seven local municipalities, with the district municipality only being responsible for the DMA. The group cited the example of the rule of the law being applied so rigidly that when the

official responsible for Disaster Management for the District Municipality went to assist at the affected area, the official was called back by the supervisor and told that it was outside the district municipality's area of jurisdiction in terms of the Civil Protection Act. The difficulties and frustrations experienced were directly attributed to the lack of adequate organisational arrangements for the management or co-ordination of disaster response to the flooding. The urgent need was expressed for the establishment of mechanisms to enable co-ordination, integration, joint planning and effective decision-making.

The focus group maintained that 'Disaster Management is the responsible agent', and that the establishment of a District Disaster Management Centre and the appointment of a Head of the Centre as required in terms of the Disaster Management Act was a matter of priority.

In the case of the affected areas of the Eden District Municipality, information came to Social Services that only two persons had been deployed to conduct needs assessments for 179 homes involving 500 people who had been affected – an impossible task in the immediate aftermath of the flood. A decision had been taken to evacuate the area and this was being undertaken with the use of only one minibus, which entailed travelling back and forth one trip at a time to evacuate 500 people. There were also no mechanisms in place for the processing of information, which resulted in the identification of needs proceeding extremely slowly. Again capacity was a major problem as only one person was trying to co-ordinate and process all the applications. There were no mechanisms for screening, for collecting baseline data or for capturing of information, no records kept and no resource database. It all involved last-minute arrangements to gather whatever could be scrambled together. The lack of information management resulted in slow responses to people's needs. According to the representative of Social Services the George, the Disaster Plan was not activated and no information on George disaster management arrangements were available. Subsequent to the flood, a meeting with the George Municipality was requested in order to clarify areas of concern over the response and recovery process. These events are again indicative of the need for effective arrangements.

According to the legislative imperatives that were being applied at the time, there should not have been any confusion regarding responsibility for civil protection in the area of the local municipalities concerned. In terms of section 20(1)(c) of Provincial Notice No. 395 of 2000, whereby notice was given by the Minister for Local Government of the establishment of the Breederiver/Winelands Municipality, provision should have been made to ensure the appointment of an Acting Chief of Civil Protection to assume office on the effective date of the establishment of the municipality and for that person to remain in office until the local municipality had made its own appointments in terms of the Civil Protection Act. This would apply equally to all of the relevant local municipalities as well as the district municipalities in terms of their notices of establishment.

The opinion was expressed that although, to all intents and purposes, the events were generally well managed, it was just by good fortune, and that the new legislation would have contributed considerably to more effective and rapid decision-making. There was a need for the introduction of a standard system for incident management which would allow for the identification of triggers to ensure a smooth transition from the management of an incident to one which threatens to, or actually does, escalate to what constitutes a disaster. Systems of this nature are in existence in other countries such as Australia, the United Kingdom and the United States of America and would include the clear allocation of roles and responsibility, central reporting mechanisms, processes for the alerting of key role-players and the dissemination of early warnings to communities at risk. An Incident Management System would clearly define the process for operation, tactical and strategic command, control and co-ordination and would eliminate the ever present 'turf battles' which tend to occur in the

management of response. One example given was a dispute which apparently arose in this event between provincial and local traffic officers regarding the closing of access routes, with each claiming jurisdiction for the same road and one closing the road and the other wanting to open it.

From the point of view of response management, the Disaster Management Act makes adequate provision for the classification and declaration of disasters in Section 49. In particular, Sections 43 and 44 require the establishment of a Disaster Management Centre, which includes a communication centre with the capacity for 24-hour operation, and which would contribute directly to effective response and recovery management. The development and the implementation of a model for a standard Incident Management System will further give effect to the intentions of the Disaster Management Act.

4.5.5 Institutional arrangements for disaster management in the affected areas

a) Internal municipal arrangements and co-ordination

The function of disaster management for the Boland district municipality is currently located in the Directorate of Planning and Community Safety. There is one full-time Disaster Management Officer but there is no provision for any input on disaster management into any management team meetings. A 'mini' disaster management centre has been in existence for some time and was considered to be adequate for the requirements.

There are no specific structures in place for interdepartmental co-ordination for the purposes of disaster management either within the Boland District Municipality's Disaster Management arrangements or within those of the relevant local municipalities.

In the case of the Eden and Overberg districts there is no dedicated post allocated for disaster management. The responsibility for disaster management for the Eden District Municipality has been assigned to the Chief: Fire and Emergency Services and similarly the Chief Fire Officer of the Overberg District Municipality also bears the responsibility for disaster management. There are also no specific internal structures for the purposes of disaster management in the arrangement for these two district municipalities either.

The urgent need for adequate institutional arrangements was echoed by all of the representatives interviewed. The statement was made by more than one representative that they were able to manage the event largely because of local knowledge and personal acquaintance rather than as a result of any formal arrangements, and that circumstances could have been very different if this was not the case. Many of the difficulties that were encountered would have been overcome and decision-making speeded up if there had been adequate arrangements in place. For example, the existing mini disaster management centre for the Boland District was not adequate for the purposes of the Joint Operations Centre (JOC) and as a result the JOC had to be established at the Commando offices in Robertson. Fortunately, it happened to be available at the time and was not being used for Commando purposes. The issue of personnel capacity was also raised in that had the Disaster Management Officer been away on leave, off sick or otherwise not available, there would not have been any other person available as a substitute. This also applied to the volume of work required for one person to fulfil all of the legislative imperatives. The fact that there were no formal institutional arrangements in place to allow for participative planning and to enable a multi-sectoral and multidisciplinary approach to disaster risk reduction and disaster response planning was a problem.

Concern was expressed over the tendency to allocate dual responsibilities to line function officials with regard to disaster management. The example was used of a Traffic Officer having been allocated the additional responsibility for disaster management and when in this instance the need arose for the roads to be closed and arrangements made for alternate access routes the officer was fully occupied with his primary role and therefore was not available to attend to his disaster management responsibilities.

The interviewees emphasised the need for the establishment of a Disaster Management Centre for the district with a dedicated post for the Head of the Centre who can effectively assess and evaluate the requirements for disaster management and make decisions as well as ensure the allocation of clear roles and responsibilities.

b) Arrangements for stakeholder participation

According to the Disaster Management Officer of the Boland District Municipality, a co-ordinating committee on which major stakeholders were represented had been established for civil protection purposes for the area of the former district council. However the committee no longer exists due to the effects of demarcation. No other formal mechanisms for disaster management in the municipal sphere have been established.

The co-ordinating committee had operated in a manner similar to the Disaster Management Advisory Forum (hereafter referred to as a DMAF) as envisaged by Section 51 of the Disaster Management Act, and it had worked well. It did not however provide for community representation. In retrospect, this was identified as a major shortcoming that requires correction. The fact that the focus of the disaster response was on the infrastructural damage and that officials lost sight of the humanitarian dimensions of the event was attributed directly to the lack of such a mechanism. According to the officials, the ward committees or a separate committee should be responsible for disaster management and there should also be a forum for local community-based organisations and non-governmental organisations to become involved. Capacity-building should take place in the ward context and should focus on areas more at risk. This would address the omission that occurred in this instance where the community was ‘forgotten’ because there was no organised structure. In other words, the ward disaster management committee would become actively involved in risk reduction as well as the other aspects of disaster management in the community.

It was acknowledged that the concept of a co-ordinating committee definitely had to be revived and that in this regard the municipality’s intention is to establish a DMAF, which must include all the relevant role-players. Sub-regional DMAFs will be established in each local municipality.

From the experience of this event, the lack of community involvement was recognised as a shortcoming, and community representation on the Forums in future was considered essential. It was considered a priority that working groups should be established comprising the relevant role-players from the Forum to enable participative disaster risk reduction and contingency planning for aspects such as fires, droughts and flooding. However, the opinion was expressed that the first initiative must be to establish the institutional arrangements right up to ward level. The next step would be to build capacity amongst institutional role-players and then to start building a volunteer corps. With regard to volunteers, the view was that use should be made of existing organisations first and thereafter any volunteer units established should be attached as reservists to the emergency services rather than to disaster management.

The sentiment was expressed that one positive aspect that was largely influenced by the spirit of the Disaster Management Act, in terms of accelerating recovery, was the speed with

which road reconstruction and repairs were commissioned. The tender process for the repairs to the R62 was fast-tracked to such an extent that the tender was awarded within three days.

In the case of the Boland District Municipality, although there were no formal structures in place for disaster management from an institutional perspective, there was nevertheless major input in the disaster response and recovery phase from the municipal roads department and to a far lesser degree from the health department, with both departments being represented in the JOC when required. The Department of Water Affairs representative, who was also present in the JOC, provided some important information on dam levels, which would have been very useful to have routinely.

At local municipality level there had also previously been co-ordinating committees for the purposes of civil protection in the areas now included in the Breederiver/Winelands Local Municipality's jurisdiction. However, these committees had likewise been rendered inactive, as many officials serving on the committees had left the employ of municipalities as a result of the amalgamations and for the same reasons no new structures had been put in place. The only forum where civil protection issues were discussed from time to time was at the local committee co-ordinating operational issues relating to security matters.

The SA Police Services and SA National Defence Force representatives participating in the focus-group discussions conducted in the Eden District Municipality immediately expressed concern at the current lack of adequate institutional arrangement for disaster management, referring to specific operational difficulties which had been encountered during the event in their area. They appealed for urgent initiatives to be put in place to establish a forum wherein all the relevant role-players could participate in the preparation of appropriate operational plans. The urgent need for clarification on institutional responsibility regarding disaster management was emphasised. The example was put forward of the confusion which reigned regarding 'who is in charge' (primary responsibility) at the scene of various incidents and in the JOC. The contention was that unless it was a security related issue then it was the responsibility of Disaster Management to facilitate. Frustration was expressed at the reluctance of the Council of the District Municipality to recognise the Disaster Management Act because of the funding issue.

The appointment of an appropriately qualified HOC, as required in terms of Section 45 of the Disaster Management Act, with the level of expertise and seniority which would enable the allocation of responsibilities to ensure the decisive decision-making, effective planning and management required of the position, was highlighted as an important issue by all respondents as a matter which needed to be seriously considered as a priority.

The second priority identified was the need to establish institutional arrangements to facilitate internal co-operation between municipal departments, for example the establishment of an Interdepartmental Disaster Management Committee.

Thirdly there was in-depth discussion on Section 51 of the Disaster Management Act, which provides district municipalities with the option of establishing DMAFs. Participants expressed the view that from their experiences of this event, the establishment of such forums to enable wide stakeholder participation was not negotiable and was fundamental to ensuring that the intentions of the Disaster Management Act of achieving an integrated, co-ordinated and uniform approach to disasters and disaster management in South Africa were met.

c) Co-operative governance[45]

There are no formally established procedures written up for liaison between the three spheres of government for the purposes of disaster management in the area of the study. However in the case of the Boland District Municipality, there are informal mechanisms in place. The standard situation report form issued by the National Disaster Management Centre was used in the case of this event. In this regard, communication with the Provincial Disaster Management Office was effective and a representative was sent to serve in the JOC. Unfortunately, the official was unable to reach the JOC on day one due to inaccessibility. However, from the second day the representative played an important and valuable role in maintaining contact and gathering information with the neighbouring municipalities in the affected areas. This was considered to be an important aspect of the province's responsibilities for the future.

In the areas concerned, there are no forums in place to enable co-operative planning with neighbouring local municipalities and district municipalities and as a result there are no formal arrangements to deal with cross-boundary risks, or contingency planning for disasters which could result in 'knock-on' impacts in neighbouring areas. The need for this was highlighted by the breaching of the Bellair Dam. This had apparently occurred on Monday 24 March but was only discovered when a SAAF helicopter happened to fly over and spot it on the morning of the next day. The impact on areas downstream was devastating. The area where the Bellair Dam is located was only assigned to the district municipality's area of jurisdiction after demarcation. Due to the fact that it had virtually never had water in it since it was built decades ago, it was never considered a threat. There were no contingency plans for the dam.

In addition, the need was expressed in all three areas of the study for more diligent monitoring of the maintenance of standards and practices in terms of risk management in the areas of municipalities to deal with cross-border risks, and the view was that the provincial sphere of government should be responsible for this role.

In the aftermath of the events of the Eden district, stakeholders have taken the initiative to establish an interim forum to embark on a process of participative planning and co-ordination for disaster management.

There was consensus that formal mechanisms must be put in place for information sharing between the Provincial Disaster Management Centre (hereafter referred to as the PDMC) and Municipal Disaster Management Centres (hereafter referred to as MDMCs) as well as between neighbouring MDMCs. In particular, there should be standard procedures put in place for the dissemination of information on early warnings and reporting of deteriorating conditions which could pose cross-boundary threats. This would require thorough and careful preplanning to ensure a clear understanding of procedures. The PDMC should be responsible to monitor this aspect, particularly with regard to planning and risk reduction for cross-boundary threats as well as high-risk developments which could have an impact on neighbouring areas.

This again emphasised the importance of mutual assistance agreements between neighbouring authorities which could be extended to accommodate the aspect of information-sharing, especially with regard to early warnings and cross-boundary risks.

[45] See Chapter 3 of the Constitution of South Africa, Act No. 108 of 1996.

Although any mutual aid agreements[46] between municipalities which were in existence before demarcation remained applicable in terms of the establishment notices of municipalities after demarcation (referred to earlier in this report) they were thought to be inapplicable as a result of demarcation. None was formally invoked. Respondents all agreed that the issue of mutual assistance agreements between authorities should not be optional and should be reflected as such in the Disaster Management framework.

d) Levels of disaster planning

In the case of all three district municipalities, disaster planning in the context of the newly demarcated municipalities had not yet been formulated. This was attributed largely to the current legislative vacuum.

The only existing plans for the Boland District are contingency plans, prepared in 1993 and updated in 2002, specifically for the Greater Brandvlei Dam and the Poortjieskloof Dam. They were prepared in the context of the Civil Protection Act and, therefore, focus only on evacuation in the event of breaching of the dams. There is no provision in the plans for early warning dissemination, preparedness or aspects such as assessment of damage and needs; no plans for shelter, humanitarian relief or any other elements normally included in disaster planning or post-disaster activities.

The Bellair Dam is located in the DMA in the area of jurisdiction of the Boland District Municipality, which therefore has full responsibility for the contingency arrangements for the dam. However, due to the fact that the area was previously in the jurisdiction of the Overberg District Municipality and was only acquired after demarcation, no planning had yet taken place in this regard. In addition, there was great confusion as to who owned the dam and who was responsible for its safety.

There are some ward contingency plans but they are no longer current, appropriate or practically implementable, because the boundaries of all the wards have changed since demarcation. In any event, they only focus on reactive measures and do not include risk reduction and emergency preparedness.

A business plan was prepared for the Boland District Municipality's IDP, which included capacity-building and awareness but, because of lack of disaster management capacity in the municipality, it has not been possible to implement it. The preparation of a disaster management policy framework for the municipality has been commissioned and is apparently currently in the process of completion.

Although there was sound planning in place by the National Parks Board for the management of the Swartvlei Estuary in the Eden district, residents and key institutional role-players from the local and district municipality as well as from provincial and national departments were clearly unaware of the guidelines and procedures in the event of flooding. The establishment of a forum for sharing of information and a process of participative planning could have contributed to avoiding the confusion and disputes which arose during this event. Subsequent to the event a forum was established (which includes a group of concerned residents) to plan collectively for the future.

According to respondents, there are evacuation plans for the Theewaterskloof Dam in the Overberg district, but there are no fully fledged disaster management plans per se, nor are

[46] Briefly, this refers to reciprocal agreements whereby two neighbouring authorities undertake to place all of their resources at the disposal of their neighbour/s and to assist in the event of a disaster.

any included in the IDP. Any current plans are founded on the Civil Protection Act and are based on the formerly demarcated areas. Therefore, they do not meet the required standards in terms of the Disaster Management Act. A completely new approach is required in the context of the new Act.

In summary, the current state of disaster management planning is restricted basically to contingency plans for dams, which were prepared in terms of the requirements of the Department of Water Affairs and Forestry.

In the context of planning, however, respondents were waiting in keen anticipation of the outcomes of the risk and vulnerability assessment which the Provincial Disaster Management Office had commissioned to inform future planning. The recognition of indigenous knowledge and its contribution to risk and vulnerability assessments and the planning process was identified as an important component. Concern was expressed that this aspect may have been overlooked in the scientific study currently being undertaken. The fact that the Disaster Management Act places the onus for planning on every municipal entity and organ of state was welcomed and was considered to be long overdue. In particular, concern was expressed over current tendencies, whereby disaster planning was viewed to be the sole responsibility of Disaster Management (or the Civil Protection Officer) with no involvement of other role-players. The opinion was expressed that the responsibilities in this regard should be included in the job descriptions of the relevant key role-players.

There was unanimous acknowledgement of the fact that in the absence of effective planning it was extremely fortunate that the response was managed as effectively as it was.

4.5.6 Methods for information management in the affected areas

a) Early warnings, dissemination of information and central reporting

According to the respondent for the Boland District Municipality, the dam contingency plans do make provision for the dissemination of early warnings to the local municipalities but there are no formal mechanisms or standard operating protocols in place for the dissemination of early warnings to the communities who may be at risk. In the event of this flood, warnings were only disseminated when the second warning was received. In this case, for example, Robertson at that stage was experiencing normal rain and was not aware of the problems developing at Montagu.

The need for such mechanisms as well as means of monitoring the levels of the river during flooding was acknowledged and the opinion expressed that a central reporting centre (the District Disaster Management Centre) and standard operating procedures for reporting all incidents and information, such as early warnings and river and dam levels, would allow for a more holistic picture to develop. Currently, the local municipality continues independently until such time that it can no longer cope before calling on the district municipality for additional assistance. The Disaster Management Centre should be operational 24 hours a day.

The major problem experienced is the lack of disaster management capacity (personnel and infrastrucure) as well as the lack of communication infrastructure. Ideally such warnings could be sent via the local municipalities to ward leaders.

In the case of the Sedgefield/Wilderness area, warnings are also received but, according to emergency services personnel, they are normally only disseminated to colleagues. The reason cited for this was to avoid panic amongst the public.

In the case of the Overberg district, the weather situation was monitored from the Thursday night prior to the flood, and by the following day it appeared as if it was going to have a major impact on Bredasdorp. However, it only impacted on the Sunday morning. Warnings of the possibility of heavy rainfalls were received by SMS from SA Weather Service. There was no contact from the PDMC in this regard. There are no set mechanisms or protocols in place for responses to warnings or for reporting the progression of severe weather events. Warnings are communicated to all of the local municipalities and to the SA Police Services.

The respondent was of the opinion that the procedure should be for the SA Weather Service to send warnings to the PDMC which should then disseminate them to the Metropolitan and District Disaster Management Centres instead of sending them to a variety of ad hoc role-players. It should then be the responsibility of the Municipal Disaster Management Centres to decide on the further dissemination of the warnings in their area and what actions to take.

Although the situation was being monitored, the main reason that the further dissemination of the warnings to communities did not take place in this event was the fact that there were no arrangements or procedures in place, nor were there any emergency communication mechanisms available for the purpose. It was acknowledged in retrospect that some method of disseminating warnings should have been devised.

In assessing the role-players reflected on the distribution list of the SA Weather Service there did not appear to have been any consistency or standardised procedure in identifying the recipients of warnings. Another issue which emerged consistently with regard to warnings was that they were received with such frequency and the context was of such a general nature that they did not indicate the degree of severity required to inform decision-making. Due to the fact that in most instances nothing further materialised, they tended to be disregarded.

b) Disaster assessment

The problems associated with the post-disaster assessment of this event have been alluded to in Section 4.5.3 and are also clearly evident in the findings of Part III of this report.

The absence of a planned approach to conducting assessments was highlighted not only in terms of the total focus given to conducting damage assessments, with the assessment of social needs being left to ad hoc initiatives, but also from the point of view of the prioritisation and allocation of scarce resources such as the air response. In this regard, the lack of appropriate information resulted in a decision having to be made to mobilise all of the available helicopter support as a precaution, because no one was able to provide an accurate account of the developing situation or to predict what search and rescue requirements would be necessary. The approach had to be to fly over the area first and conduct a reconnaissance of the situation from the air before landing and reporting to the JOC.

Disaster assessment and situation reporting are multidisciplinary processes which serve as a critical tool to inform decision-making. They require the setting down of procedures and the preparation of survey questionnaires for the gathering of critical information which is essential to ensuring rapid, appropriate and cost-effective disaster response and recovery.

They are an essential element of disaster planning, requiring the active participation of key role-players and experts who should also be involved in the post-disaster assessment teams.

The development of operational guides, which include both assessment tools and standard operating procedures for every single activity associated with disaster response and recovery, are a critical element of disaster management plans.

c) Media liaison

In terms of disaster planning, and operating protocols in particular, the need was expressed to ensure adequate arrangements for media liaison. Respondents reported an incident that occurred in the JOC at Robertson which could have had far reaching implications. As a precautionary measure, it was decided that an inspection should be conducted on the status of the wall of the Poortjieskloof Dam, and a representative of the Department of Water Affairs and Forestry was taken up in a helicopter to measure movement of the dam wall. Slight movement was recorded but it was within the norms. Unfortunately, the press had been allowed into the JOC and having overheard the information, reported on it causing considerable panic amongst residents. Respondents were of the opinion that the media should be referred to the disaster management centre and that there should be a media facility with only one individual identified to deal with the media. Only authorised persons should be allowed to enter the JOC.

d) Record keeping

According to the respondents, the detail of the disaster was not adequately recorded in terms of legal procedures, although an incident log was kept and a scribe appointed. No facilities were available for voice recording either. The availability of an appropriately equipped disaster management centre with the necessary technology would solve most of these problems. Backup power as well as the correct communication technology, for example, are essential.

Record keeping is regarded as a very important component of the management of disaster response not only from the legal point of view but also to conduct reviews and learn from past experience. Setting up the mechanisms for information management is an equally important part of the process; if there had been standard procedures for conducting assessments, the humanitarian needs in this disaster would not have been overlooked.

e) Communication

In the area of the Boland District Municipality, communication remains a major problem. For the purposes of managing this event, the Commando radio communication system was used. Telkom telephone lines were functional except for one area that was without telephone communication. Cell phones lasted as long as batteries lasted. There was a short power cut, during which radio communications operated off batteries until the batteries failed.

There are 19 towns in the area of the district municipality, all of which operate on varying communication systems. It would be possible to bridge the gap in the old area, but the newly acquired areas are a problem (particularly rural areas now included in local municipalities). The lack of a single frequency for operational purposes, which is accessible to all agencies, creates major difficulties in the management and co-ordination of incidents and disasters. Although there is the migration plan for the National Emergency Alarm Radio Network (NEARNET), this is not going to solve the multi-agency/one frequency problem. The issue of

maintenance of repeater sites after migration is going to be a major headache in terms of cost, as many of the sites are only accessible by helicopter.

The municipality has sponsored radios for farmers in the DMA – one per populated farm and a repeater for emergency communication (e.g. for fire and medical emergencies). These radios lasted for about 18 hours during the flood before their batteries failed. Farmers were supposed to buy their own mobiles, which would have helped in this instance, but this has not yet materialised. Efforts are still being made to set this up. In total, three farms in the area did not have contact.

This is definitely a major shortcoming and requires rectification as there were no communication mechanisms to establish the impact in communities at risk, which contributed to the fact that the humanitarian aspect was neglected.

In the Overberg district there is also a serious problem in this regard. According to the respondent, the disaster management framework will need to be much more prescriptive regarding adequate radio communication. The matter of a 'trunked system' must be investigated and a decision taken regarding the NEARNET. The NEARNET and its infrastructure are being reviewed and difficulties considered. It is only due to innovation on behalf of districts and the province that opportunities to link systems have been created.

There is a current resource database, which is limited and requires extensive further development, but all of these unattended issues were related to a total lack of disaster management capacity in the municipal sphere. Most of the respondents indicated that they relied primarily on their local knowledge and personal contacts in the area to overcome this, but recognised that in their absence there would be a major problem.

There was consensus that the whole aspect of effective information management is inadequate, and the development of an information system incorporating a comprehensive resource database is absolutely essential.

4.6 Conclusions and Recommendations

The value of this research is the fact that it has been drawn from actual experiences of the key role players directly involved the management of this event. Therefore, it is of benefit to practitioners, other role players and stakeholders alike who are involved in disaster management on a daily basis. More importantly however the lessons learned can contribute to the prevention and mitigation of the effects of events of this nature in the future.

The outcomes of this study serve to clearly illustrate that the establishment of effective institutional arrangements are fundamental to integrated and coordinated disaster management. The study further illustrates the extent to which policy and legal frameworks affect the administration and management of disasters.

Clearly, the difficulties experienced in the management of the social impacts of this event as well as from the management of the event from a response perspective are inextricably linked to the issue of institutional arrangements and capacity. The lack of Institutional arrangements and capacity can in turn be attributed to the current policy and legislative dilemma in which local government finds itself with regard to disaster management.

4.6.1 Policy and legislation

From the point of view of the policy and legal context for this research, comparisons were drawn to establish whether the provisions of the Disaster Management Act (the Act) would have contributed significantly to addressing the difficulties encountered.

During the process of conducting the fieldwork it became patently clear that this was the case and that *the implementation of the provisions of the Disaster Management Act, supported by a sound policy framework to provide guidelines for the implementation of the Act, should not be delayed but should be effected as a matter of urgency. Furthermore, it is recommended that a strategy be implemented as an interim measure to initiate the phasing in of key provisions of the Disaster Management Act to address the current critical shortcomings until the Act becomes effective.*

The recommended interim strategy will be discussed in the following context:

- Institutional arrangements and the allocation of roles and responsibilities.
- Disaster management planning.
- Disaster response and recovery.

4.6.2 Institutional arrangements and the allocation of roles and responsibilities

The allocation of clearly defined roles and responsibilities is essential to the elimination of confusion and to ensuring good decision-making. This is particularly significant in the case of disaster management, when decisions which can have far reaching implications have to be made on the spur of the moment. This aspect has been provided for in the Disaster Management Act by the requirement that Metropolitan and District Municipalities appoint a Head of the Disaster Management Centre.

As an interim measure, it is recommended that each district municipality appoint a suitably senior person in their employ as the interim focal point for disaster management for the municipality until the appointment of a Head of the Centre is made in terms of the Act.

As a further interim strategy, it is proposed that in the event of a non-security related disaster threatening to occur or occurring in the area of the district, the interim Head of the Centre assume responsibility for the establishment of a disaster operations centre at a pre-identified suitable venue and for the overall co-ordination and management of the event. In addition, the municipal managers of the local municipalities (or the person who is appointed as the Chief or Acting Chief of Civil Protection in terms of Sections 12 and 14 of the Municipal Structures Act) should represent their municipalities in the disaster operations centre to undertake the co-ordination and management of events in their respective areas.

Participative planning and the application of co-operative governance are one of the cornerstones of government policy. Effective, integrated and co-ordinated disaster management is based on participative planning and the implementation of measures that reduce disaster risk, ensure emergency preparedness and promote rapid and effective disaster response and recovery. This requires the participation of key personnel within the institutional structure of a municipality, representatives from relevant national and provincial departments, and the community and a range of other external stakeholders. The Act makes provision for effective arrangements to enable this participation by the establishment of Municipal Disaster Management Advisory Forums. Although it is not obligatory to establish such forums at the municipal sphere, it is difficult to conceive of how the participative

principle could be applied without such structures. In fact, the study has shown that in the aftermath of this event, forums have been spontaneously initiated along these lines in two of the affected districts.

Accordingly, it is recommended that:

- Each district municipality immediately establish an Interdepartmental Disaster Management Committee comprising relevant key personnel for the purposes of co-ordinating internal departmental planning.
- The establishment of District Disaster Management Forums be initiated as a matter of priority.
- Interim disaster management structures be initiated in the ward context in communities known to be at risk.

The identification of lead functional agencies for the various operational activities associated with disaster management, and the allocation of responsibilities in terms of co-ordination and the establishment of Joint Operations Centres for the tactical management of field operations at the scene of incidents, should be pursued as a matter of urgency from within these forums.

Furthermore, it is recommended that an intensive campaign be initiated to sensitise the aforementioned role-players with regard to their responsibilities in terms of the Act. A key consideration in this process of sensitisation is to focus on communities at risk.

Consideration should be given to investigating innovative mechanisms whereby funding can be made available nationally to kick-start the establishment of district disaster management centres and the appointment of heads of those centres with immediate effect.

In terms of the disaster management framework, it is recommended that:

- The establishment of municipal disaster management forums be strongly recommended but, in the event that a municipality decides not to exercise the option to establish a forum for the purposes of disaster management, municipalities be required to identify an alternate existing structure to pursue the intentions of the Act with regard to the role of forums.
- The matter of primary responsibility be addressed by the identification of lead functional agencies for each of the activities associated with disaster management.
- Emphasis be placed on ensuring adequate capacity for disaster management and that guidelines be provided for the minimum requirements in terms of the establishment of disaster management centres.
- Clear guidelines be given for the appropriate placement of the function in the hierarchy of structures of municipalities.
- Guidelines be formulated for the introduction of mechanisms for the monitoring and management of cross-boundary risk in both municipal and provincial context.
- Clear guidelines be included for the establishment, infrastructure and operation of provincial and municipal disaster management centres.

4.6.3 Disaster management planning

This research has highlighted the critical importance of adequate planning, which involves the assessment of risk and vulnerability to enable efforts to be focused on disaster risk

reduction in communities identified to be most at risk of disasters, and then to integrate risk reduction strategies into developmental planning. It has also shown the urgent need for the preparation of operational guides (plans) to ensure rapid and effective disaster response and recovery actions.

The issue of making funding available to conduct thorough risk and vulnerability assessments to inform and focus planning where it is most urgently required should enjoy national attention as a priority.

In as much as there is a need for integration of development planning, there is equally a need for integration in the context of disaster management planning. This is particularly so because of the multi-sectoral and multidisciplinary nature of disaster management. During the process of collecting data for this study, it became apparent that a guide in the form of a planning framework was necessary to ensure not only that plans embraced all of the legal requirements in terms of content, but also that there is integration and standardisation of planning. In terms of Section 26(g) of the Municipal Systems Act, disaster management plans are listed as core components of municipal IDPs. Clearly this is also an issue that requires urgent attention.

As an interim measure, it is recommended that district municipalities prepare a high-level strategic plan that will set out the overall arrangements for disaster management in the district, which will include *inter alia*:

- A qualitative risk profile supported by priority strategies for reducing the risks identified in the profile, and accompanying implementation plans included as annexures to the plan which will be integrated into the IDP.
- The institutional arrangements for disaster management for the district and clear allocation of roles and responsibilities.
- The arrangements for the dissemination of early warnings.
- procedures for the activation of the plan and for the classification and declaration of a state of disaster
- Standard operating protocols for key role-players in municipal departments
- A template, provided for the purpose of assisting municipalities to fast track the process and to ensure standardisation.
- For the purposes of the disaster management framework it is recommended that:
- A comprehensive planning framework with accompanying guidelines be included to ensure standardisation and integration of disaster management plans.
- Clear guidelines be included for procedures to be followed for the format and content of severe weather warnings and the mechanisms for the dissemination of early warnings and responses.
- A nationally co-ordinated community awareness programme be initiated to inculcate risk avoidance behaviour for commonly encountered hazards through public/private sector partnerships and in conjunction with the media.

4.6.4 Disaster response and recovery

Accurate and thorough assessments are not only fundamental to ensuring a rapid and effective response and recovery but are also critical to mitigating the impact of a disaster on communities, the infrastructure and the environment. This is clearly reflected by the consequences of the lack of accurate assessments highlighted in this part of the study and, to a much greater extent, in Part III of this research.

Disasters do not occur exclusively between the hours of 08h00 and 16h00, and informed decision-making to ensure a co-ordinated approach can be effective only if a holistic picture of the circumstances is available.

The lack of effective emergency communication mechanisms and the lack of a central reporting facility, which is operational on a 24-hour basis, contributed greatly to the difficulties encountered, and hampered the management of the response and recovery, in this event.

The installation of communication mechanisms, which are linked to an interim reporting centre, in communities identified to be at risk, the identification of disaster management focal points in communities at risk and the dissemination of information to those focal points on the mechanisms and procedures for reporting of events that are threatening to occur or have already occurred should enjoy priority attention. The installation of NEARNET radios for this purpose in those communities should be considered.

Research should be commissioned to explore the possibilities and options available toward the introduction of a national emergency radio communication system that will allow interagency communication for the purposes of disaster management.

For the purposes of the disaster management framework it is recommended that:

- Guidelines and standardised procedures be formulated for conducting damage and needs assessments, including initial assessments and sector-specific follow-up assessments.
- The development of a model for a national Incident Management System be commissioned to ensure standardised approaches and the clear identification of roles and responsibilities.
- Consideration be given to the formation of Disaster Assessment Response Teams.
- Clear guidelines be included for the development of a policy on appeals for donations and criteria set for the management and distribution of humanitarian relief.
- Guidelines and minimum requirements for emergency communication be specified.
- Guidelines be developed which include minimum requirements for the recording of information on disasters.
- In order to learn lessons and add value to disaster management planning, post-disaster reviews be routinely conducted.

Part V: Counting the Costs[47]

5.1 Introduction

Extreme weather events are responsible for triggering more than 70% of disasters of natural origin. In the Western Cape, the majority of declared disasters as well as significant disaster events that are undeclared have a strong weather component.

The calculation of disaster-related impacts is an essential prerequisite for responsible disaster risk management. This is because it generates information on the multi-sectoral consequences of disaster events. In this way, it provides important baseline information for calculating the relative costs and benefits of mitigation investments against recurrent expenditures for relief, recovery and reconstruction.

With specific focus on the impacts resulting from the March 2003 cut-off low, the study team gave priority to collecting and compiling only the *direct* losses associated with the event. In this context, the study aimed specifically at:

- Identifying the key categories of loss relevant to this specific disaster.
- Confirming the spatial extent for the disaster-related impacts.
- Collecting, quantifying and consolidating the impacts identified.
- Mapping and representing the impacts to show loss patterns across areas and sectors.

There are three major loss categories conventionally used when determining disaster-related economic losses. These are:

- Direct damage/loss, which is all damage to property occurring more or less simultaneously with the disaster itself (i.e. physical infrastructure, installations, machinery, crops ready for harvesting and livestock).
- Indirect damage, which refers to damage to the flow of goods and services that cease to be provided almost immediately after a disaster.
- Secondary effects reflect the disaster's impact on the main macroeconomic variables, such as regional income or, in this instance, agricultural employment.

While best international practice recommends the collection of information on both indirect and secondary impacts, time and resource constraints made this unrealistic for the current study.

For the purposes of this research, the team collected quantified information on the following impact categories:

- Impacts on people.
- Impacts on physical infrastructure.
- Impacts on agriculture.
- Insured impacts.
- Impacts borne by local and provincial government.

[47] Leigh Sonn and Gillian Fortune, DiMP/UCT.

5.2 Methodology

5.2.1 General methodology

In the absence of a uniform provincial reporting system for consolidating losses across sectors and administrative jurisdictions, the research team adopted the approach below.

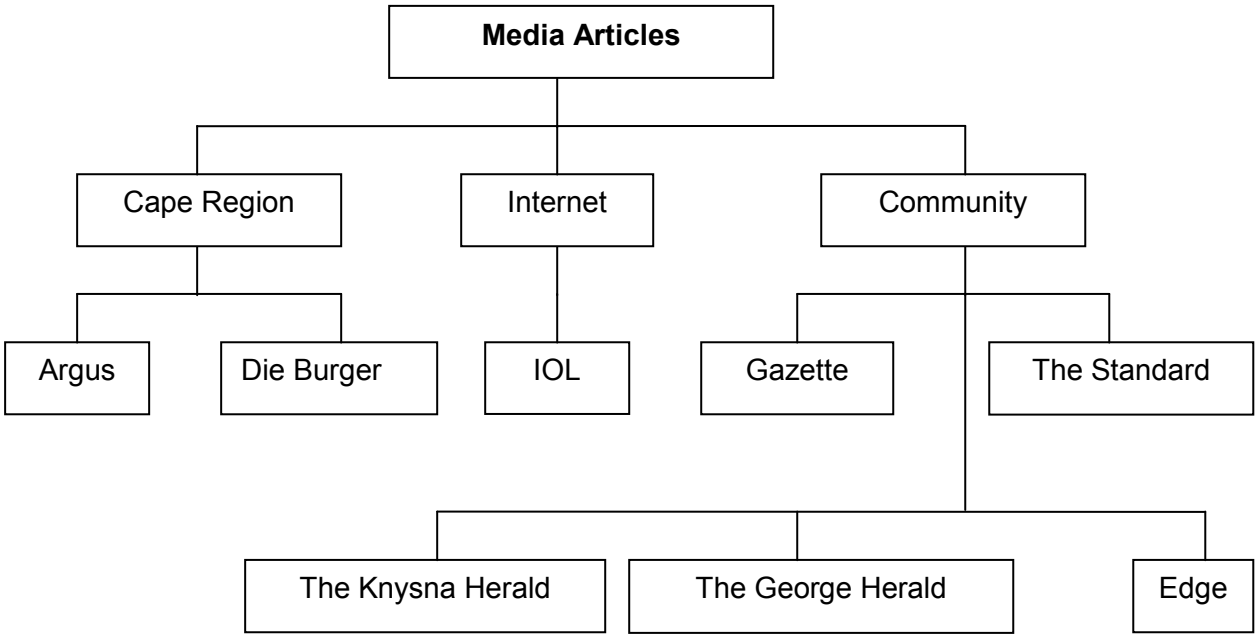
a) Identification of key categories of loss and their spatial extent

This step was undertaken as a broad 'scoping exercise' from 24 March until 7 April 2003 to determine the general character of impacts, the areas affected and potential resource people/information sources for more detailed reports. Specific measures taken included:

- Review of regional and local media disaster reports.
- Assessment of spatial/other characteristics of the weather system.
- Attendance at co-ordination meetings.
- Review of government reports/summary documents.
- Identification of resource people.

Newspaper, Internet and other media sources accessed for initial reports on the disaster are reflected in Figure 5.2.1.1 below. These gave an initial indication of where damages were sustained. Newspapers based in Cape Town as well as local community newspapers were reviewed.

Figure 5.2.1.1: News media reviewed for information on disaster impacts



These reports were matched against information on the characteristics of the weather system provided by the Climate Systems Analysis Group (CSAG) to determine the likely impacts, and to identify the geographic area exposed to the cut-off low.

In addition, members of the research team were fortunate to attend two co-ordination meetings convened by the Provincial Department of Local Government in Robertson, which

provided operational updates on the losses incurred, as well as planned reconstruction measures.
This information was subsequently confirmed by the helpful provision of disaster and loss reports by the Provincial Disaster Management Office.

b) Collection, quantification and consolidation of identified impacts

Follow-up telephonic interviews were conducted with approximately 30 representatives of the municipalities affected, as well as relevant provincial departments and the private sector. These discussions sought information on:

- The nature of impacts experienced (i.e. on people, buildings, roads, agriculture, electricity).
- The scale and geographic distribution of impacts related to a specific sector or area
- Methods already adopted to collect and represent impact information.
- 'What would be reasonable' for consolidating sector-specific or area-specific information for the purposes of this research.
- 'What would be useful' for the research team to provide back to the municipality or department concerned.

These interviews indicated that no uniform reporting format existed for recording and consolidating losses.
To streamline the quantification and consolidation process, simple loss reporting forms were developed and distributed to all government and private sector organisations that reported losses (with the exception of the Provincial Departments of Agriculture and Water Affairs and Forestry, who had already consolidated losses systematically). Refer to Appendix C for examples of the forms, which were formatted as Microsoft Exel spreadsheets.
The impact recording team recognised the practical importance of geo-referencing the reported impacts. This allowed impacts recorded across multiple sectors to be consolidated by administrative area (e.g. by municipality or district municipality) to reflect total losses, and also facilitate improved risk reduction planning. It also allowed weather, flooding, infrastructural and agricultural impacts to be spatially consolidated to identify areas at particular risk of extreme weather events such as this.

To enable streamlined geo-referencing, standard A0 maps were prepared and distributed to disaster managers and/or municipal engineers in the affected municipalities. These maps, along with the Excel reporting forms were returned to DiMP and the forms consolidated, first into Excel spreadsheets and then into an Access database.

Figures 5.2.1.2 and 5.2.1.3 represent the provincial departments and municipalities/district municipalities contacted to provide economic loss information.

Figure 5.2.1.2: Provincial Departments contacted

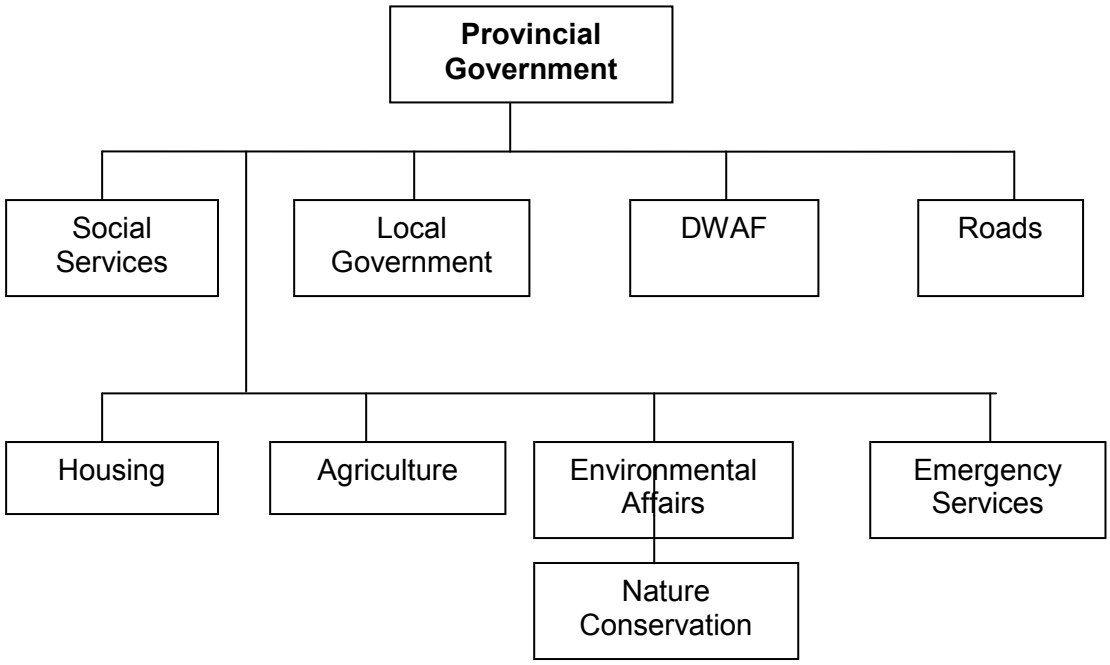
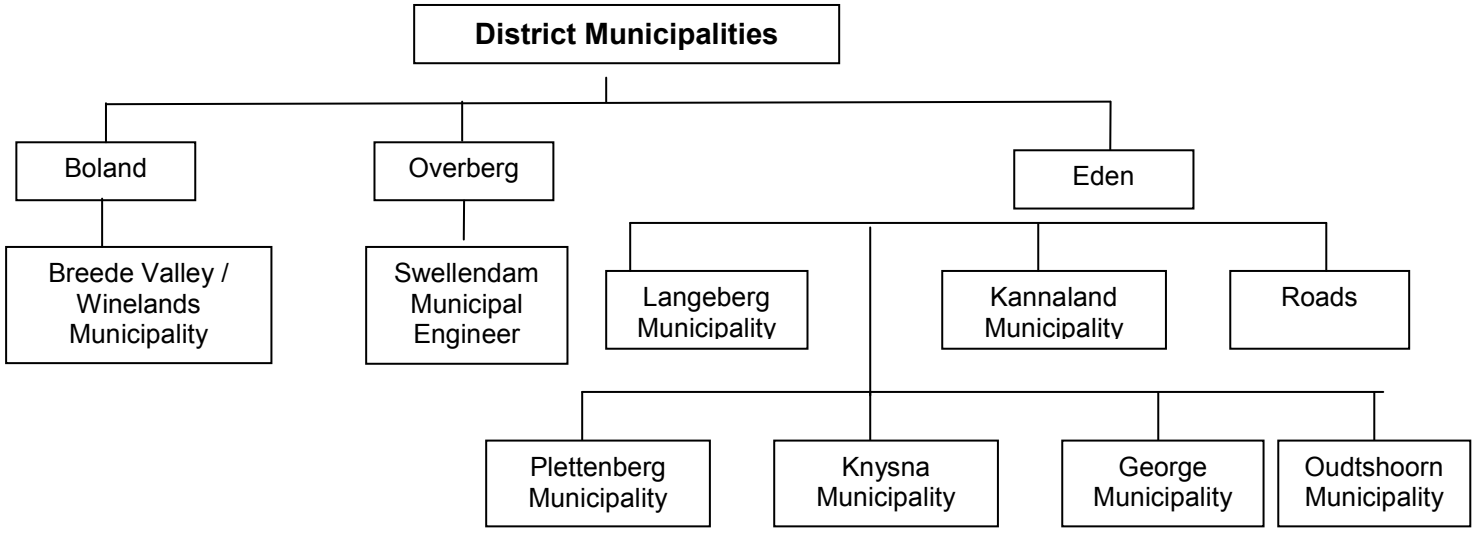


Figure 5.2.1.3: Municipalities and District Municipalities contacted



c) Mapping and representing the impacts to show loss patterns across areas and sectors

The quantified loss information and completed maps were forwarded to AFRICON for consolidation into a geographic information system. The mapped outputs are reflected later in this chapter.

5.2.2 Information gathering methods for specific loss categories/sectors

Many different types of loss were associated with this event. These included impacts on people, property, agriculture and the natural environment. This implies a host of different role-players at various organisational levels, as well as in different arenas that experienced damages or impacts. Therefore, different methods were used to collect and consolidate loss information for:

- Direct impacts on people (death or injury).
- Relief costs.
- Direct economic losses.
- Indirect impacts on health.

a) Direct impacts on people

Newspaper sources reported the deaths of three individuals that were associated with the weather event. Two people drowned in Hermanus when a wave swept them out to sea. One man died when a tree fell on his dwelling in the informal settlement of Dam se Bos in Knysna. There were no other reported deaths.

b) Relief Costs

The information on the costs of humanitarian assistance during the event was collected by means of telephonic interviews. The non-governmental organisation, ACVV, which operates in the Montagu area, and the South African Red Cross Society were contacted for information. Each municipality and district municipality was also approached for information.

c) Direct economic losses

Various organisations and government departments were approached in the collection of impact and economic loss information. The hydrometeorological nature of the event immediately directed attention to sectors such as water supply infrastructure, agriculture and road networks. These were among the first contacted. Through telephonic interviews and a critical review of incoming loss information, the need to contact other organisations was also highlighted.

Government-recorded impacts

Within the provincial government, the Department of Water Affairs and Forestry (DWAF), the Department of Agriculture and Provincial Roads were among the first contacted. Loss information given by irrigation boards supplemented that of the DWAF and Department of Agriculture. Relevant disaster-related Information was also drawn from reports provided by the Department of Local Government.

Disaster Managers and Municipal Engineers in the Boland, Overberg and Eden District Municipalities were contacted, who provided additional information on specific municipalities that had borne disaster-related impacts. Those municipalities were then approached directly for information.

Economic losses covered independently or through private insurance

A private insurance company in the Boland was contacted for information regarding private insurance claims, as the research team was advised that this company was contracted to assess most of the privately insured damage in the disaster-declared area. Eskom's field offices in Worcester and George were also approached for loss information. In addition, the co-owner of the Sanbona Reserve on which the Bellair Dam was contacted for information on losses sustained. Two canning factories that sustained significant flood and weather-related damage in Ashton were also approached for information on direct losses.

(d) Indirect impacts on health

When tracking the impacts of sudden onset hazards such as this, there is often a tendency to focus primarily on injuries and deaths. However, findings presented in Part III profiled the prevailing conditions of poverty for the households most affected by this extreme weather event, and the damage to poorly constructed low-income and informal housing.

Field research indicated that many homes sustained significant rain damage to walls and roofs, as well as the flooding of floors. These conditions undermine health status, particularly in the elderly, children and individuals with compromised immune systems, and increase the risk of illness, especially upper, and more seriously, lower respiratory infections.

Information was gathered from 12 health facilities in the Breede River/Winelands and Swellendam Municipalities, tracking the pattern of curative consultations between March and May 2003 of children younger that five, and comparing this with the same three months in 2002.

In addition, data were collected on the incidence of lower respiratory infections in children under five for the same reporting periods. Lower respiratory infections are considered more severe than infections of the upper respiratory tract, and require antibiotics or possible hospital admission.

5.3 Findings

5.3.1 Introduction

Collected information was consolidated and streamlined into the tables, graphs and charts reflected below. Economic loss information is reflected in South African rands, while every discrete impact recorded (i.e. each structure damaged or household who received Social Relief) is also reflected in the tables below. This is to ensure a balance between tracking economic loss and the distribution/scale of losses that may still effect disruptions to local economies, services and livelihoods.

Total reported direct economic losses for March 2003 are estimated at R212 422 663, as reflected in Table 5.3.1 and illustrated in Figure 5.3.1.1. Figure 5.3.1.2 shows the losses distributed by sector.

Table 5.3.1:Total reported economic losses

By Organisation / Administration	No. of Recorded	Losses	%Total Loss

	Impacts		
Provincial Government*			
Dept. of Water Affairs and Forestry	48	13 850 000	6.52
Dept. of Agriculture	1	95 000	0.04
Dept. of Education	11	1 708 000	0.80
Nature Conservation (Dept. of Environmental Affairs and Tourism)	2	1 130 000	0.53
Emergency Services	n/a	100 000	0.05
Roads	139	78 584 200	36.99
Subtotal	**201**	**95 467 200**	**44.94**
District and Local Municipalities**			
Breede River/Winelands	5	1 281 015	0.60
George ***	2	1 100 000	0.52
Kannaland	3	507 500	0.24
Knysna ***	3	223 812	0.11
Langeberg	3	2 472 000	1.16
Swellendam	8	1 159 000	0.55
Haarlem (under Eden District Municipality)	12	178 500	0.08
Subtotal	**36**	**6 921 827**	**3.26**
Private Sector****			
Eskom	8	1 600 000	0.75
Agricultural land and infrastructure	716	89 521 136	42.14
Irrigation Boards	4	163 000	0.08
Private Insurance	91	3 201 500	1.51
Bellair Dam	1	14 000 000	6.59
Subtotal	**820**	**108 485 636**	**51.07**
Social Relief			
National Dept of Social Development	**774**	**1 548 000**	**0.73**
Total	**1831**	**212 422 663**	**100.00**

*Excludes SAAF costs
**Excludes Plettenberg Bay Municipality
*** This total includes the removal of trees and debris in various locations
****Excludes two factories, Ashton Canning and Tiger Brands, in Ashton

Figure 5.3.1.1: Distribution of total reported economic losses

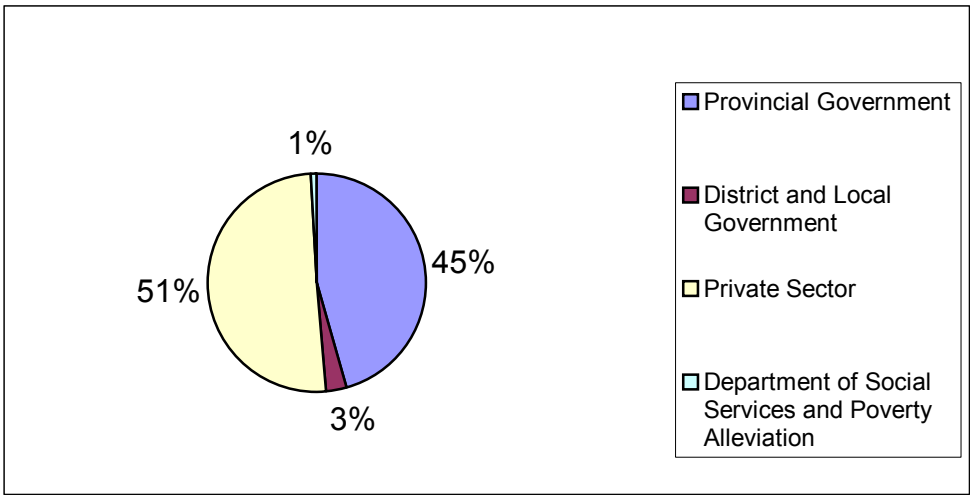


Figure 5.3.1.2: Economic losses by sector

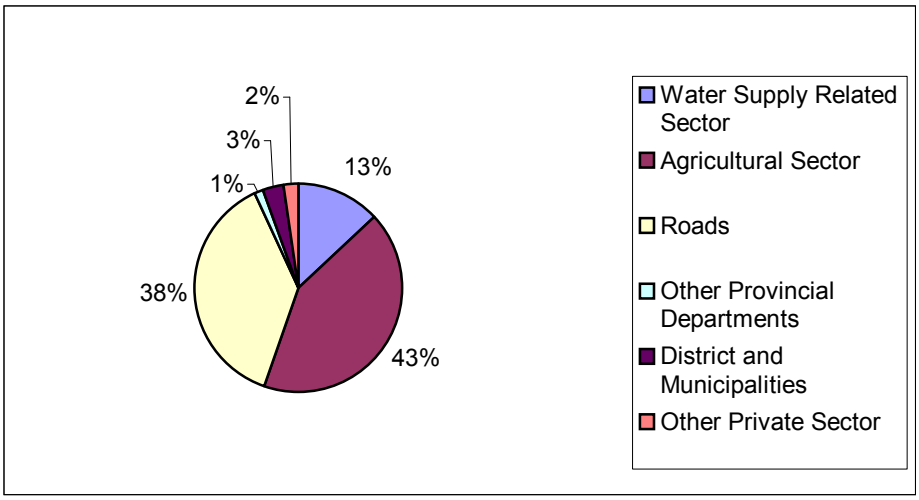


Table 5.3.1 and Figures 5.3.1.1 and 5.3.1.2 summarise total direct reported loss information associated with this disaster event, showing a total of R212 422 663 was sustained in direct economic losses. Of this, R95.5 million (45% of the total) were losses borne by Provincial Government Departments and R6.9 million (3.26%) were costs carried directly by district municipalities and selected municipalities in the weather-affected areas.

However, this summary of economic loss information underlines the shock sustained by the private sector, with R108 485 636 recorded as direct losses. This represents almost 51% of all the reported economic impacts.

Figure 5.3.1.2 presents economic loss information by its sectoral impact, underlining the impact borne first by agriculture (43%) and then by road maintenance agencies (38%). Direct losses sustained by the water sector account for 13% of total economic impacts.

Figure 5.3.1.3: Distribution of reported impacts (total 1831)

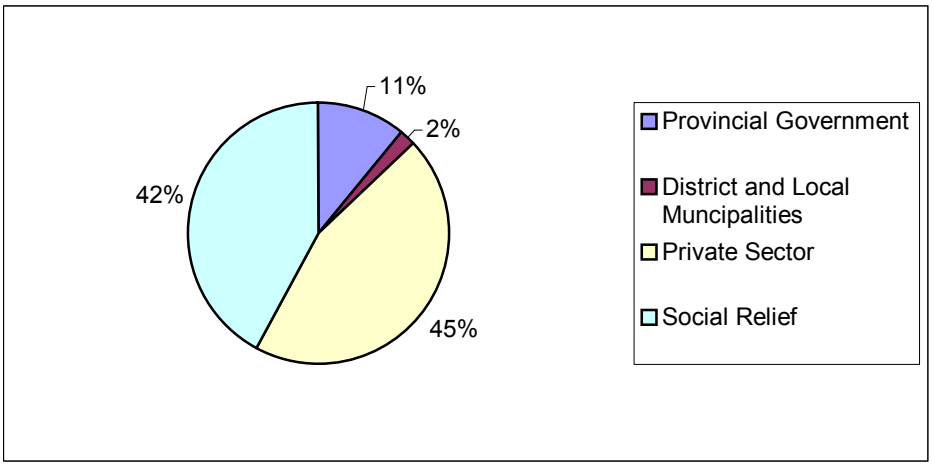


Figure 5.3.1.3 illustrates the distribution of the number of recorded impacts. The private sector constituted 45% of 1 831 recorded impacts. Social Relief impacts make up 42%. This illustrates the human impact.

These specific losses are examined in more detail in section 5.3.2.

5.3.2 Direct economic losses sustained by departments of the Provincial Government of the Western Cape

The total loss sustained by Provincial Government Departments, according to the information gathered, was an estimated R95.5 million. Of this, the Provincial Roads Department was the most severely affected with a total loss estimate of R78.6 million, as shown in Table 5.3.2.1 and Figure 5.3.2.1. The economic losses are illustrated in Figure 5.3.2.2.

Table 5.3.2.1: Economic losses to Provincial Departments

Provincial Government	No. of Recorded Impacts	Losses	%Total Loss
Dept. of Water Affairs and Forestry	48	13 850 000	14.51
Dept. of Agriculture	1	95 000	0.10
Dept. of Education	11	1 708 000	1.79
Nature Conservation (Dept. of Environmental Affairs and Tourism)	2	1 130 000	1.18
Emergency Services	n/a	100 000	0.10
Roads	139	78 584 200	82.32
Total	**201**	**95 467 200**	**100**

Figure 5.3.2.1: Economic losses sustained by Provincial Departments

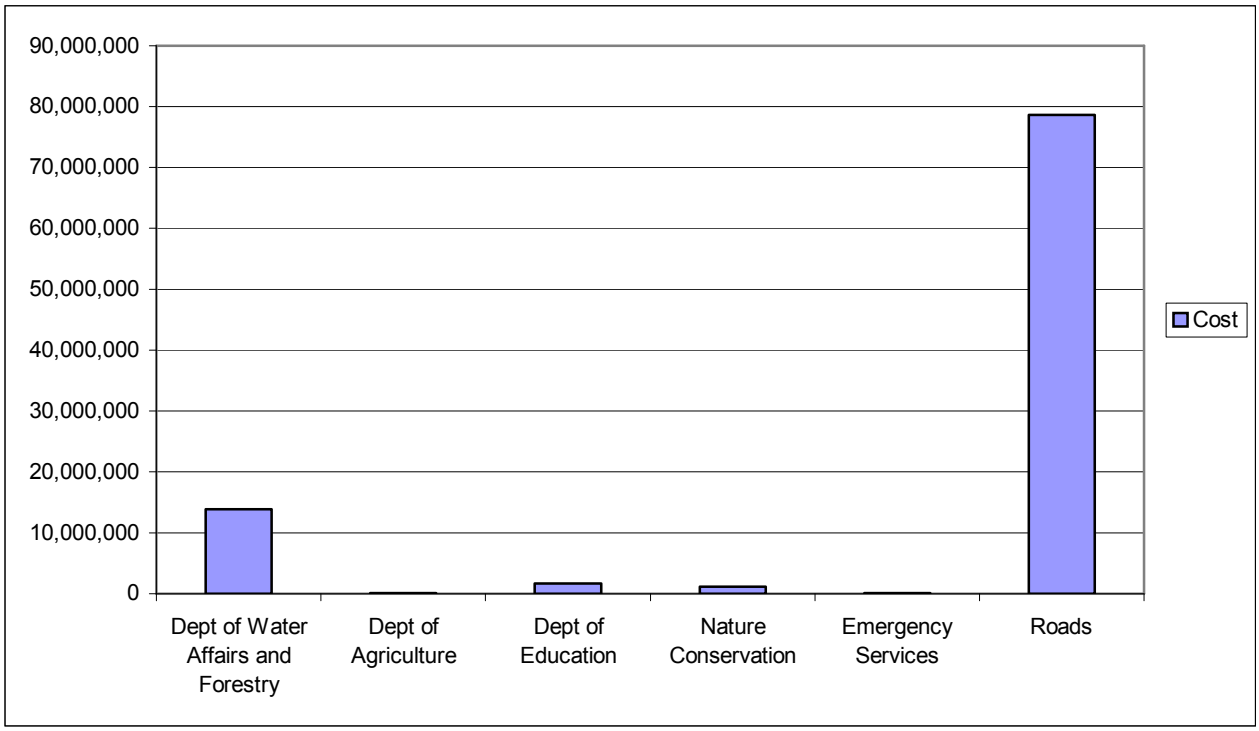
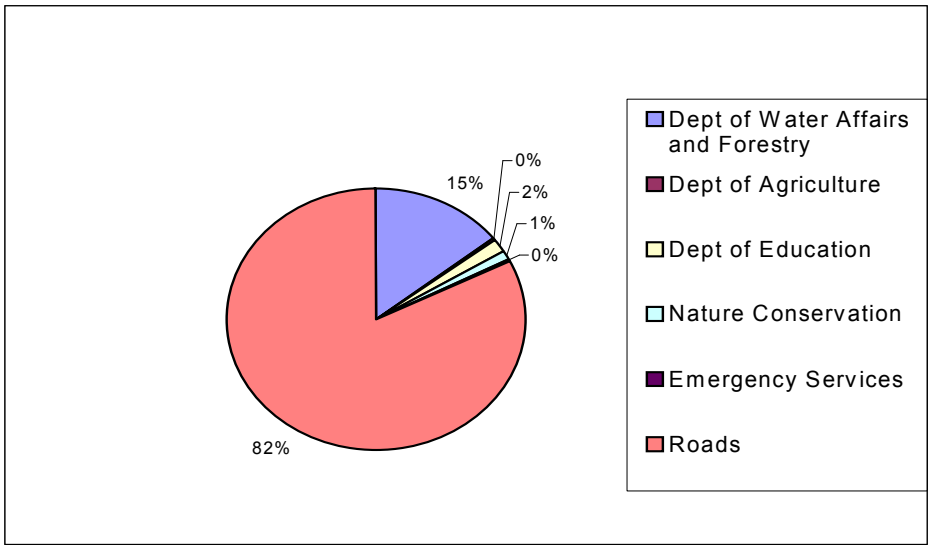


Figure 5.3.2.2: Distribution of economic losses for Provincial Government



DWAF sustained damages estimated at R13.8 million. Provincial Government's reported losses for agriculture refer to damage to its own property (at R95 000) and do not include damage to private farms, which is estimated at R89.5 million.

Figure 5.3.2.3: Distribution of recorded impacts for Provincial Government (total 201)

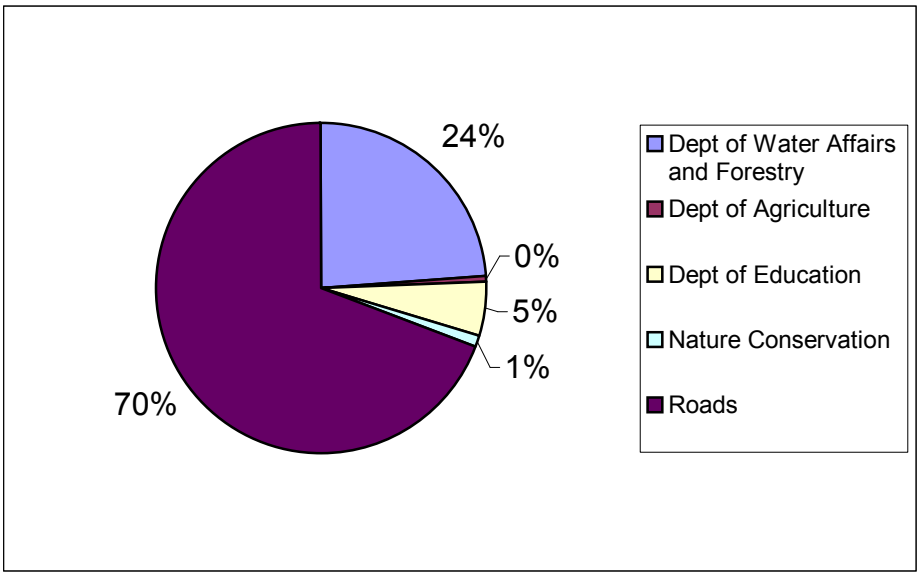


Figure 5.3.2.3 illustrates the impact on DWAF and Roads. It shows that of the 201 recorded impacts for Provincial Government, Roads constituted 70% and DWAF 24%.

A more detailed description of the impacts sustained by each department follows.

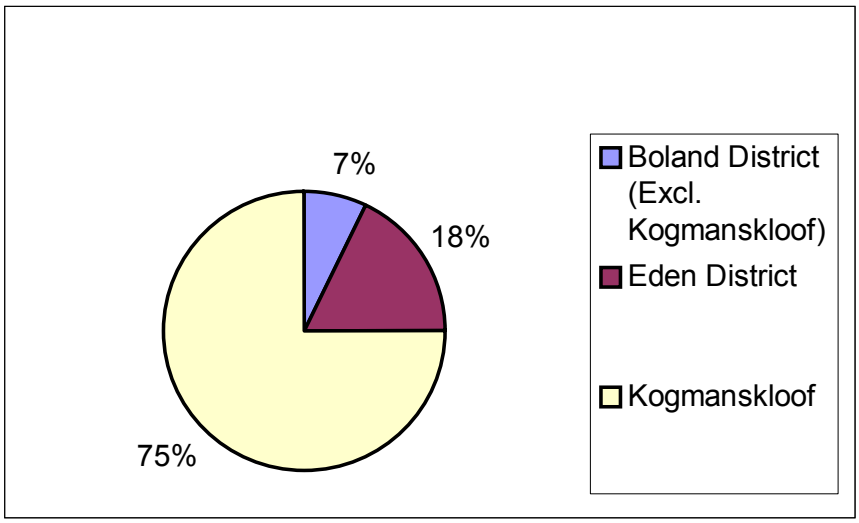
a) Provincial roads

Road damage relating to the March 2003 cut-off low was reported in many areas, extending from the Boland to the Eden District Municipalities. Of these damages, the highest cost was incurred repairing the Kogmanskloof Pass between Montagu and Ashton, estimated at R59 million. This can be seen in Table 5.3.2.2 and Figure 5.3.2.4. Approximately 75% of the total cost for provincial roads was attributed to this one impact.

Table 5.3.2.2: Economic losses for Provincial Roads

Administrative Area	**No. of Recorded Impacts**	**Losses (R)**	**%Total Loss**
Boland District (excl. Kogmanskloof)	43	5 684 200	7.23
Eden District	96	13 900 000	17.69
Kogmanskloof	1	59 000 000	75.08
Total	**140**	**78 584 200**	**100**

Figure 5.3.2.4: Distribution of economic losses to roads including Kogmanskloof Pass



The Eden District Municipality also sustained heavy losses to its road network as a result of the extreme weather event and the flooding/subsidence that accompanied it (R13.9 million), comprising 18% of all roads-related losses. When damage to the Kogmanskloof Pass is set aside, the impact to the Eden District Municipality roads network attributed to the March 2003 cut-off low increases to 71% of all recorded losses to Provincial Roads (see Figure 5.3.2.5).

Figure 5.3.2.5: Damage to provincial roads excluding Kogmanskloof Pass

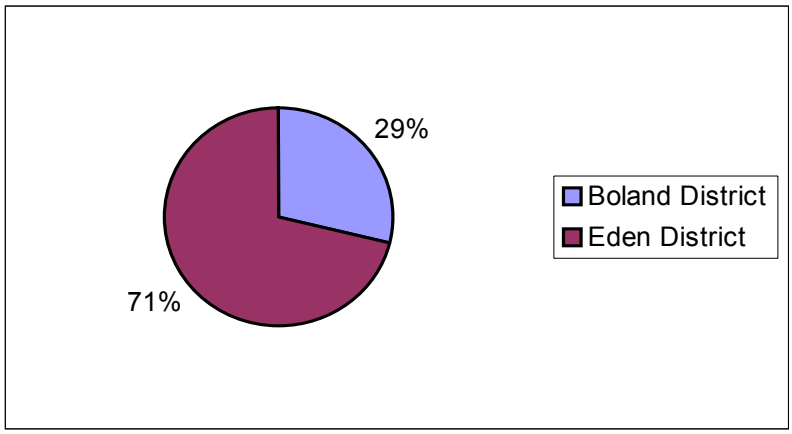
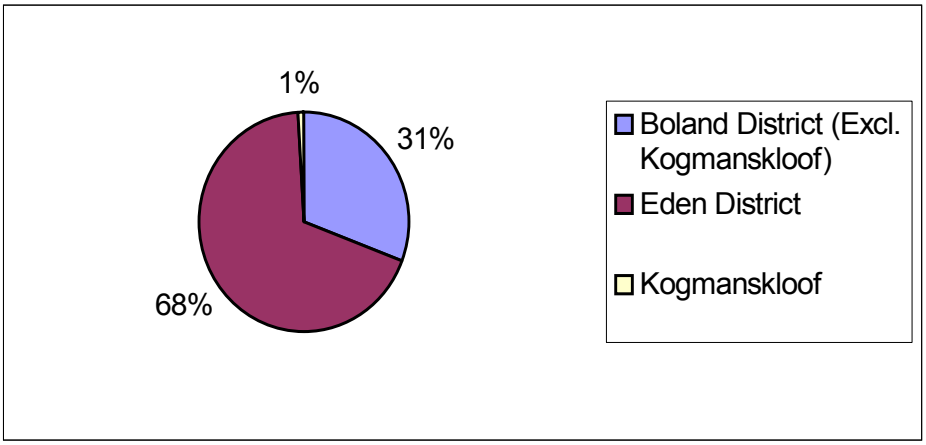


Figure 5.3.2.6: Distribution of impacts recorded (total 140)



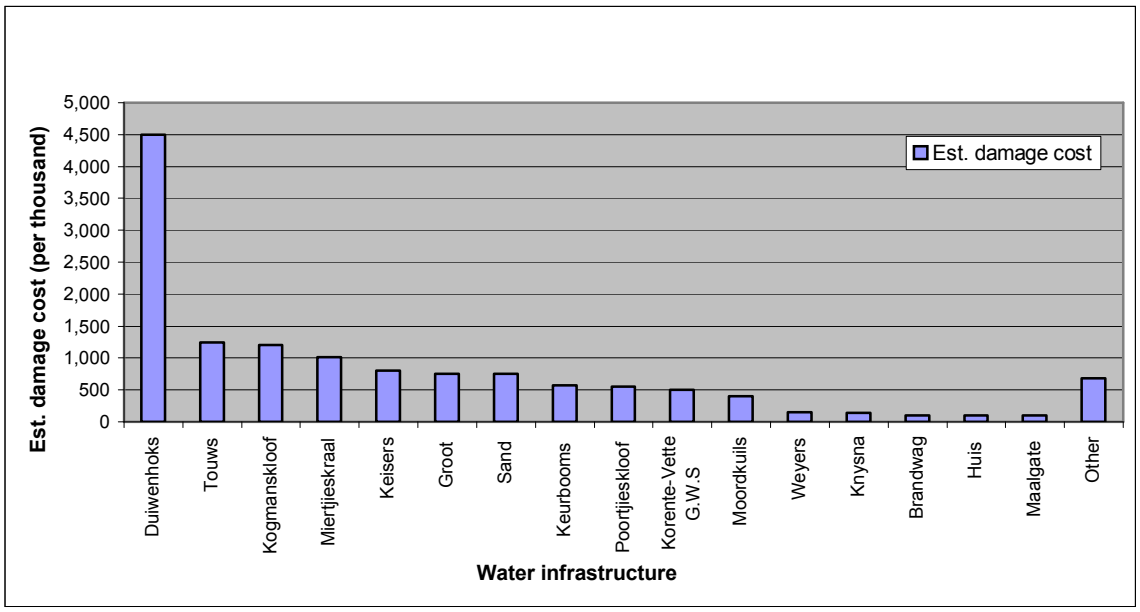
The number of recorded impacts is illustrated in Figure 5.3.2.6. Eden District constitutes 68% of the 140 recorded impacts for roads.

b) Department of Water Affairs and Forestry (DWAF)

DWAF collated information on the impacts sustained to its infrastructure across the Western and Southern Cape. This information was forwarded to DiMP and consolidated with other collected loss information. Total reported losses to DWAF infrastructure were estimated at R13.85 million, with damage to hydrological gauging infrastructure estimated at R10.43 million (75%). Damage to dam infrastructure for which DWAF is responsible was estimated at R3.37 million (not including the damage to Bellair Dam, as these costs are still being finalised).

It can be seen from the direct economic loss information presented in Figure 5.3.2.7 that DWAF infrastructure at Duiwenshok sustained the greatest impact (R4.5 million or approximately 33% of total losses).

Figure 5.3.2.7: Damage to DWAF infrastructure



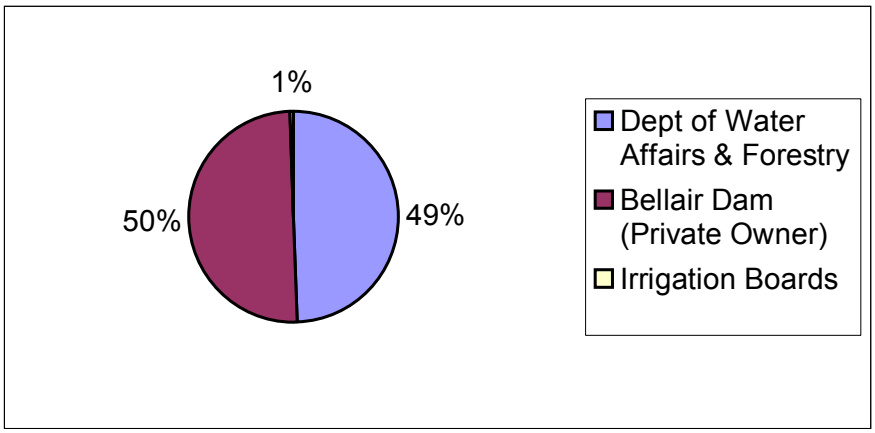
* 'Other' represents infrastructure damaged at Karatara, Prinsrivier, Diep, Vet, Duiwe, Gamka, Goukou, Grobelaar, Grootbrak, Kandelaars, Klein le Roux, Malgas, Wynands, Klipberg, Swartvlei, Bo Lang Vlei, Calitzdorp, Marnewicks, Vermaaks, Tuinroete. Each sustained damage under R100 000. This graph does not include DWAF's possible losses for the Bellair Dam.

When total private losses for damage to water infrastructure are included with DWAF's estimates, the direct total economic is estimated at R28 013 000. Of this however, R14 million is estimated as the direct losses sustained to the Bellair Dam and a further R163 000 sustained by local irrigation boards (see Table 5.3.2.3 and Figure 5.3.2.8).

Table 5.3.2.3: Economic losses for sectors relating to supply of water

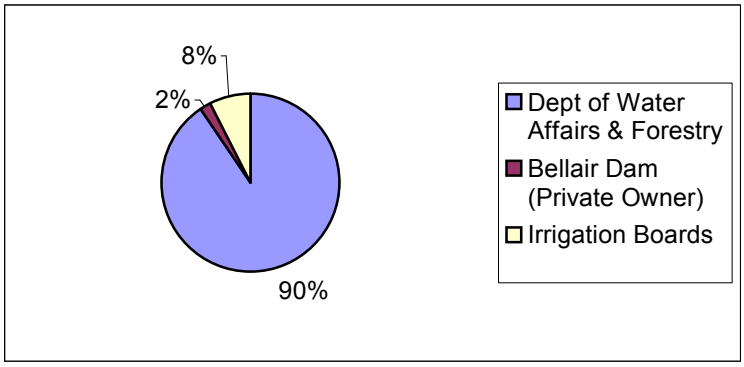
Organisation/Structure	**No. of Recorded Impacts**	**Losses**
Dept of Water Affairs & Forestry	48	13 850 000
Bellair Dam (private owner)	1	14 000 000
Irrigation Boards	4	163 ,000
Total	**53**	**28 013 000**

Figure 5.3.2.8: Distribution of economic losses for the sectors relating to water supply



The distribution of the total number of recorded impacts is illustrated in Figure 5.3.2.9. It shows that DWAF recorded 90% of the 53 impacts to water infrastructure. The impacts to the four irrigation boards constitute 8%.

Figure 5.3.2.9: Distribution of recorded impacts for sectors relating to water supply



c) Department of Agriculture

Similarly, the Department of Agriculture collected comprehensive damage information from 386 farms in the Western Cape that sustained losses associated with the March 2003 cut-off low. This was entered into an existing electronic database. Again, the information was forwarded to and consolidated by DiMP.

The findings presented below represent primarily private sector losses sustained by farmers in the weather-affected areas. However, the summarised loss information presented here represents a small portion of the extensive assessment effectively undertaken by the Department of Agriculture immediately following the disaster.

R89 521 136 were reported as direct losses to farms in the weather and flood-affected areas, as shown in Table 5.3.2.4. Of these, 46% were attributed to infrastructure, while a further 22% and 19% of all losses were respectively explained by insured infrastructure and soil loss (Figure 5.3.2.10).

Table 5.3.2.4: Losses classified by type of damage

Damage Type	Estimated Loss [R]
Infrastructure	41 721 815
Infrastructure (insurable)	19 899 413
Livestock loss	10 420 433
Municipal authority	85 000
Soil loss	16 712 875
Welfare	681 600
Total	**89 521 136**

Figure 5.3.2.10: Agricultural losses categorised by type of damage

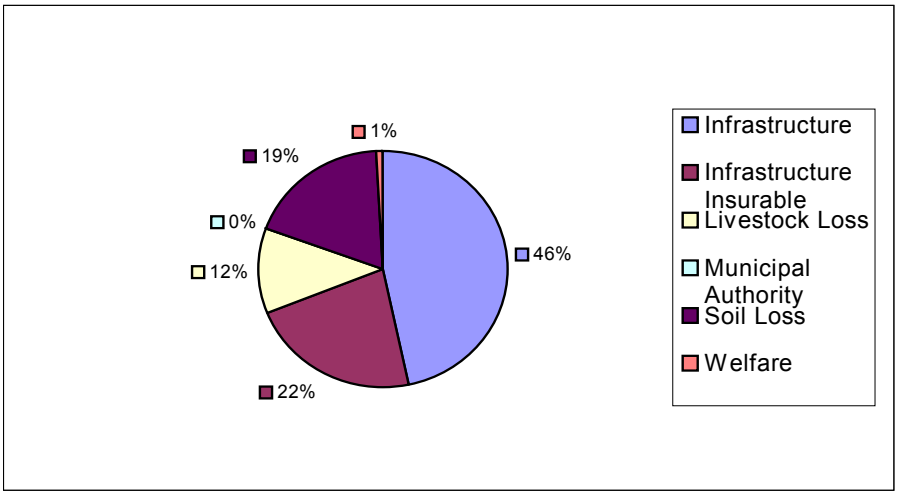


Figure 5.3.2.11 presents a more detailed breakdown of uninsured infrastructural losses sustained by farmers. Of these, 71% are attributed to irrigation-related impacts, of which 57% of all losses to irrigation infrastructure are attributed to small dams (Figure 5.3.2.12).

Figure 5.3.2.11: Types of uninsured farm infrastructural damage

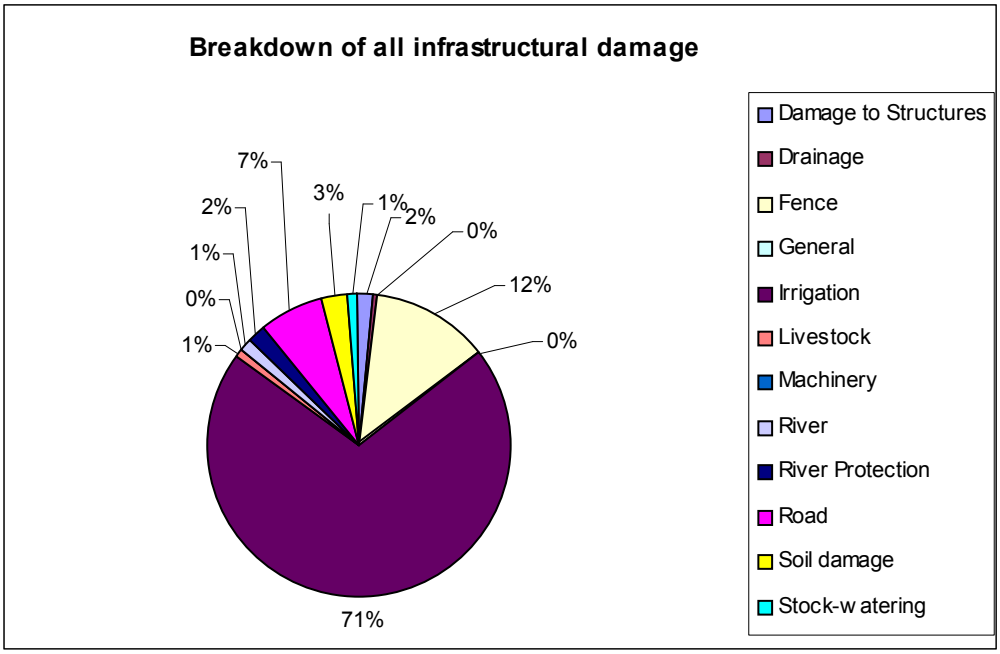
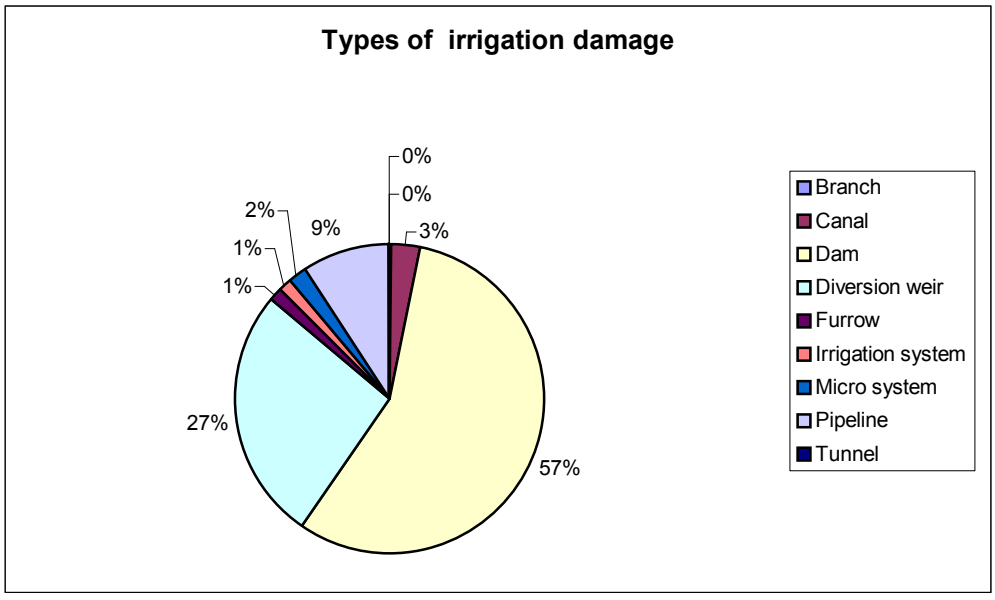


Figure 5.3.2.12: Reported uninsured damage to irrigation infrastructure



d) Department of Education

The Department of Education sustained estimated damages to schools of R1.7 million. These were for primary and high schools shown in Table 5.3.2.5. All schools were damaged as a result of rain. Some were also affected by runoff and wind. 63% of all recorded losses were borne by the Montagu Primary School (R1 081 000), which required emergency evacuation on Monday 24 March due to flooding.

Table 5.3.2.5: Reported weather and flood damage to schools

School	Damage
Ashbury Primary School	10 000
Montagu High School	320 000
Montague Pre-Primary School	200 000
Montagu Primary School	1 081 000
WA Roussouw Primary School	10 000
Wardia VGK Primary School	10 000
Fraaisig Primary School	14 000
Outeniqua	40 000
Olympia Skills School	8 000
Poplars Primary School	7 000
Milkwood Primary School	8 000
Total	**1 708 000**

e) Nature Conservation

Two nature reserves run by Cape Nature Conservation sustained damages totalling R1.13 million. The De Hoop Nature Reserve's main road was washed away, creating a donga. The Goukamma Nature Reserve also sustained damage to the access road. In both cases alternative tracks were being used. The damage was affecting access for tourists. In the case of Goukamma it affected safety, as the alternative route was dangerous.

5.3.3 Losses borne by local municipalities

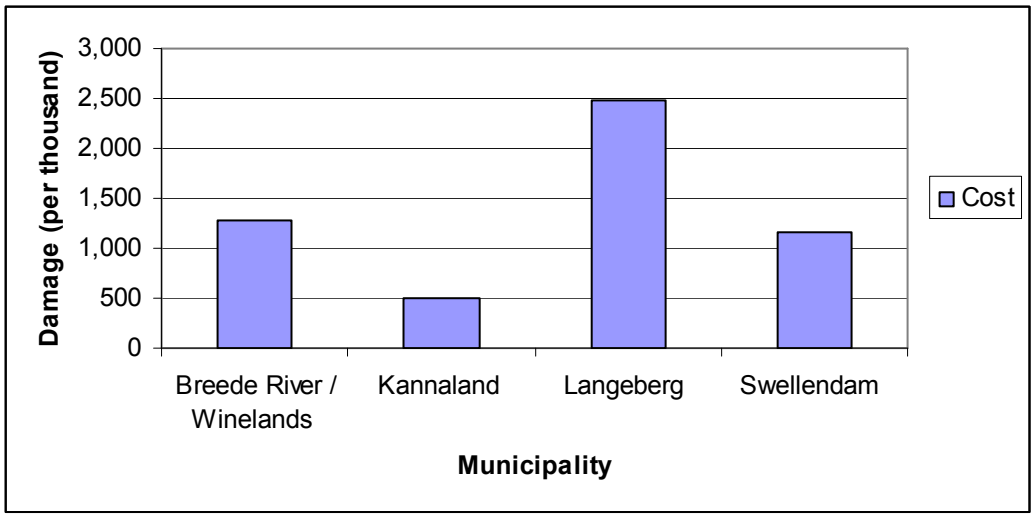
Information was received from the Breede River/Winelands, George, Knysna, Kannaland, Langeberg and Swellendam Municipalities. The total loss reported by these municipalities is estimated at R6 743 327.

Table 5.3.3.1: Losses to municipalities

Local Municipalities	Losses (R)	%Total Loss
Breede River/Winelands	1 281 015	19.00
George	1 100 000	16.31
Kannaland	507 500	7.53
Knysna	223 812	3.32
Langeberg	2 472 000	36.66
Swellendam	1 159 000	17.19

Total	**6 743 327**	**100**

Figure 5.3.3: Damage to municipalities



Langeberg Municipality, which reported the highest estimated damage at R2.472 million (Table 5.3.3.1 and Figure 5.3.3), incurred damage to the Heidelberg sewerage works. The Breede River/Winelands Municipality also experienced significant damage to its sewerage works. In addition, the Breede River/Winelands Municipality sustained damage to its electricity supply for both the town and surrounding areas, with damage totalling R1.28 million.

The Swellendam Municipality reported total losses of R1.159 million, of which an estimated R400 000 was attributed to damaged water supplies to Suurbraak. The Kannaland Municipality reported damage in Zoar, totalling R509 000. This included damage to the town's main road and the main water supply.

Absolute compared with relative (proportionate loss)

One of the many challenges associated with determining disaster impacts is the question of 'absolute' vs 'proportionate' or 'relative' loss. With respect to the March 2003 extreme weather event, this issue was clearly illustrated when municipal infrastructural losses were related to a municipality's planned annual budget, and compared across several municipalities that sustained significant loss. This issue is illustrated in Table 5.3.3.2

Table 5.3.3.2: Disaster loss as a proportion of annual municipal and maintenance budgets

			2003/2004	**Budget**	
Municipality	**Reported disaster losses (R)**	**Planned Municipal Budget (2003/4)**	**Disaster loss as % Municipal Budget**	**Maintenance & Repair Budget**	**Disaster loss as % Maintenance Budget**
Breede River/ Winelands	1 281 015	133 138 502	**0.96**	4 810 280	**26.6**
Langeberg	2 500 000	75 000 000	**3.3**	8 100 000	**30.9**

Kannaland	509 000	21 000 000	**2.4**	950 000	**53.58**

This table clearly illustrates the relative impact of a costly disaster shock to less well-resourced municipalities. While the Breede River/Winelands Municipality clearly sustained significant losses, the Kannaland Municipality bore impacts that were twice as great when related to available budget for maintenance and repair and 2.5 times greater when related to planned annual municipal expenditure. Similarly, losses sustained by the Langeberg Municipality are 3.4 times greater than those experienced by the Breede River/Winelands Municipality, when expressed as a proportion of planned municipal expenditure for 2003/2004.

It is possible that disaster shocks result in proportionately greater loss burdens on smaller or less well-resourced municipalities, which bear a relatively costlier disaster recovery and reconstruction burden than their wealthier neighbours, even if their total reported losses are less.

5.3.4 Other losses sustained by the private sector

Commercial farm losses are reported in Section 5.3.2 above. A private insurer provided damage information from an existing Excel sheet, reporting damages from different weather- and flood-affected areas (Table and Figure 5.4.3.1). The most significant reported loss was reported from a farm near Buffeljags River, with damages totalling R1 million. It can also be seen that the most significant damage to privately insured property was reported for Ashton, Heidelberg and Montagu.

Table 5.3.4.1: Damage reported by private insurance claims

Town	Damage Cost	No. of Claims
Buffelsjagrivier	1 000 000	1
Ashton	678 000	7
Heidelberg	622 000	4
Montagu	356 000	24
Breede River	131 000	5
Swellendam*	112 000	9
Malgas	69 000	7
Bonnievale	59 000	4
Mcgregor	32 500	5
Robertson	27 500	6
Caledon	20 000	1
Greyton	19 000	1
Albertinia	10 000	1
Struisbaai	9 500	3
Agulhas	9 000	4
Suurbraak	8 000	1
Stilbaai	8 000	1
Bredasdorp	8 000	1
Riviersonderend	6 000	1
Napier	6 000	1
L'Agulhas	5 000	1

Villiersdorp	2 000	1
Stormsvlei	2 000	1
George	2 000	1
Total	**3 201 500**	**91**

*The cost of damage for Swellendam could not be obtained

Figure 5.3.4.1: Damage to privately insured property

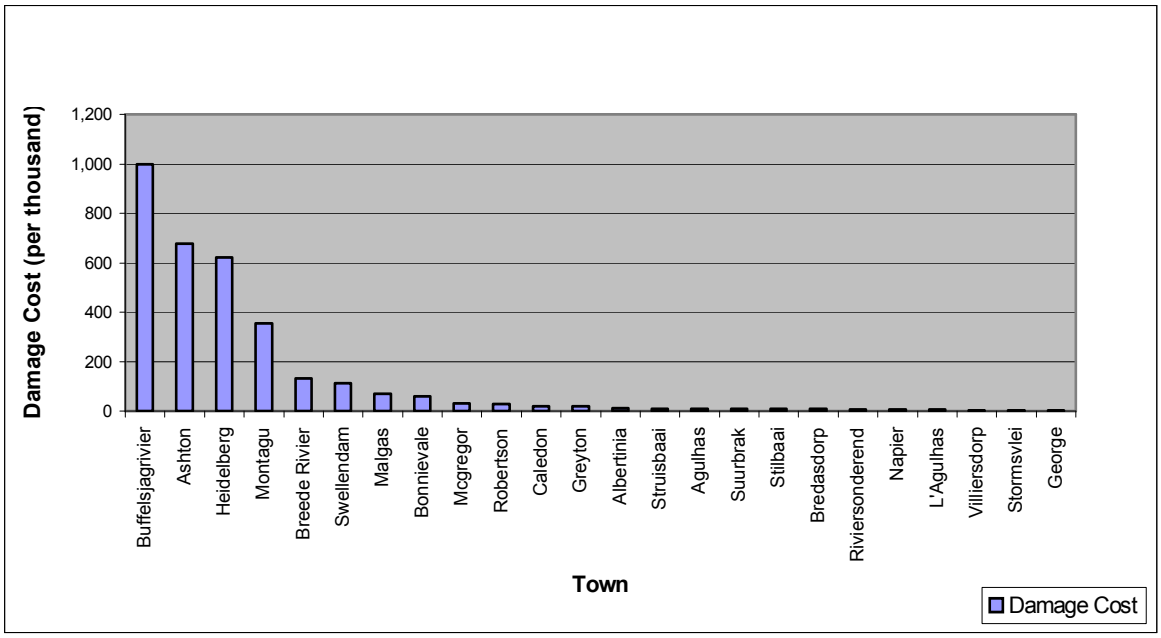
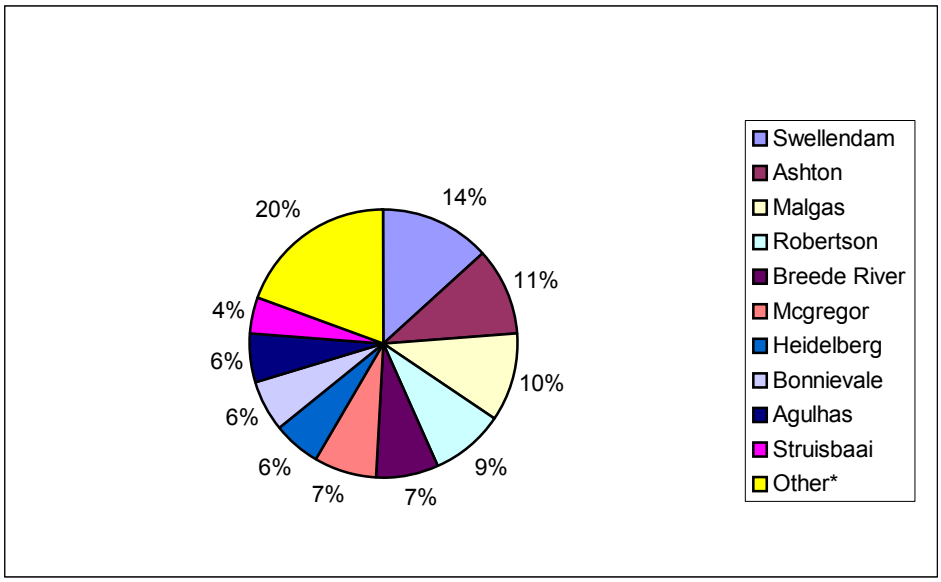


Figure 5.3.4.2 shows the distribution of the number of recorded impacts. Swellendam constituted 14% of the 91 claims filed. Ashton, Malgas and Robertson constituted 11%, 10% and 9% respectively. Twenty per cent of the total number of claims represents an accumulated total for those towns that had one claim each.

Figure 5.3.4.2: Distribution of the total recorded impacts for private insurance claims



* Other is an accumulated total of impacts for Albertinia, Bredasdorp, Buffelsjagrivier, Caledon, George, Greyton, L'Agulhas, Napier, Riversonderend, Stilbaai, Stormsvlei, Suurbraak, Villiersdorp, which had one reported impact each.

Eskom also reported damages in the areas of Montagu, Knysna to Plettenberg Bay and Ladismith, as reflected in Table 5.3.4.2. Eskom's Ladismith representative reported the greatest damage, estimated at R 1.3 million. In this area, electricity supply was disrupted by severe river flooding from the Brand and Touws Rivers, in part triggered by the failure of the Bellair Dam. This resulted in many areas being without electricity for up to three weeks, although the impact of this was reduced somewhat by the use of generators. As the area affected by the outages is dependent on farm income, the disruption to electricity supplies resulted in significant indirect losses for the farmers affected.

Table 5.3.4.2: Direct losses reported by Eskom due to damaged infrastructure

Area	**Cost**
Montagu	220 000
Knysna to Plettenberg Bay	80 000
Ladismith	1 300 000
Total	**1 600 000**

5.3.5 Relief costs

Information was collected telephonically regarding any assistance that was given to those requiring humanitarian aid. Table 5.3.5 summarises the information collected. The food parcels and blankets are valued at R10 per item. The mattresses are valued at R100 each.

Table 5.3.5: Relief costs

Organisation	**Mattresses**	**Food Parcels**	**Blankets**	**Clothes (R)**	**Building Materials**	**Estimated Cost (R)**

South African Red Cross Soc.	45	20				650–750
Swellendam Municipality		20–30				300
ACVV		752		3 000		10 000–15 000
George Municipality			15			150
Knysna Social Services		30	60		R16,020	16 920
Total	**45**	**822–842**	**75**	**3 000**	**R 16 020**	**28 020 – 33 120**

Many organisations gave donations to the ACVV. The costs are the estimated worth of the items donated. In Knysna, building materials were donated by DSS & PAs for the repair of the roofs of two houses damaged by fallen trees. Plastic sheets were also distributed in informal settlements to cover roofs.

5.3.6 Indirect losses

a) Impact on agriculture and tourism

Time and other constraints limited the impact analysis for this event to a review of direct losses. However, the significant shock to the agricultural sector will reflect itself for several years, as farmers replace damaged infrastructure and replant in areas where crop losses were sustained.

The level of losses sustained by commercial farmers has implications for future production and income generation. It also has consequences for employment opportunities for the agricultural sector's seasonal work force. At the time of the research, the medium/long-term implications of reduced production had not been fully determined by the farmers interviewed. Similarly, the possibility of 'down-sized' seasonal employment opportunities had not been discussed with farm workers. In one focus-group discussion with farmers from the Montagu and Ashton Agricultural Associations, the need to determine workers' perceptions of medium-term employment opportunities was expressed.

Unfortunately, it was also not possible to reflect the indirect losses to local tourism that accompanied the disaster. Clearly, the combination of the disrupted road route between Ashton and Montagu and widespread publicity of the 'flood disaster' in the media discouraged visitors at exactly the time when the Klein Karoo Arts Festival took place.

b) Indirect impacts on children's health

The wet and damp living conditions that followed the heavy rains and flooded houses were expected to have impacts on children's health. Data collected on attendance of under-five-year-olds at health facilities in the affected areas are reflected below.

Table 5.3.6.1: Curative consultations for children < 5 years within the declared disaster area, March–May 2002/2003

		Year					
		2002			2003		
Town	**Clinic Name**	**March**	**April**	**May**	**March**	**April**	**May**
Ashton	Zolani	109	151	92	72	94	95
	Cogmans	97	202	171	133	151	123
		206	**353**	**263**	**205**	**245**	**218**
Barrydale	Barrydale clinic	**72**	**41**	**52**	**47**	**40**	**104**
Bonnievale	Happy Valley	**39**	**66**	**60**	**63**	**174**	**104**
Buffelsjags		**26**	**15**	**18**	**38**	**63**	**61**
McGregor		**59**	**73**	**57**	**34**	**53**	**38**
Montagu	Ashbury	70	64	73	62	71	103
	Victoria	100	100	65	37	65	29
	Montagu town	0	5	12	11	8	2
		70	**169**	**150**	**110**	**144**	**134**
Robertson	Robertson PHC	132	91	86	134	112	156
	Bergsig	203	129	115	167	397	276
	Nkqubela	98	93	110	94	125	106
		433	**313**	**311**	**395**	**634**	**538**
Swellendam	Swellendam PHC	0	0	0	180	131	166
	Railton	131	96	55	65	46	114
		131	**96**	**55**	**245**	**177**	**280**
Suurbraak		**34**	**87**	**21**	**32**	**40**	**62**
Total		**1 170**	**1 213**	**987**	**1 169**	**1 570**	**1 539**

Table 5.3.6.2
Curative consultations for children <5 years, March–May 2002/2003

Year	March	April	May
2002	1 170	1 213	987
2003	1 169	1 570	1 539
Difference (no.)	1	357	552
% difference	**-**	**+ 29%**	**+ 55.9%**

When 2003 curative consultation results are compared with those for 2002 for the same period, these have increased by 29% and almost 60% respectively for the months of April and May 2003. Moreover, in Ashton, Montagu and Robertson, under-five consultations

increased by 20%, 31% and 60% respectively in the month following the March 2003 cut-off low.

Figure 5.3.6.1: Total curative consultations for children <5 years, March–May 2002/2003

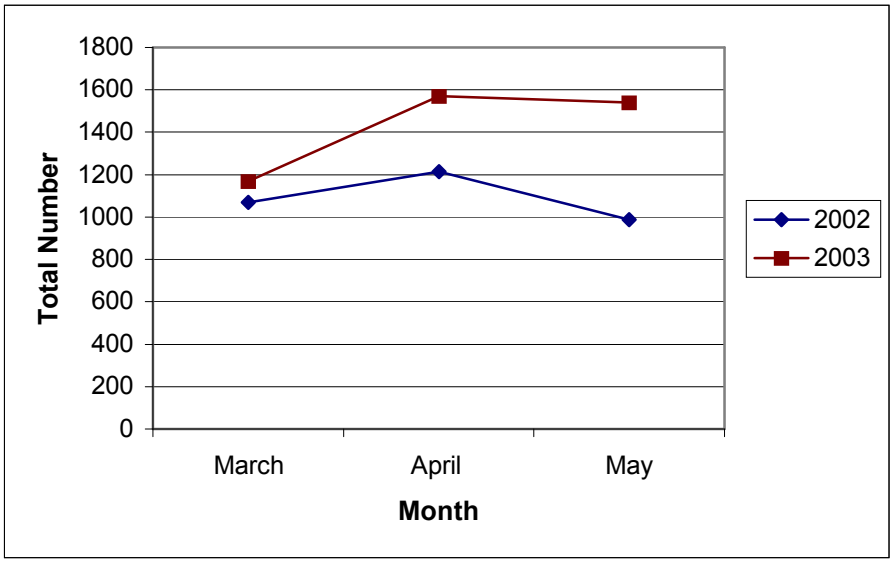


Table 5.3.6.3 compares the numbers of children treated for lower respiratory infections in May 2002 and May 2003. For the two months compared, the number of children with lower respiratory infections increased by nearly 86%.

Table 5.3.6.3: Lower respiratory infections for children <5yrs, May 2002 and May 2003

Town	May 2002	May 2003	% increase	% decrease
Ashton	22	17		22.7
Barrydale	2	21	950	
Bonnievale	2	8	300	
Buffelsjags	1	16	1 500	
Mcgregor	3	1		66.7
Montagu	2	1		50.0
Robertson	57	85	49.1	
Swellendam	3	11	266.7	
Suurbraak	0	11	1 100.0	
Total	**92**	**171**	**85.9**	

These findings show unsurprising increases in the level of paediatric illness in the towns affected by the extreme weather event. This applies both to overall increases in frequency of illness (see Table 5.3.6.2), as well as in patterns of relatively more severe respiratory infection (Table 5.3.6.3).

These results underscore the impact that an additional weather shock exerts on the most vulnerable members of already poor and stressed households, and the persisting effects of damp non-weather-proofed housing.

5.4 GIS Outputs – Reflecting the Spatial Distribution of Disaster Impacts

5.4.1 The gist of GIS

Scientists have always been interested in describing their surroundings, be it space or the earth itself. As technology has developed, so have the methods of describing and illustrating these surroundings. This has led to the development of geographical information systems (GIS).

The idea behind GIS is that the surface of the earth, which is three-dimensional, is transformed using mathematics onto a two-dimensional plane. This transformation is called a projection.[48] It is like taking the surface of a ball and representing it as a flat piece of paper. There are different methods of projection to achieve this.

The two dimensional plane represents each point on the surface of the earth as a co-ordinate using x and y, as learnt in high school. These x and y co-ordinates are used to generate 'shapefiles'. The shapefiles can then be used to produce maps.

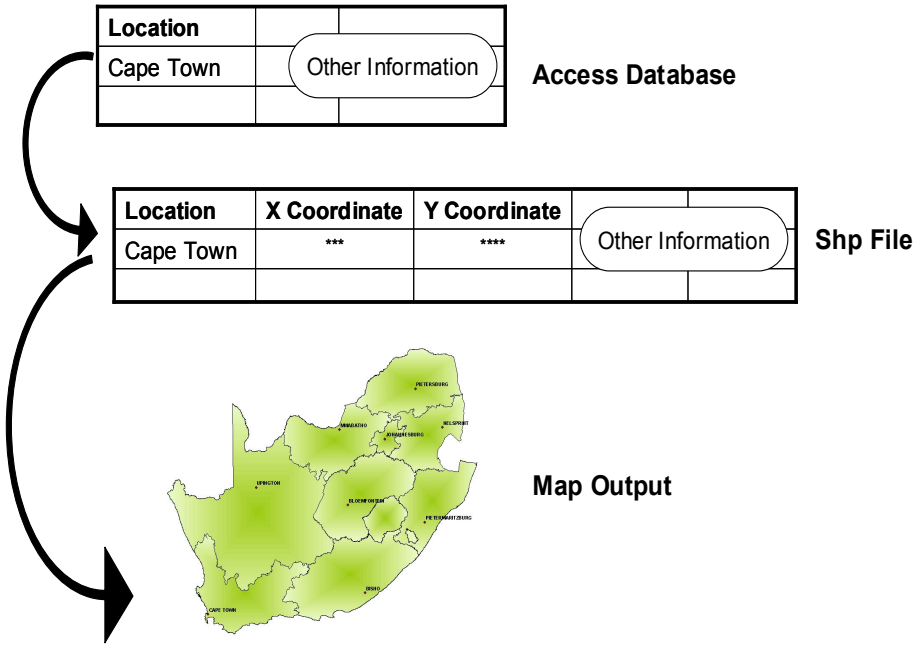
5.4.2 Methodology

In this study, there were two different processes used to map the impact information. This depended largely on how the information was collected, that is whether the information was marked on a map or completed in a table without a map.

The impacts that were marked on a map were plotted manually. This was accomplished fairly easily. The information that was received on the Excel sheets without a map posed a greater challenge. The process of mapping this information is illustrated in Figure 5.4.2. The information received in Excel spreadsheets is entered into an Access database. The location in the database is then matched with the one in the shapefile. The spelling and case has to be the same for a positive match. The x and y co-ordinates in the shapefile can then be illustrated on a map.

Figure 5.4.2: An illustration of the mapping process

[48] Kennedy & Kopp (2000) 'Understanding Map Projections'



The following impact information was successfully mapped:

- The damaged or destroyed gauging stations.
- A percentage of the farms affected.
- Langeberg, Kannaland and Langeberg Municipalities.
- Roads.
- Schools

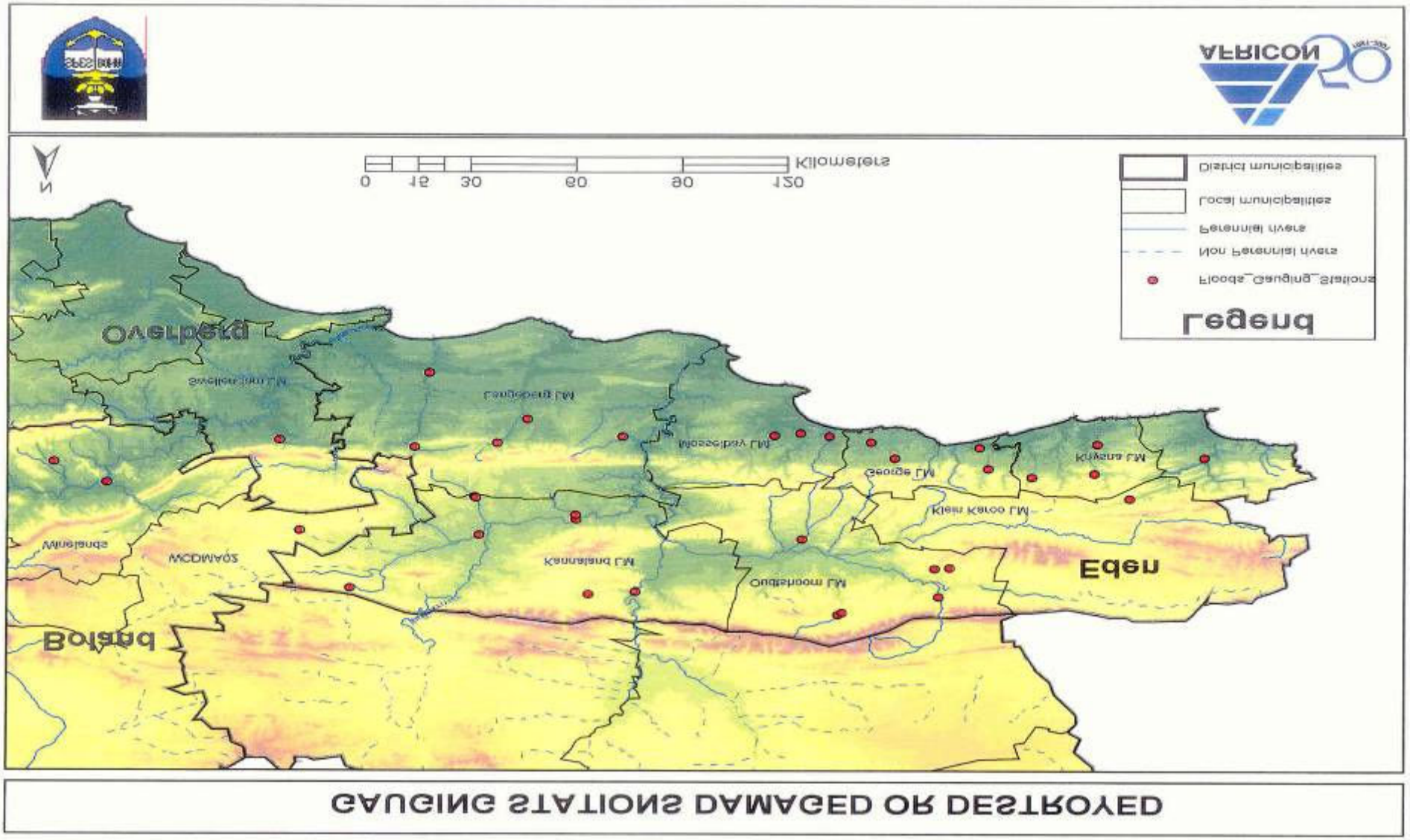
Each of these will be looked at in turn.

5.7.3 Gauging stations

The damaged or destroyed gauging stations were easily mapped. In the Excel sheet received, each station had a station number associated with it. These numbers were found in the shapefiles containing water infrastructure.

The mapped stations can be seen in Figure 5.4.3. It illustrates that damage to gauging stations occurred across the Boland, Overberg and Eden District Municipalities. It implies that each of the rivers where the gauging stations were situated was flooded to some degree. It should also be noted that the majority of damage to the stations occurred in the Eden area.

Figure 5.4.3


AFRICOM
Kilometers
0 15 30 60 90 120
Legend
District municipalities
Local municipalities
Perennial rivers
Non Perennial rivers
Floods_Gauging_Stations
Overberg
Eden
Boland
GAUGING STATIONS DAMAGED OR DESTROYED

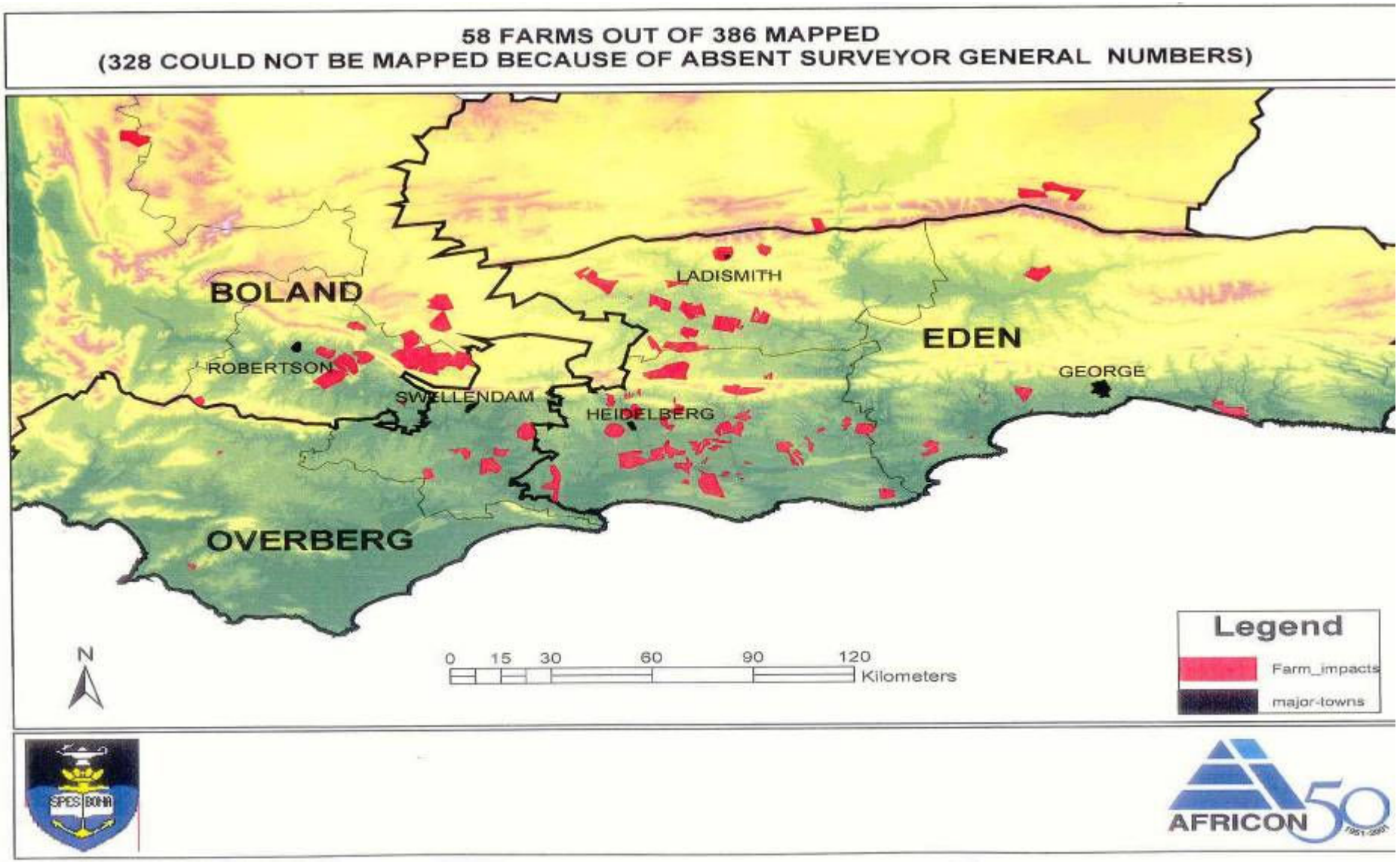
5.4.4 Farms

The information regarding farms that experienced damage was received in an Excel spreadsheet. The farm names were also listed in this sheet. The idea was to use these farm names, find them in the shapefiles and geo-reference them. The greatest constraint was the names themselves.

As has been stated earlier, the item to be mapped has to have exactly the same name in the database as in the shapefile. This refers to spelling as well as case. The list of damaged farms was manually compared to those in the shapefiles. In many instances, the farm names were completely different. There are several possible reasons for this. A farm could have been subdivided and the new farm given a different name. Hence, only the original farm appears in the shapefile and not the new one. It is also possible that the farm listed as damaged is not listed in the shapefile at all. As a result, only 58 farms of a total of 386 were successfully mapped. The process would have been made easier had the farmers been required to list the Surveyor General number of their farms.

Even though only 15% of the farms were mapped, it is clearly illustrated in Figure 5.4.4 that the farming industry suffered greatly. Again, the direct damage appears to be spread across a wide area. This also raises many questions with regards to the indirect impact that has been experienced in terms of lost production and income.

Figure 5.4.4


58 FARMS OUT OF 386 MAPPED
(328 COULD NOT BE MAPPED BECAUSE OF ABSENT SURVEYOR GENERAL NUMBERS)
BOLAND
LADISMITH
EDEN
ROBERTSON
SWELLENDAM
HEIDELBERG
GEORGE
OVERBERG
N
0 15 30 60 90 120
Kilometers
Legend
Farm_impacts
major-towns
SPES BONA
AFRICON 50

5.4.5 Municipalities

The information received from Langeberg, Swellendam and Kannaland Municipalities was successfully mapped. Langeberg and Swellendam Municipalities were given A0 maps to illustrate where damage had occurred. These were geo-referenced manually and are shown in Figures 5.4.5.1 and 5.4.5.2 respectively.

Three cases of damage were reported in the Langeberg Municipality. These were around the town of Heidelberg, highlighted in red in Figure 5.4.5.1. The damage appears to have occurred around the rivers that run through the town. These also appear to be in a valley. This implies that the flooding could have been a result of runoff as well as the swelling of the rivers.

The damage reported in the Swellendam Municipality appears to be concentrated around the towns of Swellendam, Railton and Suurbrak (Figure 5.4.5.2).

Information on the damage in the Kannaland Municipality was received primarily for the town of Zoar. This is shown in Figure 5.7.5.3. As can be seen from the map, all of the damage reported occurred along the roads in the town. This implies that flooding could have resulted from poor storm-water drainage.

Information received from other municipalities was not marked on hard-copy maps. In most cases, this was because they were not furnished with a map as they were approached later in the study as the extent of the damage unfolded.

Figure 5.4.5.1

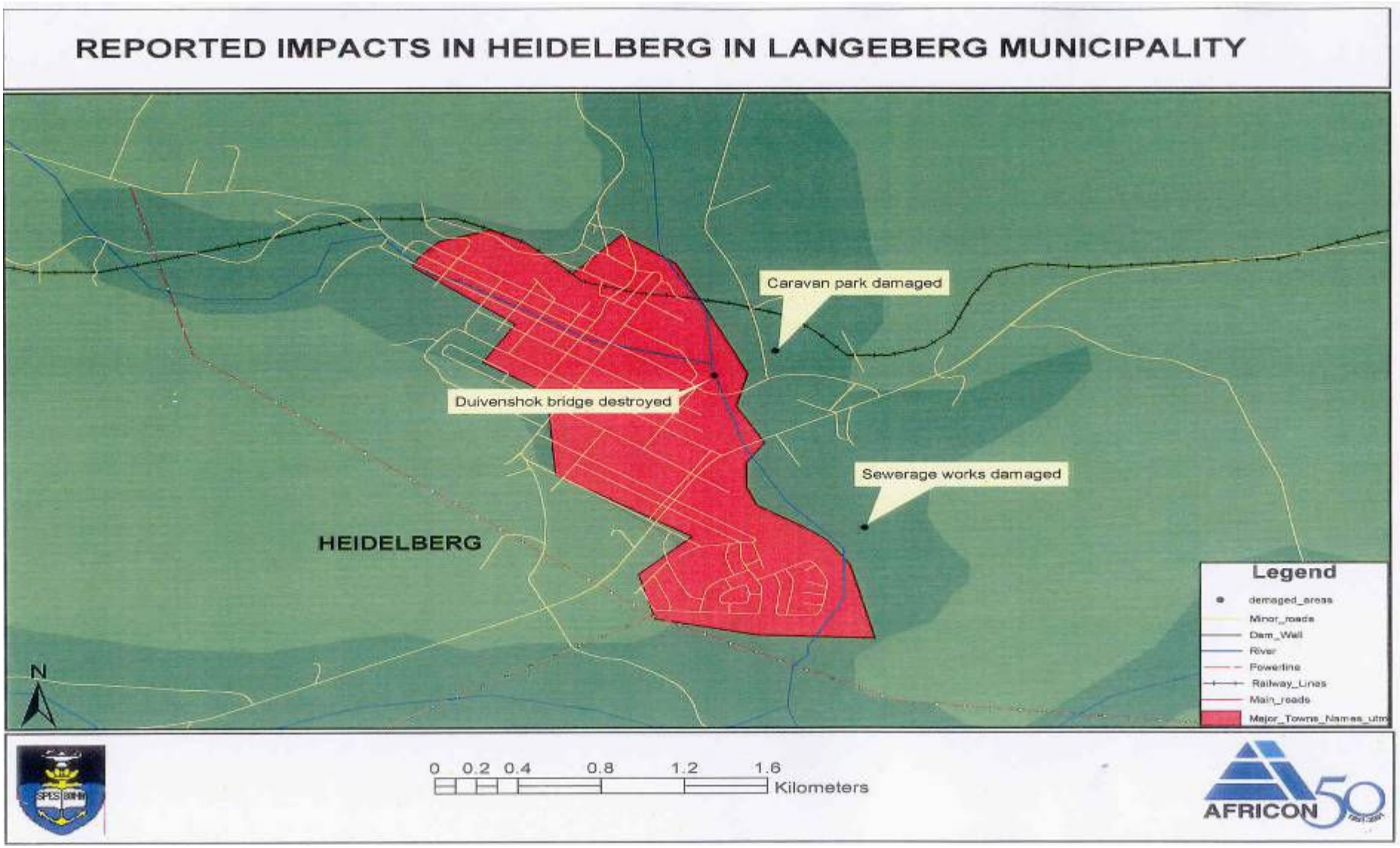

REPORTED IMPACTS IN HEIDELBERG IN LANGEBERG MUNICIPALITY
Caravan park damaged
Duivenshok bridge destroyed
Sewerage works damaged
HEIDELBERG
N
Legend
demaged_areas
Minor_roads
Dam_Wall
River
Powerline
Railway_Lines
Main_roads
Major_Towns_Names_utm
0 0.2 0.4 0.8 1.2 1.6
Kilometers
AFRICON 50

Figure 5.4.5.2

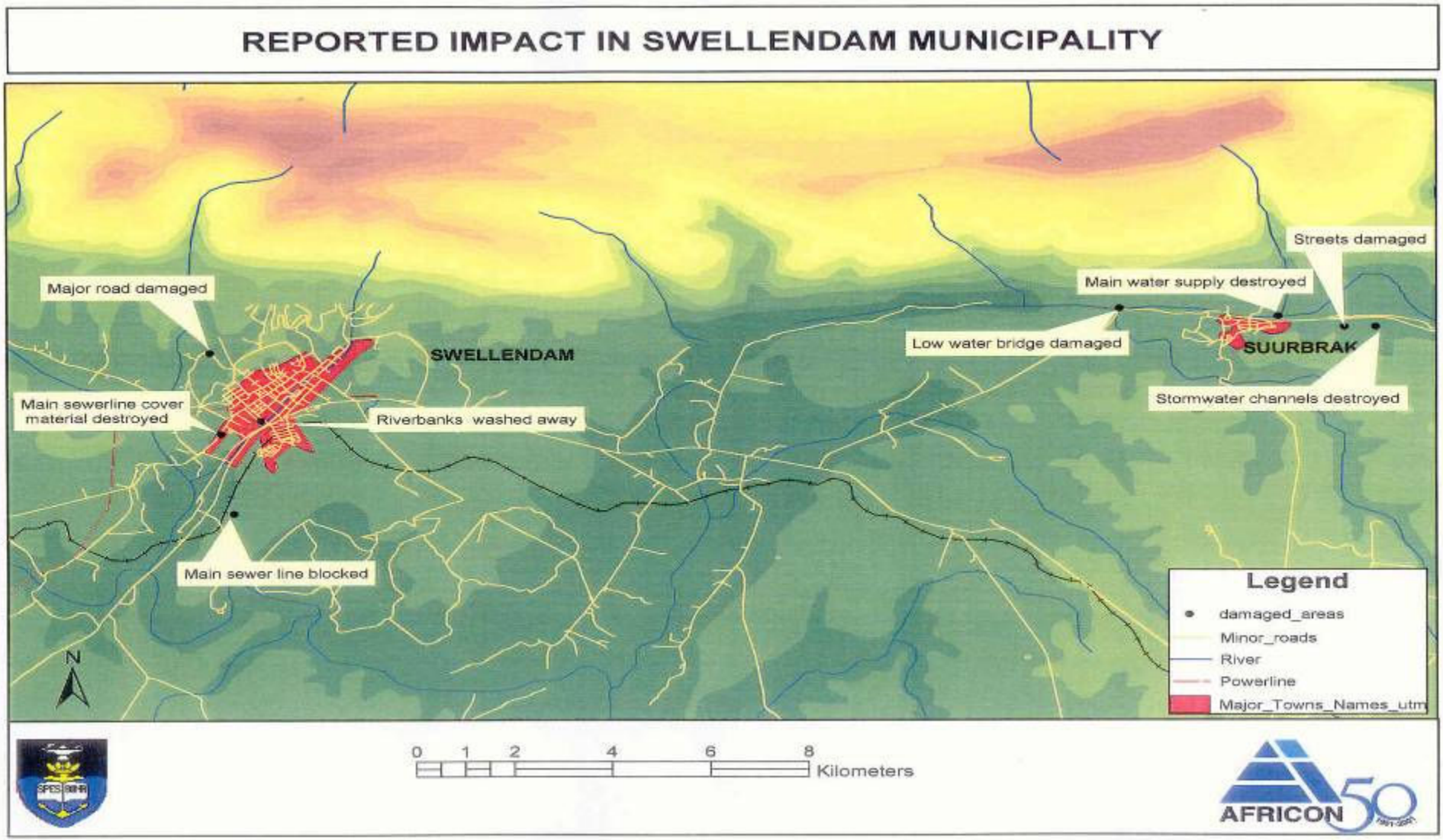
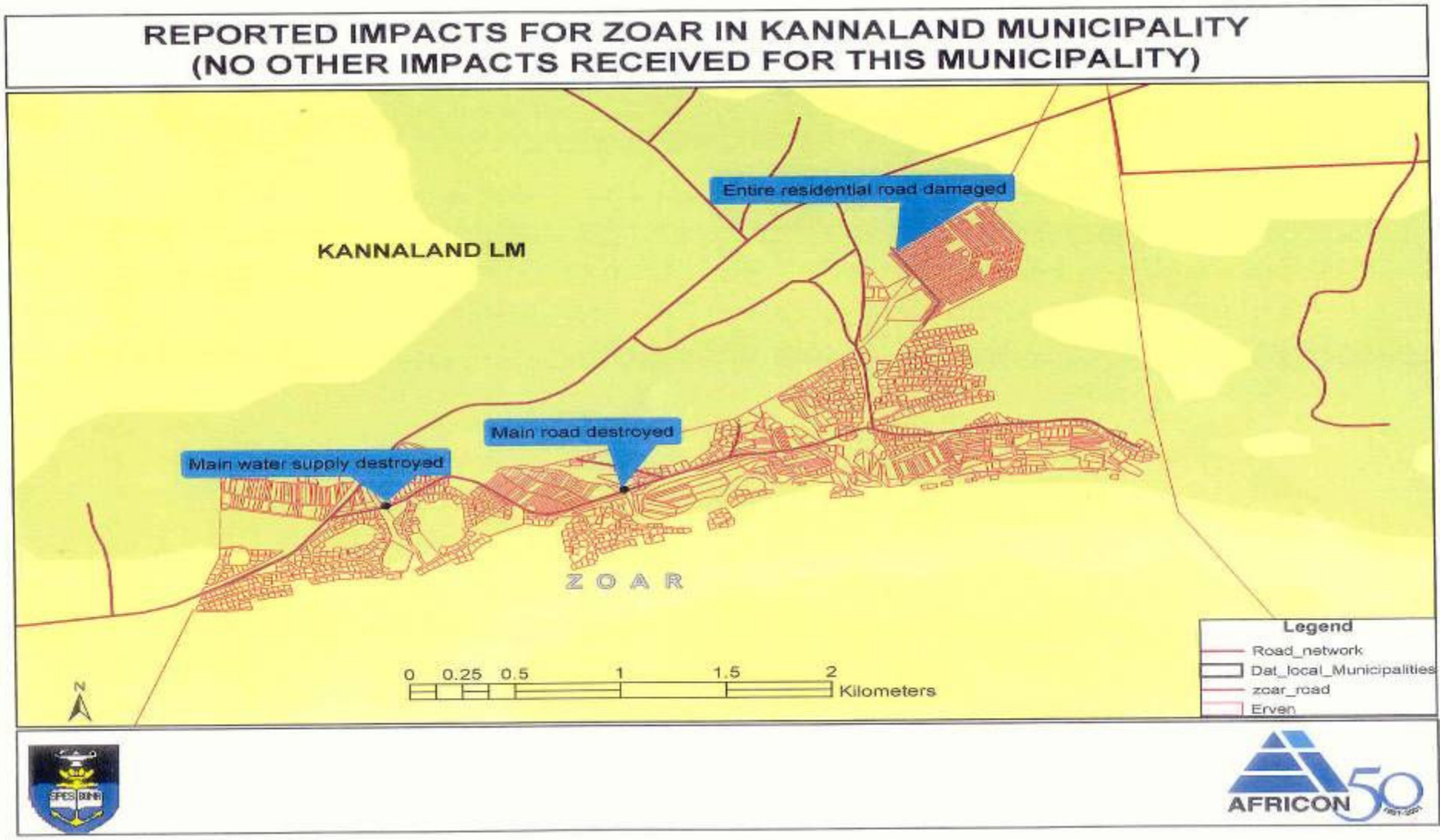

REPORTED IMPACT IN SWELLENDAM MUNICIPALITY
Major road damaged
SWELLENDAM
Main sewerline cover material destroyed
Riverbanks washed away
Main sewer line blocked
Main water supply destroyed
Low water bridge damaged
Streets damaged
SUURBRAK
Stormwater channels destroyed
N
Legend
damaged_areas
Minor_roads
River
Powerline
Major_Towns_Names_utm
0 1 2 4 6 8
Kilometers
AFRICON 50

Figure 5.4.5.3


REPORTED IMPACTS FOR ZOAR IN KANNALAND MUNICIPALITY
(NO OTHER IMPACTS RECEIVED FOR THIS MUNICIPALITY)
KANNALAND LM
Entire residential road damaged
Main road destroyed
Main water supply destroyed
ZOAR
0 0.25 0.5 1 1.5 2
Kilometers
N
Legend
Road_network
Dat_local_Municipalities
zoar_road
Erven
AFRICON 50

5.4.6 Roads

Two sets of road information were received. These were for the Boland and Eden areas. The information was also received in two different ways.

Boland's road damage was marked on a map with points. This is shown in Figure 5.4.6.1. The information was easily assimilated as it was manually captured. The map shows that road damage and destruction was concentrated in the Montagu area. The most costly damage to a single road, that of the Cogmanskloof, occurred in a valley.

The information for the Eden District Municipality was received in Excel spreadsheets. The impacts were not marked on a map using points. Instead, a road number was given with the associated damage. When this information was mapped, the entire road was highlighted, as can be seen in Figure 5.4.6.2. It is likely that the damage occurred where the road intersects or comes close to a river. It is possible that the damage occurred as a result of river flooding. In this map it can be seen that certain roads are highlighted in the Overberg area. The information on the damage to one of these roads was received in a separate report obtained from Provincial Roads.

It is possible that the shapefiles used to map the damaged roads were not the most recent. Updated shapefiles were obtained from the Department of Transport and Public Works. However, the projection of the shapefiles did not match. As there was a time constraint, the projection was not changed. This map again shows that the impacts of the March cut-off low were widespread.

Figure 5.4.6.1

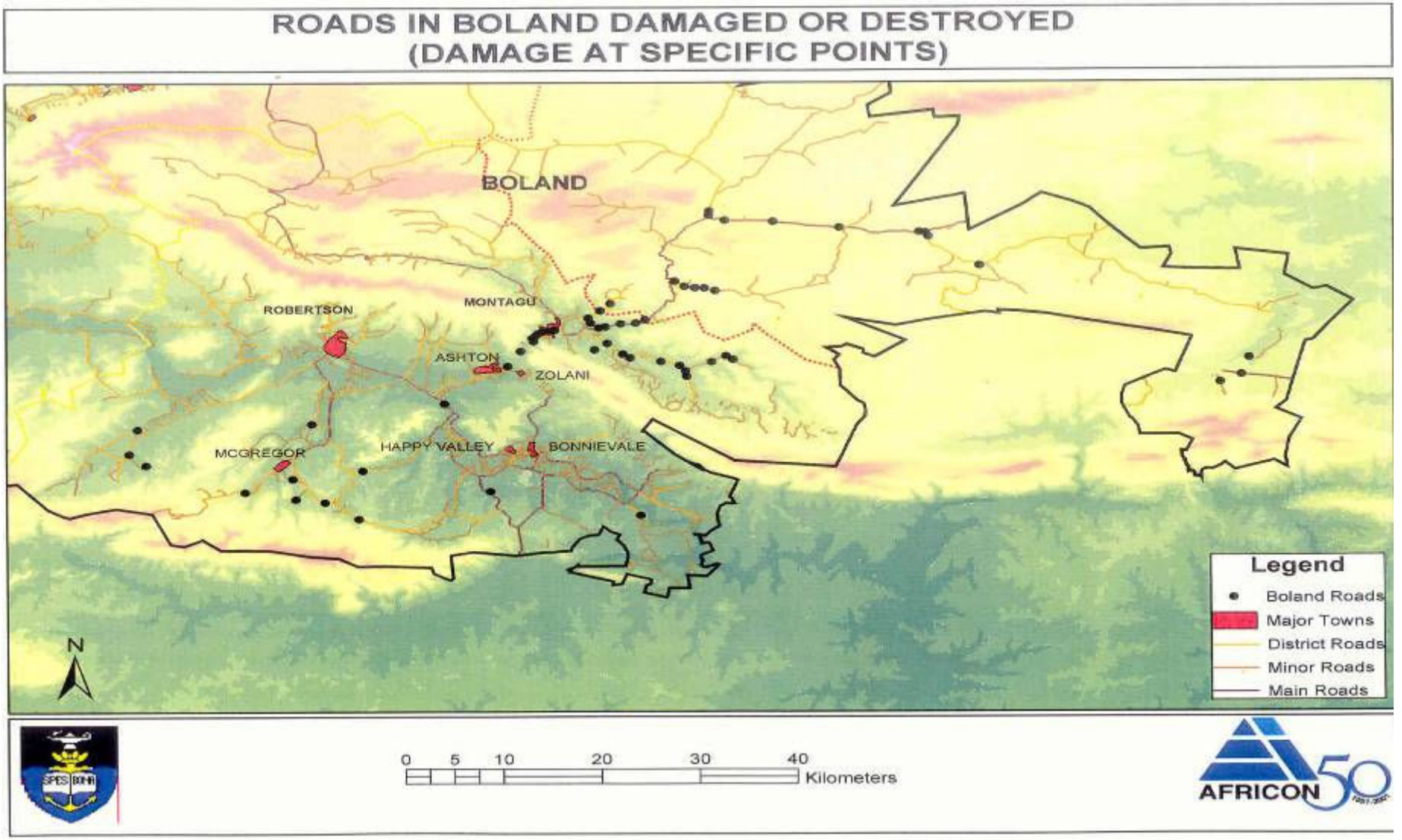
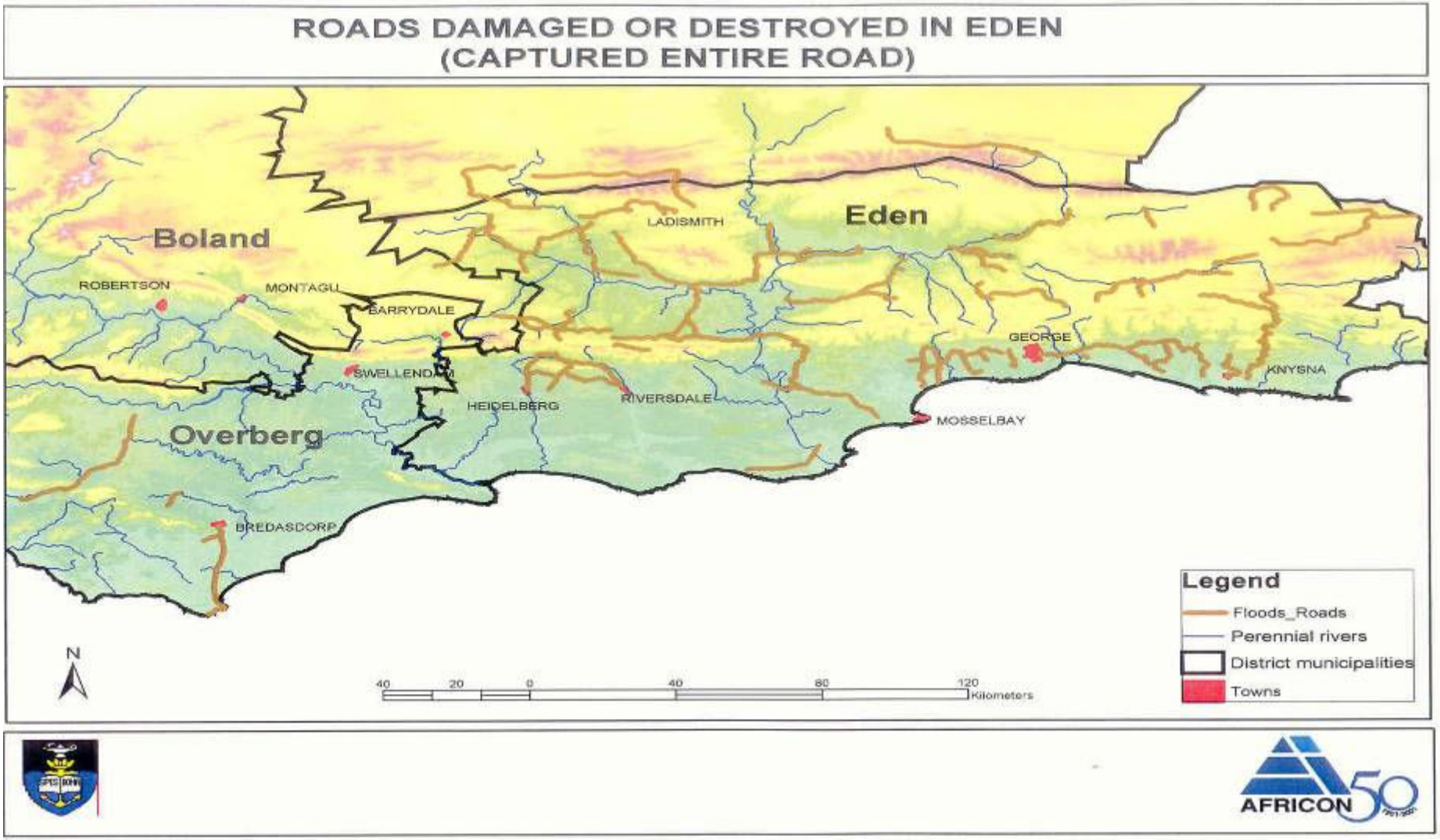

ROADS IN BOLAND DAMAGED OR DESTROYED
(DAMAGE AT SPECIFIC POINTS)
BOLAND
ROBERTSON
MONTAGU
ASHTON
ZOLANI
MCGREGOR
HAPPY VALLEY
BONNIEVALE
N
Legend
Boland Roads
Major Towns
District Roads
Minor Roads
Main Roads
0 5 10 20 30 40
Kilometers
AFRICON

Figure 5.4.6.2


ROADS DAMAGED OR DESTROYED IN EDEN
(CAPTURED ENTIRE ROAD)
Boland
Eden
Overberg
LADISMITH
ROBERTSON
MONTAGU
BARRYDALE
SWELLENDAM
HEIDELBERG
RIVERSDALE
GEORGE
KNYSNA
MOSSELBAY
BREDASDORP
N
40 20 0 40 80 120
Kilometers
Legend
Floods_Roads
Perennial rivers
District municipalities
Towns
AFRICON 50

5.4.7 Schools

The schools were easily mapped, as the shapefiles containing all the schools existed already. The schools damaged in the flooding are shown below.

Figure 5.4.7.1 shows the schools in the Montagu area. Three are in the town. The two that are very close to the riverbank are the Montagu Primary and High Schools. The other three outside the town are most likely to be farm schools. Figure 5.4.7.2 shows schools that were damaged in the Mossel Bay and George areas. Figure 5.4.7.3 shows the school that was damaged on the Doring River in the Swellendam Municipality.

Figure 5.4.7.1

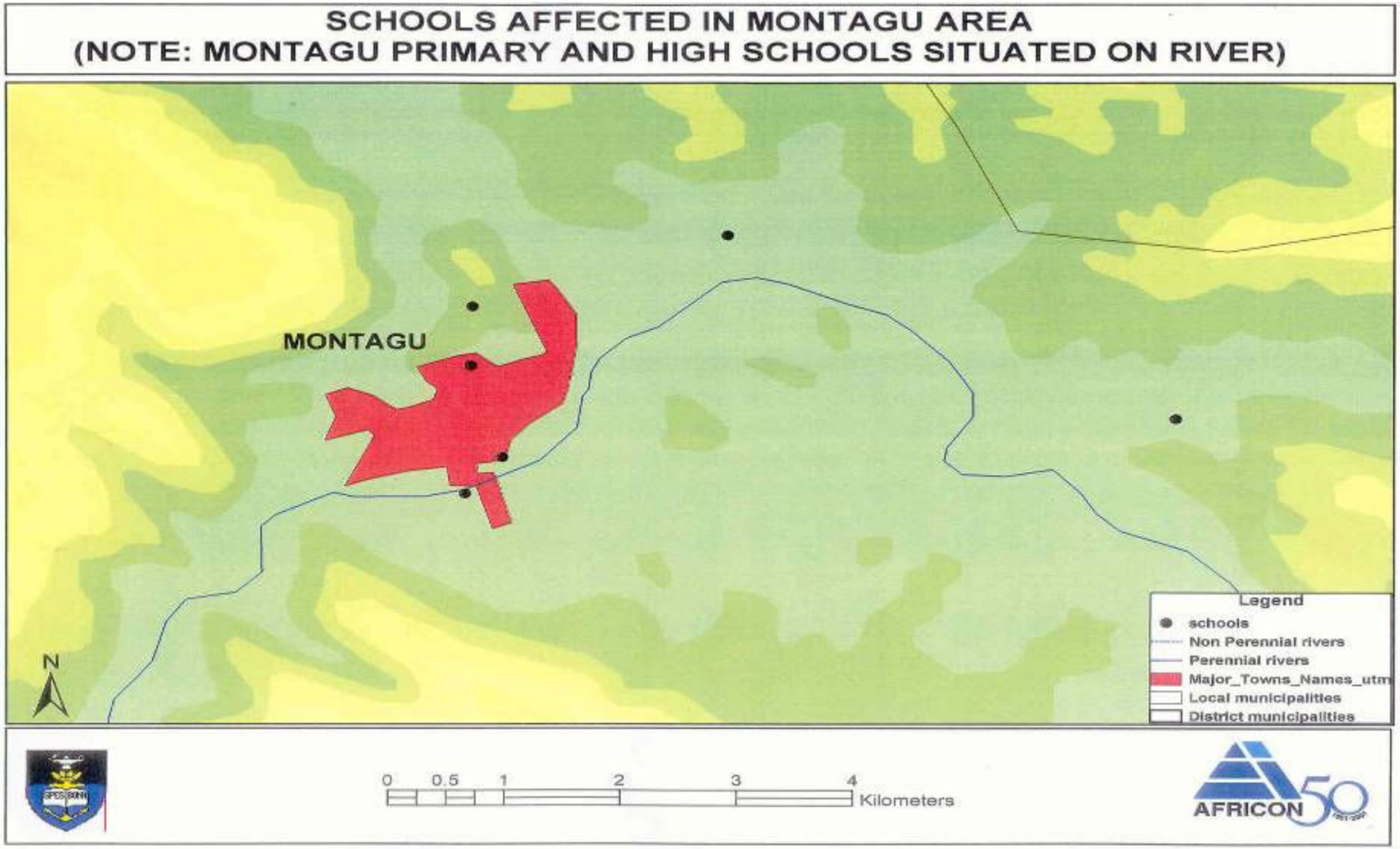

SCHOOLS AFFECTED IN MONTAGU AREA
(NOTE: MONTAGU PRIMARY AND HIGH SCHOOLS SITUATED ON RIVER)
MONTAGU
N
Legend
schools
Non Perennial rivers
Perennial rivers
Major_Towns_Names_utm
Local municipalities
District municipalities
0 0.5 1 2 3 4
Kilometers
AFRICON 50

Figure 5.4.7.2

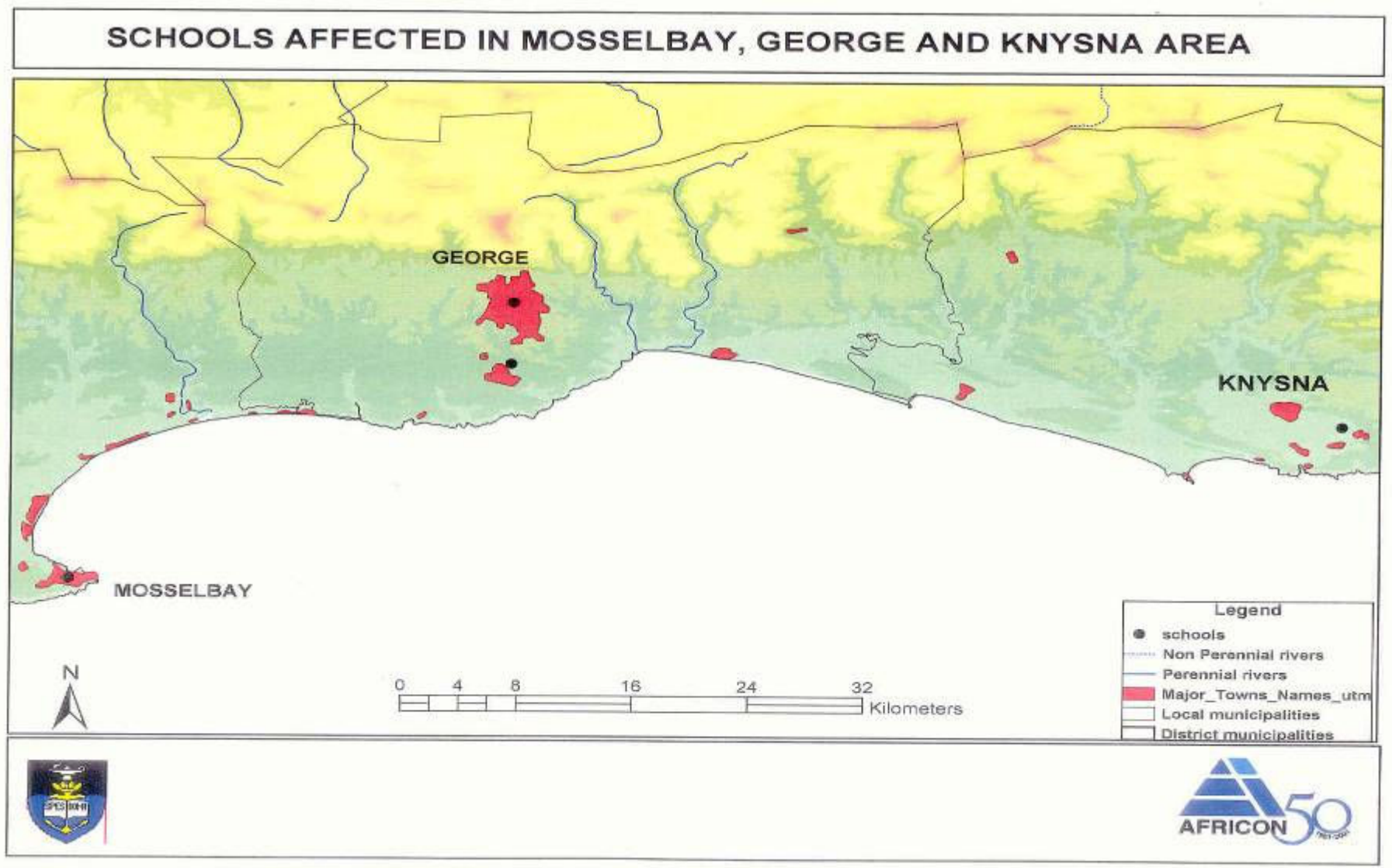
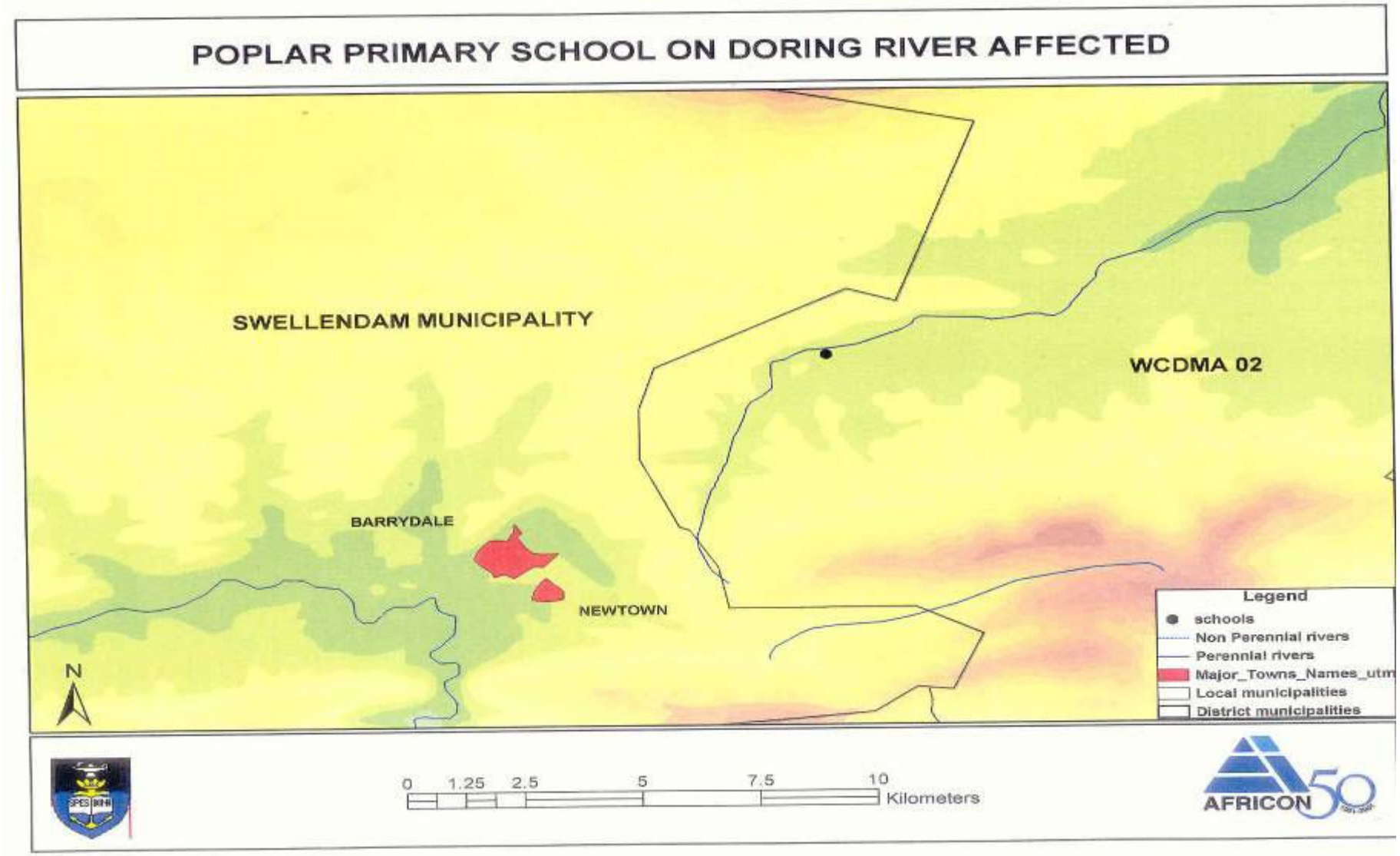

SCHOOLS AFFECTED IN MOSSELBAY, GEORGE AND KNYSNA AREA
GEORGE
KNYSNA
MOSSELBAY
N
0 4 8 16 24 32
Kilometers
Legend
schools
Non Perennial rivers
Perennial rivers
Major_Towns_Names_utm
Local municipalities
District municipalities
AFRICON 50

Figure5.4.7.3


POPLAR PRIMARY SCHOOL ON DORING RIVER AFFECTED
SWELLENDAM MUNICIPALITY
WCDMA 02
BARRYDALE
NEWTOWN
N
Legend
schools
Non Perennial rivers
Perennial rivers
Major_Towns_Names_utm
Local municipalities
District municipalities
0 1.25 2.5 5 7.5 10
Kilometers
AFRICON 50

5.4.8 Conclusion

A large amount of impact information was received for this project, but it was possible to map only a small percentage of this. Much of the other information was not mapped because the underlying information system has not yet been set up for the purposes of geo-referencing information. For this to be possible, shapefiles need to be created of the physical infrastructure. This means the co-ordinates of the various infrastructures need to be captured. It is then possible for municipal managers to capture the impact information into an Excel spreadsheet and then map it. Another possibility is if, after an event, the co-ordinates of the impact sites are recorded using a GPS. These co-ordinates could then be mapped.

In the case of collecting the impacts om farms, when the farmers complete the compensation forms for the Department of Agriculture, they should include the Surveyor General number of their farm. The number can then be mapped.

5.5 Limitations/Difficulties

The collection of the impact information presented a great challenge. The absence of uniform loss-reporting procedures/formats constrained the collection and consolidation of information across sectors and administrative areas. Despite this, provincial and local government officials and other individuals contacted were, without exception, extremely co-operative in the completion of impact-related forms, maps and tables.

Specific areas that required diligence in consolidating information included avoiding the recording of duplicated impacts, as well as obtaining sufficiently robust georeferences for the losses. For instance, road damage recorded in the Breede River/Winelands Municipality was also reported in the provincial roads database.

Similarly, georeferencing agricultural losses was constrained when the Surveyor General's Number (S.G.No.) for a specific farming unit was not provided.

Lastly, it is clear that, despite exhaustive efforts, not all impacts related to this event were captured. However, it is contended that losses sustained by the public sector have at least been well reflected.

5.6 Conclusions and Recommendations

5.6.1 Conclusions

The impacts reported in this study *significantly reflect the path and spatial extent of the March 2003 cut-off low*, along with its specific hazard characteristics (heavy rainfall, strong winds and cold temperatures). Reported direct losses reflect these characteristics, with different impact patterns indicating 'specific elements that were vulnerable' to one or more of the weather system's hazard features.

This partly explains the diversity of the impacts recorded, with, for instance, livestock losses often attributed to the abrupt fall in temperatures, while Eskom impacts in the Southern Cape were the result of winds. Impacts borne by poor households were largely attributed to the interplay between heavy rains and structural inadequacies of their houses. Bridges failed due to heavy river flows, often worsened by upstream debris.

A complete review of the interplay between the weather conditions, riverine flooding and agricultural, infrastructural and other losses will be possible only after all loss and flood information are entered into GIS.

However, findings indicate that the event defined meteorologically as the 'March 2003 cut-off low' and which resulted in the Magisterial Districts of Montagu, Robertson and Swellendam being declared 'states of disaster' affected a geographic area well beyond the boundaries of the identified disaster-affected zone.

Moreover, the *direct economic losses sustained exceeded R210 million*, the majority of which will be borne by the private sector, primarily farmers.

As indicated in Part II of this report, the general area affected by the March cut-off low is exposed regularly to heavy rain events. In addition, it is exposed to recurrent riverine flood risk. The sizeable losses reported in this event underline the urgent need to revisit the management of weather and flood risks in the affected area, especially when repeated weather and flood events result in costly and ongoing 'patch-up' and 'repair' interventions. This is especially the case for less well-resourced municipalities and district municipalities for whom a weather or flood induced shock has significant consequences for their annual budgets.

The findings also illustrate the *cumulative impacts of multiple hazards on 'downstream' areas* at risk. In this case-study, while there is no doubt that the Montagu-Ashton area sustained significant losses, communities in downstream coastal zones were affected simultaneously by swollen rivers due to upstream runoff, heavy rains (falling one day later on the South Coast than in the Boland) and gale-force winds.

One of the most striking limitations of this impact review is its *inability to determine representative impacts on people and households* across the areas affected. In the absence of uniform assessments reflecting the scale and range of communities affected, indirect indicators drawn from health facilities in the officially disaster-affected area have indicated serious health consequences for young children in those communities. The significant increases in both the frequency of paediatric consultations and in the severity of respiratory illness treated suggest that the full human impact of this event, especially on young children, was under-assessed.

5.6.2 Recommendations

With respect to the impacts identified and recorded in this report, it is recommended that:

- Mechanisms are put in place in the areas affected by the March 2003 cut-off low to enable the *assessment and strengthened management of extreme weather and flood-related risks* as both a disaster management and development priority. (This includes multi-sectoral collaboration across government departments, as well as across municipalities, and a wide range of other stakeholder groups, including Agricultural Associations and technical specialists).
- *Improved health surveillance* mechanisms are implemented in clinics serving the weather and flood-affected communities to track patterns in child illness (especially respiratory illness) as one impact indicator, and to identify communities/households who require greater support and external intervention.

- Weather and flood risk information, as well as GIS/documented information on impacts consolidated in the course of this case-study, are *actively disseminated* within the provincial government departments concerned, as well as affected municipalities, so it serves as a practical platform for future disaster management and development planning.

With respect to subsequent impact assessments of disaster events, it is recommended that:

- *Standard impact reporting procedures* are established for those municipalities and government departments that do not yet use a uniform system. This includes the standardisation of hard-copy and electronic formats, and clear designation of a provincial focal point to consolidate these (or out-sourcing arrangements to facilitate this).
- Priority is given to establishing assessment procedures/guidelines for *identifying and tracking impacts on disaster-affected individuals, households and communities*, especially those most vulnerable, in order that these impacts are not overlooked and underestimated.

Part VI: Conclusions and Recommendations

6.1 Introduction

This report has aimed at capturing and recording the characteristics of the March 2003 cut-off low that triggered widespread damage and hardship across the Western Cape Province of South Africa. This chapter finalises the report by revisiting the main conclusions identified in the previous chapters, as well as making recommendations that will improve capabilities to minimise the likelihood of future disaster losses to extreme weather events.

6.2 Conclusions

6.2.1 The cut-off low was an extreme weather event

Extreme flooding was recorded

Weather and flood impacts occurred at different times in different geographic areas, reflecting the path of the weather system

Parts I and II confirm the significance of the natural hazard processes that triggered this disaster occurrence. The South African Weather Service identified the March 2003 cut-off low as a potential extreme weather event in the days immediately preceding 22–26 March. Unfortunately, for reasons presented in Parts II and IV, the advisories and warnings did not activate preparedness measures in the areas subsequently affected. It is also significant to note that the advisories and warnings were issued during a long holiday weekend that began on Friday 21 March. The first deaths attributed to the weather system were recorded in Hermanus on Sunday 23 March and serious rain and flood damage were reported in Montagu on Monday 24 March (the first day at work after the three-day weekend).

The weather system, as it crossed the Western Cape, was indeed extreme. Heavy rainfalls were recorded in Montagu, Ashton and Barrydale. Gale-force winds were recorded in the Southern Cape. Unseasonally low temperatures were recorded from Montagu (10^{o}C) to Port Elizabeth (5.9^{o}C). This combination of heavy rainfall, strong winds and cold temperatures resulted in a diversity of impacts on infrastructure, the agricultural sector, livestock, electricity services and people – depending on which elements were vulnerable and exposed to the weather system.

One of the consequences of the heavy rain was riverine flooding, reflected in the Montagu, Buffelsjags, Duiwenhoks, Brand, Touws, Karatara and Keurbooms River areas, at levels considered ‘rare’, and classified as 20-year or greater floods. The severity of the floods was related to levels of development in the flooded areas, with significant losses incurred in the Kogmanskloof River Catchment. This is related to the proximity and density of development to the rivers concerned.

An important finding in this research refers to the temporal and spatial differences in the timing of the weather and flood impacts – which reflected the movement of the weather system. While heavy precipitation was falling over Montagu on 23–24 March, similar levels were only recorded in the Southern Cape a day later. However, these rain impacts were further compounded by river run-off from the upper catchments.

6.2.2 People living in poorly constructed homes were most affected

There was no uniformity in identification of areas or communities affected

Some communities received relief and recovery assistance – some managed on their own

As Part III describes, the people who were most affected by the extreme weather event were those residing in poorly constructed homes. These were either unable to resist the rain, or had storm-water drainage capabilities that could not manage surface run-off. Generally, it was these 'weather affected' households who received emergency relief and subsequently registered for Social Relief. Only 12 households of the 772 applicants for Social Relief were directly affected by riverine flooding.

In the absence of institutional arrangements that would have resulted in the uniform identification of areas affected by the weather event/flooding, or identification of specific communities or households that were seriously affected, there was great unevenness in the institutional responses to humanitarian needs. As a result, communities and households who experienced similar weather or flood impacts received different levels of external assistance. In not one of the municipalities visited was one designated person responsible for assessing/consolidating disaster-related impacts on people and households – to provide a comparable profile of human losses to that provided on damaged infrastructure by the municipal engineer.

Similarly, different communities had varying expectations/understandings with respect to their eligibility for Social Relief. This resulted in many households not applying for Social Relief to replace water-damaged property. In these communities, rain or flood-affected households managed their losses alone or, in the case of many farm-workers residing on farms, repaired their homes with the farmer's assistance.

6.2.3 Disaster management action is 'caught between two Acts'

The limited to non-existent institutional arrangements to manage the disaster incident could be effectively addressed with the new legislation

Interim measures can be taken to strengthen disaster management capacity while the new legislation is being implemented

While it is agreed that the disaster incident was generally well-managed, this was largely attributed to strong local knowledge and personal relations, rather than robust institutional arrangements. Many of the less well-managed aspects of the incident could be explained as a result of the legislative vacuum caused by disaster management 'falling between two Acts'. The Disaster Management Act, 2002, which was promulgated in January of that year, is considered to be one of the finest pieces of disaster management legislation in southern Africa and is far removed from its precursor, the Civil Protection Act, 1977. It provides for an integrated and co-ordinated disaster management policy that focuses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters and post-disaster recovery; the establishment of national, provincial and municipal disaster management centres; disaster management volunteers; and matters incidental thereto.

The Civil Protection Act, however, focuses solely on post-disaster response and recovery, thereby essentially ignoring risk reduction, but also in that it does not provide clear guidelines

for effective institutional arrangements or enable rapid decision-making and response. It creates great confusion by not allocating clear responsibilities in terms of decision-making and disaster declarations and does not provide adequately for the active participation of all relevant stakeholders.

Unfortunately, despite the fact that the new Disaster Management Act has been promulgated, it will (in terms of Section 65) only come into operation on a date still to be decided by the State President. Until that date, those sections of the old Civil Protection Act which were assigned to a province still apply. Strictly speaking, therefore, until such time as Sections 2, 2A, 3, 4, 5, 6(1) and 7 of the Civil Protection Act are repealed by the province concerned, they remain effective.

Despite this, however, in other provinces substantial progress has been made in introducing certain aspects of the Disaster Management Act that are not in conflict with the existing legislation. In other words they have taken the approach of applying the 'spirit of the law' rather than the 'rule of the law' in order to meet their constitutional commitments, the requirements for Integrated Development Plans (hereafter referred to as IDPs) as set out in the Municipal Systems Act, 2000 and to apply relevant aspects of the policy proposals in the White Paper on Disaster Management, 1999 in the interests of the communities they serve.

6.2.4 The triggering event for widespread disaster loss was the March 2003 cut-off low, not riverine floods

Losses were widespread across multiple sectors and communities

The human impact of the disaster was under-assessed

While the disaster event is popularly referred to as the 'Montagu Floods', the triggering event was the cut-off low identified by SAWS the preceding week as a potentially endangering weather system. It is possible that communities/areas which bore significant impacts generated directly by the severe weather did not receive the appropriate attention because they did not conform to the definition of being 'flood-affected' – even though the weather system itself was an extreme event.

The direct economic losses sustained as the result of severe weather and flood damage exceeded R210 million, the majority of which will be borne by the private sector, primarily farmers. However, the general area affected by the March cut-off low is exposed regularly to heavy rain events. In addition, it is repeatedly exposed to recurrent riverine flood risk. The sizeable losses reported in this event underline the urgent need to revisit the management of weather and flood risks in the affected area, especially when repeated weather and flood events result in costly and ongoing 'patch-up' and 'repair' interventions.

The findings also illustrate the cumulative impacts of multiple hazards on 'downstream' areas at risk. While there is no doubt that the Montagu-Ashton area sustained significant losses, communities in downstream coastal zones were affected simultaneously by swollen rivers due to upstream run-off, heavy rains (because of heavy rains falling one day later on the South Coast than on the Boland) and gale-force winds.

Lastly, one of the most striking limitations of this impact review was its inability to determine representative impacts on people and households across the areas affected. However, indirect indicators drawn from health facilities in the officially disaster-affected area, have indicated serious health consequences for young children in those communities. The

significant increases in both the frequency of paediatric consultations and in the severity of respiratory illness treated, suggest that the full human impact of this event, especially on young children, was under-assessed in the areas exposed to the extreme weather event.

6.2.5 Post-disaster research can accurately 'capture' and consolidate otherwise lost information on disaster events

Disaster research can provide a platform for change, building on lessons learned

This case-study, implemented immediately following a significant disaster event, illustrates the value of collecting information on a complex event before details of the event are forgotten. South Africa is highly disaster-prone. However, the level of documentation of nationally declared disasters is very low. This directly affects our ability to inform policy with facts, generate locally relevant training and education efforts that use South African case-studies or to make cost-benefit decisions about investments in disaster prevention and mitigation. The funds made available for this research approximate 0.05% of the total direct economic losses sustained. Yet, they have generated multi-sectoral findings with potential to inform policy across a range of sectors and services.

The research process itself played a critical role in facilitating a 'debriefing' especially for front-line responders, and for drawing 'lessons learned' from the field before these were forgotten.

In many instances, the research process itself has initiated positive changes with respect to disaster management at local levels, supporting the spirit of the legislation recently promulgated but not yet implemented. In the same way, it has generated a wealth of material to support professional training programmes and the development of simulation exercises that are based on real experience and robust physical science, rooted on realities in South Africa – not Bangladesh or the Philippines or other countries which supply many of our current training/resource materials.

6.3 Recommendations

6.3.1 Introduction

This section is divided into five parts:

6.3.2 focuses on strengthening capacities to anticipate and manage impending weather and flood threats.

6.3.3 addresses issues on strengthening institutional capabilities for more effective emergency response and post-event recovery processes that support vulnerable communities.

6.3.4 focuses on immediate strategies and measures to strengthen institutional capacities in disaster management.

6.3.5 addresses issues on strengthening capacities to record and track disaster-related impacts to better inform disaster management and development planning.

Each of these clusters of recommendations is relevant to slightly different target audiences. These are specified below.

6.3.2 Strengthen capacities to anticipate and manage impending weather and flood threats

(relevant to the generation of robust and useful information on hazard/risk processes by physical and environmental scientists and engineers)

- *Simplify the messages* to increase understanding and emphasise likely impacts rather than weather characteristics.
- Revisit the tone, content and method of communication for severe warnings, so that they contain a *greater sense of urgency*.
- Introduce a *'code' system* to highlight different levels of potential weather-induced danger.
- In the event of a severe weather warning, contact a targeted, limited number of *individuals responsible for key decision-making* rather than depending on mass communication of the warning by sms.
- *Actively involve representatives of the Cape Town Weather Office* in debriefing sessions related to the March cut-off low and subsequent disaster management planning consultations.
- Use rainfall and hydrological data at the time of a flood event to determine areas affected. This information will identify focused areas for more detailed investigation based on the intensity (magnitude) of the event.
- Give priority to identifying areas subject to flooding through comprehensive hydrological studies in the South Western areas of the Western Cape.
- Give priority to improving the development and utilisation of flood plains and flood prone areas (including the management of trans-boundary risks).

6.3.3 Strengthen institutional capabilities for more effective emergency responses and post-event recovery processes that support vulnerable communities

(specifically for service providers supporting at-risk or marginal communities and households in disaster-prone areas)

- Improve the effectiveness of emergency responses with:
    - Preparedness planning, including the early warning and monitoring of extreme weather hazards and dissemination of warning information to communities at risk.
    - Identification of all communities/households affected by the hazard's impact through a comprehensive assessment – especially those that are most vulnerable.
    - Provision of timely and appropriate emergency assistance (i.e. confirmation of availability of possible evacuation facilities, transport arrangements, blankets, mattresses and relief food, community security services, and provision of black plastic bags for securing belongings).
- The disaster management plans developed by the local authorities should strengthen the early warning of communities by:

- Improving the quality of and access to relevant severe weather warnings. This also includes appropriate relief committees and farming associations working with identified at-risk communities.
- Strengthening community capacity to monitor changes in the intensity of an extreme weather hazard, providing indicators for securing their belongings, and potential evacuation.

- Strengthen and standardise methods for identifying and assessing affected communities/ households by:

  - Conducting on-site assessments for all vulnerable communities/households affected by the weather event and its consequences.
  - Focusing on the impacts to livelihoods and not solely on impacts to infrastructure, to provide a more sensitive indicator of need.
  - Developing standard procedures and guidelines for determining affected households and communities, to be implemented by both local authorities as well as humanitarian assistance organisations.
  - Designating one position responsible at municipal and provincial levels for consolidating information on the extent of disaster impacts on households and individuals.
  - Establishing a multidisciplinary provincial monitoring mechanism to verify communities/households identified as 'disaster affected', as well as those who may have been overlooked. This oversight function applies to the determination of emergency relief as well as access to Social Relief.

- Support measures that reduce long-term vulnerability and support post-disaster recovery by:

  - Undertaking research to examine the role of post-disaster Social Relief in replacing lost assets, supporting household recovery and reducing disaster vulnerability.
  - Ensuring, wherever possible, that decision-making to determine those households eligible for Social Relief is informed by the Department of Social Services and Poverty Alleviation office(s) most familiar with the areas/communities affected.
  - Encouraging the local authorities in the affected municipalities to establish Disaster Management Advisory Forums, as recommended in the newly promulgated Disaster Management Act.

6.3.4 Adopt immediate strategies and measures to strengthen institutional capacities in disaster management

(most relevant to those involved in provincial and local government)

- Implement an interim strategy to initiate the phasing in of key provisions of the Disaster Management Act to address the current critical shortcomings of the Civil Protection Act until the Disaster Management Act becomes effective, by ensuring that:

  - Each district municipality appoints a suitably senior person in their employ as the interim focal point for disaster management for the municipality until the appointment of a Head of the Centre is made in terms of the Act.
  - In the event of a non-security-related disaster threatening to occur or occurring in the area of the district, the interim Head of the Centre assumes responsibility for

the establishment of a disaster operations centre at a pre-identified, suitable venue and for the overall co-ordination and management of the event.

- The municipal managers of the local municipalities (or the person who is appointed as the Chief or Acting Chief of Civil Protection in terms of Sections 12 and 14 of the Municipal Structures Act) represent their municipalities in the disaster operations centre and undertake the co-ordination and management of events in their respective areas.
- Each district municipality immediately establish an Interdepartmental Disaster Management Committee (comprising relevant key personnel for the purposes of co-ordinating *internal departmental planning*) and District Disaster Management Advisory Forums, and initiate interim disaster management structures in the ward context in communities known to be at risk. Consideration should be given to investigating innovative mechanisms whereby funding can be made available nationally to kick-start the establishment of district disaster management centres and the appointment of heads of those centres with immediate effect
- Lead functional agencies for the various operational activities associated with disaster management and the allocation of responsibilities be urgently identified in terms of co-ordination and the establishment of Joint Operations Centres for the tactical management of field operations at the scene of incidents.
- An intensive campaign is initiated to sensitise the aforementioned role-players with regard to their responsibilities in terms of the Act. A key consideration in this process of sensitisation is to focus on communities at risk.

- Ensure that disaster management and disaster risk-reduction planning are informed by reliable and robust risk and vulnerability assessments by:

  - Drawing national attention to the need for funding to conduct thorough risk and vulnerability assessments to inform and focus disaster risk planning where this is most urgently required.
  - Encouraging district municipalities (as an interim measure) to prepare a high-level strategic plan (in order to assist municipalities to fast-track the process and to ensure standardisation, a template should be provided for the purpose) that will set out the overall arrangements for disaster management in the district, which will include:
    - a qualitative risk profile supported by priority strategies for reducing the risks identified in the profile and accompanying implementation plans included as annexures to the plan which will be integrated into the IDP;
    - the institutional arrangements for disaster management for the district and clear allocation of roles and responsibilities;
    - the arrangements for the dissemination of early warnings;
    - procedures for the activation of the plan and for the classification and declaration of a state of disaster; and
    - standard operating protocols for key role-players of municipal departments.

- Strengthen communication capabilities for more effective disaster response and recovery by:

  - Installing communication mechanisms, which are linked to an interim reporting centre, in communities identified to be at risk.
  - Identifying disaster management focal points in communities at risk.

- Disseminating information to those focal points on the mechanisms and procedures for reporting of events in their communities which are threatening to occur or have already occurred.
- Considering the installation of NEARNET radios for this purpose in those communities.
- Commissioning research to explore the possibilities and options available toward the introduction of a national emergency radio communication system, which will allow interagency communication for the purposes of disaster management

- Disseminate lessons learned from this case-study relevant to the development of the national disaster management framework, specifically recommending:

With respect to the Disaster Management Act's institutional arrangements:

- The establishment of municipal disaster management advisory forums. In the event that a municipality decides not to exercise the option to establish a forum for the purposes of disaster management, municipalities should be required to identify alternative existing structures to pursue the intentions of the Act with regard to the role of forums.
- Attention to the issue of primary responsibility for each of the activities associated with disaster management by identifying lead functional agencies.
- The establishment of adequate capacity for disaster management and the provision of guidelines for the minimum requirements in terms of the establishment of disaster management centres.
- The development of clear guidelines for the appropriate placement of the function in the hierarchy structures of municipalities.
- The formulation of guidelines for the introduction of mechanisms for monitoring and managing cross-boundary risk in both municipal and provincial contexts.
- The inclusion of clear guidelines for the establishment, infrastructure and operation of provincial and municipal disaster management centres.

With respect to disaster management planning:

- The development of a comprehensive planning framework with accompanying guidelines to ensure standardisation and integration of disaster management plans.
- The development and inclusion of clear guidelines for procedures to be followed for the format and content of severe weather warnings and the mechanisms for the dissemination of early warnings and responses.
- Initiation of a nationally co-ordinated community awareness programme to inculcate risk-avoidance behaviour for commonly encountered hazards through public-private sector partnerships and in conjunction with the media.

With respect to disaster response and recovery:

- The formulation of guidelines and standardised procedures for conducting damage and needs assessment, including initial assessments and sector specific follow up assessments.
- The development of a model for a national Incident Management System to ensure standardised approaches and the clear identification of roles and responsibilities.
- The possible establishment of Disaster Assessment Response Teams.

- The inclusion of clear guidelines for the development of a policy on appeals for donations and on criteria for the management and distribution of humanitarian relief.
- Specifications on minimum requirements in terms of emergency communication.
- Development of guidelines which include minimum requirements for the recording of information on disasters.
- The routine undertaking of post-disaster reviews in order to learn lessons and add value to disaster management planning (e.g. this case-study).

6.3.5 Strengthen capacities to record and track disaster-related impacts to better inform both disaster management and development planning

(relevant to both disaster management and social/health service providers)

- Put in place mechanisms in the areas affected by the March 2003 cut-off low to enable the assessment and strengthened management of extreme weather and flood-related risks.
- Establish assessment procedures/guidelines for identifying and tracking impacts on disaster-affected individuals, households and communities, especially those most vulnerable, in order that these impacts are not overlooked or underestimated.
- Improve health surveillance mechanisms in clinics serving the weather and flood-affected communities to track patterns in child illness (especially respiratory illness) that may follow extreme weather events and floods.
- Actively disseminate weather and flood risk GIS/impact information consolidated in the course of this case-study with the provincial government departments concerned, as well as affected municipalities, so it serves as a practical platform for future disaster management and development planning.
- Establish standard impact reporting procedures for those municipalities and government departments that do not yet use a uniform system. This includes the standardisation of hard-copy and electronic formats, and clear designation of a provincial focal point to consolidate these (or out-sourcing arrangements).

Appendices

Appendix A: Research Flyer

Recording the Flood and Storm Disaster in the Boland, Overberg and Eden District Municipalities 24–26 March, 2003

A Research Initiative Supported by the Department of Social Services and Poverty Alleviation, Western Cape Provincial Government
and
United Nations Food and Agriculture Organisation

Implemented by the University of Cape Town

Background

The recent flood event reflected itself widely, across sectors, infrastructure, services, communities and the natural environment. To 'capture' this complexity requires a multi-disciplinary approach.

To achieve this, the research will examine the event from four perspectives:

- A meteorological perspective
- A biophysical perspective, including the hydrology of the floods.
- A disaster management perspective
- A community assessment perspective

Each of these approaches uses slightly different methods and information. The final report will reflect each perspective in-depth, as well as draw lessons across the different fields.

Overview of Each Approach

Meteorological Analysis
(Suzanne Carter, Climate Systems Analysis Group, UCT carter@egs.uct.ac.za)

This aims at achieving better understanding of the atmospheric drivers of the heavy rainfall that was triggered by a persistent cut-off low. It will also compare the recent rainfall event to others in the Karoo to provide insight into the probability of future flood events.

Methods
This will involve both quantitative and qualitative methods, including:

- Analysis of atmospheric charts (18–27 March) to identify synoptic features – most importantly the cut-ff low (most clearly defined on the 24 March)
- Animation of satellite images for same period to visually analyse the development of the extreme event.
- Historical climatology to compare the last 100 years climatology of surrounding towns, using monthly means and comparison to March 2003
- Focus on information dissemination regarding the weather warning process to understand the process that determines warnings for such events, and to identify constraints as well as opportunities for improved information dissemination.

Biophysical and Hydrological Analysis

(Jacques Botha, Africon – Jacquesb@africon.co.za, Dr Peter Holmes, UCT – holmes@enviro.uct.ac.za, Dan Rogatschnig, MSc Student UCT - rogat@ananzi.uct.ac.za, Dirk Van Bladeren, SRK Consulting – dvanbladeren@srk.co.za)

This component aims at determining the flood hydrograph for the event and the magnitude of the flood. It will also focus on the nature and extent of damage to the physical environment (e.g. soil loss estimates) in the catchments of the Kingna and Keisie Rivers, and the Kogmans River, as far as the confluence with the Breede.

In addition, it will assess land-use and land-cover conditions within the catchment prior to the floods, and model future flood scenarios under different rainfall and catchment surface conditions (later output).

Methods
A range of methods will be used to address these issues. They include:

- Obtaining gauging station levels for the event from DWAF and calibrating sites where the discharge tables have been exceeded.
- Setting up data files for a flood frequency analysis, i.e. return periods.
- Conducting a regional flood frequency analysis to determine the event magnitude in terms of the discharges.
- Comparing runoff results (flood peaks) with the rainfall data, and assessing hydrology results in terms of the catchment land-use, rainfall,

topography and catchment alignment to weather systems.
- Carrying out time series analysis of air photos and satellite imagery to determine changes in land use cover and vegetation over the last four or five decades.

Disaster Management Analysis

(Disaster Mitigation for Sustainable Livelihoods Programme, UCT – helenmac@enviro.uct.ac.za, Pat Reid, Disaster Management specialist – Patreid@patreid.co.za)

This analysis will contain two major components. The first comprises the consolidation, costing and mapping of flood-related impacts.

The second component will examine the successes and difficulties encountered in the management of the event within the legal and institutional framework provided in the Civil Protection Act, 1977 (No. 67 of 1977). It will also explore how the provisions of the Disaster Management Act, 2002 (Act No. 57 of 2002) might have contributed positively/negatively to the process; and will identify key elements that are relevant to the National Disaster Management Framework.

Methods
The methodology will involve both qualitative and quantitative elements, and include:

- Recording of disruption, damages and destruction of infrastructure, lifeline services, and telecommunications. The severity of the damage, the time of damage and the associated costs will similarly be consolidated. Severity indicators will be used to profile the impacts, in terms of extent of damage and the time to recover.
- Mapping in a Geographic Information System (GIS), using Africon's digital aerial photographs.
- Review of the study area and the chronology of the event.
- Review of existing planning and institutional arrangements, risk reduction and the IDP, emergency preparedness, response and recovery; measures taken to anticipate and manage the event, search and rescue, evacuation, emergency relief, logistics and communication; measures taken to ensure continuation of essential services; a description of mechanisms for disaster assessment in terms of damage and needs; a description of the extent of stakeholder participation; and a description of the extent to which information technology contributed to the process.
- Semi-structured interviews with relevant role-players using structured and open ended questionnaires
- Focus-group discussions.

Community Assessment

(Rick de Satge, Developmental Services – landtill@iafrica.co.za, Helen Macgregor, Disaster Mitigation for Sustainable Livelihoods Programme, UCT – helenmac@enviro.uct.ac.za)

This will profile affected communities who were either evacuated, whose houses were destroyed or damaged and communities that were isolated. Communities whose livelihoods were affected both directly and indirectly will be explored, which will include specific sectors such as agriculture and tourism. Communities affected outside the declared disaster areas will be recognised. The most vulnerable communities will be given preference, to include poor communities that may be economically marginalised and have required relief/compensation. At a household level this will be further defined in terms of female-headed households, households without insurance, or those that will not receive compensation from either their employees or the state.

Methods
This will involve a range of both quantitative and qualitative methods, including:

- Semi-structured open-ended questionnaires will be used in interviews with Local Government staff, including Municipal Managers, Disaster Managers, Director of Housing and local councillors, Director of Agri SA, and directors or staff of other related institutions/ organisations involved in relief or recovery, such as the ACVV and the MAG training Centre. Interviews will similarly be held with households provided with compensation or insurance, as well as those not. Random interviews across the community will also be conducted.
- Focus-group discussions will be held with the Social Security Compensation Committee, Residents' forums, women's groups, etc.
- A statistical profile of the affected communities will be generated using the 1996 census. Social Service Population Department will be responsible for the collection and representation of this data.
- Consolidation of needs assessments by ACVV, Social Services and Red Cross.
- Consolidation of Social Service Register for compensation.

FAO-Specific Outputs

A separate research output will be generated for FAO on the role of local level institutions in reducing vulnerability to natural disasters. The study will examine the role of local institutions and organisations in the design and implementation of risk management strategies in the flood-affected areas, and in building community social capital for disaster prevention and preparedness.

Research Process and Timeframe

UCT's Disaster Mitigation Programme will take overall responsibility for co-ordinating the research.

Field consultations/visits are planned by DiMP from 14–17 April.

Field research to consolidate information on the Disaster Management components as well as the community/social impacts will take place from 22–24 April.

Individual specialist visits by the biophysical impact research team will be scheduled over the next two weeks.

We particularly welcome suggestions on what kind of information affected municipalities, provincial departments and the farming community would find most useful.

The final research findings will be presented and discussed in a workshop towards the end of May/early June.

Contact Details for DiMP/UCT

If you have questions about the research, suggestions concerning how best to take it forward, or priorities you would like to see addressed, please do not hesitate to contact the Disaster Mitigation for Sustainable Livelihoods Programme, UCT at:

Telephone:
021 650 4743/2987
021 650 4115/4116
021 650 4742

Fax:
021 689 1217

E-mail:
Holloway@enviro.uct.ac.za
Helenmac@enviro.uct.ac.za
Sprime@enviro.uct.ac.za

Appendix B1: Long weekend advisory report

Thursday 20th March 2003 11:00

Severe Weather Warning : Nil

WEATHER ADVISORY
==========
LONG WEEKEND HOLIDAY MAKERS

WEATHER CONDITIONS ARE EXPECTED TO DETERIORATE SIGNIFICANTLY DURING THE LONGWEEKEND OVER THE SOUTHWESTERN PARTS OF WESTERN CAPE PROVINCE DURINGSATURDAY.

WIDESPREAD RAIN AND COLD TEMPERATURES WILL SET IN AND, ALONG THE COAST, STRONG TO GALE FORCE SOUTHWESTERLY WINDS.

THESE CONDITIONS WILL PERSIST THROUGH SUNDAY AND SPREAD TOWARDS THE GARDEN ROUTE.

Appendix B2: SMS sent to stakeholders

1. Gale force SW'ly winds between Cape Point and Cape Agulhas today spreading to Plettenberg Bay tomorrow (Sunday). 2. Very rough seas developing between Cape Point and Plettenberg Bay tomorrow (Sunday). 3. Heavy falls of rain are expected in places along the South coast and adjacent interior tomorrow night (Sunday). 4. Very cold conditions are expected on the high ground of the Western and Northern Cape Provinces tomorrow (Sunday) with possible snowfalls on the peaks of the Matroosberg and Swartberg mountains.

Appendix B3: Other advisories and warnings sent out by Cape Town Weather Office

Friday 21st March 2003 11:00

EXTREME WEATHER ADVISORY FOR LONG WEEKEND:

WESTERN CAPE

J. Stander and K. J. Rae

Friday 21 March 2003

Following close on the heels of the most recent heavy rain producing system, yet another episode of extreme weather is poised to affect parts of the country. This time the emphasis will be over the Western Cape region. S A Weather Service forecasters expect this to be an intense storm system, likely to be associated with a host of severe weather phenomena.

On Saturday 22nd March, a cold front is expected to make landfall over the Western Cape, bringing with it a significant deterioration in prevailing weather conditions. Temperatures will drop markedly between Friday and Saturday and very cold conditions with general rain will set in. Prospective climbers and hikers are advised that particularly adverse conditions are expected over the mountains of the Western Cape, with bitterly cold, wet and windy conditions posing a distinct safety hazard.

Strong to gale force south westerly winds are expected to develop, while very rough sea conditions with seas exceeding 6 metres are forecast to occur along the south western and southern coasts of Western Cape by early Sunday. Squally weather is likely to occur both over the open sea as well as inland, where some degree of wind damage can be expected. The public are strongly urged not to venture out to sea, given the extreme nature of the expected conditions. Wave action along the south western and southern seaboard is also likely to be extreme and the public would be well advised to stay clear of breakers along the shoreline.

Heavy rainfall, exceeding 50mm per 24 hours, can be expected along the south coast of Western Cape during Sunday. Localised flash flooding of rivers as well as overland runoff could well contribute to storm damage.

These conditions are likely to spread eastwards towards the Garden Route later on Sunday and towards the western part of Eastern Cape overnight Sunday, through to Monday morning.

The S A Weather Service will continue to monitor the development of this system on a 24 hour basis and the public can be assured that timeous updates will be issued as and when necessary.

Friday 21st March 2003 11:00

Severe Weather Warning: Nil
Advisory for long weekend:
1. Weather conditions are expected to deteriorate significantly overnight tonight (Friday) over the South-Western Cape spreading to the Western parts of the Northern Cape and Southern Cape during tomorrow Saturday.

2. These conditions will persist during Sunday when it will be cold with general rain.
3. Strong to gale force South-westerly winds are expected along the southern coastal areas on Sunday associated with very rough seas.
4. Heavy falls of rain are possible in places along the south coast and adjacent interior Sunday night.

Saturday 22nd March 2003 05:00
Severe Weather Warning: Nil
Advisory for long weekend:
1. The rainy and cold conditions over the South-Western Cape will spread to the Western parts of the Northern Cape and Southern Cape during today Saturday.
2. These conditions will persist during Sunday when it will be cold with general rain.
3. Strong to gale force South-westerly winds are expected along the southern coastal areas on Sunday associated with very rough seas.
4. Heavy falls of rain are possible in places along the south coast and adjacent interior Sunday night.

Saturday 22nd March 2003 11:00
Severe Weather Warning :
1. Gale force SW'ly winds (65km/h) are expected between Cape Point and Cape Agulhas today (Saturday) spreading to Plettenberg Bay tomorrow (Sunday).
2. Very rough sea with a total sea and swell in excess of 5m developing between Cape Point and Plettenberg Bay tomorrow (Sunday).
3. Heavy falls of rain are expected in places along the south coast and adjacent interior tomorrow night (Sunday).
4. Very cold conditions are expected over the western high ground areas of the Northern Cape and Western Cape Provinces tomorrow (Sunday).
5. Light snowfalls are likely tomorrow (Sunday) on the Matroosberg and later the Swartberg mountains.

Sunday 23rd March 2003 11:00
Severe Weather Warning :
1. Gale force southwesterly winds(65km/h) are expected in places between Cape Point and Cape Agulhas today (Sunday), spreading to Plettenberg Bay Tomorrow (Monday) and moderating in the west.
2. Very rough seas with wave heights in excess of 5m are expected today(Sunday) between Cape Columbine and Plettenberg Bay but tomorrow (Monday) only east of Cape Agulhas.
3. Very cold conditions are expected over the western high ground areas of the Northern Cape and Western Cape today (Sunday).
4. Light snowfalls are likely today (Sunday) on the Matroosberg and later tonight on the Swartberg mountains.
5. Heavy falls of rain are expected along the south coast and adjacent interior tonight(Sunday).

Monday 24th March 2003 05:00
Severe Weather Warning :
1. Very cold conditions will persist on the high ground of the Western Cape and the western parts of the Northern Cape.
2. Gale force southwesterly winds reaching 75km/h (40knots) are expected in

places between Cape Point and Plettenberg Bay today (Monday) moderating in the west later.

3. *Very rough sea conditions are expected with wave heights in excess of 5m today (Monday) between Cape Point and Plettenberg Bay subsiding from the west overnight.*
4. *Heavy falls of rain (50mm in 24 hours) are expected in places along the Western Cape south coast today (Monday).*

Appendix C1: Impact table and comments page

	Name of Organisation:																			
	(please print)																			
		C. Service Disrupted				D. to G. Nature of Impact														
		From		To		River Flooded			Rain			Run-off			Wind			Siltation		
						D1	D2	D3	E1	E2	E3	F1	F2	F3	G1	G2	G3	H1	H2	H3
A. Ref. No.	B. Name of affected Structure / Area / Service	Date	Time	Date	Time	Affected	Damaged	Destroyed	Affected	Damaged	Destroyed	Affected	Damaged	Destroyed	Affected	Damaged	Destroyed	Affected	Damaged	Destroyed

A. Ref. No.	J. Comments

Appendix C2: Environmental impacts

A. Ref. No.	K. Description of Location or area	L. Description of damage	M. Cost

Appendix C3: Budget information

Budget Information

Name of Organisation: ……..

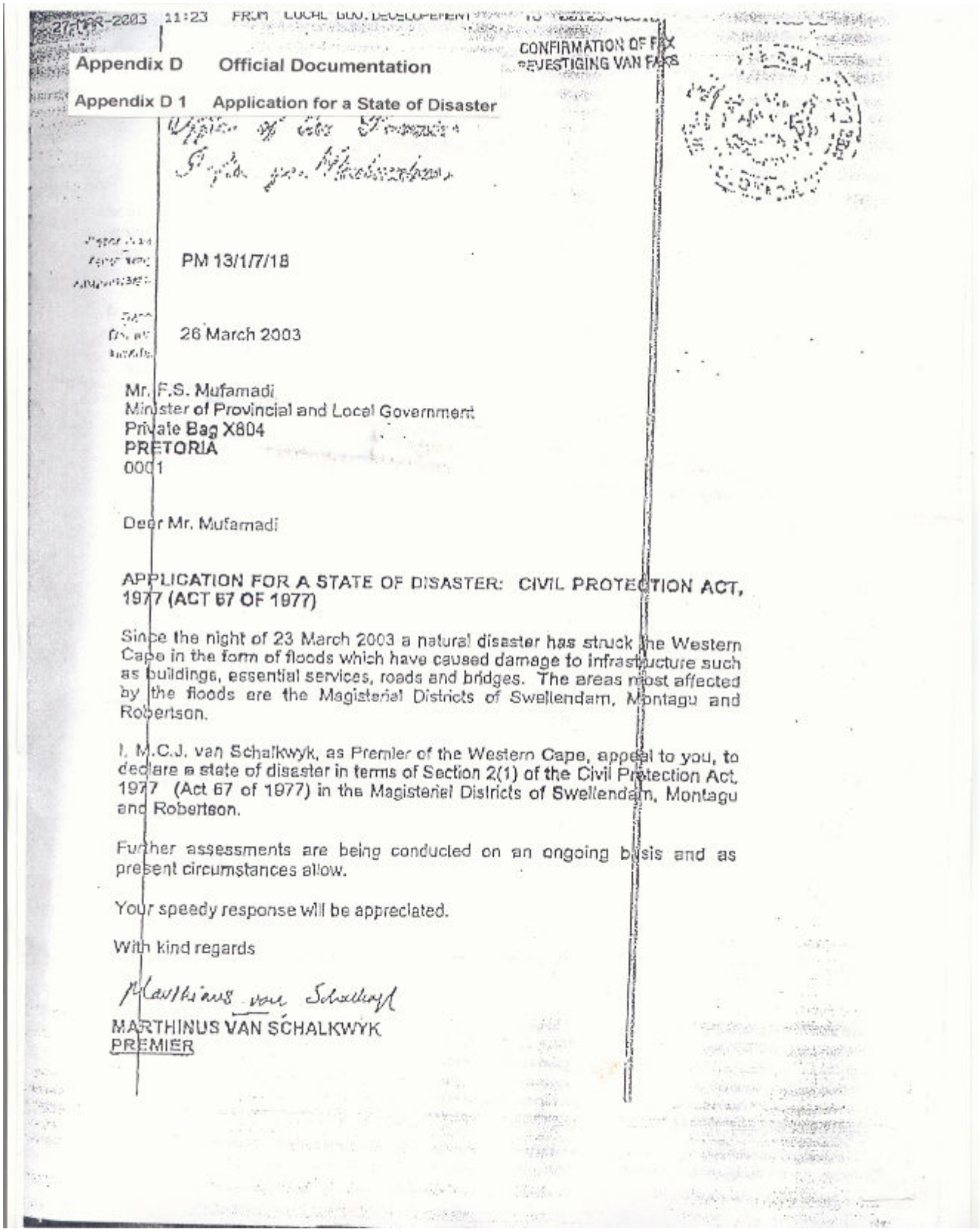
Completed by: ……..

Contact Details: ……..

(*please print)*

2002 / 2003		2003 / 2004		
Planned Municipal Expenditure	Planned Maintenance & Repair Expenditure	Planned Municipal Expenditure	Planned Maintenance & Repair Expenditure	Estimated Total Damage Cost

Appendix D1: Application for a State of Disaster



27-MAR-2003 11:23 FROM LOCAL GOV. DEVELOPMENT

CONFIRMATION OF FAX
BEVESTIGING VAN FAKS

Appendix D Official Documentation

Appendix D 1 Application for a State of Disaster

Office of the Premier
Cape Town

PM 13/1/7/18

26 March 2003

Mr. F.S. Mufamadi
Minister of Provincial and Local Government
Private Bag X804
PRETORIA
0001

Dear Mr. Mufamadi

APPLICATION FOR A STATE OF DISASTER: CIVIL PROTECTION ACT, 1977 (ACT 67 OF 1977)

Since the night of 23 March 2003 a natural disaster has struck the Western Cape in the form of floods which have caused damage to infrastructure such as buildings, essential services, roads and bridges. The areas most affected by the floods are the Magisterial Districts of Swellendam, Montagu and Robertson.

I, M.C.J. van Schalkwyk, as Premier of the Western Cape, appeal to you, to declare a state of disaster in terms of Section 2(1) of the Civil Protection Act, 1977 (Act 67 of 1977) in the Magisterial Districts of Swellendam, Montagu and Robertson.

Further assessments are being conducted on an ongoing basis and as present circumstances allow.

Your speedy response will be appreciated.

With kind regards

Marthinus van Schalkwyk

MARTHINUS VAN SCHALKWYK
PREMIER

Appendix D2: Application to Declare a Disaster

CONFIRMATION OF FAX
BEVESTIGING VAN FAKS

Office of the Premier
Kantoor van die Premier

PM 13/1/4

26 March 2003

Mr. Thabo Mbeki
The President: Republic of South Africa
Private Bag X1000
PRETORIA
0001

Dear Mr. President

APPLICATION TO DECLARE A DISASTER: FUND RAISING ACT, 1978 (ACT 107 OF 1978)

Since the night of 23 March 2003 a natural disaster has struck the Western Cape in the form of floods which have caused damage to infrastructure such as buildings, essential services, roads and bridges. The areas most affected by the floods are the Magisterial Districts of Swellendam, Montagu and Robertson.

At this stage humanitarian aid in the form of emergency feeding and shelter is being provided to approximately 1000 persons.

I, M.C.J. van Schalkwyk, as Premier of the Western Cape Province, hereby appeal to you to declare a disaster in terms of Section 18(a) of the Fund Raising Act, 1978 (Act 107 of 1978) in the Magisterial Districts of Swellendam, Montagu and Robertson.

Further damage assessments are being conducted on an ongoing basis and as present circumstances allow.

I also respectfully propose that it would add value to the process if the National Ministers for Provincial and Local Government and Social Development would be able to personally visit the affected areas to report back to yourself and National Cabinet on the extent of the damage.

Your speedy response will be appreciated.

With kind regards

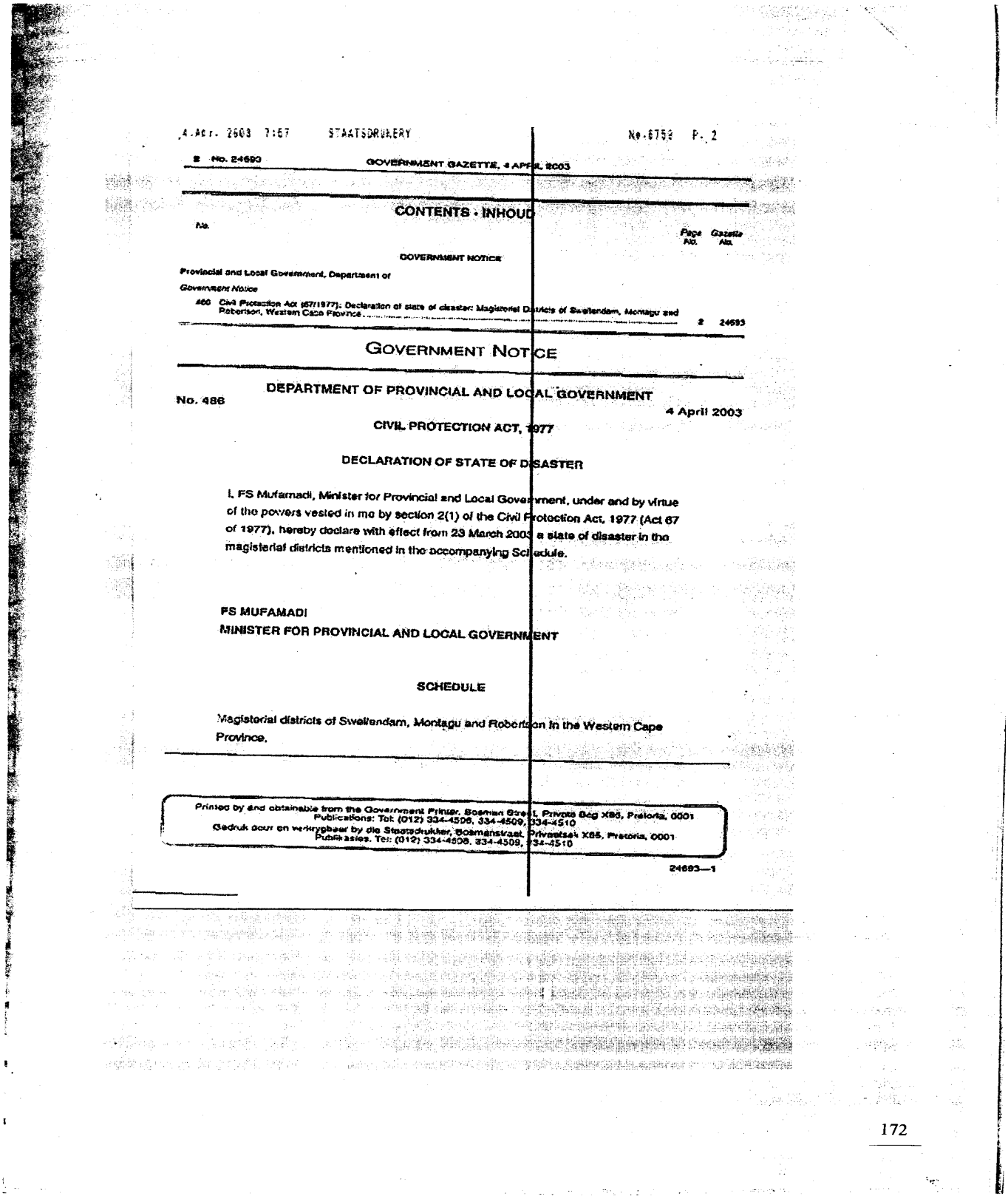
Marthinus van Schalkwyk

MARTHINUS VAN SCHALKWYK
PREMIER

19/20/6/1 K3.

Private Bag X9043, Cape Town 8000
Tel: +27 21 483 4705
Fax: +27 21 483 3421

Appendix D3: Declaration of State of Disaster



4 Apr. 2003 7:57 STAATSDRUKKERY No.6752 P. 2

2 No. 24693 GOVERNMENT GAZETTE, 4 APRIL 2003

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	Government Notice		
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GOVERNMENT NOTICE

DEPARTMENT OF PROVINCIAL AND LOCAL GOVERNMENT

No. 486

4 April 2003

CIVIL PROTECTION ACT, 1977

DECLARATION OF STATE OF DISASTER

I, FS Mufamadi, Minister for Provincial and Local Government, under and by virtue of the powers vested in me by section 2(1) of the Civil Protection Act, 1977 (Act 67 of 1977), hereby declare with effect from 23 March 2003 a state of disaster in the magisterial districts mentioned in the accompanying Schedule.

FS MUFAMADI
MINISTER FOR PROVINCIAL AND LOCAL GOVERNMENT

SCHEDULE

Magisterial districts of Swellendam, Montagu and Robertson in the Western Cape Province.

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Publikasies. Tel: (012) 334-4508, 334-4509, 334-4510

24693—1

Appendix E: Individuals and Organisations Contact List

Name	Organisation/Institution	Contact Details
Norman Angel	Eden District Municipality (Roads)	(044) 803 1300
Yakeen Atwaru	Department of Environmental Affairs and Development Planning	(021) 483 2877
Mark Barnard	Ashton Canning Company	(023) 615 1140
Jimmy Binos	GAB Robbins	(023) 625 1380
Cor Bothma	Department of Water Affairs and Forestry, Worcester	(023) 247 1625
S Brink	Knysna Municipality	(044) 302 6452
Erica Brits	Die Burger	(021) 406 2391
Joseph Bruintjies	Department of Social Services and Poverty Alleviation	082 990 7638
J Burger	Poortjieskloof's Irrigation Board	(023) 614 2277
Mr Carsten	Department of Health	(023) 348 1400
Schalk Carstens	Department of Local Government, Sub-directorate Disaster Management	(021) 483 5016
Peter Cattell	Western Cape Nature Conservation Board	(044) 383 0042
Nicholas Cillier	Department of Transport & Public Works (Roads infrastructure)	(021) 483 2178
Bernard Cupido	Breede River/Winelands Municipality	083 580 3634
Customer Services	Die Burger	(021) 406 2121
Coleen de Villiers	South African Weather Services, Pretoria	082 233 8484
Henk de Villiers	Tiger Brands	(023) 615 1120
Neels de Villiers	Department of Transport & Public Works	(021) 863 2020
Roy Erinson	Wilderness National Park	(044) 877 0046
Phlippe Evertson	Health and Welfare Committee	(028) 514 3576
John Flemmer	Department of Social Services & Poverty Alleviation	(021) 483 5737
Reynard Geldenhuys	Overberg District Municipality	(028) 425 1157
Elsa Green	South African Red Cross	(021) 797 5360
Willie Hartsenberg	Kannaland Municipality	(028) 551 1023
Tierck Hoekstra	Western Cape Nature Conservation Board	(028) 316 3338
Mr Hoffman	Montagu Municipality	(023) 614 1112
Cynthia Jansen	ANC Women's League, McGregor	083 109 3544
Tania Johnson	Department of Water Affairs and Forestry, Bellville	(021) 950 7100
Pat Jordaan	Oudtshoorn Municipality	(044) 272 2221
Kim Klein	Department of Local Government, Sub-directorate Disaster Management	(021) 483 5016
Jackie Kleinhans	Suurbraak Clinic	(028) 522 1639
Captain Kleinhans	South African Police Services, Montagu	(023) 614 1230
Jacques Kriel	Poortjieskloof's Irrigation Board	(023) 614 2919
Chris Koch	Swellendam Municipality	(028) 514 1100
Sister Kuiswell	Knysna Municipal Clinic	(044) 302 6377
Superintendant Patric Leigh	South African Police Services, Swellendam	(028) 514 2515
Mr Lombard	Department of Social Services and Poverty Alleviation	(044) 302 6418
C M Lotz	Langeberg Municipality	(028) 713 2418
Dr Lunnon	Boland District Municipality	(023) 347 0945
Nelly Matjies	The Herald	(044) 874 2424

Lieutenant Colonel Allan McCarthy	Airforce Base, Ysterplaat	(021) 508 6435
Mr Simon Mckenizie	Disaster Relief Committee	(023) 614 1175
Richard Meyer	Knysna Municipality	(044) 302 6372
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Keith Moir	South African Weather Services, Cape Town Weather Office	(021) 934 0450
Mr Moodley	Knysna Municipality	(044) 302 6381
Frans Mouski	Department of Water Affairs and Forestry	(021) 950 7100
Julian Muller	Eskom	(044) 801 2730
H Myburgh	Korentepoort's Irrigation Board	(028) 713 3433
Tembani Nbyinini	Councilor: Area of Zolani	083 480 5585
Mnikeli Ndabambi	South African Weather Services, Pretoria	(012) 310 3458
Nico Nel	Knysna Municipality	(044) 302 6452
Barend Nelson	George Municipality	(044) 874 7458
John Nortjie	Swellendam Municipality	082 841 23 64
Hans Ottervanger	Eden District Municipality (Roads)	(044) 803 1301
Maureen Oukamp	Overberg District Municipality	(028) 425 1157
Mr Paddiachi	Breede River / Winelands Municipality	(023) 615 1100
Kevin Parry	Statistics South Africa	(012) 310 2111
Mr Picararo	Duivenshok's Irrigation Board	(028) 722 1646
Dries Pretorius	Knysna Municipality	(044) 382 3645
Johann Raats	Department of Water Affairs and Forestry	(023) 347 1625
Superintendant Rall	South African Police Services, Robertson	(023) 626 3672
Glen Roberts	EnviroMon	(021) 853 7947
Andres Roux	Department of Agriculture	(021) 808 5341
Andrew Schofield	Sanbona Wildlife Reserve	(028) 572 1822
Gabriel Setsiba	Department of Education	(021) 467 2129
Francinah Sibanyoni	Department of Water Affairs & Forestry, Pretoria	(012) 336 7500
Dr Wayne Smith	Emergency Management Services	(021) 948 9900
Ian Snyders	Eskom	(044) 801 2130
D Snyman	Miertjieskraal's Irrigation Board	(082) 805 8531
Sampie Steenkamp	PAWC Disaster Management	(021) 483 5016
Mr J Streicher	Buffeljagts's Irrigation Board	(028) 512 3729
Johan Taljaard	Eskom	(028) 551 1630
Mr Teat	Breede River / Winelands Municipality	(023) 614 1112
Kobus Thjron	Central Karoo Municipality	(023) 449 1000
Mrs Tiger	Department of Social Services & Poverty Alleviation, Worcester	(023) 342 2400
Alan Tompson	Councilor: Area of Swellendam	072 253 2995
Mr Tyiga	Department of Social Services & Poverty Alleviation, Worcester	(023) 342 2400
Jan van Bosch	Eskom	(023) 342 3245
Johan van de Wat	Miertjieskraal's Irrigation Board	(028) 551 1137
Callie Van den Heever	Department of Agriculture	(021) 808 5369
Ben van Rensburg	Montagu Chamber of Business	(023) 614 2681
Jacob van der Westhuizen	Breede River / Winelands Municipality	(023) 615 1100
Dave van Schalkwyk	Boland District Municipality	(023) 626 3112

Judy van Wyk	Afrikaans Christelike Vroue Vereeniging	(023) 614 1490
Roy Veldtman	Boland District Municipality	(023) 626 3456
Chris Venter	Department of Agriculture	(021) 808 5010
Hadley Venter	Plettenberg Bay Municipality	(044) 533 1692
Phillip Wahl	Eskom	(021) 915 2653
Bomber Webb	The Edge	(044) 343 2415
Erwin Weideman	Department of Water Affairs and Forestry	(023) 347 1625
Johan Wiggens	Department of Water Affairs and Forestry	(023) 343 2901
Wendy Young	Eden District Municipality	(044) 803 1300