

CHAPTER 1

1.1 Introduction

The world today is becoming increasingly vulnerable to multiple hazards and risks that can escalate into disasters (IPCC, 2001). Communities face natural hazards, but today's incidents are often generated by, or at least exacerbated by a host of human activities, including various socio-economic and political processes (Disaster Management Southern Africa, 2003). It is argued that at the most dramatic level, human activities are changing the natural balance of the earth, interfering with the atmosphere, oceans, forest cover and the natural pillars that make the world a livable home (Canon, *et al.*, 1993).

Rapid economic growth brings with it increasing complexity, more extensive systems of infrastructure, denser populations, and more excessive demands on the immediate environment and essential natural resources (IDNDR, 1999). At no time in human history have so many people lived in cities clustered around seismically active areas and other sources of risk, including fire risk, flooding and others (Allinson, 1994).

Destitution and demographic pressure have resulted in populated flood plains, people living in high risk zones including areas prone to landslides and even areas prone to epidemics (Allinson, 1994). Poor land-use planning, environmental mismanagement, poor governance, appropriate institutions to effectively reduce risk and a lack of regulatory mechanisms further increase and compound the risk and exacerbate the effects of disasters (Lewis, 1999).

Unremitting efforts have been carried out to reduce the threats of disasters and create a safer world (Alley, 1993). Disaster specialists have increasingly sought to understand how people come to be at risk to disasters. From such initiatives, emerges an understanding of how to reduce these risks and people's vulnerability to disaster events (Bull-Kamanga, *et al*, 2003).

It is difficult to get institutions responsible for disaster response to make the shift, from a reactive to a more proactive disaster management response. Many of the measures to reduce disaster risk require collaboration with other agencies and engagement with resource poor communities (Cutter, 1993). For urban areas, this means working with different departments of the city and with the many community based organizations and local NGO's engaged in urban development (Bull-Kamanga, *et al*, 2003).

Urban disaster specialists have developed understandings of risk and vulnerability from different perspectives. Most urban specialists see vulnerability in terms of the high risks to people's livelihoods from external shocks or stresses or lack of assets or other resources that permit them to cope with these (Bull-Kamanga, *et al*, 2003). It is still common for urban specialists' work on vulnerability to ignore environmental hazards, especially from infectious and parasitic diseases, despite the fact that these cause or contribute to most of the ill-health, injury and premature death amongst large sections of the urban population (Bull-Kamanga, *et al*, 2003).

According to Comfort *et al.*, (1999), there must be a coordinated effort to improve the assessment of risk in vulnerable regions. This involves the recognition, assessment and mapping of the hazard area, compiling information of the previous disasters, costs and

the types of damages that occurred. An advantage with such a system is that it makes it possible to secure accurate and timely measures of environmental degradation or renewal that are connected with social, economic, political or technical changes in monitored regions (Comfort, *et al.*, 1999).

Such systems also help in identifying critical actors at each jurisdictional level, their risk assumptions, their different types of information needs and the design of an information infrastructure that would support their decisions (Cutter, 1996). By so doing, it will be possible to transform the destructive spiral of disaster into a learning process for responsible management of the environment (Comfort, *et al.*, 1999).

South Africa faces a wide range of potential threats or hazards that can trigger disaster events. The country, the people and the ecosystems are exposed to a wide range of weather hazards, including drought, severe storms and cyclones that can trigger widespread hardships and devastations (Holloway, *et al.*, 2003). Furthermore, the rapidly growing urban centres, particularly in Gauteng, the Eastern and Western Cape and other provinces increasingly concentrate large numbers of people, infrastructure, commercial and industrial activities, as well as critical services in areas exposed to weather extremes and a host of other risks e.g. fires and other human-induced hazards (Hewitt, 1997). Despite ongoing efforts to extend housing and other essential services to poor urban and rural communities, including those in informal settlements, large numbers of people live in undeserved, ecologically fragile or marginal areas, facing recurrent natural hazards and other threats (Holloway, *et al.*, 2003).

The consequences of disasters and even “small” disaster incidents on society and the economy go far beyond the immediate devastation witnessed through the media. Several social-economic studies have revealed that the secondary effects and indirect costs of disasters have long-term repercussions on societies, irrespective of their degree of development (IDNDR, 1999).

The impact of incidents or even disasters and their contributions to poverty are, however, underestimated as is the extent to which rapidly growing and poorly managed urban development increases risks (Mitchell, 1999). Even though such circumstances are in most cases the results of unplanned development, there is a tendency to examine natural disasters usually from an emergency-management (response) perspective and not tackle the core cause of such situations (IDNDR, 1999). Such an approach may cause us to give priority to the response to disasters *after* disastrous events have occurred treating events rather than reducing risks to disasters *before* they occur (Alley, 1993). This is emphasized in the new Disaster Management Act of South Africa (57) of 2002.

More recently, however, the longer-term coupling of disaster-risk reduction with development is also increasingly becoming key (www.bmtpc.org.disaster.htm). Calls for improved and strengthened local response capacity, while advocating a global culture of prevention are therefore increasingly being made (IDNDR, 1999).

1.2 Alexandra Township-Living with risk

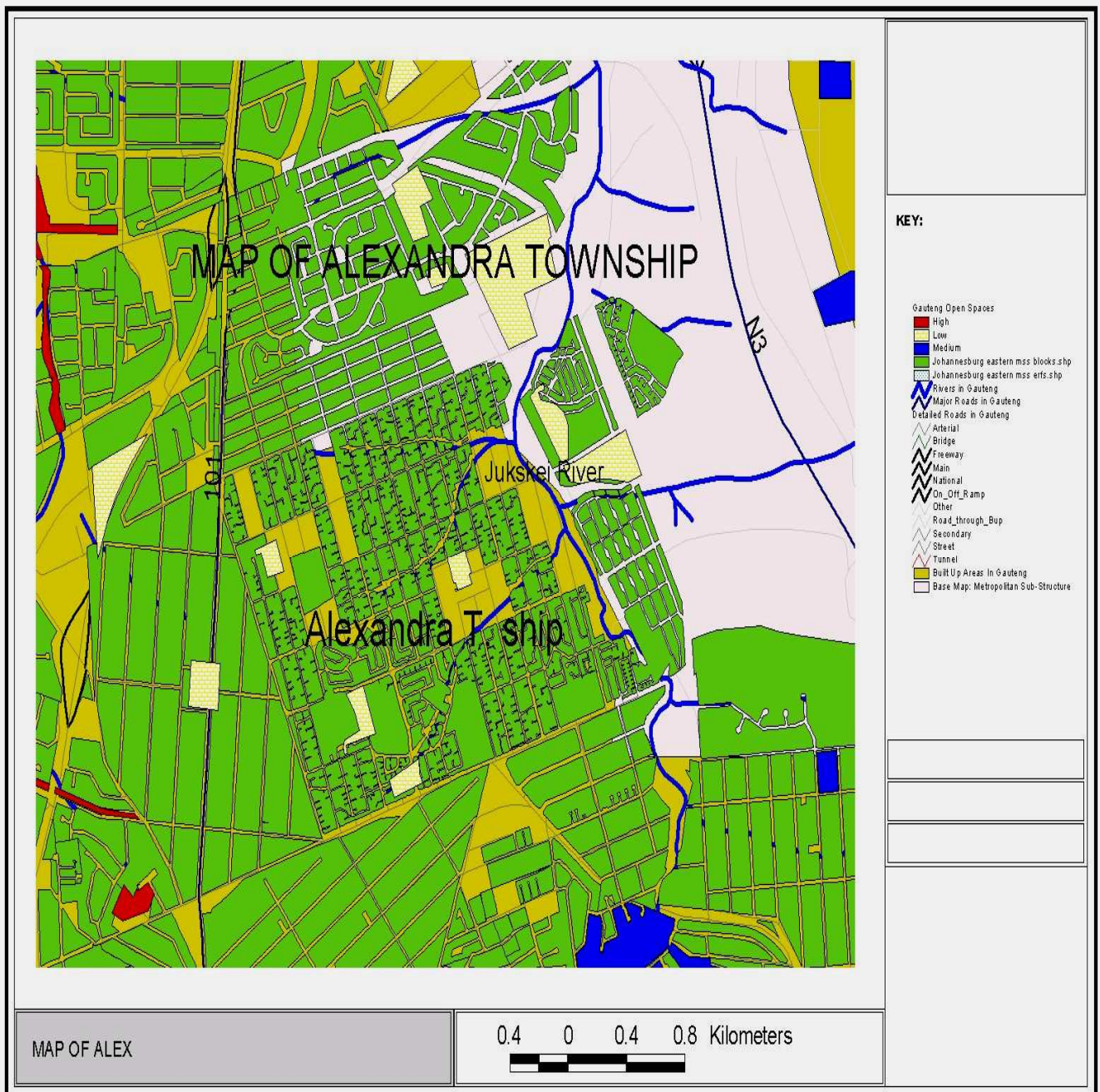


Fig 1: Map of Alexandra Township (Source: GPG, GIS)

Alexandra Township, which lies within the northern suburbs of Johannesburg (Figure 1), is known for its history of being densely over populated. Thousands of people live in flood prone settlements along the Jukskei River in this township (Mayekiso, 1996). In 1994, more than 6000 households settled below the level reached by previous floods. Floods are by far the most common type of disaster, but disasters of all nature have their turn across the township (Alexander, 1999).

The river is also known to be the most polluted in the country (Alexander, 1999). This has become a life threatening area as informal dwellings are built on all available spaces along the river and are usually made of poor building and other materials (Mquba, 2002). These types of informal dwellings are more prone to damage from the effects of hazards (Alexander, 1999). Moreover, when water levels of the river rise above the riverbanks, the densely packed settlements usually collapse in to the river causing damage and injury. These situations are 'visible' examples of disaster risks and vulnerability amongst the Alexandra Community. The condition in the informal settlement of Alexandra indeed could be described as a permanent disaster (Alexander, 1999; Mquba, 2002).

Several kinds of disasters, with negative consequences, impact on Alexandra Township. Some of such incidences include:

- Floods
- Fires
- Epidemics (cholera, HIV/AIDS)

Having information that includes the incidents, severity, occurrence, magnitude and factors heightening disaster risk, is essential if we are to reduce disaster risk. The availability, accessibility and nature of disaster risk information in Alexandra Township is examined in this report. Databases and recordings of potential disasters that have occurred in Alexandra are examined in this study.

1.3 Aims and objectives of the study

Disaster inventories and profiles help in creating an awareness of the magnitude and frequency of incidents, improve understanding of disaster-risk and enhance the capacity to analyze and represent hazards, vulnerability and risk in terms of space and time, both retrospectively and prospectively (www.DesInventar.org).

This tracking, monitoring and collection of information on phenomena and activities that trigger disaster events are crucial for the implementation of risk- reduction measures. Moreover, the sharing of such information and creating awareness about such issues will enable all role players, including communities, to gain a better understanding of the relationship between human action, natural phenomena, environmental vulnerability and risk (Serje, 2002). Creating awareness is vital to the success of any strategy on managing disaster events (Department of Constitutional Development, 1999). Data sharing is thus a key area of concern and relevant role players need to find appropriate “mechanisms” and “institutions” to ensure effective data dissemination and use.

With this background, the central/key aim of the study is:

- To assess the information contained in relevant disaster inventories for Alexandra Township to begin the development of a comprehensive disaster risk inventory for the settlement.

The report is structured as follows:

1.4 Outline of Chapters

Chapter 1: Introduction.

The first chapter provides a brief and up-to-date introduction to the study and general explanation of Disaster Risk. It further gives a brief profile of the risk status of Alexandra Township in relation to disasters. Furthermore, it illustrates the aims and objectives of the study and the outline of report chapters.

Chapter 2: Literature Review.

The chapter covers topics relating to the general principles of disasters (hazards, risks and vulnerability). Focus in this instance is solely on different kinds of disaster risks in urban South Africa; flood risk, informal dwelling fire risks and health risks that are addressed in this report. Critical analysis of disaster capturing systems, problems and challenges are critically looked at in this chapter.

Chapter 3: Research Methodology.

The chapter reflects on a range of quantitative and qualitative methods that were used to gather the data for the study. They include:

- Desktop study, internet information, library data, newspaper sources, literature review, etc.
- Consultation and interaction with key personnel e.g. disaster management officials and fire personnel.

Chapter 4: Research Findings and Analysis.

The chapter outlines the information contained and collected from relevant disaster inventories for Alexandra Township since 1991-Aug 2005. Preliminary analyses of the collected data are included. Finally some emerging challenges for establishing disaster databases are described.

Chapter 5: Discussion and recommendations.

This final chapter concludes the study and suggests or recommends ways forward to make progress in improving the quality of disaster data, which in the longer term will help in successful disaster preparedness and mitigation.

CHAPTER 2

2.1 Overview of Disasters

Ensuring that one has a comprehensive data set to inform and reduce disaster risks is retarded by the wide array of data that is required. In this chapter, an overview of disasters and approaches to disaster risks is provided. In this brief overview of the literature, the mosaic of data required is starkly highlighted.

Many types and scales of disasters occur. What most disasters have in common is the potential harm and often exceptional concentrations of death and injury that result (Quarantelli, 1998). Damage is often sufficient to disrupt part of society's productive activity and administrative functions. Poorer groups and socially disadvantaged groups are generally the most affected and they are often least equipped to cope with extreme disasters. A disastrous event overwhelms, at least for a time, the ability of established routines (Hewitt, 1997).

Floods, disease epidemics, fires and other hazards are normal functions of the natural environment. They affect all living organisms but they are only referred to as disasters or catastrophes when they impact human society to cause social disruption, material damage and loss of life (Middleton, 1995). Disasters are events that cause or threaten death, injury or disease, damage to property, infrastructure or disruption to the community that usually exceeds the ability of the affected community to cope using only its own resources (Disaster Management Act of South Africa, 2002).

These events occur when a significant number of vulnerable people experience a hazard and suffer severe damage and disruption to their livelihood system in such a way that

recovery is unlikely without external aid (Blaikie *et al.*, 1994). In other words, these are events or conditions of significant destruction, disruption or distress to communities (Disaster Awareness Program, 1997). Nowhere in the world is the impact of these disasters stronger felt than in developing countries, where they cause huge material damage, untold human suffering, hardship and misery (Disaster Awareness Program, 1997).

The dramatic increase in disasters and the damage caused by such events or processes in the recent past has become a cause of concern nationally and internationally. These events should no longer be looked at as 'Acts of God' over which there is little or no control. Nor can they be left to be understood by natural scientists and handled by rescue teams alone. There is a growing need for new ways of analysis, new approaches and new methods to address disasters (Ariyabandu, 1999).

Disaster management has traditionally been the focus of hazard scientists and those usually concerned more with geophysical dimensions of hazards. Emphasis has been on the technical construction of risk involving the quantification of the probability that a hazard will be realized and the magnitude of consequences associated with hazards (Emani, 1996). The emphasis particularly at the local level has therefore tended to focus on preparedness (pre-impact activities) (Cutter, 1993).

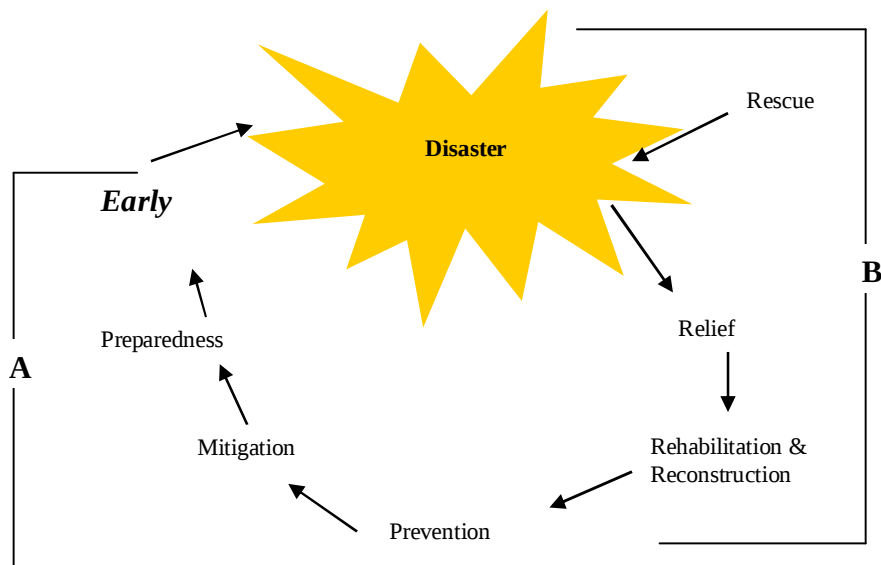


Fig 2: Pre-disaster reduction phase A & Post disaster recovery phase B (Source: *Cutter, 1993*).

More recently, however, attention has focused increasingly on examining risk and disasters as social constructs, according to various social science paradigms (Department of Constitutional Development, 1999).

In South Africa, the Green and White Papers on Disaster Management, together with the Disaster Management Act (Act 57 of 2002) have attempted to capture the technical preparedness aspects of disasters as well as the socio-economic and development aspects. Inclusion of mitigation (longer-term efforts that build on sustainable development initiatives) together with preparedness is called for in these two legal documents. Management/Reduction of disasters therefore becomes a much wider ranging process including various role players.

2.2 What is Disaster Risk?

No matter where one is located, whether in an urban or rural environment, one's chances of experiencing a disaster are usually strongly linked to one's vulnerability to the event. The more vulnerable a community, the greater the physical, economic and emotional costs of a disaster (Blaikie, *et al.*, 1994). The concept of vulnerability developed out of a recognition of the differential impacts of hazards of equal intensity on different countries and on different groups within the country. Vulnerability has been defined as "the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist and recover from the impacts of a natural hazard" (Blaikie, *et al.*, 1994: 9).

Vulnerability to a disaster usually follows a progression arising from factors such as poverty, a lack of infrastructure and a fragile environment. Poor communities living in makeshift structures in densely populated urban areas prone to flooding and lacking decent routes are likely to be extremely at risk during periods of heavy rain or in a fire. In a sense, one's degree of vulnerability may well produce a disaster (Blaikie, *et al.*, 1994) hence:

$$\text{HAZARD} + \text{VULNERABILITY} = \text{DISASTER.}$$

Disasters are not only caused by natural events. They are also embedded and are the product of the social, political, economic and environmental conditions that set or pose certain kinds of risks or hazards to human beings (Department of Constitutional Development, 1998). In other words, they should be studied in terms of both the physical processes involved and of the human factors affecting the vulnerability of certain groups of people to disasters (Middleton, 1995).

It is argued that people live in adverse economic situations that lead them to inhabit parts of the world that are affected by natural hazards. The situation relates to the manner in which assets and income are distributed between different social groups, and various forms of discrimination that occur in the allocation of welfare (Blaikie *et al.*, 1994): “The vulnerability of a community at risk must be understood, on the collective level, as the degree to which socio-economic and socio-political factors affect a community’s participation to absorb and to recover, and on the personal and domestic level as ‘defenceless’ and the inability to cope with risk, shocks and stress” (Disaster Awareness Program, 1997: 9).

At a household level, this vulnerability to a hazard might be increased by pressures such as unemployment, lack of access to insurance (social or individual) and living in poorly constructed dwellings on land prone to erosion. These conditions are, however, usually generated on a deeper level by political disempowerment and economic or educational discrimination formed the basis of the political and economic system (Kelso, 1999). Due to the situations in which many people find themselves socially, politically and economically, they usually end up suffering from repeated and multiple disasters (Blaikie, *et al.*, 1994).



Photograph 1

Vulnerability to disasters can also be caused by urban development and change, which may dislocate communities, cause planned or spontaneous relocation of settlements, expose them to more familiar hazards, or reduce access to services. Among the many global transformations that are occurring in the twentieth century, is the shift to a predominantly urban world dominated increasingly by more people and congested settlements (Mitchell, 1999). “Uncontrolled urbanization increases disaster risks with the urban poor exposed to the highest risk” (Stop Disasters, 1996:3). People are forced by circumstances to move to hazard-prone areas and lack the skills and economic opportunities to effectively reduce the risks to which they are exposed, or even prepare for the disasters to come (Stop Disasters, 1996; Mitchell, 1999).

In assessing urban risk, it is argued that many cities are built on or contains disaster-prone sites mainly because cities outgrew what were originally relatively safe sites. Most of the global cities in the world were founded centuries ago, many on sites that were originally

safe (Stop Disasters, 1996). When these cities were relatively small, there was no need for urban development over hazardous sites. As they grew, the population could no longer be accommodated in safe areas, or all the safe, well-located sites became too expensive for low-income groups (World Disaster Report, 1998).

Any analysis of existing vulnerability must therefore include the identification of processes, which may have caused a vulnerable condition to occur (Disaster Awareness Program, 1997; von Kotze and Holloway, 1996). In general then, it can be said that urban development can increase disaster susceptibility in a number of ways (Stephenson, 1991):

- Cities are mostly associated with naturally risky locations such as sea coasts and flood plains because such places also confer important benefits and some times its because mostly, it's the open space available.
- The physical process of building cities often creates or exacerbates existing environmental risks, for instance, paving over water sheds reduces infiltration, speed runoff and increases flood volume.
- The built environment is continuously “wearing out” but the rate of urban replacement rarely matches the rate of urban obsolescence.

Certain vulnerability theorists have attempted to illustrate the way in which different structures operate on various levels to create and maintain vulnerability through the use of a model. One such model is the Disaster Pressure-Release Model (Blaikie, *et al*, 1994). The model is a relatively simple construction for showing how disasters occur when natural hazards affect vulnerable people. The basis for the Disaster Pressure-Release model is that a disaster is the intersection of two opposing forces: those processes

generating vulnerability on one side and the physical exposure to a hazard on the other (Wisner, *et al.*, 1994).

The progression of vulnerability

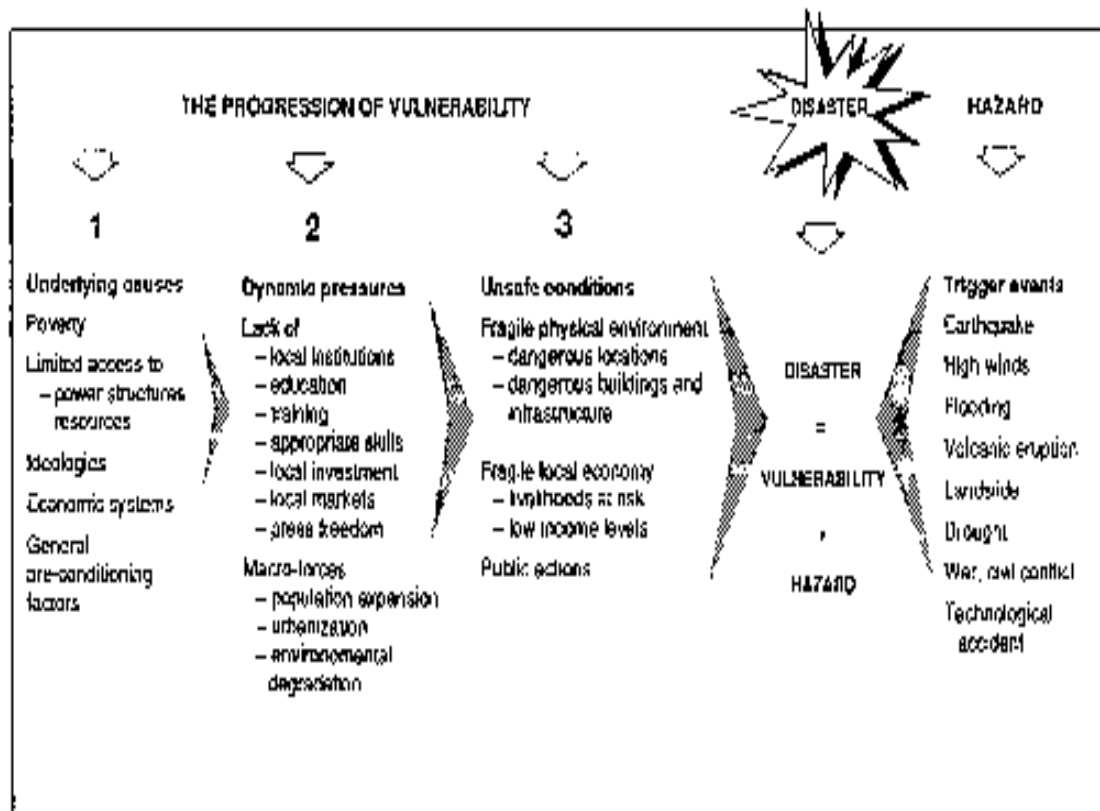


Fig 3: 'Pressures' that result in disasters: the progression of vulnerability (Source: Wisner, *et al.*, 1994).

Pelling (2003) relates to the above model by reflecting on the importance of the social infrastructure of a neighbourhood or city in reducing disaster risk. According to Pelling (2003), it is important to unpack the social dimensions of vulnerability, to find out what it is that makes certain individuals more or less prone to the negative impacts of environmental shock and stress, and from this position, to identify those attributes that might best be assembled to build resiliency in the face of future environmental hazards.

It is argued that the susceptibility of an individual or group to risk is understood to be an outcome of their access to economic, social, political, physical and environmental assets. “The asset profile of an individual or group shapes the likelihood of them being exposed to, but also their capacity to cope with any negative impacts of environmental disaster” (Pelling, 2003:67).

It is furthermore argued that disaster risks accumulate historically through inappropriate development interventions (UNDP, 2004). In other words, disaster risk is intimately connected to processes of human development. For instance, every bridge that is washed away in a flood began as a development activity. “Urbanization and the concentration of people in hazard prone areas and unsafe buildings, increases in poverty that reduce the human capacity to absorb and recover from the impact of a hazard, and environmental degradation that magnifies hazards such as floods and droughts, are only few examples of how development can lead to disaster risk” (UNDP, 2004:9).

Disaster risk is, as a result, increasingly of global concern and its impact and actions in one region can have an impact on another (UNISDR, 2004). These risks are further compounded by increasing vulnerabilities related to changing demographic, technological and socio-economic conditions, unplanned urbanization, and development within high risk zones, climate variability, environmental degradation and the impact of epidemics such as HIV/AIDS, points to a future where disasters could increasingly threaten the world’s economy, its population and the sustainable development of developing countries (UNISDR, 2004).

Even though disaster risk is of global concern, it must not be seen to be inevitable. During the World Conference on Disaster Reduction, there was an emergence of an international acknowledgement that efforts to reduce disaster risks must be systematically integrated into policies, plans and programs for sustainable development and poverty reduction and be supported through bilateral, regional and international cooperation, including partnerships (UNISDR, 2004). Sustainable development, poverty reduction, good governance and disaster risk reduction are mutually supportive objectives, and in order to meet the challenges ahead, accelerated efforts must be made to build the necessary capacities at the communities and national levels to manage and reduce risk (UNISDR, 2004).

2.3. Critical Disaster Risks in Urban South Africa

2.3.1 Flood risks

Much of the literature on disasters emphasize that floods are the most universally experienced natural hazards, which tend to be larger in special impacts and involve greater loss of life than other disasters (Blaikie, 1994). Throughout the history of mankind, floods have brought untold wealth and prosperity to civilization and at the same time, they have caused tremendous losses and resulted in untold suffering for millions of people (UNISDR,2004). Flood disasters are destructive of life, not only through drowning and indirect injury, but also because of associated diseases and loss of properties. These types of events occur when a river flows beyond its usual banks, causing damage to property and killing people. These types of hazards can arise from

abnormally heavy precipitation, dam failure, rapid snow melts, or even river blockages (UNISDR, 2004).

According to Blaikie *et al.*, (1994), the crucial point about understanding why disasters occur is that it is not only natural events that cause floods. They are also the products of the political, social and economic environment into which a 'flood' event is located. It is argued that poverty for example, is the single most contributor to disasters in both urban and rural areas (Disaster Management Guidelines, 1990). People, who are vulnerable to disasters all over the world, especially poorer countries, are largely poor. These people build their houses in disaster prone areas mainly because they do not have money to acquire suitable land and houses. Their houses are mostly constructed from corrugated iron, cardboard and often do not have foundations. When disasters such as floods occur, people living in these areas are affected badly (von Kotze and Holloway, 1996). Other reasons why flood disasters occur include the manner in which assets are distributed between different social groups and various forms of discrimination that occur in the allocation of welfare (Blaikie, *et al.*, 1994).

Flood disasters are universally known for resulting in loss of human life, damage to properties, loss of valuable assets and disruption of livelihood (Blaikie, *et al.*, 1994). These are seen to be the most dramatic direct result of flooding. Flood disasters also cause thousands of rand of damage especially to the government that have to give aid

to the affected communities. As stated in Alexander (1993), floods alone can account for 40% of the total for all damage caused by hazards.

In Japan, it is argued that the investment in the prevention of flood disaster is currently more than 200 billion yen a year. There are also health-related consequences caused by floods. This includes diseases like cholera, malaria or colds. All these can be prevented by effective mitigation and preparedness measures. There is therefore a need for integration of different organizations and various interventions to manage disasters effectively and to plan the preparedness measures. Focused efforts are therefore required to reduce the risk of flooding on societies. “Flood forecasting and warning systems, data collection systems, flood plain management practices and land use planning, as well as economic and social measures can be adopted within an integrated framework to lead to sustainable solutions” (UNISDR, 2004:6)

2.3.2 Informal dwellings and fire risks

Disasters associated with fires in poor urban areas, where informal settlements are densely located, are disasters waiting to happen, unless effective disaster risk management is implemented. Potential fire hazards in overcrowded urban apartment buildings with faulty or inadequate fire-prevention are also areas of concern (Department of Constitutional Development, 1998).

Fires constitute a major hazard in the squatter settlements, much as they did in colonial times. Fire is another everyday hazard in many communities. In most years, most cities

experience several major fires that consume hundreds of houses and small businesses at a time (Mitchell, 1999). It is argued in many studies that there is direct correlation between population density and fire frequency. A combination of hazardous materials, congested living spaces and narrow streets is involved in most fires (Mitchell, 1999).

In most cases, the causes of fires are the same. The provisional huts of *estera mats* in Gujarat, although never seen as permanent, are frequently lived in for extended periods while resources are accumulated for more durable housing materials constructed of adobe or brick (Oliver-Smith, 1999 from Mitchell, 1999). The *estera mats* are flammable and kitchen mishaps with kerosene stoves frequently ignite these fragile dwellings, quickly consuming the hut and all its contents and spreading to all huts built close by (Oliver-Smith, 1999 from Mitchell, 1999).

Furthermore, beside household fires, no continent is entirely free from wildfire hazards. Wildfires occur mostly during winter from the early May to late September, for instance in Africa, especially before the first spring rains. In general, high temperatures, windy weathers and period of vegetation growth provide the most dangerous conditions (Smith, 1996).

2.3.3 Health risks

“All the categories of class, race, gender and ethnicity, which differentiate privileges and oppressions, also affect vulnerability...Exploited and stressed individuals and populations are at greater risk of emerging and resurgent diseases. In addition, because they cannot

avoid exposure to unsafe conditions in their social or physical environments at home or at work or play, they are often constrained by circumstances into unwanted and unsafe choices and offered limited access to therapeutic interventions” (Wilson, *et al.*, 1994: 334-5; cited in Hewitt, 1997).

Congested populations are mostly at risk of spreading contagious diseases. In epidemics, the dangers tend to be worse for urban populations, the disease more readily passed among them or having more concentrated impacts (Hewitt, 1997). This is related to rapid urbanization that can overwhelms sanitation systems and medical care, which, at the end of the day leads to some diseases.

Infectious diseases, some of which are preventable and curable are the greatest cause of morbidity and mortality on the global scale. The global trend towards urbanization, with many of the fastest urban growth rates being recorded in the poorer countries of the world, has been cited as the major factor in the increased frequency of many infectious diseases (Middleton, 1995). In most cases, many of the diseases are associated with water. One of the common epidemics is cholera.

Cholera is caused by a bacterium called *vibrio* which can survive outside the human gut in such environments as water, moist foodstuffs, human faeces and soiled hands, all of which can act as media for its transmission (Middleton, 1995). Although it may be possible to prevent totally the emergence of new cholera strains and the cyclic spread of the disease, there is no doubt that the introduction of basic sanitary measures, the

provision of safe drinking water and the promotion of less crowded living conditions in developing countries would do a great deal towards limiting the spread of this often disease. It is the lack of these basic provisions that make cholera a common killer in many countries (Middelton, 1995).

AIDS on the other hand is caused by the human immunodeficiency virus (HIV). The disease is transmitted through sexual intercourse, or by blood from an infected person being introduced to another through shared needles, or use of contaminated blood products (Blaikie, 1994). Inadequate precautions in the sterilisation of needles and surgical instruments, as well as in screening blood from blood donor services all increase the risk of contracting AIDS by means other than sexual intercourse. For these reasons, people in countries with a poor medical infrastructure are at greater risk of contracting AIDS (Blaikie, 1994).

There are a number of co-factors, which are thought to be associated with increased rates of HIV. Firstly, many respond to AIDS, with accusations and counter allegations to those infected with the virus. Fear of the disease has led to coping mechanisms characterised by denial (Urban Health and Development Bulletin, 2000). This ranges from denial of the disease's existence, to acceptance but denial of personal risk. The most unjust manifestation of fear has led ultimately to denial of the human rights of others.

The epidemic has been typified by homophobia, xenophobia and otherising—"it only happens to people who have multiple sexual partners, sex workers, and so on" (Urban

Health and Development Bulletin, 2000: 16). This false sense of security cushions one's feelings of personal vulnerability and risk (Thomas and Crewe, 2000). The long period of invisibility before the onset of AIDS and the renaming of AIDS itself into the diseases that manifest opportunistically, have facilitated denial. Poverty, social dislocation and gender inequality all fuel the spread of the epidemic (Thomas and Crewe, 2000).

These factors, together with the complex information necessary to communicate, such as the difference between HIV and AIDS, the mechanisms of the immune system, and reproductive biology makes communication around the diseases a 'Herculean' task (Urban Health and Development Bulletin, 2000).

The world at large is certain to experience severe consequences arising from the AIDS epidemic. South Africa is no exception in this case. Over 3 million people are currently estimated to be HIV infected, and the number is projected to more than double over the next decade-unless major behavioural changes are adequately promoted and realized. Younger people are most severely affected by the disease with around 60% of all adults who acquire HIV becoming infected before they turn 25 (Thomas and Crewe, 2000).

Younger women are particularly vulnerable. They are at greater risk of infection due to biological, social and economic factors; they are also vulnerable to the various effects of the epidemic. Orphans are perhaps the most tragic and enduring legacy of the HIV/AIDS epidemic (Thomas and Crewe, 2000). By 2005 in South Africa, there are expected to be

around 800 000 orphans (under age 15). This figure will rise to more than 1, 95 million in 2010.

The sharpest economic effect of the South African epidemic will probably be on wealth distribution rather than on the size of the economy as a whole. In the field of human and social development, however, the consequences are expected to be much more profound. Increased illness and deaths, and reduced life expectancy, will clearly compromise development objectives, while the survival of the poor household will be made more difficult (Thomas and Crewe, 2000).

One of the most obvious economic consequences of the HIV/AIDS epidemic is the need for increased resources to care for the sick and dying. Both the public and private health sectors will be seriously affected. Projected expenditure will almost certainly not be sustainable, given public and private sector affordability constraints (Thomas and Crewe, 2000).

2.4 Relative impact of disasters on the social order

In disasters risks, from floods to fires or epidemics most members of low-income groups are killed or injured disproportionately. The victims of disasters experience disasters as overpowering, violent and destructive events that leave lasting wounds in people, and the environment. Disasters stay alive in the mind of the victims, long after the visible and physical phenomena have subsided (World Disaster Report, 1998). The wounds caused by disasters are many and varied, they are not only physical, economic and social damages that have to be repaired and compensated, but there are also legacies that may

continue all during the recovery process and beyond (Disaster Awareness Program, 1997).

Many disasters cause changes in community composition: through evacuation, disappearance, death, new roles and resettlement. Homecoming is not a return to the known social unit but to a changed community. Secondly, there are changes in attitudes: the group as a whole and the individuals in the group has memories of the events, of the losses that influence their behavior and priorities. The process of recovery then, includes mourning, grief and dealing with losses (Disaster Awareness Program, 1997).

The destruction of property from disasters may leave longer scars on the communities involved (Bryant, 1991). From previous researches done, respondents argue that the worst aspect from disasters was losing personal belongings, properties which had some sort of link to dead parents, children or even friends (Bryant, 1991). It is in all this of utmost importance that vulnerability assessment and reduction be of high priority.

2.5 Informal settlement risk in South Africa: Context and legal parameters

Many inhabitants of South Africa live in an environment that is harmful to their health and well-being. Communities live in informal settlement in many parts of the country that are particularly vulnerable to environmental hazards. These can be as a result of the nature of and location of the settlement itself or from external threats which comes from outside of the settlement (Napier, 2002). Inequalities in the distribution of wealth and resources, and the resultant poverty, are among the important causes as well as the result of environmentally harmful practices (NEMA, 1998).

Informal settlements have emerged around the country during the last few years. A number of these settlements have grown to very large proportions over large tracts of land, which creates severe problems during fires and heavy rains (IDMC, 1995). Dwellings are normally erected in a hap-hazard fashion with little regard to firebreaks, roads, flood lines, or any other kind of orderly planning. Basic services and infrastructure, for instance water, sewerage, electricity and even telephone systems are normally not present (Mitchell, 1999). Materials used for building informal dwelling units range from iron and wood to cardboard, plastic sheeting and any other item that could provide shelter. No foundations are constructed and floors consist largely of some sort of covering over the bare earth (McCall, *et al*, 1992). No area better demonstrates these than Alexandra Township, the area that provides a stark contrast to its neighbour Sandton, surely one of the wealthiest areas in Gauteng.

Urban policies in South Africa in the 1940s were to control “non white” access to any residence in urban areas. Groups of migrants from rural areas or outlying peri urban zones set up illegal shack communities on vacant land as near to jobs as they could get (Mashabela, 1990). Squatters and shack dwellers even fell outside the meagre attempt by townships to supply water, sanitation, electricity, drainage, roads, traffic regulation and health services. Spatial apartheid produced extreme densities and hence subdivision of structures for relatives or even rentals (Wilson and Ramphele, 1989).

This spatial pattern of extremely dense urban settlement with insufficient services has led to critical health and safety hazards for Alexandra Township residences. In addition to public health, fire and traffic hazards, these areas often become the site of illegal dumping of hazardous waste (SAHRC, 2001a). Flooding, mass wastage of slopes and air pollution due to the use of mineral coal fires for warmth and cooking where electricity is commonly absent or unaffordable are also common hazards. Alexandra Township present an extreme case of apartheid urbanization. The hazard of flash flooding has to be seen in the context of deeply rooted patterns of vulnerability as well as history of distrust of attempts by technicians to mitigate this hazard (Wisner, 1999).

The Jukskei River in Alexandra Township is the embodiment of poverty. Thousands of poorly constructed shacks line its banks, some dangerously close to the water, and the river is generally regarded as a health hazard (www.iol.co.za). The residents are exposed to continual hazardous conditions and many children suffer from malnutrition (SAHRC, 2001a). High unemployment and unsanitary conditions result in circumstances, which make people extremely vulnerable to any added stress or shock. Low unreliable incomes mean that people have little protection and are unable to recover if they are exposed to a hazard. During rainy seasons, it is always feared that because of erosion by the river along the heel of the bed, the riverbanks will be in jeopardy of caving in and collapsing at any time (Goosen, 1994).

The population estimates of Alexandra are between 200 000 and 440 000 (345 000 registered residents plus 45 000 squatters), living under distressing environmental and

socio-economic conditions (Motsepe and Perry, 2000). The levels of unemployment in Alexandra are estimated to be around 50%, further, exacerbated by political disturbances and unrest that led to disruptions in schooling (Alexander, 1994b). Alexandra has a population, which is characterised by a shifting, and continual ebb and flow of people to and from the township, which makes it difficult to understand their pattern of social well being (Motsepe and Perry, 2000).

Using aerial photographs and household sampling, it has been calculated that a flood of the Jukskei River with a recurrence interval of 50 years could destroy nearly 900 informal settlements, endangering between 4400 to 10 500 people depending on one's estimate of family size per shack (Goosen, 1994). Another similar exercise found 1235 shacks below the 50 year flood line and a total of from 4940 to 7400 people exposed to risks (Goosen, 1994).

On the other hand, current estimates present an alarming picture of rapidly increasing HIV infections and significantly increasing numbers of people becoming ill and ultimately dying from AIDS- related illnesses in Alexandra Township (Motsepe and Perry, 2000). A study conducted in 2000 by IUPHC indicates that 13% of the ante-natal attendees and 18% of STD patients are infected with HIV in Alexandra Township. Such estimates generally present an alarming picture of rapidly increasing HIV infection, a significantly increasing number of people becoming ill and ultimately dying from AIDS related illnesses (Motsepe and Perry, 2000).

The above reflects that there are wide ranges of environmental health concerns in Alexandra Township. For instance, issues of housing, surface water quality, access to piped water, lack of adequate flush sanitation, indoor and ambient air pollution, food safety, HIV & AIDS and others are major environment and health concerns in Alexandra Township.

2.6 Legal Parameters for disaster risk reduction in South Africa

The levels of disaster risk are on an increase in South Africa (NDMF, 2005). The country is exposed to a wide range of hazards that can trigger widespread hardship and devastations. In addition to the natural and man-made threats and despite ongoing progress to extend essential services to poor urban and rural communities, large numbers of people live in conditions of chronic disaster vulnerability-in undeserved, ecologically fragile or marginal areas-where they face recurrent natural and other threats that range from drought to repeated informal settlement fires (NDMF,2005). Such severe threats profiled the urgency for legislative reform in the field of disaster risk management, stimulating a consultative process which resulted in the Green and White paper on Disaster Management. These important discussion and policy documents afforded opportunity for consultation with multiple stakeholder groups and provided platform for development of draft legislation that was consistent with emerging international trends in disaster risk reduction (NDMF, 2005).

The above mentioned efforts with regard to disaster risk management reform by government and a wide range of stakeholders were reflected in the promulgation of the Disaster Management Act (Act 57 of 2002) on the 15th of January 2002. The act recognizes the wide-ranging opportunities in South Africa to avoid and reduce disaster

losses through the concerted energies and efforts of all spheres of government, civil society and the private sector. Furthermore, the act acknowledges the crucial need for uniformity in the approach taken by such a diversity of role players and partners (NDMF, 2005).

The Act provides for:

- An integrated and coordinated disaster risk management policy that focuses on preventing or reducing the risk of the disasters, mitigating the severity of disasters, preparedness, rapid and effective response to disasters and post disaster recovery.
- The establishment of disaster management centres in all three spheres of government
- Disaster risk management volunteers.

The Disaster Management Act (Act 57 of 2002) specifies the National Disaster Management Framework as a legal instrument to address such needs for consistency across multiple interest groups, by providing a coherent, transparent and inclusive policy on disaster management appropriate for the country as a whole (NDMF,2005). This legal instrument recognizes a diversity of risks and disasters that occur in southern Africa, and gives priority to developmental measures that reduce the vulnerability of disaster prone areas, communities and households. Furthermore, in keeping with the international best practice, the framework places explicit emphasis on the disaster risk reduction concepts of disaster prevention and mitigation as the core principles to guide disaster risk management in South Africa (NDMF, 2005).

The National Disaster Management Framework calls for Disaster Management Centres to establish the necessary capability to generate an Indicative Disaster Risk Profile and to maintain the profile's dynamic character by continuously monitoring and updating it. This risk profile must include maps that represent priority disaster risks affecting the country, as well as consolidated information on recorded losses for specific threats in different provinces (NDMF, 2005). In this context, Geographic Information System represent a powerful tool for spatially representing hazard, vulnerability and consolidated risk information. The process of auditing and compiling information must be inclusive. Specialist research units, private sector partners, government departments and committees, and other sources for relevant scientific reports and data on hazard and vulnerability patterns must be contacted. There must also be consultation with NGOs, CBOs and traditional authorities on historical and changing patterns of risk (NDMF, 2005).

The profile must however, take into account the unevenness in the quality of available hazard and vulnerability information in the country and the dynamic nature of the risks they describe. Establishment of such a national profile will lead to more detailed risk investigations being done at the provincial and local level (NDMF, 2005). The NDMF further addresses the need for conducting ongoing disaster risk assessments and monitoring to inform disaster risk management planning and priority setting, guide disaster risk reduction efforts and monitor the effectiveness of such efforts.

2.7 The relevance of a Disaster Risk Profile for Disaster Risk Reduction

As depicted above, much of the world's population is concentrated in urban areas along rivers, coastal regions and geological hazards (IDNDR, 2000). Vulnerability to natural hazards is increasing as people migrate to areas which are subject to cyclones, fires and others. Inappropriate new development continues to expand into hazard-prone areas such as low-lying coastal areas, flood plains, steep slopes and bushfire-prone urban/rural fringes, despite the development of land-use planning guidelines and building design standards and codes. Due to this, there is a need to promote and support the development and implementation of appropriate mitigation strategies and warning systems (IDNDR, 2000). This can only be achievable in the long term if there is a system in place for a data base that, if rigorous enough, can enable the detection of trends of disaster incidents in a certain area and demonstrate the extent of the problem.

Such databases are not only vital for identifying trends in the impacts of disasters but also in assisting in vulnerability identification and enhanced tracking of the relationships between development and disaster risk (World Disaster Report, 2005). The derived information is vital in rationalizing decision-making for disaster preparedness, as well as providing an objective base for vulnerability assessments and priority setting. For instance, it allows one to decide whether floods in a given area are more significant in terms of its human impact than earthquakes or whether a district is more vulnerable than a neighboring district and what is driving or causing such risk (www.desinventar.org).

One of the factors that plays a very important role in preparing effective counter measures against future disasters is disaster history, including what measures were taken

to deal with the incident, what was the scale of the disasters, how effective or ineffective were the intervention measures designed to mitigate disasters and what were the lessons learnt from the experiences. “Compiling a data base of disasters that have occurred in the past decade, will be a valuable asset in the next century” (IDNDR, 2000:5).

At a very fundamental level, knowledge of the vulnerability to different types of disasters is necessary for the most effective relief and planning (www.desinventar.org). The usefulness of a disaster inventory and database as a tool in disaster risk reduction has become increasingly evident to many government and international agencies engaged in disaster relief as well as in mitigation and prevention programmes (www.desinventar.org). Furthermore, the database helps to serve the purposes of humanitarian action at national and international levels. For instance, it can help as an empirical base of information that can be useful for projects and research within organizations.

A disaster inventory can be a formidable tool in the hands of local authorities, which can present proof of the magnitude of disasters in communities, proof that can be used to force the adoption of policies and legislations oriented to implement risk mitigation and disaster prevention initiatives. It can also provide the figures of losses and damages that are needed to prove that investing in mitigation and prevention is profitable, in both direct and indirect costs.

From this point of view, the existence of the inventory can be seen as a reduction in the institutional vulnerability of a community, not only giving local authorities a tool to use in the risk mitigation process, but a strategic instrument to deal with central governments

and funding institutions. These organizations, both at national and international levels, are demanding more and more exigent requirements to justify investments and the data itself along with the results of the analyses performed with an inventory can provide the capability to support proposals and/or funding decisions.

2.8 Disaster Inventories.

2.8.1 DesInventar and MANDISA systems.

Having outlined some of the advantages and disadvantages of a disaster risk inventory or database, attention now turns to two such systems that have been developed in South Africa and Chile. The first system is Desinventar in Chile. This is a conceptual and methodological framework about disasters of any magnitude (big, medium or small), generated by natural or technological phenomenon ([www. Desinventar.org](http://www.Desinventar.org)).The system has been used in Chile for some time. It proposes the use of historical data on the impact of disasters that is collected in a systematic and homogenous manner to be used in the process of identifying hazards and vulnerabilities and thus risks in regions. A special emphasis, when using this system, is made in the accounting of small and medium disasters, which uncover in many cases hazards and vulnerabilities that could be otherwise hidden (Serje, 2002).

The Desinventar system's objective is to create disaster inventories and have the capacity to analyze and represent hazards; vulnerabilities and activities that go from mitigation to post disaster attention and recovery. Databases (records including post and present disasters), that are accumulated through the use of Desinventar System, are very critical

in the evaluation of vulnerability and risk growth (Serje, 2002). Even in developed countries, the importance and need of collecting systematic and homogenous data about disasters is being recognized. For instance, the natural hazards Caucus delivered a report to the United States Congress called A National Priority: Building Resilience. The report focuses on how congress can help reduce the country's vulnerability to hazardous events and outlines specific areas that need the attention of legislators (Serje, 2002). These include:

- Developing a continually updated database of losses from natural disasters.
- Obtaining data on the cost-effectiveness of mitigation
- Improving early warning and emergency response.
- Fostering long-term recovery by improving coordination across government and other agencies.
- Focusing on disaster prevention as well as response
- Increasing the reliability of critical infrastructure.

In order to ensure that data bases are accessible, useful and rigorous, a number of criteria are required, namely:

- All inventories must use the same variables to measure the effects and the same homogenous and basic classification of events
- The information compiled and processed must be entered in a scale of time and at a geo-referenced spatial level.
- The inventories should be analyzed with system tools, which are a basic requirement in comparative research and to support decision making processes related to mitigation actions and risk management as a whole (Serje, 2002).

The sources of information for the Desinventar system may however vary (LA RED, 2002). The information includes data supplied by national or regional governmental bodies, information agencies and pre-existing databases. The Desinventar database usually has 56 fields of information that include, but are not limited to:

- Name of geographical area
- Source of information
- Duration of the disaster
- Missing persons
- Description of the source
- Number of deaths
- Number of homes destroyed
- Effect on sewer system
- Losses in local currency

It must be noted that the system enables users to also add new fields, depending on their areas of interest and to give more details of an event. (La Red, 2002). Some of the definitions of the fields that are entered when using the Desinventar system are:

- Death-this corresponds to the number of people killed as a direct result of the disaster, either immediately or some time subsequently.
- Number missing-number of people whose whereabouts are unknown as a result of the disaster. This includes people presumed dead but for whom there is no physical evidence.

- Affected- Number of people suffering indirect or secondary effects associated with a disaster (shortcomings in provision of public services, shops and work, as well as isolation).
- Homes destroyed- Homes leveled, buried, collapsed or deteriorated to such an extent that they are no longer habitable.
- Source of information- this field is used to record the source(s) from which the information is obtained.

Several countries, including those from like Latin America, have adopted this system and they seem to be successful (Serje, 2002).

In South Africa, similar efforts have been undertaken to create a disaster inventory database. In November 1997, a pre 'Periperi' consultation took place in Cape Town of potential partners to discuss the establishment of a southern African network on disaster risk reduction. In addition to participation by non-governmental organizations and universities from across southern Africa, there was also attendance by representatives from USAID/OFDA and La Red, Latin America's network on risk reduction (Mandisa Report, 1999). The outcome of the presentation was the formulation of the MANDISA system (Monitoring, Mapping and Analysis of Disaster Incidents in South Africa). According to Serje (2002), MANDISA is another disaster inventory instrument, adapted from Desinventar that has been developed and applied in parts of South Africa by the PeriPeri network. The system is being used for the construction of the Cape Town disaster profile.

The main aim of Cape Town efforts is to develop strategic intelligence capacities in the field of disaster risk reduction (MANDISA project proposal, 2001). The system permits the storage of data for the construction of inventories in a standard and homogenous manner. The MANDISA data-base was informed by four major considerations. These were the conceptual framework for understanding disaster risk in South Africa, prevailing international literature on hazards and vulnerability and field reports provided by MANDISA researchers.

The conceptual framework for the MANDISA data-base incorporated several critical departures from DesInventar. In the MANDISA conceptualisation, disaster risk = hazard x vulnerability of elements at risk. Therefore, data fields were included for the likely hazards facing South Africa, specifically the Western Cape. Choices of specific disaster types were shaped by published and unpublished literature, but focused mainly on fires, floods and drought. It also incorporated a detailed list of ‘contributing risk factors’ which affect disaster impact (thus incorporating the vulnerability elements). Recognizing that disaster losses are multidimensional, MANDISA incorporated a range of impacts, including human losses, infrastructural and environmental impacts. Most prevailing disaster data-bases focus primarily on deaths, injured and affected people, infrastructure destroyed and economic loss (www.egs.ac.za).

The systems of MANDISA and Desinventar are also designed as supporting tools for the understanding of disasters as ‘events’ recurring in everyday relations between the dynamics of the society and their technological advances and those of nature. In these systems, data as well as other indicators such as the number of people whose homes were

destroyed during incidents and other kinds of disasters are taken into account. These efforts are trying to move away from databases that have been used in tracking disasters solely derived from international assistance agencies or reinsurance claims. It is against this detailed overview that the Alexandra data are compared.

2.9 Summary

This chapter has provided a theoretical background on disaster risks, their causes and consequences associated with injuries, loss of assets and illnesses that may be felt for years. It has further emphasized significant causes of disaster risk and how it can be linked to development and vice versa. Vulnerability from the perspectives of exposure, resistance and resilience, have also been examined. Further on, the chapter has reflected on the Disaster Inventories, which were used as base models for this study: i.e. DesInventar and MANDISA inventory systems. Legal parameters for disaster risk reduction (Disaster Management Act (Act 57 of 2002) and the National Disaster Management Framework) pertinent to the South African context were looked at. Inherent challenges in developing the disaster database/inventory are also discussed in this chapter.

CHAPTER 3

3.1 Research Methodology

The two inventory systems, as illustrated in chapter 2, have been developed in South Africa and Chile and have been used as templates to inform this study. The main objective of the DesInventar system (developed and widely used in Chile), is to create inventories and have the capacity to analyze and represent hazards, vulnerabilities and activities from mitigation to post disaster attention and recovery. MANDISA (adapted from DesInventar) correspondingly is aimed at developing strategic intelligence capacities in the field of disaster risk reduction. Both systems permit the storage of data for the construction of inventories in a standard and homogenous manner. Both systems are very comprehensive and the intention here was to examine the degree to which a similar system could be compiled for Alexandra Township. In an effort to gather data for the study and for the creation of a disaster inventory for Alexandra Township, a range of qualitative and quantitative research methods were used.

Firstly, the international and national literature surrounding disaster risk is reviewed in order to examine the changing perspectives on vulnerability, hazards, and risk reduction. A review of this literature allows the researcher to have a broader understanding of how “disasters” and “risks” are dealt with at different levels and by different institutions. A review of such literature further helps in analyzing and finding out how and what constitutes a comprehensive disaster risk profile/ inventory at all levels and for different institutions and organizations (internationally up to locally).

Secondly, previous studies, secondary literature, various theses and reports that were undertaken with relevance to Alexandra and other areas, are examined as part of the literature reviewed in order to see what was done previously concerning disasters and risks around the area. Such sources also provide a basic context from which a disaster profile can be initiated. In addition to these, local newspapers, reports of local agencies, records of local governments, data bases of relevant role players for instance, brochures about Alexandra Township are also taken in to account.

Thirdly, for Alexandra Township, data are identified from a variety of sources including the City of Johannesburg Disaster Management Centre, newspaper clippings, Red Cross, fire fighters' documents, Alexandra clinic, South African Weather Services, press agencies and others. These data provide a preliminary disaster risk profile that enables the identification of hazard and risk types for the area. From such a preliminary assessment, a more detailed investigation can be launched.

Furthermore, data from the City of Johannesburg Metropolitan Municipality Disaster Management Centre are collected in the following manner: Recorded information from the emergency communication centre (part of the Disaster Management Centre) is examined, with a specific focus on fires, floods and cholera. Recorded information is presented in tables and graphs to reflect incidence (i.e. new incidents and year), along with data on dwellings damaged and destroyed. The City of Johannesburg Disaster Management Centre uses the ESS (Emergency Services System) to record the data. The ESS is the most widely used system in South Africa and has been adapted by most

municipalities and even institutions of higher learning and research. This is an extensive system comprising of a number of programs and lines of source code. Its features include but are not limited to:

- Call taking,
- Dispatching,
- Split-call taking and dispatching,
- Incident call completion,
- On-line occurrence book.

All the incidents that took place in Alexandra Township and other part of the Johannesburg Metropolitan Municipality jurisdiction are logged in the occurrence log book. Consultation and interaction with the City of Johannesburg Metropolitan Municipality's Disaster Management Centre officials also provided insights about previous incidents in Alexandra Township in the previous years. The period of investigation is from January, 1991-August 2005. These years were selected because it was during this period that more concerted efforts were made to develop a disaster database. The cut off period was determined by the period used to undertake this research.

Having identified a number of data sources, the following steps were taken. Initial data collection took place from the newspaper articles, libraries, internet and previous research articles that date back to the 1990s. In addition to scoping potential data from the above mentioned sources, disaster relief information was collected from South African Red Cross Society (SARCS). SARCS had grouped these reports in specific 'incident'

envelopes. Several visits to the Alexandra fire station, interaction and consultation with the fire officials, also provided insights about previous incidents in the township.

3.2 Challenges encountered during data gathering

Several problems were encountered when compiling the inventory, some of which are highlighted below. Most of the information sources (i.e. Alexandra Fire Station), did not have the recorded incidents stored electronically. The data are filed as paper records in different places and organizations. From the newspaper sources, financial implications were experienced because the researcher had to pay in the Star offices, hourly for access to data. Some paper-based systems were well organized and others less so. Some data were not sorted or filed chronologically during the keeping/ archiving process. There were some odd pages that could not be linked to a specific incident or even date.

Data were managed differently, with some organizations keeping their records for only a few years. Others did not keep their records according to any kind of system and this further compounded data collection. Moreover, past records were often archived in different locations, all with slightly different administrative systems. Such discoveries critically highlighted the practical requirements for systematically collecting and compiling primary paper reports from a wide range of sources.

Furthermore, the data from the COJDMC is for all incidences that were reported within their jurisdiction as a whole. The researcher had to extract data for Alexandra from a much larger data set. Their collection further dates back only a few years ago (in keeping

with the new Disaster Management Act, 57 of 2002). The Alexandra Township Fire Station also started to operate within the township from 1999 and as a result their data dates back only from 1999. This has led to the reliance on only a few sources, of which accuracy and quality cannot be guaranteed. Moreover, most of the data sources did not record the costs associated with a specific event. The information only reflected the relief measures taken by the City of Johannesburg. Dates were also very confusing. In some cases, it was not easy to determine or establish the exact date of the occurrence of an incident such as floods. As a result, registered dates of incidents varied between sources. Some information did not have dates at all. Data are just filed in years. This will make it very difficult in future to establish trends and recurrences.

Despite the above mentioned difficulties during data gathering, the researcher received considerable support from the services, institutions and organizations contacted and in most cases, the researcher was given access to the data. Despite the caveats stipulated, the data enabled a “first-cut” overview towards a comprehensive disaster inventory for Alexandra Township.

Furthermore, economical costs and disaster losses (i.e. value of the damaged properties and resources, financial costs to the municipality/government) associated with the incidents are not in most cases reflected and as such, this remains critical for appropriate intervention and development efforts to effectively reduce risks. Such a scenario precludes reliable and useful appraisals of the economic sensitivity of disasters/incidents and their links and relation to development. Furthermore, it was difficult to get statistical

information on HIV/AIDS due to confidentiality. As a result of this, trends and patterns on HIV/AIDS are not included in this report.

3.3 Summary

A range of research methods that were used to collect the data for the purpose of the study are outlined in this section. The chapter also reveals some of the challenges that the researcher was faced with during the data collection process from different sources and institutions. In chapter four, the information collected from relevant disaster inventories are outlined and critically analysed.

CHAPTER 4

4. Research Findings and Analysis

4.1 Disaster Inventory for Alexandra Township: 1991-August 2005

In many contexts around the world, there are few or no standard and representative data suited to formal risk assessment (Hewitt, 1997). Valid and systematic information on risk of disasters and their human impact has not been available for planning emergency relief and preparedness within development programmes. A comprehensive data bank of disaster occurrences over time can give an indication of the frequency of a particular disaster, so that we can begin to ensure effective disaster risk reduction (www.desinventar.org). For instance, Msunduzi River in Pietermaritzburg, usually has annual floods and if historical data are available these can assist the analysis flood risk, peak rainfall events and other seasonal, temporal and spatial dimensions of disaster risk (IDMC, 1995).

In cases where historical data are available, the quality is questionable as is comparability. More often than not, information is available in fragmentary bits from different sources (CRED, 1994). For instance in South Asia many people are killed, affected and made homeless by disasters with natural and non- natural triggers.

During the early 1990s, on average, 56% of those who died were killed by disasters (Ariyabandu, 1999). This is due to the subcontinent's large population, its exposure to a wide variety of hazards, and its population's high level of vulnerability to those hazards.

Official statistics documents the loss of life and damage caused by disasters as the indications of their impacts (Ariyabandu, 1999). The statistics only reveal the ‘tip of the iceberg’. The full impact of disasters, including their impact on lives and livelihoods, is evident only in the long run and cannot be quantified in financial and economic terms alone.

The limitations of official statistics are obvious from the criteria used to define disasters. For instance, the criteria for an entry in the records used to compile the International Federation of Red Cross’s annual report are ‘ten deaths, and/or 100 affected, or even an appeal for assistance’ (Ariyabandu, 1999). Smaller- scale disasters therefore do not enter the records, do not make the headlines, and pass unnoticed yet, they are substantial in number and impact. Facing disasters daily is a way of life for many vulnerable communities around the world (Ariyabandu, 1999). This lack of a fundamental management tool has been to the obvious detriment of effective relief and mitigation, both at international and national levels (Mitchell, 1999).

The same applies to Alexandra Township where there is a lack of systematic, homogeneous and compatible records of disaster typologies for the Township, usually encountering small to medium scale disasters (Kelso, 1999). A large volume of useful information is also dispersed. As a result, numerous small- and medium-scale events are often ignored or remain hidden. It is therefore difficult to establish trends and recurrences of such incidents.

Efforts are carried out in this study to begin to create an inventory for incidents/disasters that have occurred Alexandra Township over the past few years. The core reason is to try to move away from databases that have been used in tracking disasters by only deriving information from international assistance agencies or reinsurance claims instead of ensuring that daily events are also captured. Such data moreover should contain evidence of some of the factors driving risks in the area. For instance, it is argued that a disaster must cause more than US\$1 million in damage or the death or injury of more than a 100 people (Middleton, 1995). Such an absolute approach has disadvantages because every disaster has a different impact on society depending upon the strength of that society to cope with the disaster.

An inventory that is area specific is essential as it could assist national and international programme managers, researchers in Disaster Risk Reduction measures and will hopefully help in sensitising policy makers and programme managers in furthering the preparedness activities. Furthermore, it is hoped that this will highlight the need for better reporting and more accurate data in the future to improve relief and preparedness efforts.

The information below reflects a set of statistics on incidents occurrence and their impact in Alexandra Township for the period January 1991-August 2005. The information is based on the data from several sources including the Alexandra Clinic, Alexandra Fire Station, Sowetan, press agencies, Sandton and Alexandra libraries, the City of Johannesburg Metropolitan Municipality's Disaster Management centre and the South African Weather Bureau Services. The newspapers (press agencies) were a good starting

point in collecting the data because they are the ones that date back to 1991 in terms of information. It must be noted however, that some of the newspaper information from libraries, were just filed by year of occurrence and name of the paper that the information was extracted from sometimes was not shown. As a result, some of the data as reflected below, do not have dates and even the source name. Such data, however, begin to illustrate the gaps and needs for a more comprehensive risk management data base.

4.2 Data collected from various newspaper/media clippings

- The Star (31 August 1992) - 6 people were left homeless after their shacks were ravaged by fire in Alexandra Township
- The Star (27 April 1992) - 11 month old toddler died after the shack she was sleeping in caught fire in Alexandra Township last night. The cause is unknown and the other members of the family are temporarily staying with their neighbours.
- Alex Times (1993, no date and month on the clipping) - 31 shacks were washed away yesterday along the Jukskei River and 432 people were left homeless and lost their valuable belongings.
- Alex Times (1994 no date and month on the clipping) - 400 people in Alexandra Township were left homeless after their shacks were wiped out by fires yesterday.

Private companies provided them with donations and the victims were evacuated to a temporary shelter.

- The Star (15 February 1994) - Jukskei River flooding over leaving 59 people homeless after their shacks were washed away.
- The star (1 January 1995) - 3 children missing after heavy downpours in Alexandra Township along the Jukskei River settlement.
- The Star (1995 no date and month on the clipping) - 27 shacks collapsed in to the Jukskei River after heavy downpours since last week. Temporary shelters have been arranged for the victims.
- The Star (12 March 1995) - Cholera victims, from the Jukskei River Settlement are treated at the Alexandra clinic.
- (1997 no source name, date and month) - 120-15 shacks destroyed by fire in Alexandra Townships after a drunken man left a candle unattended. Fire fighters responded and temporary shelter organized for the victims. 197 people are affected by the incident.
- (1997 no source name, date and month) - “Another cholera incident in Alexandra Township, a wake up call for the local council”.

- The Star (12 February 2000) - Jukskei River dwellers left stranded after their shacks were swept away by heavy rains yesterday. 200 shacks were destroyed and victims were later on housed in tents at the Marlboro Transit camp.
- (2000 no date and month on the clipping) - One child suffered from severe burns at No 19 13th avenue after a shack burnt down. Neighbours donated clothes and corrugated iron to the family.
- (2001 no date and month on the clipping) - Community helped to erect new shacks after three shacks were ravaged by fire at n0 150 22nd Avenue last light. One adult suffered from minor injuries and was taken to the Alexandra Clinic for smoke inhalation treatment.

As can be seen above, these data are a reflection of discrete events and are episodic. Despite usefulness in drawing attention to the events, they are very poor in data pertaining to information on vulnerability and on causes of vulnerability and risks.

The City of Johannesburg Metropolitan Municipality's Disaster Management Centre over the past few years started to collect detailed disaster-incidents data (in keeping with the Disaster Management Act, Act 57 of 2002). According to the City of Johannesburg Metropolitan Municipality's Disaster Management centre officials, their database is based on some important criteria and definitions. They record incident occurrence by the

following fields: Date, Location, Type of incident, Damaged Structure, Fatalities, Injuries, No. of People Affected and Relief measures. The COJDMC record each and every incident that comes through their communication centre. The officials stated further that any incident that needs their response is recorded. Examples of data that have been recorded by the COJDMC are illustrated below.