

**AN INTEGRATED MODEL FOR DISASTER RISK ASSESSMENT FOR LOCAL
GOVERNMENT IN SOUTH AFRICA**

**MALIGA REDDY
20171161**

**Thesis submitted for the degree Doctor of Philosophy in Public
Management and Governance at the North West University**

Promoter: Professor D Van Niekerk

Co-promoter: Professor G Van Der Waldt

2010

ABSTRACT

AN INTEGRATED DISASTER RISK ASSESSMENT MODEL FOR LOCAL GOVERNMENT IN SOUTH AFRICA

M Reddy

PhD. Thesis, Department of Public Management and Administration, North-West University (Potchefstroom Campus).

The intensifying nature and extent of disasters together with the associated devastation and astronomical costs required to manage the rippling effects of disasters, enunciates the national and international focus on disaster risk reduction. Further the ever evolving and complex dynamics of risk as the decisive contributor to disasters has heightened the urgency to pursue effective disaster risk assessment as a prerequisite to inform the disaster risk management planning and disaster risk reduction intervention processes. A structured and systematic approach to disaster risk assessment assists in maintaining rigour thus promoting the quality and validity of the process and its outcomes. Appropriate models serve as valuable tools in enabling this methodological perspective to undertake disaster risk assessment. The non-existence of an appropriate disaster risk assessment model in South Africa has initiated the emphasis and purpose of this study thereby underscoring the critical need for the development of an effective, holistic and integrated disaster risk assessment model for local government in South Africa.

In spear heading the process towards the development of an appropriate disaster risk assessment model, the research commenced with establishing and asserting the fundamental link between disaster risk assessment and disaster risk reduction as an avenue to contextualise and ground the key issues in effective disaster risk reduction.

The exploratory analysis engaged in presenting a theoretical construct of disaster risk assessment examined the core components informing the disaster risk assessment process. This discussion led to the comparative review of three disaster risk assessment models viz the Community-Wide Vulnerability and Capacity Assessment (CVCA) Model, the Community-Based Risk Reduction Model and the South African Disaster Risk Assessment Model interrogating the significant characteristics, structure and application of the models. The results of the comparison of the above three models provided the necessary insight for the development of the disaster risk assessment model for local government in South Africa. Further influenced by the outcomes of the applied research on the critical analysis of the current disaster risk assessment practice within the four selected municipalities representing local government in South Africa; viz eThekweni Metropolitan, Ekurhuleni Metropolitan, Bojanala District and Stellenbosch Local Municipalities. Through the data coding, classification and interpretive process, constructive and correlated research findings were immanent guiding the final development of the integrated disaster risk assessment model for local government in South Africa.

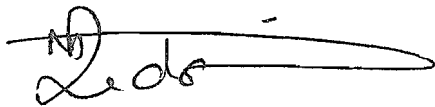
Keywords

disaster, risk, disaster risk assessment, hazard assessment, vulnerability analysis, disaster risk management, disaster risk reduction, disaster risk assessment model, progression of safety, resilience, community participation

DECLARATION

I declare that "An Integrated Disaster Risk Assessment Model for Local Government in South Africa" is my own work, that it has not been submitted before for any degree or examination in any other university, and that all sources I have used or quoted have been indicated and acknowledged as complete references.

Maliga Reddy

A handwritten signature in black ink, appearing to read 'M. Reddy', with a long horizontal stroke extending to the right.

.....
Signature

TABLE OF CONTENTS

	Page no.
Title page	i
Abstract	ii
Declaration	iv
 CHAPTER 1	
 OVERVIEW OF THE STUDY	 1
1.1 INTRODUCTION	1
1.2 ORIENTATION AND PROBLEM STATEMENT	2
1.2.1 Research Aims and Objectives	8
1.2.2 Value of the Research	9
1.3 RESEARCH METHODOLOGY	10
1.4 CONCLUSION	12
 CHAPTER 2	
 INTROSPECTION AND ANALYSIS OF DISASTER RISK REDUCTION	 14
2.1 INTRODUCTION	14
2.2 CONTEXTUALISING DISASTERS	15
2.3 THE EMERGENCE OF THE CONCEPT OF DISASTER	
RISK REDUCTION	21
2.3.1 The shift in focus towards disaster risk reduction	22
2.3.1.1 <i>Disaster Risk Reduction Model</i>	26

2.3.1.1.1	<i>Principles of the model</i>	26
2.3.1.1.2	<i>Characteristics of the model</i>	28
2.3.1.1.3	<i>Challenges confronting the effective implementation of the model</i>	32
2.4	RISK REDUCTION OBJECTIVES	33
2.4.1	Communicating the understanding of vulnerability	35
2.4.2	Analysing vulnerability	35
2.4.3	Focus on Reverse in PAR Model	37
2.4.4	Promoting sustainable development	41
2.4.5	Improving livelihoods	42
2.4.6	Adding mitigation and recovery	42
2.4.7	Extension to culture	43
2.5	CORNERSTONES OF DISASTER RISK REDUCTION	43
2.5.1	Reducing vulnerability through community participation	43
2.5.2	Reducing vulnerability through public policy action	45
2.5.3	Reducing vulnerability through a culture of prevention	47
2.5.3.1	<i>Awareness raising</i>	47
2.5.3.2	<i>Societal arrangements</i>	48
2.5.3.3	<i>Empowerment</i>	48
2.5.4	Reducing vulnerability through risk assessment	49
2.6	CONCLUSION	50

CHAPTER 3

THEORETICAL OVERVIEW OF DISASTER RISK ASSESSMENT	52
3.1 INTRODUCTION	52
3.2 CONCEPTUAL FRAMEWORK FOR DISASTER RISK ASSESSMENT	53
3.2.1 Hazard	53
3.2.1.1 <i>Characteristics of hazard</i>	55
3.2.2 Disaster Risk	58
3.2.2.1 <i>Nature of risk</i>	60
3.2.2.1.1 <i>Choice of action</i>	61
3.2.2.1.2 <i>Outcomes: Probability and Consequence</i>	63
3.2.3 Vulnerability	66
3.2.3.1 <i>The dynamics of vulnerability</i>	70
3.2.3.2 <i>Vulnerability analysis</i>	74
3.3 DISASTER RISK ASSESSMENT	77
3.3.1 Informational needs for risk/hazard decisions	79
3.3.2 The Disaster Risk Assessment process	81
3.3.2.1 <i>Hazard identification</i>	82
3.3.2.2 <i>Estimation of Risk and Vulnerability</i>	84
3.3.2.3 <i>Social consequence evaluation</i>	86
3.3.3 Problems in risk assessment	87
3.4 CONCLUSION	88

CHAPTER 4

EXPLORATORY REVIEW OF THREE DISASTER RISK ASSESSMENT MODELS PROMOTING EFFECTIVE DISASTER RISK REDUCTION	90
4.1 INTRODUCTION	90
4.2 GUIDING CRITERIA FOR EFFECTIVE RISK ASSESSMENT MODELS	91
4.2.1 Political commitment	91
4.2.2 Multi-disciplinary and multi-sectoral approach	93
4.2.3 Adaptability	94
4.2.4 Community participation	96
4.2.5 Resilience	97
4.3 REVIEW OF THE THREE DISASTER RISK ASSESSMENT MODELS	99
4.3.1 The Community-Wide Vulnerability and Capacity Assessment (CVCA) Model	102
4.3.1.1 <i>Underlying Principles of the model</i>	102
4.3.1.2 <i>Characteristics of the model</i>	104
4.3.1.3 <i>Challenges encountered by this model</i>	114
4.3.2 Community-Based Risk Reduction Model	116
4.3.2.1 <i>Main Principles of the model</i>	116
4.3.2.2 <i>Characteristics of the model</i>	117
4.3.2.3 <i>Challenges facing the model</i>	123
4.3.3 South African Disaster Risk Assessment Model	124
4.3.3.1 <i>Key Principles of the model</i>	125
4.3.3.2 <i>Characteristics of the model</i>	126

4.3.3.3	<i>Challenges confronting the model</i>	131
4.4	COMPARATIVE ANALYSIS OF THE THREE MODELS	133
4.5	CONCLUSION	142
CHAPTER 5		
	RESEARCH METHODOLOGY AND FINDINGS	144
5.1	INTRODUCTION	144
5.2	RESEARCH METHODOLOGY AND DATA COLLECTION PROCESS	145
5.2.1	The Quantitative Approach versus the Qualitative Approach	147
5.2.1.1	<i>Maintaining Quality and Validity in the research</i>	150
5.3	RESEARCH FINDINGS	155
5.3.1	Quantitative Research Findings	155
5.3.2	Qualitative Research Findings	162
5.3.2.1	<i>Research Themes</i>	162
5.3.2.1.1	<i>Political Commitment</i>	162
5.3.2.1.1.1	<i>Legal and regulatory framework</i>	162
5.3.2.1.1.2	<i>Political support</i>	164
5.3.2.1.1.3	<i>Institutional framework</i>	165
5.3.2.1.2	<i>Multi-disciplinary and multi-sectoral approach</i>	168
5.3.2.1.2.1	<i>Role-players in disaster risk assessment</i>	168
5.3.2.1.2.2	<i>Relevance of a diverse approach</i>	168
5.3.2.1.2.3	<i>Training and skills development</i>	169

5.3.2.1.3	<i>Community participation and Resilience</i>	170
5.3.2.1.3.1	<i>Need for community participation</i>	170
5.3.2.1.3.2	<i>Role of community</i>	171
5.3.2.1.3.3	<i>Significance of training and awareness</i>	172
5.3.2.1.4	<i>Disaster risk assessment process</i>	173
5.3.2.1.4.1	<i>Organisational capacity to undertake disaster risk assessment</i>	174
5.3.2.1.4.2	<i>Current disaster risk assessment practice</i>	178
5.3.2.1.4.3	<i>Challenges encountered in undertaking disaster risk assessment</i>	181
5.3.2.1.4.4	<i>Possible solutions for implementation</i>	182
5.4	CONCLUSION	184
 CHAPTER 6		
THE PROPOSED DISASTER RISK ASSESSMENT MODEL FOR LOCAL GOVERNMENT IN SOUTH AFRICA		186
6.1	INTRODUCTION	186
6.2	OVERVIEW OF THE RESEARCH	187
6.3	DEVELOPMENT OF AN APPROPRIATE MODEL FOR SOUTH AFRICA	189
6.3.1	Legislative Implications for Disaster Risk Assessment within South Africa	189
6.3.1.1	<i>Analysis of the disaster risk assessment requirements for local government in South Africa</i>	191
6.3.2	Proposed Disaster Risk Assessment Model for Local Government in South Africa	195
6.3.2.1	<i>Core principles of the proposed disaster risk assessment model</i>	199

6.3.2.2 Operationalisation of the model	212
6.4 CONCLUSION	221
CHAPTER 7	
RECOMMENDATIONS AND CONCLUSIONS	222
7.1 RECOMMENDATIONS	222
7.2 CONCLUSIONS	225
BIBLIOGRAPHY	227
APPENDICES	250
ANNEXURE A: Sample of Disaster Risk assessment Questionnaire And Interview Schedule	250
ANNEXURE B: Focus Group Feedback on Questionnaire And Interview Schedule	260
eThekweni Metropolitan Municipality	261
Ekurhuleni Metropolitan Municipality	270
Bojanala District Municipality	282
Stellenbosch Local Municipality	293

CHAPTER 1

OVERVIEW OF THE STUDY

1.1 INTRODUCTION

This chapter reinforces the nature, scope and purpose of the study by analysing the salient issues informing and emerging from the research. A thorough exposition of the research problem is justified through the extensive academic and theoretical investigations. In particular, the international agenda on disaster risk reduction together with the national focus on pro-active, disaster prevention and disaster risk reduction stimulated interest in the topic of research.

The research aims and objectives are stated and correlate with the purpose of the study. As such, it serves as a vehicle for the attainment of the research outcomes which are: the development of an integrated disaster risk assessment model for local government in South Africa; its positive attributes to improving the practice of disaster risk assessment; and endorsing the valuable contributions of such a tool within the disaster risk management environment whilst denoting its relevance and applicability as proclaimed through the detailed research methodology process adopted in the study.

The research findings influenced the development of the integrated disaster risk assessment model, and promoted effective, co-ordinated and integrated disaster risk assessment and disaster risk reduction practices within local government in South Africa.

1.2 ORIENTATION AND PROBLEM STATEMENT

The escalating social, economic and physical (environmental) costs of disasters point towards the need for a comprehensive understanding of hazards, risks and vulnerabilities that are embedded within societies to achieve and promote effective and appropriate disaster risk reduction strategies.

Disasters occur world-wide, however, their impact is greater in developing countries (like India, Turkey and Africa) where they occur very often (Alcantara-Ayala, 2002:107-124). Alcantara-Ayala further substantiates that the occurrence of natural disasters in these countries is due to two main factors. First, there is a relation with the geographic location and geological – geomorphologic settings. Developing or poor countries are located to a great extent in zones largely affected by volcanic activity, flooding, seismicity, and fires. The second factor is linked to the historical development of these countries where the economic, social, political and cultural conditions are not good (that is to describe a society still grappling with the effects of poverty, underdevelopment and political stability and/or transformation), and consequently act as factors contributing to high levels of vulnerability and risk of disasters.

This dual characteristic of disasters is clarified by Alexander (1993:4) when he describes a natural disaster as some rapid, instantaneous or profound impact of the natural environment upon the socio-economic system or as a sudden disequilibrium of the balance between the forces released by the natural system and the counteracting forces of the social system. The severity of such disequilibrium depends on the relation between the magnitude of the hazard and the tolerance of the human settlements of such an event (Albala-Bertrand, 1993:259). Therefore, by reviewing the different definitions of natural hazards and natural disasters it is evident that the conceptualisation has changed from a perspective of a merely physical or natural event towards the integration of the human system.

During the 1960s, disasters were understood as uncontrollable events in which a society undergoes severe danger, disrupting all or some of the essential functions of the society (Fritz, 1961:651-694). The notion of a defenceless society clearly damaged by a powerful natural force is expressed in a definition where a disaster is severe, sudden and frequent, disrupting the normal structural arrangements within a social system, over which the social systems have no control (Barkun, 1974).

Westgate and O'Keefe (1976) were among the first to recognise the importance of vulnerability by defining disaster as the interaction between extreme physical or natural phenomena and a vulnerable human group resulting in general disruption and destruction, loss of life and livelihood and injury. The International Decade for Natural Disaster Reduction (IDNDR, 1992) defined a disaster as "a serious disruption of the functioning of a society, causing widespread human, material, or environmental losses which exceed the ability of the affected society to cope using only its own resources." Disasters are often classified according to their speed of onset (sudden or slow), or according to their cause (natural or human-made).

Moreover, the interest of understanding not only the natural events *per se* but the characteristics of risk in the areas prone to these phenomena have directed the attention of many social scientists towards the study of risk and vulnerability (see Albala-Bertrand, 1993; Blaikie *et al.*, 1994; Cannon, 1994 and Varley, 1994). Hence, research has revealed that disasters which affect people stem from the realisation of risks as a dynamic socio-political process (MRM, 2003:1). This results from the conjuncture of hazard, elements at risk and vulnerability which exist in a specific area for a given time. This risk is not fixed. By virtue of its components, it varies according to time and space.

Alexander (1993:7) professes that a hazard may be regarded as the pre-disaster situation in which some risk of disaster exists, principally because the human

population has placed itself in a situation of vulnerability. Alexander further explains that vulnerability to hazards is the product of a physical and socio-economic phenomenon and the suite of factors that increases or decreases the ability to cope and adapt to changes.

In essence, vulnerability is the outcome of the complex interplay of a range of socio-economic and cultural factors and is mediated by political and/or institutional disempowerment, economic and educational discrimination (Mgquba & Vogel, 2004:30). The causes of social vulnerability for example, are usually explained by the underlying social conditions and are often ignored from the more technical assessments of a hazard event (Cutter, 1996:529). Vulnerability is compounded by the degree to which a community is at risk and to which socio-economic and political factors affect the community's resources, and on the personal and domestic level, by defencelessness and inability to cope with risks (Winchester, 1992:41). Twigg (in Aryal, 2003:5) therefore argues that vulnerability is too complicated to be captured by models, frameworks and maps. There are various dimensions to vulnerability: economic, social, demographic, political and psychological. There are many factors making people vulnerable, not just a range of immediate causes but a host of root causes. They are also dynamic or in a state of constant change and because they are complex and diverse, all elements within societies are moving so that these changes occur in different parts of society in different ways at different times.

A hazard is a threat to people, whereas risk is the measure of that threat or the probability of a hazard occurring and possibly culminating in a disaster due to vulnerable conditions (Cutter, 1996; Blaikie *et al.* 1994:21-44). Risk refers to a scenario comprising the threats of possible physical, financial and/or social losses. Evaluation of risks become essential as they can provide an improved basis for planning and for the allocation of financial and other resources as well as designing interventions and future mitigation activities. In essence therefore,

disaster risk is not caused by hazardous events *per se*, but is historically constructed through human activities and processes (UNDP, 2004:30).

Disaster risk can be represented as a continuum from at one extreme, the risk from everyday hazards (such as contaminated water supplies, poor sanitation, house fires and dangerous working and living environments) to the other extreme where the risk is associated with infrequent catastrophic hazard events such as major earthquakes or cyclones that devastate entire countries and regions. In between these two extremes lie the risk associated with frequently occurring small-scale hazard events (such as highly localised landslides, flash floods and debris flows) and periodic medium-scale hazard events.

Often, those people and communities most vulnerable to natural hazards are also vulnerable to other sources of hazards. Livelihood strategies for many people are all about playing off risks from multiple hazard sources: economic, social, political, and environmental (UNDP, 2004:91). From this perspective, where resources and capacities are very limited and everyday risks are too great, it becomes difficult to invest time and money in reducing a potential natural hazard risk. When choices are limited, energy is spent on coping with the most immediate of threats, that is to say, the attention is directed to much greater everyday threats from safety and security to food and water.

Therefore, alerted by heightening impact and intensification of disasters, the international disaster reduction community initiated various strategies as a means of counteracting and managing emerging and anticipated disaster situations. In this respect the international initiatives could be traced back to the International Decade for Natural Disaster Reduction (IDNDR) declaration (for the period 1990 to 2000) which was instrumental in raising the profile of deliberations around the social and economic causes of disaster risk. Subsequently, in the year 2000, the United Nations International Strategy for Disaster Reduction (ISDR) was formed, which replaced the International Decade for Natural Disaster

Reduction. The strategic focus of the ISDR was to promote the issues of awareness, assessment and management of disaster risk. In addition, the Eight Millennium Development Goals proclaimed in 2002 highlighted disaster risk as a critical component of the development process that needs to be addressed by 2015 (UNDP, 2004). Further support for this international agenda on disaster risk reduction was from the numerous conferences, seminars and working groups keenly engaging and interrogating the pertinent concerns and challenging relating to disaster risk reduction. In particular, the World Conference on Disaster Reduction hosted in Kobe-Hyogo (Japan) in 2005 and the pronounced Hyogo Framework for Action 2005-2015 with clear milestones towards effective disaster risk reduction (Kobe Report, 2005; ISDR, 2005). Equally important is the ISDR Disaster Risk Reduction Model (ISDR, 2005) that emerged out of the global review of disaster reduction (ISDR, 2002) which provides an international framework for the practice of effective disaster risk reduction.

In South Africa the challenge is to identify, review, develop, modify and implement appropriate risk reduction strategies in a co-ordinated, effective, efficient and economical manner for the whole of South Africa. As such, the Disaster Management Act of South Africa (2002) stresses disaster risk assessment which is identified as the first and most crucial step (according to the National Disaster Management Framework of South Africa) towards risk reduction (as outlined in sections 20, 33 and 47 of the Act). Furthermore, it is critical to acknowledge that the study of disaster risk assessment concentrates on the elements of hazard, vulnerability and risk that are dynamically related. The relationship of these elements can be expressed as a simple expression ($\text{Risk} = \text{Hazard} \times \text{Vulnerability}$). This illustrates the concept that the greater the potential occurrence of a hazard and the more vulnerable the population, the greater the risk (Blaikie, *et al.* 1994; Alexander, 1993:7-10; Varley, 1994:1-30).

Therefore, a thorough analysis of disaster risk assessment will provide a complete and comprehensive picture of the society in question by tracing and

examining the above factors and dynamics towards effective risk reduction. As such, the relevance and importance of disaster risk assessment as an effective risk reduction strategy becomes very evident. However, currently within South Africa there exists no model for ensuring the practice of effective disaster risk assessment, be it at national, regional or local level (South Africa, 2005). Also, what needs to be highlighted is the fact that although strategies for the reduction and prevention of disasters are universal, their applicability needs to take into account the particular characteristics of the threatened entity in such a way that a better understanding of the hazards, risk and vulnerabilities of that society can lead to the development of appropriate and adequate disaster reduction and prevention strategies. Therefore, to add merit to the above issue, the case-study/focus group approach (concentrating on a selected community and its environment) becomes a valuable tool in the process. After all, the focus on disasters is not only on the natural processes but also of their interaction with the human system. This inclusion of disaster risk in the broader perception of risk that people have to face in their daily lives requires a much more integrated and comprehensive approach to disaster risk reduction stemming from a systematic approach to identifying, assessing and reducing of all kinds of risk associated with hazards and human activities.

According to Twigg (2004a:2-3) the modern disaster risk assessment approach recognises that a wide range of geological, meteorological, environmental, technological and socio-political hazards threaten society; individually and in complex interaction. Hence, disasters are no longer only seen as unfortunate once-off events to be responded to, but also as deep-rooted and longer-term problems that must be planned for. Therefore, there is a need to explore the relationships between natural hazards with other sources of hazards in the accumulation of risk as a precursor to developing an integrated and effective disaster risk assessment model for local government in South Africa.

The need for of an appropriate disaster risk assessment model cannot be overemphasised. Such a model will offer a simple, flexible and comprehensive structure/approach for conducting the process of disaster risk assessment. It will also serve to guide and enhance this process through improving disaster planning. Since understanding and reducing risks and vulnerability is undoubtedly the task of multi-disciplinary and multi-sectoral teams, it becomes apparent that an integrated model is the ultimate answer in facilitating and promoting effective disaster risk reduction. Towards the development of the disaster risk assessment model the following research aims and objectives were constructed.

1.2.1 Research Aims and Objectives

The aim of this research were to develop an integrated model for disaster risk assessment and to guide and enhance the disaster risk assessment process within local government thereby improving disaster risk planning and facilitating effective disaster risk reduction.

In achieving the afore-mentioned aims, the objectives of the research were to:

- define and explore disaster risk assessment within local government in South Africa;
- review and examine the link or relationship between disaster risk assessment and disaster risk reduction;
- clarify and analyse the requirements to undertake disaster risk assessment by local government in South Africa;
- investigate and review the current disaster risk assessment practice within local government in South Africa;
- explore and evaluate disaster risk assessment models promoting effective disaster risk reduction; and
- adapt and contextualise an appropriate and effective disaster risk assessment model for local government in South Africa.

In accomplishing these specified research objectives, the following critical questions were addressed by the research:

- what is disaster risk assessment within the local government context in South Africa?
- what informs and guides the current practice of disaster risk assessment within local government in South Africa?
- what is the relationship between disaster risk assessment and disaster risk reduction?
- which are the appropriate or relevant disaster risk assessment models promoting effective disaster risk assessment?
- how can the existing models be adapted to suite the South African context?
- what should a disaster risk assessment model for local government level entail?
- what are the lessons or recommendations for future disaster risk assessment practice within local government?

It is against this backdrop that the practices of disaster risk assessment were critically examined thus affirming the relevance and the value of the research

1.2.2 Value of the Research

The challenge confronting national, regional and local government in South Africa is that of implementing and complying with the stipulations of the Disaster Management Act 57 of 2002, the National Disaster Management Framework of 2005 and the respective Provincial Frameworks (within the particular regions) with regards to disaster prevention and disaster risk reduction. Hence, this study will serve as a valuable tool to local government offering an appropriate and relevant model for the facilitation and the promotion of effective disaster risk assessment towards the implementation of practical disaster risk reduction strategies.

Another important contribution of the study is the improved practice of disaster risk assessment through integrated and co-ordinated approach involving a diverse team of relevant stakeholders. The outcomes of such a process is better conceptualisation and knowledge of the disaster risk assessment activities yielding a more informed and active participation process by all stakeholders. As such, the essence of a vulnerability-driven, community-based, bottom-up system is enunciated justifying the merits of the partnership concept in disaster risk assessment.

An added value of the study is that apart from contributing to the general academic debate on disaster risk assessment and disaster risk reduction, the structure of the model developed encourages the application thereof through appropriate contextualisation across all sectors of government (nationally, regionally and internationally) involved in disaster risk assessment practices.

Having ascertained the basic contributions of the study, it is vital to examine the research methodology used to achieve the various research outcomes.

1.3 RESEARCH METHODOLOGY

The scope of the research required the use of both the quantitative and qualitative approaches (Fox & Bayat, 2007; Welman, *et al.* 2005; Brynard, *et al.* 1997). As such, a descriptive method of the quantitative approach was explored (Fox & Bayat, 2007; Welman, *et al.* 2005; Brynard, *et al.* 1997) allowing for data to be systematically collected through descriptive survey questions (refer to Annexure B, questions B4, B5, and B6). This necessitated the application of the Likert Scale and the Quintile Classification methods to analyse the data collected.

In comparison, the qualitative approach facilitated an inductive, intuitive, descriptive, diverse and flexible research process (Flick, 2009; Silverman, 2000;

Shaw, 1999). This approach encourages a variety of perspectives according to the real dynamics being focused on within the given research environment, probing for an in-depth comprehension of issues enabling the researcher to construct abstractions, concepts and hypotheses from details collected (Merriam, 1988; Creswell, 1994; Woods, 1999; Silverman, 2000). In keeping with such a method, smaller but focused samples were selected rather than large random samples.

The non-probability sampling technique (Fox & Bayat, 2007; Welman, *et al.* 2005; Brynard, *et al.* 1997) through the purposive sampling style was used to identify the sample to best represent the relevant population. The research population alluded to in this study is local government therefore warranting that all three categories of local government are included as the focused sample. Hence, four focus groups were selected across different regions in the country and with varying degrees of complexities that is, the eThekweni Metropolitan Municipality, Ekurhuleni Metropolitan Municipality, Bojanala District Municipality and Stellenbosch Local Municipality.

These identified focus groups played a pivotal role in the data collection process. The research instruments (Marshall & Rossman, 1980; Strauss & Corbin, 1998; Denzin & Lincoln, 2000) employed for this purpose ranged from group questionnaires, deliberations and field surveys to interview schedules (included in Annexure B). The underlying intention was to establish the various crucial issues as clarified in the key questions noted above (refer to 1.2.1).

In pursuit of the research objectives a variety of research methods were explored stemming from critical literature review, conceptual analysis, exploratory reviews, comparative analysis, administering of questionnaires, field surveys, focus group discussions and interviews (Silverman, 2000; Bak, 2004; Fox & Bayat, 2007). In addition a diverse source of data from academic books, legislations, journal articles, periodicals, research papers, websites, conference proceedings,

national and international reports and publications informed the research process and provided the basis for the effective triangulation of the information.

The triangulation process (Flick, 2009; Fox & Bayat, 2007; Welman, *et al.* 2005; Henning, *et al.* 2004) assists in promoting the quality and validity in the research through a multitude of research methods, techniques and data sources. The methodological rigour applied in the data collection, analysis and deductive stages were fundamental to maintaining and enhancing the quality and validity of the research. The data analysis and interpretative process (Woods, 1999; Silverman, 2000; Holliday, 2007) was pursued within a logical framework advocated through five prominent steps (Holliday, 2007) as:

- the data coding process;
- the division of data into suitable categories;
- process of tracking (iterative, inherent in all steps of the process);
- the clustering of data into relevant research themes; and
- the final interpretation process.

The implementation of the above process ensured a coherent, consistent, holistic and quality focused approach advancing constructive research findings and deductions.

1.4 CONCLUSION

The current state of rapidly emerging disasters and the prevalence of disaster risk underscore the critical need to develop an effective, holistic and integrated model for disaster risk assessment. As such, the incremental approach espoused in developing the integrated disaster risk assessment model reflects the systematic and thorough conceptualisation thereof.

In effect, the exploratory review examining the link between disaster risk assessment and disaster risk reduction articulates the relevance and focus of the

study. In addition, the critical literature study provides a theoretical framework for disaster risk assessment forming the theoretical basis for the development of the model. Further, the comparative analysis of the three disaster risk assessment models promoting effective disaster risk reduction provides the necessary insight into the key issues for consideration in structuring an appropriate tool to promote effective disaster risk assessment practice. Hence, the significant lessons highlighted during this review serves as the foundation on which the integrated disaster risk assessment model is built.

The applied research conducted through the selected focus groups presents a critical analysis of the comprehension and the current disaster risk assessment practice within local government in South Africa. Based on the study objectives, the primary and secondary data collected were accordingly correlated, analysed and evaluated by means of the data analysis and interpretative process. Thus, the research findings and deductions formed the final dimension to the development of the model.

Through this accumulative process of theoretical underpinnings, best practice lessons, and the research recommendations, the integrated disaster risk assessment model emerged. The appropriate contextualisation of this model is guided by the specific legislative requirements governing the disaster risk assessment practice by local government in South Africa. The practical adoption and implementation of the model is interpreted, followed by pragmatic recommendations for consideration in expediting the application thereof.

In summary, the contribution of the study is acknowledged and aspects for further research are disclosed. Having sketched the parameters of the research, the next logical step will be to share the introspection and analysis of disaster risk reduction.

CHAPTER 2

INTROSPECTION AND ANALYSIS OF DISASTER RISK REDUCTION

2.1 INTRODUCTION

As disasters continue to strike and increase in magnitude, complexity, frequency and economic impact, the varied debates around the issue of hazards and vulnerability is strengthened. The natural phenomena which cause disasters are in most cases beyond human control, however, vulnerability is generally a result of human activity; aggravating the risk factors within their environment. Therefore, it is important for society to recognise and improve traditional methods and examine new ways to live with risk, and take the necessary actions to prevent and reduce the effects of such disasters. The overarching aim of disaster risk reduction activities is to reduce risk in the ever escalating number of fatalities and economic losses in countries and communities. To achieve this, it is necessary to have a clear understanding of the evolving nature of disaster risk and its implications before mitigation and prevention strategies are developed through the process of disaster risk assessment.

In view of the above, this chapter aims to provide impetus to the focus on disaster risk reduction and its inherent link to disaster risk assessment. This chapter will commence with a detailed interpretation and analysis of disasters in order to comprehend the complex events associated with disasters. A thorough knowledge of the various dynamics of disasters is fundamental in order to grasp the enduring debate around hazard, vulnerability and risk.

Having highlighted the distinction between hazard and disaster, especially within the systems concept of environment and disaster, the discussion follows through attempting to unravel the concept of disaster risk reduction. A broad picture of disaster risk reduction is presented before tracing the need for the paradigm shift from disaster management to that of disaster risk reduction.

A review of the key global strategies on risk reduction, that is, Yokohama Strategy and Plan of Action for a Safer World and the Hyogo Framework for Action heightens the seriousness, commitment and priority that are attached to promoting disaster risk reduction. This is encapsulated in the Disaster Risk Reduction Model, as an international initiative, providing a generic framework on the crucial elements of risk reduction. A review of the key principles and characteristics of this model paves the path for further deliberations on the objectives and cornerstones of risk reduction.

The objectives of risk reduction are explored with special attention to Wisner's seven objectives that draw on and link to the critical principles and actions of the global risk reduction strategies.

To finally concretise the basis for successful risk reduction, salient guiding principles are examined. This includes stakeholder participation, public policy actions and development of a culture of prevention to risk assessment.

The focal point of interest around risk assessment is the internationally acclaimed notion that disaster risk assessment is the first and most essential step towards the process of disaster risk reduction, alluding to the link between disaster risk assessment and disaster risk reduction. Chapter Three of the thesis pursues this argument further by illustrating the theoretical framework of disaster risk assessment.

2.2 CONTEXTUALISING DISASTERS

Maskrey (1989:1) clarifies that natural hazard and natural disaster are two different terms which are used interchangeably but which are frequently confused. For instance, earthquakes, floods and cyclones are regarded as synonymous with disaster, but although these hazards can be highly destructive, they do not necessarily cause disaster. The hazards themselves are not disasters but rather a factor in causing a disaster. Two other factors are essential (*viz*) the events effect on people and their environment, and human activities that

increase its impact. There is therefore a high risk of disaster when hazards occur in a vulnerable situation. Smith (2001:7) aptly defines a disaster as 'the realization of hazard'. Events such as earthquakes, tsunamis, hurricanes, floods and landslides have been considered as direct synonyms for disaster. This interpretation had enforced the belief that there was nothing to be done when faced with disasters since they were natural phenomena and were unavoidable (Burton *et al.* 1993; Smith, 2001; Bankoff, *et al.* 2004).

On the other hand Wisner, *et al.* (2004:49), Blaikie, *et al.* (1994:21), Varley, (1994:1) and Maskrey (1989:2); profoundly project that disasters are a result of the interaction of socio-economic and political structures and processes and the physical environment. Simply stated, there is no risk if there are hazards but vulnerability is nil, or if there is a vulnerable population but no hazard event. Natural hazards constitute a complex web of physical and environmental factors interacting with social, economic and political realities of society (Tobin & Montz, 1997:8). Hence, the crucial point about understanding why disasters occur is that it is not only natural events that cause them. They are also the product of the political and economic environment and the way it structures the lives of different groups of society (Blaikie, *et al.* 1994:3).

Many aspects of the social environment are easily recognised. For example, people live in adverse economic situations that lead them to inhabit parts of the physical environment that are easily affected by natural hazards; for instance this may be flood plains of rivers or earthquake zones. There are many other less obvious political and economic factors that underlie the impact of hazards. These involve 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. Disasters highlight these inherent weaknesses in a society and often force a reappraisal of goals. Generally, the poorer sectors of society are affected to a far greater extent than the middle and upper-class families (Wisner, *et al.* 2004:5-12; Blaikie, *et al.* 1994:3-5).

In order to comprehend the magnitude of the potential for disaster, it is first necessary to understand the nature of a disaster and to place it in a geographic context. Cuny (1983:12-15) emphasises a focal point, that is, a disaster should be defined on the basis of its human consequences and not only on the phenomenon that caused it. Simply stated, natural phenomena such as earthquakes, hurricanes, and excessive rains occur worldwide, but their potential for widespread disaster is more a function of the ability of communities to cope in terms of their physical structures and social and economic systems (Cuny, 1983:13).

The increase in disaster potential is one result of the cycle of poverty which is common in developing countries. Alexander (1993:43) pointed out that the roots of poverty which are also the predominant roots of vulnerability are increased marginalisation of the population caused by the high birthrate and the lack of resources to meet the basic human needs. Incidentally, natural hazards and human progress are rooted in the same ongoing processes of global change (Smith, 2001:3). As the population grows and owns more material possessions, and as the built environment expands to accommodate such changes, greater numbers of people and property are put at risk. These social and demographic trends also impose heavy burdens on precious natural assets such as land and water. Many people in the poorest countries now therefore have a fragile dependence on a degraded resource base which becomes progressively less able to withstand pressures from environmental forces. In the words of Smith (2001:7) and Varley (1994:1) this leads to an event, concentrated in time and space in which a community experiences severe danger and disruption of its essential functions accompanied by widespread human, material and environmental losses which often exceed the ability of the community to cope without external assistance.

Various scholars such as Blaikie, *et al.*, Alexander, Smith and Wisner, *et al.* to mention but a few, have stated that disasters are complex events as many factors often interact in unexpected ways giving rise to problems that were not

accounted for in disaster plans. Complexity is not just a question of quantities. In terms of the number of people and artifacts at stake it also derives from qualitative aspects like social and economic factors as well as from the relations that develop historically between settled populations and their environment. Besides physical parameters like building structures, material, age of construction of houses and infrastructure, indicators are equally important as they are related to how this environment is used, how resources are accessed and rules regulating the function of services (Tobin & Montz, 1997:8; Alexander, 1993; Burton, *et al.* 1993). In other words, “soft” parameters are just as important, in order to grasp the complexity of different environments and society.

Moreover, recognising poverty (in the discussion by Cuny, 1983; Alexander, 1993; Smith, 2001 and Wisner, *et al.* 2004) as the primary root of vulnerability and disaster in developing countries is the first step toward developing an understanding of the need for change in current disaster management and response practices. In effect, if the magnitude of disasters is an outgrowth of underdevelopment and poverty, one cannot expect to reduce the impact by providing food, blankets, tents and traditional forms of assistance. So, although floods or earthquakes are natural processes, the disasters associated with them are not. To understand disasters, it is necessary to focus on social processes, that is, human vulnerability rather than just natural hazards (as justified further in Chapter Three of the thesis). After-all, a better understanding of this concept would lead to more appropriate and successful strategies for effective disaster risk reduction.

In summary, Bhatt (2002:8) proclaims that a disaster takes place when a community is affected by a hazard, usually defined as an event that overwhelms that community's capacity to cope. In other words, the impact of the disaster is determined by the extent of a community's vulnerability to the hazard. This vulnerability is not natural. It is the human dimension of the disasters, the result of the whole range of economic, social, cultural, institutional, political and

psychological factors that shape people's lives and create the environment that they live in (as illustrated in Figure 1). What becomes evidently clear is that disasters are conditioned by human activities. Hazards may be natural in origin, but it is the way in which societies have developed that cause hazards to become disasters.

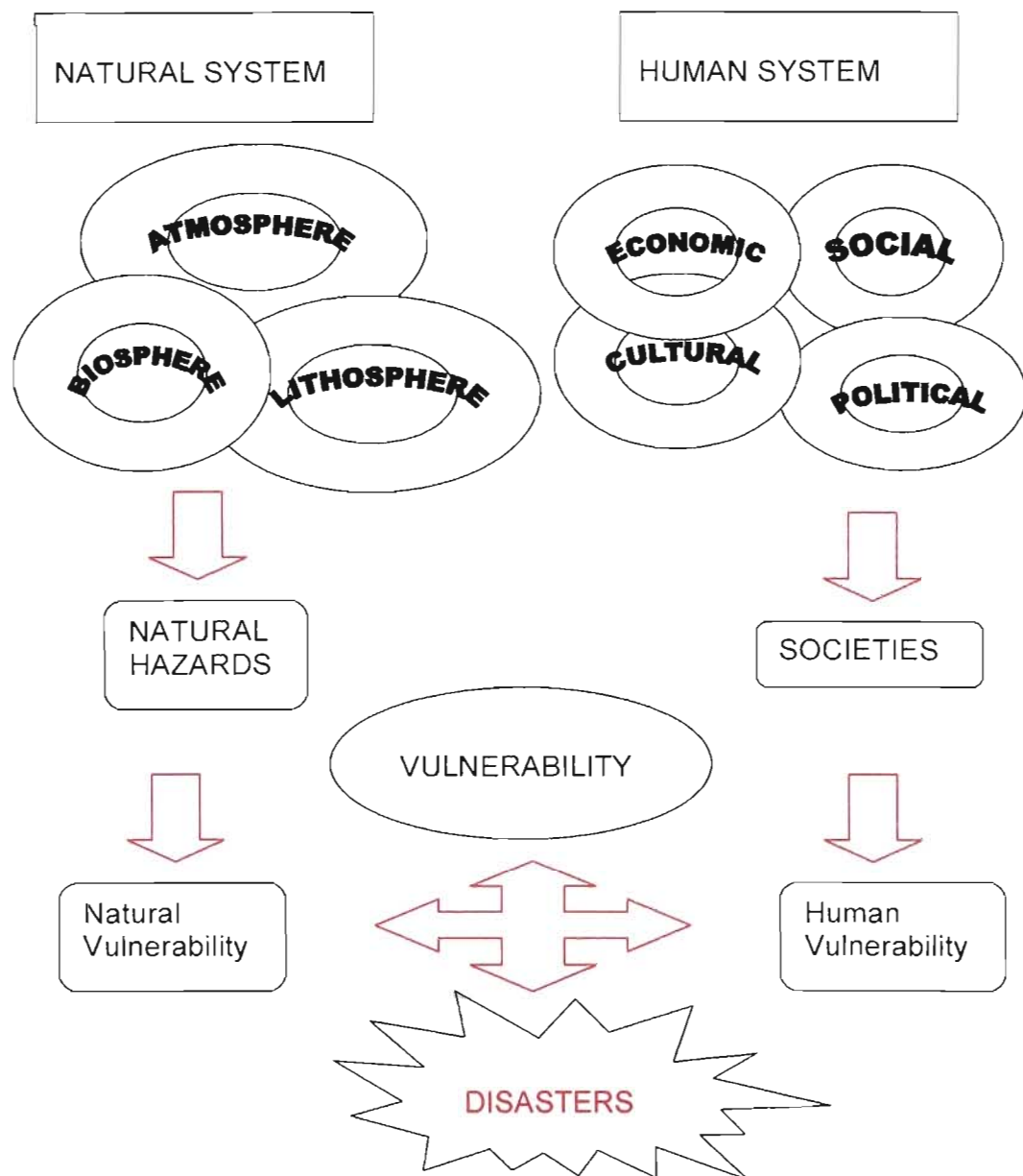


Figure: 1. Systems Concept of Environment and Disaster (Adapted from Alcántara-Ayala, 2002:13).

As illustrated above, hazards become disasters only when they converge with a vulnerable population and cause significant loss of life and damage to property and exceed their ability/resources to cope. As Kofi Annan (former UN Secretary-General) puts it, hazards only become disasters when people's lives and livelihoods are swept away (Annan, 2003). If the ultimate aim is to develop a disaster resilient society, the starting point in the process of risk reduction should be to shift the focus away from quantifying natural hazards and move towards identifying, assessing and ranking the various risks and vulnerabilities (Bogardi & Birkmann, 2004:75-82). Justifying the importance and relevance of disaster risk assessment and disaster risk reduction.

2.3 THE EMERGENCE OF THE CONCEPT OF DISASTER RISK REDUCTION

The relationship between human actions, environmental stewardship, climate change and disaster risks are becoming increasingly crucial reminders that improved management of natural hazards and the reduction of disaster risks must be given the highest priority. In light of this, disaster risk reduction has grown in importance on the international agenda. The natural hazards of 2004 and 2005, that is: the impacts of the Indian Ocean tsunami; earthquakes in Pakistan and Indonesia; heat waves and fires in Europe; hurricane Katrina in New Orleans and hurricane Stan in Central America, prompted calls for improved disaster prevention and preparedness systems. An important factor is reducing risk before such incidents arise; and these efforts are usually referred to as disaster risk reduction.

As the above examples show that while one may not be able to prevent earthquakes, tsunamis and storms from occurring, there are many ways of mitigating their impact through effective disaster risk reduction practice. The literature of International Strategy for Disaster Reduction (ISDR), 2007; Department for International Development (DFID), 2004 and United Nations Development Programme (UNDP), 2004; describe disaster risk reduction as a

framework where practitioners and community members work together to explore factors of risk, to implement systems, policies, practices, and to change living conditions to avoid or limit the destructive impacts of a hazard.

Effective disaster risk reduction roots itself in careful risk identification and analysis before implementing prevention or mitigation actions (Holloway, 2003:34). In essence, disaster risk reduction can be clarified as the systematic development and application of policies, strategies and practices to minimise vulnerabilities and disaster risks throughout societies to avoid (prevent) or limit (mitigate and be prepared for) the adverse impacts of hazards (ISDR, 2007a; DFID, 2004 and UNDP, 2004).

2.3.1 The shift in focus towards disaster risk reduction

In the late 1990s, increasing disaster losses worldwide highlighted the need to move beyond “managing disaster events” and to better address the risk processes that drive them in the first instance. More importantly, according to UNDP (2004:386) where many of these risks are compounded, impacts of disasters are often exacerbated. Simply stated, risks accumulate before being released in a disaster. Everyday hazards and vulnerability form patterns of accumulating risk that can culminate in disaster triggered by an extreme hazard event. This explains the increasing use of the expression “disaster risk reduction” recognising the importance of risk issues, in contrast to previously employed “natural disaster reduction”. It was in this context that greater and concerted emphasis was placed on “disaster risk reduction” rather than “disaster management” (Salter, 1998; Mileti, 1980; UNDP, 2004; United Nations, 2005; Kobe Report, 2005).

Furthermore, concerned by the upward trend in the number and impact of disasters, the International Decade for Natural Disaster Reduction (IDNDR) was initiated in 1990 to serve as a catalyst for natural disaster reduction. One of the most important gains of the IDNDR is the movement of policy investments from

the concepts of hazards and disasters to the concepts of risk and vulnerability (UNDP, 2004:17-18). The declaration of the IDNDR helped to raise the profile of discussions surrounding the social and economic causes of disaster risk. In acknowledging this came the realisation that mitigating losses through technological and engineering solutions dealt with the symptoms rather than with the causes of the problem; and that reducing disaster risk required greater attention be given to the social dimensions. In the early 1980s research by the Swedish Red Cross demonstrated a continuous increase in the number of deaths and injuries from disasters, and their economic impact (Wijkman & Timberlake, 1984:21-27). In effect, the increase is in the impact of disasters on people; where more and more people have become vulnerable to hazards because of changes in their social, economic, cultural and political environment. This becomes apparent in economic pressures that force many of the poor to settle in cheap and dangerous locations. Evidence and statistical data has shown that the frequency and impact of disasters has continued to rise (International Federation of Red Cross-IFRC, 1997:116-119; UNDP, 2004; IFRC, 2008b). In response to this devastating reality, one of the main outcomes of the IDNDR was the Yokohama Strategy for a Safer World and the Plan of Action adopted in 1994 at the World Conference on Natural Disaster Reduction held in Yokohama, Japan. The Yokohama Strategy sets guidelines for action on prevention, preparedness and mitigation of disaster risk. These guidelines are based on a set of principles that stresses the importance of risk assessment, disaster prevention and preparedness, the capacity to prevent, reduce and mitigate disasters, and early warning systems (ISDR, 2007b:1).

As the successor to IDNDR in 2000, the UN International Strategy for Disaster Reduction (ISDR) was formed to foster this agenda by focusing on the processes involved in the awareness, assessment and management of disaster risks. As such, the United Nation's (UN, 2005:1) International Strategy for Disaster Reduction:

- expresses its serious concern about the number and scale of natural disasters and their increasing impact which resulted in massive loss of life and long-term negative social, economic and environmental consequences for the vulnerable societies throughout the world, especially in developing countries;
- recognises the need to continue to develop an understanding of, and to address socio-economic activities that exacerbated the vulnerability of societies to natural disasters and to build and further strengthen community capacity to cope with disaster risks; and
- challenges governments and related international organisations to consider disaster risk assessment as an integral component of development plans and poverty eradication programmes.

A considerable incentive for rethinking disaster risk as an integral part of the development process comes from the aim of achieving the goals laid out in the Millennium Declaration (UNDP, 2004:15). Eight Millennium Development Goals (MDGs) were agreed upon in 2000, with most goals set for achievement by 2015. Achieving MDG 1 (to eradicate extreme poverty and hunger) and MDG 7 (to ensure environmental sustainability) will have a direct impact on reducing human vulnerability to everyday hazards and the accumulation of risk that contribute to disasters (UNDP, 2004).

Within the South African context, the Disaster Management Act 57 of 2002 was promulgated in 2003 and The National Disaster Management Framework followed in 2004. The primary focus of the above legislation is on disaster prevention and risk reduction aligned to the international call for disaster risk reduction.

A milestone was the World Conference on Disaster Reduction (WCDR) which took place in Japan (Kobe-Hyogo) in January 2005, a few weeks after the tsunami in the Indian Ocean. As a contribution to the emerging international

agenda for disaster risk reduction, the Hyogo Framework for Action adopted at this conference emphasised the following priorities for the future:

- there is a need for disaster and risk reduction to be an essential part of the broader concerns of sustainable development, hence the need to make sure that risk assessments and vulnerability reduction measures are taken into account in different fields such as environment management and poverty reduction;
- it is essential to note that current development practices do not necessarily reduce communities' vulnerability to disasters. Ill-advised and misdirected development practices may actually increase disaster risk;
- political commitment by public and private policy-makers and local community leaders, based on an understanding of risks and disaster reduction concepts are fundamental to achieving change;
- although national and local authorities bear the main responsibility for the safety of their people, it is the duty of the international community to advocate policies and actions in developing countries (that pursue informed and well-designed disaster risk reduction strategies); and
- long-term commitment to support local disaster reduction endeavours are as important as funding emergency assistance following high profile disasters (Kobe Report, 2005).

The above discussions clearly accentuate and map out the need for commitment towards disaster risk reduction. The logical argument propagated by ISDR is that risk reduction is value for money whereby investing in risk reduction strategies will help to drastically reduce the impact and cost of future disasters. There is therefore a demand for a generic disaster risk reduction model to guide and promote the concept of disaster risk reduction in a methodical manner.

2.3.1.1 ***Disaster Risk Reduction Model***

The United Nations–International Strategy for Disaster Reduction (ISDR, 2002) *Living with Risk* report which formed a global review of disaster reduction initiatives is evident of the increasing commitment and documenting of “good practice” for effective risk management (Twigg, 2004a). This global review gave rise to the Framework for Disaster Risk Reduction as a means to harmonise and systematise the various elements and achievements in the field of disaster risk management. The ISDR secretariat, in collaboration with the United Nations Development Programme (UNDP) developed a model for this framework. This was done in conjunction with a growing number of stakeholders in the United Nations, international, national and local organisations, through the Inter-Agency Task Force on Disaster Reduction as well as by means of an online consultation in August 2003, attracting over 300 participants from around the world (<http://www.unisdr.org/dialogue>). The basic goal of this collective and iterative process was to encourage and strengthen disaster risk reduction practice. This is reflective in the underlying principles of the disaster risk reduction model.

2.3.1.1.1 *Principles of the model*

In pursuance of the trends towards “good practice”, the Disaster Risk Reduction Model promotes information and data collection and capturing. The ripple effect is that the dissemination of good practice and positive outcomes can further encourage more commitment to disaster reduction through the following five, key principles (ISDR, 2005:392), as follows:

- Reflecting the multi-dimensional, interdisciplinary and multi-hazard nature of disaster risk reduction where a multi-sectoral process aims at strengthening partnerships across sectors and disciplines, including involvement of community level organisations, volunteer groups and the private sector are necessary.

- Ensuring a firm basis for political advocacy to promote practical action and the implementation of results. Often, lack of wider political commitment to disaster reduction is identified as the main barrier to progress in implementation. Reason for this includes the fact that there are other more important priorities for funding and political attention, such as development needs and environmental protection. The weak co-ordination of advocacy programmes and action due to the proliferation and fragmentation of the disaster reduction community along disciplinary and institutional boundaries impact negatively on disaster risk reduction efforts. Therefore, adopting a holistic and integrated approach is essential in overcoming the above complexities.
- Assisting users to highlight areas where capacities are to be developed through a strong emphasis on continuous review, monitoring and evaluation of disaster reduction practices; resulting in the early detection of possible gaps and constraints; allowing for informed decisions and modified action plans for implementation.
- Providing a basis for setting goals and targets, adapted to different contexts against which progress can be measured and gaps identified. This will create the platform to build momentum and accelerate the rate of progress in disaster reduction while measuring its results. It also warrants government and organisations accountable for what they promise to achieve through these targets.
- Creating strong impetus for the promotion of disaster risk reduction in a coherent and effective manner. Usually, different sectors, disciplines and institutions, for example environmental management, poverty reduction and financial management, speak different languages and introduce new practices which need to be harmonised.

These underlying principles collectively add value to such a model which serves to enhance the International Strategy for Disaster Reduction and facilitate the attainment of the objectives of the Millennium Development Goals, forming a stronger basis to reduce risk and vulnerability.

To increase support and effectively drive these initiatives, the above model is further exemplified by its salient characteristics.

2.3.1.1.2 Characteristics of the model

There are five core areas that underpin the significance and practice of this model (refer to Figure 2) that is in consonance with the cornerstones of risk reduction (as clarified towards the end of this chapter). They are (ISDR, 2002; ISDR, 2005):

- Political commitment which is expressed in terms of good governance, is expected to elevate disaster risk reduction as a policy priority, allocate the necessary resources for it, enforce its implementation and assign accountability for failures, as well as facilitate participation from civil society to private sector.
- Risk identification and impact assessment is a well-defined area with a significant knowledge base on methods for disaster impact and risk assessment. Systematic assessment of losses, especially the social and economic impact of disasters and mapping of risks are fundamental to understand where to take action. Also, early warning is increasingly identified as a means to inform public and authorities on impending risks which is crucial for timely inputs to reduce their impact.

- Knowledge management where information management and communication, education and training, public awareness and research are all parts of improving and managing knowledge on disaster risks and their subsequent reduction. The inclusion of disaster reduction curriculum at all levels of education, sound public awareness and information campaigns, and effective media involvement in advocacy and information dissemination, co-ordinated training for communities at risk and professional staff, and target specific research are the main ingredients to support the knowledge base for effective disaster reduction.
- Application of risk reduction measures involves the conscious move from merely analysing and knowing about risks to taking concrete actions to reduce their impact. Of significance, is the fact that ideas and practices of other disciplines will complement what is already practiced within the field of disaster risk management. It is clear that instruments for risk management have proliferated especially with that of environmental management, poverty reduction and financial management tools as complementary solutions. For example, physical and technical measures such as flood control techniques; soil conservation practices and land use planning are well known practices and have been implemented with combined results. Their failure is often due to poor governance rather than lack of knowledge as to what to do.

Social and economic development practices with proven results in poverty alleviation such as social protection and safety nets are increasingly regarded as ways of reducing risks and instruments for self reliance in recovery. Therefore, to promote and enhance effective results, synergies need to be built between sustainable development and disaster risk management practices.

- Preparedness and emergency management have always proven to be the most effective instruments in reducing life losses from direct and indirect effects of disasters. A well-planned and prepared system is expected to be effectively informed by early warning, have approved national and local preparedness plans with regularly rehearsed communication and co-ordination systems, as well as adequate logistical infrastructure and emergency funds to respond appropriately and promptly.

A close review of the above features reflects strongly on a proactive approach towards effective disaster risk reduction. However, there are critical challenges that need to be addressed to further improve the results of the Disaster Risk Reduction Model (Figure 2).

Sustainable development context

Socio-cultural

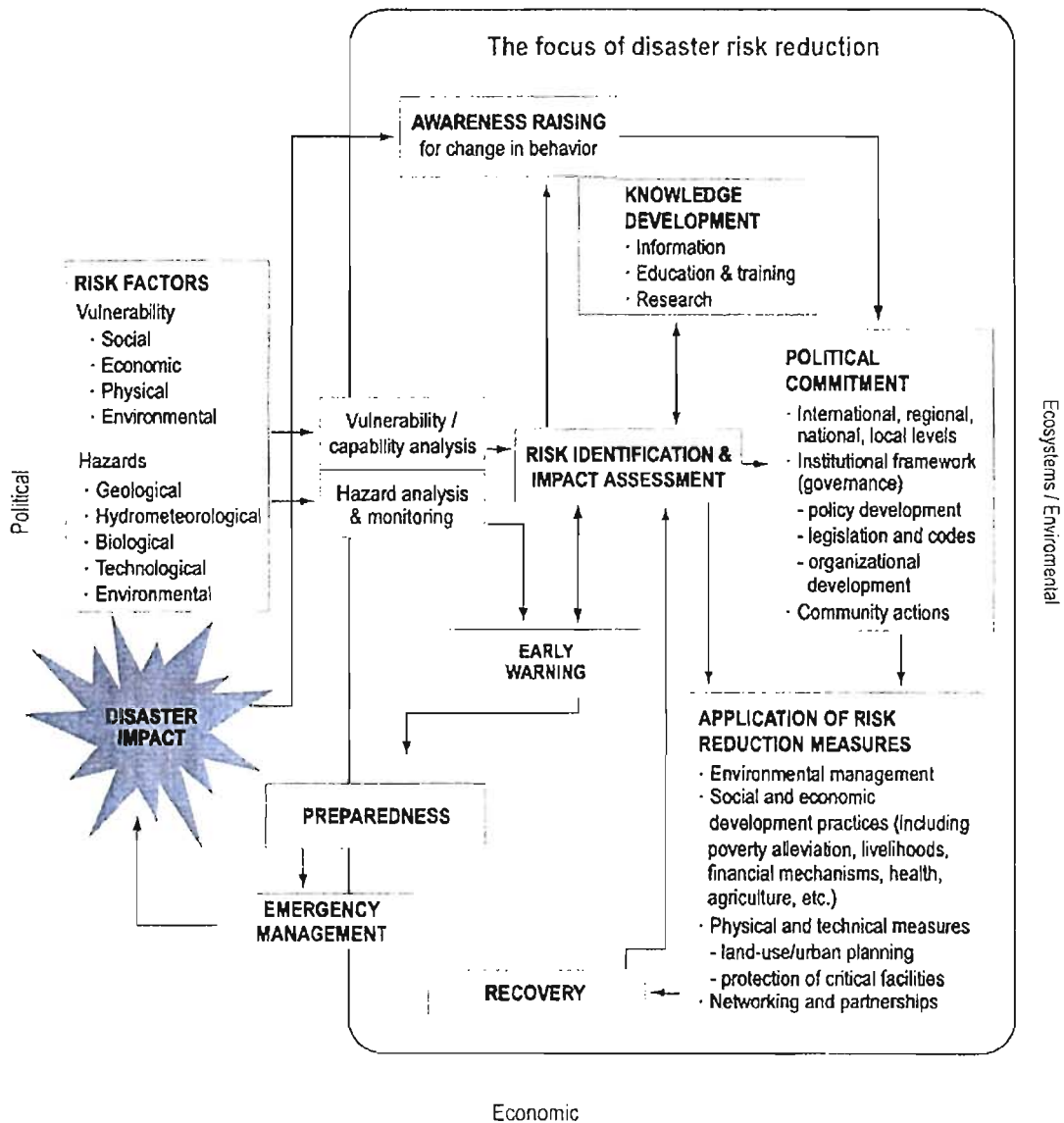


Figure: 2. Disaster Risk Reduction Model (Adapted from ISDR, 2005:15)

2.3.1.1.3 *Challenges confronting the effective implementation of the model*

There are two pertinent obstacles that often delay the successful implementation of this model (Mitchell, 2003; ISDR: 2005), viz disaster risk reduction is often an afterthought in the budgetary allocations with very little political clout. Hence there is a need for disaster risk reduction to be an integral part of the broader concerns of sustainable development and planning. Such an approach needs to be integrated with short-term achievable objectives whilst simultaneously maintaining a strong focus on the long-term objectives of reducing risk to ensure sustainable development. As such, policy-makers, both national and international, have to recognise this move as a step in the right direction and make it their moral obligation to direct resources towards disaster risk reduction as part of sustainable development initiatives. Therefore, mobilisation of the necessary resources for its translation at the local level and the allocation of national budget for planning and implementation of disaster risk reduction are crucial. After all, such an investment is cost-effective in the longer term as fewer resources will be required to provide relief and reconstruction against effective preparedness and mitigation measures.

The effective and proactive involvement of donors and the business sector is also important where the common dilemma encountered by government is an endless list of priority needs and demands to be addressed against a very limited resource base. In light of this reality, disaster risk reduction is viewed and rated as low priority when compared with more pressing concerns like poverty eradication and infrastructural development. Therefore, the engagement of donors, both national and international, and the business sector as sponsors or partners will serve to supplement governments' resources and coping capacity. The above will facilitate projects of an innovative and proactive nature, like disaster risk reduction that may never have been considered previously due to its long-term effect and value.

Secondly, a more technical challenge is getting various interdisciplinary groups to talk the same language. The starting point is to reach consensus on key issues and to contextualise all discussions within clear parameters so as to avoid confusion and ambiguity. For example, clarity around concepts such as disaster risk reduction, risk assessment and vulnerability need to be established. Another important consideration is that whilst allowing and acknowledging specific and peculiar disciplinary influence, it is crucial that focus is on the inter-disciplinary and multi-disciplinary perspective that is directed towards a common interest. This should serve as the platform for co-ordinating, integrating and harmonising risk assessment and vulnerability reduction measures across the various disciplines. The purpose here is to connect to each other as an integrated whole and function synergistically, rather than operate in isolation at cross purposes. More importantly, the rewards in terms of shared expertise and resources, together with improved results, cannot be over emphasised.

These challenges should be embraced in a positive light so as to encourage creative and diversified forms of responses towards the risk reduction objectives to be pursued within a flexible and operational framework.

2.4 RISK REDUCTION OBJECTIVES

Despite the ever-increasing knowledge and technological sophistication, losses from hazards continue to rise at least as fast as the increase in global wealth and population. Environmental degradation combined with human activities is the origin of various catastrophes such as flooding, fires, as well as technological disasters and transport accidents. Therefore, a comprehensive understanding of natural systems coupled with risk assessment can make a major contribution to reduction of risks and overall disaster risk reduction. Burton *et al.* (1993:1) justified this concern by arguing that the ways in which humankind deploys its resources and technology in attempts to cope with extreme events of nature are inducing more damage to the environment. Furthermore, there is also a more serious challenge which is well articulated in the Brundtland Report (Gooneratne

& Obudho, 1997:150), that the careless and uncaring human activities may be responsible for negatively influencing the natural environment resulting in climate change (global warming), together with dangerous levels of pollution and massive amounts of land degradation. This is further aggravated by the processes of rapid social change which in turn places more people at risk, making them more vulnerable. Therefore, reducing hazard or vulnerability contributes to risk reduction; and reducing risk means reducing the possibility of future disaster. However, risk and disaster are ever-increasing problems with costly implications. This argument can be linked to the absence of political will and support where the focus is more on a response approach to emergency situations and less on the execution of a systematic and organised approach towards effective disaster prevention and reduction (Ahrens & Rudolph, 2006).

Regardless of the emphasis placed on the preservation of life and property, the potential for the occurrence of extreme events will always remain capable of overcoming the capacity of society to cope without dramatic changes in its normal operations. However, while hazards cannot be eliminated, the limits of tolerance of every society to their effects can be increased and the potential for disaster risk reduced. The crucial point of interest therefore, is to examine the key objectives of risk reduction.

Wisner, *et al.* (2004:330) identifies seven risk reduction objectives, collectively termed "CARDIAC". When interpreted, "CARDIAC" reads as follows:

C= communicate the understanding of vulnerability

A= analyse vulnerability

R= focus on reverse of Pressure and Release (PAR) model

D= promote sustainable development

I= improve livelihood

A= add mitigation and recovery

C= extend to culture

The discussion below provides more clarity and a proper perspective on the aforementioned objectives.

2.4.1 Communicating the understanding of vulnerability

In general, training and education programmes adopt a two-pronged approach. The first is the acquisition of knowledge relating to the nature of hazards, vulnerability and capacities. The second is to develop capacities that influence change in daily life, in ways that increase personal and social protection. That is to say, people consciously examine their environment and living conditions through an understanding of the “pressure” and “release” model. Thereafter they make rational choices in protecting themselves from disasters (Twigg, 2002:20).

This then leads to the second risk reduction objective where the focus is on risk assessment by analysing hazards, vulnerabilities and capacities.

2.4.2 Analysing vulnerability

In the risk assessment arena, there is a strong bias towards the natural sciences, where disasters are associated with the physical phenomena that generate these natural events (Bankoff, *et al.* 2004; Burton, *et al.* 1993; Smith, 2001). Hence, most disaster managers believe that disaster risk assessment is synonymous with scientifically created ‘hazard mapping’. This view emanates from the false assumption that once hazards are mapped in terms of their location, duration, frequency, severity and impact characteristics, then the risk assessment process is complete. Therefore, integrated hazard and capacity/vulnerability analysis (CVA) rarely happens (Wisner, *et al.* 2004:333).

Despite such obstacles, there is sufficient evidence of progress in certain areas for example; CVA has been extensively used by the International Federation of Red Cross and Red Crescent Societies (IFRC). The IFRC refers to it as VCA, or Vulnerability/Capacity Assessment. Furthermore, in many developing countries, CVA is also practiced at a local level, stemming from the ground-breaking

revelation of Anderson and Woodrow (1989) who in turn built on the efforts of Cuny (1983), Cutler (1984), and Maskrey (1989). For example, in a rural southern African context, the non-governmental organisation (NGO) network Peri Peri, explicitly uses the equation $R = H \times V$ as a means of stimulating village discussions. Also, the Citizens' Disaster Response Network (CDRN) in the Philippines uses a Hazard, Vulnerability and Capacity Assessment Matrix (refer to Figure 3) to facilitate constructive dialogue in these areas.

Hazard Assessment	<ol style="list-style-type: none"> 1. Hazard type 2. Warning signs 3. Forewarning 4. Speed of onset 5. Frequency 6. When 7. Duration
Vulnerability Assessment	<ol style="list-style-type: none"> 8. Extent 9. Elements at risk and reasons why elements are at risk 10. People at risk 11. Locations of people at risk
Capacity Assessment	<ol style="list-style-type: none"> 12. Resources left and capacity for disaster response

Figure: 3 Hazard, Vulnerability and Capacity Assessment Matrix (Adapted from Wisner, *et al.* 2004:334).

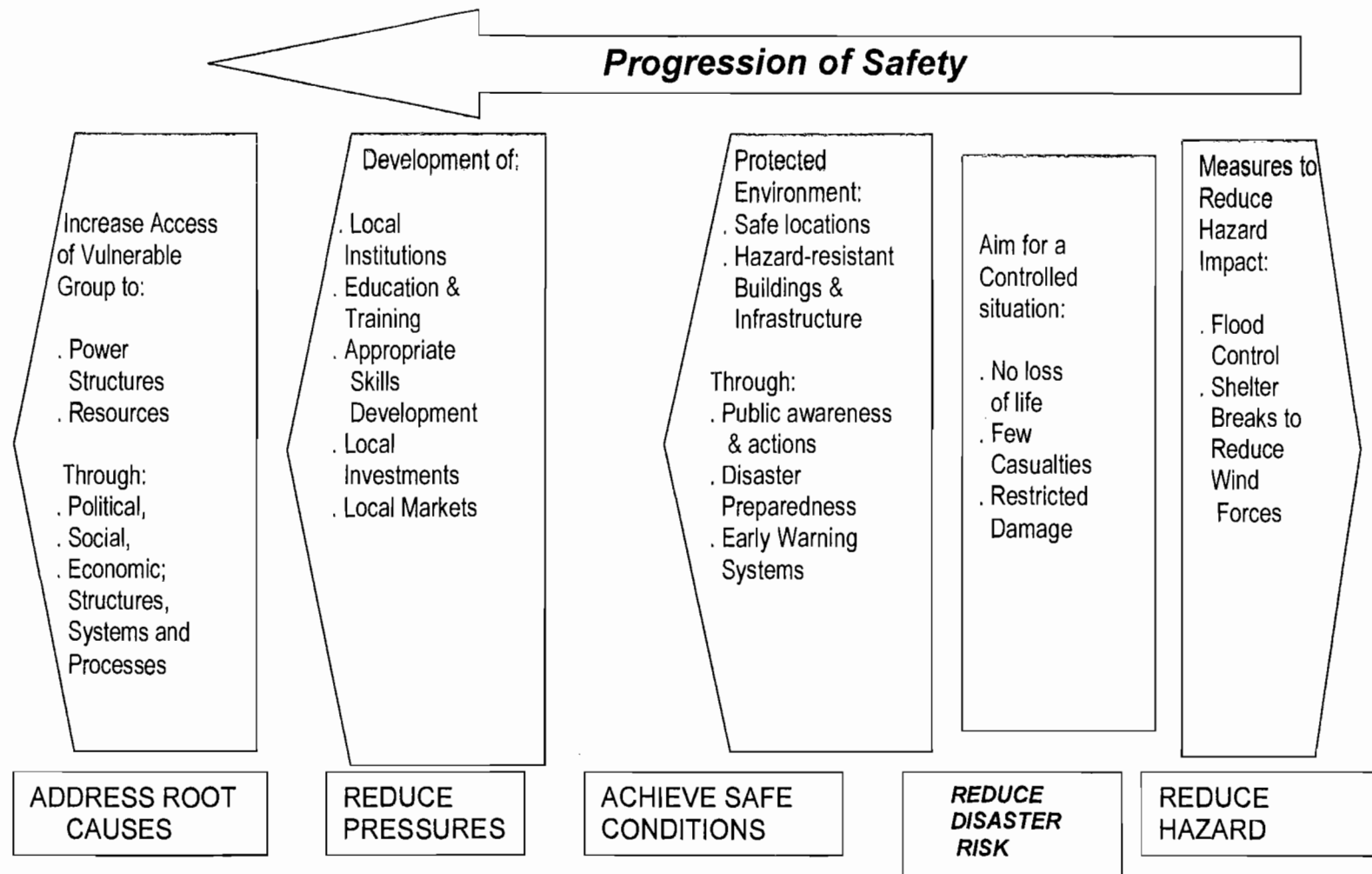
As is illustrated in Figure 3 above, the systematic gathering of information required for risk assessment, including vulnerability, capacity and exposure to hazards allows for the appropriate interpretation and analysis of information of a diverse nature that is useful in determining the level of vulnerability to disaster of specific groups in society. Once this information is available, it becomes necessary to explore means of reducing risk through addressing root causes, dynamic pressures and unsafe conditions which are the third risk reduction objective.

2.4.3 Focus on Reverse in PAR Model

In the “pressure and release” (PAR) model (Blaikie, *et al.* 1994; Wisner, *et al.* 2004) risk is presented as the result of the concurrence of some conditions of vulnerability and of some possible threats. Vulnerability is obtained from identifying the social pressures and relations from national to local level. At the national level, they are referred to as “root causes” such as political, economic and social structures. At the intermediate level, they are called “dynamic pressures” such as population growth, environmental degradation, urban development and population pressures. At the local level they are known as “unsafe conditions” such as social fragility, potential harm and poverty. In this approach, prevention and mitigation is conceived as “releasing” the pressure of what is national over what is local. Therefore, risk reduction signifies intervention at each level, that is, conditions of insecurity, the dynamic pressures and the root causes (Wisner, 1993; Cannon, 1994; Blaikie, *et al.* 1994; Wisner, *et al.* 2004).

In contrast, the “access model” suggests that risk is generated as a result of the difficulties that some social groups or families have in accessing certain resources over time. In effect, the “pressure” model can be reversed to provide security instead of risk. Where vulnerable people’s access to resources can be improved, and changes in power relations can be introduced. This decreasing vulnerability, and if aid is properly managed and implemented, even the most vulnerable survivors can recover in such a way that future vulnerability is

reduced. The underlying principle is to present a transformed version of the “pressure” model. Hence, the new outcome is “safe” as opposed to “unsafe” conditions; “sustainable” versus “unstable” or “fragile” livelihoods; and “resilience” as compared to “vulnerable” people. This perspective is encapsulated in Figure 4, where the “release” process is presented as a reversal of disaster “pressure” (Wisner, *et al.* 2004:344).



Adapted from ADPC, 2004; Wisner, *et al.* 2004.

Figure: 4. The Release of “Pressures” to reduce disasters: progression of safety (Wisner, *et al.* 2004:344).

To illustrate this progression of safety in practice, it may be useful to consider the example of poor communities living in squatter or informal settlements. The starting point is to address the root causes by carefully examining the various (social, political, physical, economic and psychological) dynamics of the community. The next step forward would be to provide and increase access of this vulnerable group to power structures (for example, local authorities through the active engagement and representation of Community Based Organisations and Non-governmental Organisations), and resources (for example, clean water). Thereafter, steady steps should be taken to reduce the various dynamic pressures impacting on the community. The focus should be on disaster and risk management training, public education and awareness, as well as skills development programmes. Also of importance is the introduction of Population and Environmental Health Programmes. To further achieve safer living conditions, it becomes necessary to ensure protected environments through safe locations and hazard resistant buildings and infrastructure. Such initiatives are strengthened through resilient local economy where the skills and training acquired by the community provides them with better jobs and economic opportunities (strengthening livelihoods). Increased income and disaster and risk management training and awareness promote positive public actions (in the form of disaster preparedness), towards reducing hazards (safer structures) thereby facilitating successful disaster risk reduction (Eade & Williams, 1995; Wisner, *et al.* 2004).

In effect the above processes corroborate with the concept of the “disaster management cycle”; which enunciates the ongoing activities pursued by government together with affected and related stakeholders to plan for and reduce the impact of disasters, respond during and subsequent to a disaster, and take appropriate steps to effectively recover after such occurrence (Coetzee, 2009). Relevant actions at all points in the cycle lead to greater preparedness,

better warnings, reduced vulnerability or the prevention of disasters during the next iteration of the cycle. Hence the disaster management cycle incorporates the development of public policies and plans that either modify the causes of disasters or mitigate their effects on people, property and infrastructure.

With this progression of safety leading to hazard reduction and ultimately reducing disaster risk, the next step is to integrate risk reduction into sustainable development.

2.4.4 Promoting sustainable development

Disasters impact negatively on development, undermining attempts at achieving the Millennium Development Goals (MDGs) (ISDR, 2004; Twigg, 2004b). Their pervasive influence comes about because impacts are felt both directly (for example, through the loss of lives, livelihoods and infrastructure) and indirectly (for example, through the diversion of resources from development to emergency relief and reconstruction, or the wider effects on the economy and society). Therefore, the most far-reaching influence of disasters is on MDG1, which has the twin goals of halving the proportion of people whose income is less than US\$1 a day and the proportion of people who suffer from hunger between 1990 and 2015 (DFID, 2004:19; UNDP, 2004).

This influence of disasters on meeting MDG1 is frequently highlighted in national progress reports on the MDGs. For example, China's MDG report cited 'natural disasters' as one of the eight key pressures undermining success in achieving MDG1, and directly links disaster risk reduction and poverty alleviation policy. In Nepal, poverty and hunger are related to the sudden loss of agricultural land through flooding and landslides. Whereas, droughts in Tanzania and flooding in Mozambique are cited as the primary causes of increasing levels of rural poverty in these countries (UNDP, 2004:24).

In light of the above, it is important to discuss environmental issues and disaster within the context of development policy. Also, there are positive spin-offs in the

consensus reached at the World Summit on Sustainable Development (2002), which could be analysed and implemented as linking disaster risk reduction and sustainable development (Wisner, *et al.* 2004:349). After-all, sustainable development is the building block to improving livelihood opportunities (as will be justified in the fifth risk reduction objective that follows).

2.4.5 Improving livelihoods

Wisner, *et al.* (2004:352) claim that development of various aspects of livelihoods can reduce risk substantially. For instance, disaster and risk management training and awareness, together with skills development programmes can vastly increase and sustain the access of poorer households to new livelihood options. These new and improved opportunities may include better employment prospects with increased earnings, resulting in better social standings and living conditions, thereby encouraging safer living standards and drastically reducing disaster risk. The next move will then be to incorporate risk reduction into disaster recovery.

2.4.6 Adding mitigation and recovery

The notion of having “recovered” from a disaster, implies that a household should have not only re-established its livelihood, physical assets and patterns of access but they should also be more resilient to the next extreme event. Changes in social structures that define access to land and property, employment and information are therefore required to assist households become more resilient to the next hazard event. Also, recovery interventions should include mitigation of future extreme events (Twigg, 2004b; Wisner, *et al.* 2004). For example, financial assistance to relocate “squatter” dwellers into low-cost, safer homes; provision of water, sanitation and electricity; and more stringent enforcement of building codes in reconstruction. These measures could lead to disaster risk reduction and encourage a culture of safety.

2.4.7 Extension to culture

The debate on creating a “safer environment” (Wisner, *et al.* 2004:367; UNDP, 2004) is multi-dimensional and challenging - yet achievable if strategically planned and implemented using an integrated approach over a given time-frame. The critical elements or cornerstones are: political commitment; economic support; and societal adaptation and re-engineering towards a culture of safety and risk reduction.

2.5 CORNERSTONES OF DISASTER RISK REDUCTION

Since disasters impact on socio-political factors, actions aimed at reducing risk should address the social factors that determine the vulnerability as well as the changes in the political environment that could increase the resilience of communities. The following parallel and complementary lines of actions can be considered to reduce exposure to disasters and promote effective disaster risk reduction (Bendimerad, 2002: 59-69; Ahrens, 2002; Kelman, 2003; Eade & Williams, 1995; Maskrey, 1990):

- community/stakeholder participation;
- public policy actions;
- development of a culture of prevention; and
- risk assessment.

These issues are further elaborated on and provide a strong basis for arguments on the link between effective risk reduction and risk assessment.

2.5.1 Reducing vulnerability through community participation

Research by Ryscavage (2003) and Twigg (2004b), and experience/case studies have shown that some of the most successful risk reduction initiatives have closely involved communities understanding risks and designing appropriate response and mitigation plans. Community-based disaster management

transforms vulnerable groups into disaster-resilient communities. Communities understand the socio-environmental constraints that define vulnerability and the parameters that determine the success of risk reduction policies and actions. Communities also have perceptions that may or may not be based on reality, but nonetheless are important to consider and incorporate in the development of risk reduction initiatives (Maskrey, 1990; Arnold, 2003).

Community involvement ensures transparency and disclosure and favours responsibility sharing as important mechanisms for disaster risk reduction and sustainable resource use. The top-down approach, still in practice in some countries, fails to involve people in vulnerability identification and disaster reduction. The arguments presented in the study by Dorsey and MacDaniels (1999) were that public participation was seen as unproductive in resolving these critical issues and was too time consuming and costly. Nonetheless, Dorsey and MacDaniels (1999) point out that while the need for public participation was questioned in the 1980s and 1990s, in the twenty-first century the issue is not 'if' community involvement should be considered and utilised, but "how" (Twigg, 2004a; ISDR, 2007a; ISDR, 2007c).

Community participation builds capacity and trust at the local level and reduces political manipulation by special interest groups. Community involvement helps not only in identifying vulnerability, but also the trade-offs involved in achieving sustainability. By its nature, community participation creates partnerships around a common agenda. However, to be successful, communities should be construed as "being part of" rather than "taking part in" an activity (Myers, 1997; Godschalk, *et al.* 1998). Disaster risk reduction issues must be framed within a community's social, cultural, environmental and economic context. Community participation involves a process that first identifies linkages between formal government structures and a community's social structures and then creates mechanisms to integrate them into a common agenda of institutional processes, risk assessments, and related programmes and policies (Arnold, 2003; Burkle, 2003; Gurr & Harff, 2003; ISDR, 2007a).

Lessons learnt with regard to community participation and risk reduction include (Twigg, 2004a; Twigg, 2004b; Pelling, 2003a; Maskrey, 1990):

- the basis for sustained work and intervention for disaster prevention, preparedness and response correlates directly with a community's level of organisation and information;
- community participation requires an honest commitment to a process from government, community leaders and stakeholders where the interests of the community at risk determine the final goal; and
- communities often view disaster protection in the context of improved livelihood security, hence disaster reduction should be seen in the light of sustainable economic, social and physical development.

A well informed society is a potent force in moving risk reduction forward and in generating responsible, people-oriented policies.

2.5.2 Reducing vulnerability through public policy action

Disaster risk reduction policy deals with the course of action adopted by government and civil society to understand hazards, assess vulnerability, evaluate risk and adopt measures for risk reduction. Examples of risk reduction policy include legal and institutional arrangements that govern land use, urban planning, and the enactment and enforcement of construction regulations. However, experience has shown that even in cases where policies have been enacted by law, the absence of enforcement can negate the effectiveness of the legal structure. For example, most developing countries have competent building codes, yet code provisions are ignored in the implementation process due to a lack of enforcement mechanisms (Ahrens, 2002; Bendimerad, 2002).

More importantly, government has the responsibility of protecting life and property, maintaining security and providing services. Therefore, government is obliged to protect citizens from the risks caused by natural and technological hazards. Government uses legal instruments and institutional arrangements to

impose a set of societal rules that order and protect society (Bendimerad, 2002; Ahrens & Rudolph, 2006). Unfortunately, pressure from special interest groups, lack of competency and bureaucratic hurdles often hinder the effectiveness of public policy in protecting the environment and reducing vulnerability and risks. Often, these issues are not in line with the objectives of government that may have short-term goals and usually react rather than plan ahead (Ahrens & Rudolph, 2006). Change within governmental structures is slow and sometimes difficult to implement. Currently, advocacy is geared towards risk reduction, yet most public policy is aimed at improving disaster response capabilities and examining prevention alternatives. Disaster risk reduction and mitigation is often too complex to be implemented by government because it involves proactive, inter-governmental co-ordination and reaching out to communities and other stakeholders (Pelling, 2003b; Kelman, 2003). Moreover, risk reduction and mitigation policies often raise fundamental socio-economic issues such as livelihood safety and resource distribution equity which government is reluctant to tackle. Hence, other more dynamic mechanisms to influence disaster reduction policy are needed. These include grassroots advocacy groups, stakeholder partnerships, and knowledge and risk dissemination.

Collaboration between government, civil society and respective stakeholders provides excellent opportunities to create policies and processes that promote effective disaster risk management. In the face of complex and competing demands, success is strongly correlated with two important factors. First, the ability of government to put in place legislation and administrative arrangements that reduce risk, and secondly, the ability of government and civil society to work together around a common agenda aimed at avoiding catastrophic losses from natural and human-induced hazards (Pelling, 2003b; Ahrens, 2002; Bendimerad, 2002; ISDR, 2007a); towards a culture of prevention and the creation of a "safer" environment.

2.5.3 Reducing vulnerability through a culture of prevention

Developing a culture of prevention to reduce the vulnerability of society to hazards constitutes the foundation of disaster risk reduction. Cultural factors dictate how people perceive risk and their motivation to enhance resilience or aggravate vulnerability. Developing a culture of prevention develops human potential which provides a community with the skills, knowledge and confidence to cope with the impacts of hazards to proactively reduce the negative consequences of future events (ISDR, 2002; Bendimerad, 2002; ISDR, 2007a).

The key actions for developing a culture of prevention are:

- awareness raising;
- societal arrangements;
- accountability forging; and
- empowerment.

These actions are discussed below, reflecting the value they add as catalysts of positive change in disaster and risk management.

2.5.3.1 *Awareness raising*

Kelman (2003) stresses that awareness raising makes individuals, communities and institutions aware of vulnerabilities and the negative impacts of disasters on their livelihoods. Armed with this knowledge, they can better understand their environment and take an active role in its management. After-all, every actor engaged in risk reduction has a competitive advantage and contributes to fighting vulnerability and improving mitigation interventions. However, to be most effective, awareness raising must target several segments of society. Governmental, non-governmental institutions and civil society organizations should aim to reform existing socio-political structures to make them more responsive to community needs. Educational processes aimed at raising awareness must also be put in the context of the everyday challenges of a

community in order to attract attention. Everyday risks related to human safety constitute an opportunity for preparing for less frequent but potentially more disastrous events (Pelling, 2003a; UNDP, 2002; Bendimerand, 2002). This then demands the need and support for the existence of strong social structures.

2.5.3.2 *Societal arrangements*

Societies organise themselves to link individuals in a community. This involves both the strengthening of government institutions and the creation of organisations representing civil society. Active civil society organisations represent the interests of stakeholders in the policy and decision making process by including community concerns in discussions surrounding policy development. Civil society organisations can improve transparency by disseminating information and initiating reform (Ahrens & Rudolph, 2006; Ahrens, 2002; Bendimerad, 2002). Societal organisations can also be effective actors in capacity development by providing training and creating partnerships. They can mobilise resources and implement disaster risk reduction programmes. However, in developing countries, civil society is often weak due to a lack of resources and capacity. The primary objective then should be to ensure the sustainability of these organisations through the implementation of appropriate empowerment strategies.

2.5.3.3 *Empowerment*

The process of empowerment is influenced by several sources which include information, and better access to resources of all kinds (Smith, 2004). Good governance empowers individuals and communities and makes them active participants in society (Ahrens & Rudolph, 2006; Bendimerad, 2002). Knowledge is also an instrument of empowerment (Smith, 2004:27). A community that is aware of its vulnerability to disasters is more likely to take action. Knowledge engenders confidence and vigilance. More importantly, knowledge constitutes the active ingredient in the participatory process that enables communities to

make informed decisions about environmental and resource allocation issues (Arnold, 2003; Burkle, 2003; Gurr & Harff, 2003).

The post-disaster period provides a window of opportunity to build networks aimed at empowering local communities in disaster management, preparedness and response. During this period, when fear and awareness of hazards and feelings of helplessness run high, community members are more receptive to learning about how to cope with life-threatening hazards (Ryscavage, 2003; Twigg, 2004b). However, sustaining programmes for community participation and developing a culture of prevention cannot be motivated by fear and anxiety alone. It should be supported through funding for community training, building networks, and developing a sense of community ownership by involving individuals in the development of action plans for disaster mitigation and preparedness through effective disaster risk assessment.

2.5.4 Reducing vulnerability through risk assessment

Disaster risk reduction is based on a continuous strategy of vulnerability and risk assessment with the fundamental need to assess, monitor and update exposure to changing conditions (ISDR, 2004; ISDR, 2007a). This is outlined in Principle 1 of the 1994 Yokohama Strategy and Plan of Action for a Safer World and the Hyogo Framework for Action, where risk assessment is viewed as a fundamental step towards successful disaster reduction policies and practices. Disaster reduction measures should therefore be based on firstly, the continuous assessment of vulnerability and hazards, ensuring a comprehensive understanding of disaster risks. After all, the process of identifying, locating, measuring and fully understanding risk is the crucial step towards the design of policies, strategies and action for disaster risk reduction. This explicitly highlights the locus of risk assessment within the context of risk reduction. These could range from development planning through to addressing risk in preparedness for response (ISDR, 2007c).

Secondly, risk assessments that reflect the dynamic nature of the environment, taking into account new and complex forms of danger impacting on the environment and society. Emerging trends in hazards and vulnerability that may stem from climate change, urban growth, disease and environmental degradation (Twigg, 2004a; ISDR, 2004) are crucial factors to be considered in disaster risk assessment.

Thirdly, reliable and accurate data and information for the identification of trends in hazards and vulnerability; to enable decision-makers to take sound disaster risk assessment decisions and adopt appropriate disaster risk reduction strategies, including that of factoring disaster risk reduction into national planning and budgetary processes (ISDR, 2007a; Twigg, 2002).

Fourthly, improved communication networks among early warning stakeholders where effective co-ordination among key stakeholders in the early warning chain promotes informed decision-making and positive response actions towards effective disaster risk reduction interventions (Twigg, 2002).

In effect, disaster risk reduction concentrates on hazards, in particular: their characteristics and related impact; vulnerability in relation to social, economic, environmental and political factors; and risk as the outcome of hazard interacting with conditions of vulnerability (Vermaak & Van Niekerk, 2004). Therefore, disaster risk assessment is identified as an integral component and crucial link in reducing risks and vulnerabilities towards the achievement of the Millennium Development Goals (Briceño, 2004) and the related global risk reduction strategies as alluded to above.

2.6 CONCLUSION

Despite the growing recognition and acceptance of the importance of disaster risk reduction, the management and reduction of disaster risk continue to pose a global challenge. One of the major challenges is the need to constantly adapt disaster reduction measures to changes in overall parameters. However, there is

international acknowledgement (ISDR, 2007a) that effort to reduce disaster risks must be systematically integrated into policies, plans and programmes for sustainable development and poverty reduction. As such, sustainable development, poverty reduction, good governance and disaster risk reduction are mutually supportive objectives of disaster risk assessment, and in order to meet the challenges ahead, accelerated efforts must be made to build the necessary capacities at the community and national levels to manage and reduce disaster risk. This is clearly substantiated within the framework of the Disaster Risk Reduction Model (Figure 2).

In summary, many disaster reduction initiatives fail to reach their objectives and only marginally impact on capacity building and vulnerability reduction because they are short-lived. Often, funds and other resources are allocated on a short-term basis and unrealistic expectations are attached to capacity building projects. As presented in this chapter, disaster reduction should be recognised as a difficult process where progress can only be achieved through well-planned and sustained efforts which are co-ordinated by a systematic process of risk assessment. Therefore, the furtherance and sustainability of the disaster risk reduction objectives requires commitment in providing long-term funding, human resources and institutional support and political backing. These issues form the crux of the discussion on the various disaster risk assessment models in Chapter Four of the thesis, as the guiding principles to effective disaster risk assessment and the development of the proposed model in Chapter Six of the thesis.

The next chapter will provide the theoretical overview of disaster risk assessment as a critical step in ensuring appropriate risk reduction strategies through a systematic and structured risk assessment process.

CHAPTER 3

THEORETICAL OVERVIEW OF DISASTER RISK ASSESSMENT

3.1 INTRODUCTION

Disaster risk assessment is commonly recognised as the first and most crucial step towards the achievement of successful risk reduction strategies and programmes (Carter, 1991; Blaikie, *et al.* 1994; Ferrier & Haque, 2003; South Africa, 2005). Therefore, the primary purpose of this chapter, in the first instance is to present the theoretical underpinnings of disaster risk assessment as a tool towards promoting effective disaster risk reduction. The second purpose is to illustrate and examine the key components of disaster risk assessment. The intention is to verify the link between these variables which will form the basis for the development of an appropriate risk assessment model. A close analysis of hazard, risk and vulnerability proves the intense relationship and inter-relatedness that exist between them giving concern to swift, yet robust interventions through the implementation and practice of a relevant disaster risk assessment model. More importantly, the shift in focus from the hazard-based approach to that of the vulnerability approach implies that the tools being utilised need to correlate with the underlying principles of the vulnerability approach.

This then brings into focus the current need and importance of disaster risk assessment as a means to minimising disaster impacts and the subsequent human and economic costs of disasters. The risk assessment process serves as a systematic tool undertaken in a structured and sequenced manner. Where stage one involves identification of the hazard followed by the estimation of risk and vulnerability in phase two and thirdly, the evaluation of social consequences. The key activities of the risk assessment process will be used as a point of departure in the development of set criteria against which the three (vulnerability driven) disaster risk assessment models (analysed in Chapter Four of the thesis) will be examined.

The information derived as a result of this process is instrumental in disaster planning and risk reduction initiatives especially within a constantly changing environment. However, to overcome unexpected problems in risk assessment, the issues of scientific uncertainty, proper cost-benefit analysis and factors relating to risks and responsibilities are recommended for consideration and inclusion into the development of the proposed risk assessment model for local government in South Africa (Chapter Six of the thesis).

These deliberations will subsequently lead to the exploratory review of three disaster risk assessment models promoting disaster risk reduction.

3.2 CONCEPTUAL FRAMEWORK FOR DISASTER RISK ASSESSMENT

The conceptual framework provides the theoretical parameters for logical discussions around disaster risk assessment. In this regard, the key components of disaster risk assessment, that is, hazard, risk and vulnerability are closely analysed.

3.2.1 Hazard

Giddens (2000:52) argues that “we live in a world where hazards created by ourselves are as, or more, threatening than those that come from the outside”. Further, current trends appear to indicate that an increase in the impact and scope of hazards and resulting disasters, already complex and multidimensional, are taking place through the combined effects of economic, social, demographic, and technological factors (Palm, 1990; Oliver-Smith, 1990). In support of this view, Scheidegger (1994:19-25) describes hazards as the result of sudden changes in long-term behaviour caused by minute changes in the initial conditions. To further enhance this notion, Smith (2001:6) views hazards as naturally occurring or human-induced process or event with the potential to create loss, that is, a general source of future danger.

In light of the above, it is clear that different conceptualisations of hazards have not only evolved over time, but they also reflect the approach of the different disciplines involved in their study. According to natural scientists, all blame is attributed to “the violent forces of nature” or “nature on the rampage” (Frazier, 1979; Maybury, 1986; Ebert, 1993; de Blij, 1994). In essence, the technical approach prevails among natural and physical scientists (Smith, 1985; Alexander, 1991). Emphasis is given to seismology, volcanology, geomorphology and other geophysical approaches to disasters (Bolt, *et al.* 1977; Steinbrugge, 1982).

Other views of “man and nature” (Burton & Kates, 1964; White, 1973; Alexander, 1993) involved a more subtle environmental approach in which the limits of human rationality and the consequent misconception of nature leads to negative outcomes in human interactions with their environment. To illustrate this perception, a natural hazard has been expressed as the elements in the physical environment harmful to man (Burton & Kates, 1964:412-441; Turner, 1976:755-756); an interaction of people and nature (White, 1973:193-216); the probability of occurrence of a potentially damaging phenomenon (UNDRO, 1980); and as a physical event which makes an impact on human beings and their environment (Alexander, 1993). To this effect, social science methods are widely used and emphasis is given to the spatial-temporal distribution of risk, impacts and vulnerability (Palm, 1990). The sociological approach stems from the works of amongst others, Dynes *et al.* (1987) and Quarantelli (1978) where, vulnerability and impacts are considered in terms of patterns of human behaviour and the effects of disaster upon community functions and organisations (Quarantelli, 1978; Drabek, 1986; Dynes, *et al.* 1987).

By examining the different definitions of hazards and disasters, it is clear that the conceptualisation has changed from the perspective of a merely physical or natural event towards integration of the human system. This interaction with the human system becomes even more apparent when the characteristics of hazards, its related outcomes, and required actions are discussed.

3.2.1.1 *Characteristics of hazard*

According to Burton *et al.* (1993:34-35) the characteristic that defines a hazard is its magnitude, frequency, duration, areal extent, speed of onset, spatial dispersion and temporal spacing. The first four of these are measurements of the aggregate of separate events. However, spatial dispersion and temporal spacing refer to the distribution of a population of events over a space of time.

The *magnitude* of a flood, for example, is the maximum height reached by the flood waters or the maximum discharge at a given point. In effect, the interaction of four factors determines the magnitude of the hazard impact (UNDRO, 1980:25):

- the first factor is the geographical pattern of the severity of the phenomenon. For an earthquake, the geographic pattern of strong motion, the potential for fire following the earthquake and flooding caused by the possible occurrence of an accompanying tsunami;
- the second factor is the number, spatial distribution and density of population which is exposed to the effects of the various hazards;
- the third factor is the vulnerability of the elements at risk when they are subjected to a given wind speed, flood depth or strong ground motion intensity; and
- the final factor is the effect of local conditions in modifying the severity of the event at a given location. For example, in the case of wind storms, speed and direction can be markedly affected by natural topographical features such as hills and valleys and even isolated buildings.

Frequency asserts how often an event of a given magnitude may be expected to occur in the long-run average. Thus, a snowstorm of a given magnitude (depth of snow accumulation in cm) may occur only once in ten years (but not every ten

years). To state that a storm or flood has a recurrence interval of ten years is to say it has in any year a ten percent chance of occurring (Tobin & Montz, 1997).

Areal extent refers to the space covered by a hazard event. For instance, Chapman (1994:118) referred to flooding as one of the more manageable of the natural hazards. Windstorms may strike anywhere but floods are restricted to relatively small, definable areas. Further, a tornado's areal extent may be a short and narrow strip while a drought may cover thousands of square kilometres.

The significance of the magnitude, frequency, and areal extent describe the strength or force of an event, how often it can be expected to occur, and over what area. In essence, the greater or more powerful the hazard event is, the less adequate the available technology becomes to effectively control or mitigate it. Also, the more frequently the hazard occurs, the greater the need to take steps to respond to or accommodate it and more importantly, the larger the area affected, the broader the segment of society likely to be subjected to loss or disruption (Burton, *et al.* 1993).

Duration refers to length of time over which a hazard event persists (Tobin & Montz, 1997). As noted by Blaikie, *et al.* (1994:21) hazards have varying degrees of intensity and severity. Thus as expected, a blizzard may cause much damage in a few hours, a fog may persist for days, a flood may last for weeks and a drought for years. The resultant effect is that, the shorter the event in time, the less can be done during its occurrence. Hazard events that last for days or weeks or longer, allow for more mitigating actions to be taken while the hazard continues, but also tests the society's capacity for endurance and extended change in behaviour.

Speed of onset can be defined as the "length of time between the first appearance of an event and its peak" (Alexander, 1993). IFRC (2000:8) describes a rapid onset disaster as an event or hazard that occurs suddenly, with little warning, taking the lives of people and destroying economic structures and

material resources. Rapid onset disasters may be caused by earthquakes, floods or tornadoes. On the other extreme, slow onset disasters occur over time and slowly deteriorate a society's capacity to withstand the effects of the hazard or threat. Hazards causing these disaster conditions typically include droughts, famines, environmental degradation and deforestation.

The significance of the speed of onset dimension is chiefly in terms of emergency preparations and of the physical capacity to operate a warning system. Where a hazard event strikes rapidly, little can be done. But where a long period of time elapses between onset and peak, the range of possible responses is usually greater (Alexander, 1993; Tobin & Montz, 1997).

Spatial dispersion can be described as the pattern of distribution over the space in which it can occur (UNDRO, 1980; Tobin & Montz, 1997). Droughts and heat waves are usually more widespread in occurrence than other events like eroding coasts and floodplains that can be mapped with some degree of precision. Spatial dispersion can be influential in determining over what territory a pattern of hazard-response is needed. Thus, adoption of measures to mitigate the effects of earthquakes depends on knowledge of where the earthquake is likely to occur (Tobin & Montz, 1997).

Temporal spacing refers to the sequence of events (Burton, *et al.* 1993). Some hazards (like volcanic eruptions) approximate a random time distribution, while others (for example tornadoes) are seasonal or cyclical. Temporal spacing carries implications for the scheduling of human activities. Where hazards are seasonal in occurrence for example, it may be possible to concentrate hazard-vulnerable farming activities in the non-hazard season. As clarified by Elo (1995:3) the conditions in one period may influence what the farmer does in the next.

In summary, Palm (1990:1) stressed that no matter where one lives or what one does; one is always subjected to some form of hazard and risk embedded in the

environment. Some risks to life, health, and property are caused by simple natural variability that is more or less rainfall in a given year and the slipping of portions of the earth's crust. Some hazards are caused by human activity, pollution of water, air, and soil from industrial wastes. Each day people are adversely affected by sudden changes in the environment or by human activities that cause long-term and irreversible damage to the environment. The outcomes of which are determined by the nature, level and extent/degree of risk present within the environment and society; as will be elaborated on in the next section.

3.2.2 Disaster Risk

The challenge facing modern societies is to accept the reality that risks and hazards are part of daily life (Perry & Mushkatel, 1984:24-27). Once this is acknowledged, attention can be redirected away from debating the mere existence of risks to more important considerations on how much risk society's face and from what sources. In reality, risk is the actual exposure of something of human value to a hazard and is often regarded as the product of probability and loss. Thus, Cutter (1996:529-539); Blaikie, *et al.* (1994), and Smith (2001), define hazard (or cause) as "a potential threat to humans and their welfare" and risk (or consequence) as "the probability of a hazard occurring and possibly culminating in a disaster".

As a concept, risk is typically viewed as being a function of two major factors (Petak & Atkisson, 1982:11):

- i) the probability that an event, or series of events of various magnitudes, will occur; and
- ii) the consequences of the events.

The concern expressed by Tobin and Montz (1997:281) is that risk is sometimes equated erroneously with a hazard, and perceived risk is equated with hazard perception. In fact, risk is part of hazard but the two terms are not synonymous. Risk is an important component of hazard analysis, and risk analysis forms an

important subdivision of the study of hazards. Frequently, risk is seen as the product of some probability of occurrence and expected loss. To get a better assessment of hazard risk, details on vulnerability must be incorporated in the analysis, conceptualizing hazards as a multiplicative function of risk, exposure, vulnerability and response (Tobin & Montz, 1997:282; Carter, 1991:346-351). This relationship can be expressed as:

$$\text{Risk} = \text{Probability of Occurrence} \times \text{Vulnerability.}$$

OR

Terminology	Interpretation
Hazard =	f (risk x exposure x vulnerability x response);
Risk =	the probability of an adverse effect;
Exposure =	the size and characteristics of the "at-risk" population;
Vulnerability =	the potential for loss; and
Response =	the extent to which mitigation measures are in place or the level of preparedness/capacity of the community to cope with the event

OR

Just simply stated, by IFRC, 2000; Chen, *et al.* (2003); as:

$$\text{Risk} = \text{Hazard} \times \text{Vulnerability}$$

Von Kotze (in Holloway, 1999:34) illustrated "a new concept of risk" wherein the primary argument is that in the expert knowledge system, disasters are seen as being driven by hazard patterns (May & Williams, 1986:5). By contrast, in the people-centred approach, the emphasis shifts from the hazard to a focus on socio-economic vulnerability. Rogers (1997:745) stressed that social processes that construct and maintain risk are as important, if not more important, than the physical dimensions of risk. Rather than explaining disasters as hazard events,

disaster occurrences are viewed as the result of unfair social, economic, political and environmental conditions and practices (Holloway, 1999). This draws reference to the dynamic nature wherein the risk and ultimately the threat (often defined as hazardousness) changes over time as human use and environmental processes change (Carter, 1991; Alexander, 1991; Tobin & Montz, 1997). Therefore, if one is expecting to see positive change in disaster outcomes, one has to come to grips with both the hazard and the risk from a number of angles. In particular, the complex nature of risk is better comprehended when viewed from different lenses, as is reflected in the discussion that follows.

3.2.2.1 *Nature of risk*

A hazard may be regarded as the pre-disaster situation (but not all hazards lead to disasters) in which some risk of disaster exists principally because the human population has placed itself in a situation of vulnerability. Alexander (1993:7) coherently described a hazard scenario within a sequence of events. The sequence of events passes through several stages, namely: hazard, risk, threat, disaster (impact), and aftermath (post-impact).

Hazard \Longrightarrow Risk \Longrightarrow Threat \Longrightarrow Disaster (impact) \Longrightarrow Aftermath.

However, the sequence does not account for variability in the time-frame for each stage. For example, the threat phase depends on the speed of onset of the geophysical process but direct impact is controlled by the duration of the event. Thus, a local flood may pose a direct threat over several hours or even days; a tropical cyclone may be tracked for over a week before hitting the shoreline; and an earthquake may permit no warning time. In essence, risk is only part of hazard but needs to be understood in order to grasp the complexities of hazards. Just as risk is only one component of hazards, risk also is complex. It comprises two elements that must be considered separately and together. These are:

- choice of action; and

- an outcome, which includes a probability of occurrence and consequences (or magnitude).

To gain a clearer perspective of the complexity of the above mentioned elements of risk, the next two sections are dedicated to explaining them within context.

3.2.2.1.1 *Choice of action*

Tobin and Montz (1997:283) argue that every decision and resultant action, whether voluntary or involuntary, is an intricate part of human existence that ultimately exposes people to risk. In reality, no one is ever completely safe no matter what decisions are made, although clearly some individuals are safer than others. For example, communities of squatter settlements of Alexandra in Johannesburg along the floodplain of the Jukskei River, are obviously more vulnerable than people living in substantial dwellings (for example, in Sandton City), in less hazardous environments. However, Cutter (1993:33) made it clear that there is no such thing as a risk-free or hazard-free environment. Societies have always made explicit or implicit choice on risks and hazards between a few lives lost versus the overall betterment of society. The decision to locate in a particular area is not always made freely but is usually determined by socio-economic forces that often are beyond the control of individuals. Thus, risk involves choices but those at risk are not always the ones who make the choices. As substantiated in the research output presented by Weichselgartner and Obersteiner (2002:2), risk experts from outside often overlook the fact that people living in hazard prone areas (especially in developing countries), have more pressing problems to face than the risk of disasters. These problems may include the lack of adequate health services, education and political influence.

Furthermore, it is impossible to avoid all risks. As a result, societies have evolved in a manner that allows them to operate within specific levels of tolerance for natural and human-made events (Foster, 1980:1). There are great difficulties in deciding what an acceptable level of risk is particularly as it is influenced by

people's perceptions and interpretations of risk (Comfort, 1988:43). This includes knowledge or belief about the seriousness of threats and associated risk as well as the subjective probability of experiencing a damaging loss. For example, if people simply discount the probability of loss from infrequently occurring events, there will be little concern with hazards and the level of risk they may be placed in.

Smith (2001:56) conveniently classifies risk into two main categories:

- involuntary risk; and
- voluntary risk.

Involuntary risk alludes to that risk which is not knowingly or willingly undertaken. They often relate to rare events with a catastrophic potential impact. The risk may be unknown to the exposed person/community. If the risk is perceived, it may be seen as inevitable or uncontrollable, for example earthquakes or tsunamis (Mileti, 1980; Blaikie, *et al.* 1994; Alexander, 1999). On the other hand, voluntary risk refers to risk which are more willingly accepted by people through their own actions. Such risk is likely to be more common, have less catastrophic potential and be more susceptible to control. The greater scope for control over voluntary risks (Mileti, 1980; Alexander, 1993) is seen in either modifications of individual behaviour (avoid living on river banks) or some form of government action (introduction of disaster management legislation and pollution control).

This division between risk categories is often less clear than it appears. In other words, a risk is generally less voluntary than another risk if its avoidance is connected with a greater personal sacrifice on the part of the risk-bearer as is illustrated by the examples presented in the outcomes below.

3.2.2.1.2 *Outcomes: Probability and Consequence*

Besides choice, some attention must be given to outcomes of decision making (Tobin & Montz, 1997:284-285). For instance, those who elect to live in hazardous areas may not fully appreciate the risk. While the initial choice may have been voluntary, their knowledge of potential outcomes may have been incomplete. For example, homeowners close to the ocean may be unaware of the seriousness of threats from cyclone-force winds, tidal surges, or rising sea levels.

Predicting outcomes is not easy since it is influenced by a number of characteristics that can vary depending on, among other factors, geographic location and time of occurrence. For example, the physical aspect of a hazard, the magnitude, timing, and extent of a geophysical event influence the decision making of individuals involved. Although risks associated with natural hazards are not usually viewed as positive, if the timing is right, the flooding of agricultural lands can increase the fertility without damaging the crops. However, a flash flood calls for the immediate evacuation of the hazard zone, and failure to respond appropriately can result in death. Thus, there is uncertainty associated with outcomes, an uncertainty founded not only in the physical dimensions of hazards but also in human decision making (Comfort, 1988; Alexander, 1991; Tobin & Montz, 1997; Smith 2001).

Overall, risk should be viewed as existing on a two-dimensional plane for any specific location, the extremes of which are high-probability with low-consequence and low-probability with high-consequence risk.

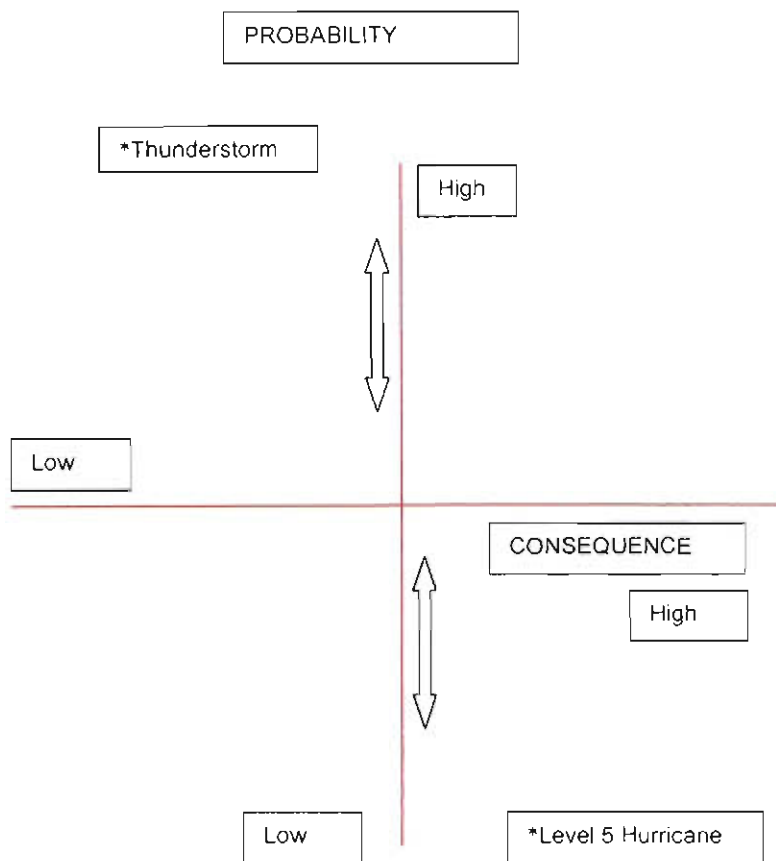


Figure: 5. Relationship between an event's probability of occurrence and the extent of probable consequences (Adapted from Tobin & Montz, 1997:286).

Figure 5 is reflective of the fact that different hazards would occupy different points on the diagram; however, the two depicted here reflect potential extremes. Also, what is apparent and clearly highlighted in the figure above, is that risk varies in magnitude, from high to low risk. This is influenced by a number of factors that indicate why and how people are most likely to be at risk from the impact of disasters. These include:

- proximity/exposure- people who occupy or, for their livelihoods, face high hazard exposures;
- capacities and resources- people who have limited means and capacity to mobilise themselves in order to increase their defences against hazards; and
- disadvantaged or marginalised- people who are peripheral or weak due to gender, age, ethnicity and class (Carter, 1991; Blaikie, *et al.* 1994; Alexander, 1993).

Therefore, in its simplest form, risk can be described as the product of probability of occurrence and magnitude of an event. In a more integral notion of risk, three separate aspects converge: eventuality, consequence and context as explored by Whyte (1982) in Tobin and Montz (1997:287). However, still concerned with society's views and perceptions of risk, Whyte (1982) suggested altering the risk formula from:

Risk = probability of occurrence X magnitude

To

Risk = probability of occurrence X magnitudeⁿ

Where

n = social values

X = multiply sign

Hence, Whyte's modification allows for inclusion of social concepts of risk and consequently recognises variation in perception in different contexts, as follows:

- regardless of individuals' experience and training, it is not the scientific definition of risk on which they base their decisions about which actions to take or which hazards they will knowingly expose themselves to; and

- knowledge is important, but only one part of the process. If risk involves choice among actions and outcomes, each of these has characteristics that also influence views of risk and determine the nature of response or action to be undertaken (Cutter, 1993; Tobin & Montz, 1997; Holloway, 1999).

In view of the arguments presented, it becomes obvious that one of the key issues in understanding risk and accomplishing risk assessment is the divergent views people hold on the importance and reaction to different risks within their environment. An added dimension to the risk complexity is the issue of vulnerability as detailed below.

3.2.3 Vulnerability

Vulnerability is a factor closely related to human activities where living with the poverty and uncertainty of their daily existence, severely constrains their freedom of choice and leaves them prey to a creeping despair that the magnitude and frequency of hazards only make worse (Bankoff, *et al.* 2004:1). Chambers (1989:1) accentuated the plight of society by describing vulnerability as “defenceless, insecurity and exposure to risk, shocks and stress...and difficulty in coping with them”. Therefore, vulnerability has two sides: an external side of risks, shocks and stress to which an individual or household is subject, and an internal side which is defencelessness, meaning a lack of means to cope with damaging loss. This focus on the internal side is pursued further by Blaikie, *et al.* (1994:9) where vulnerability refers to the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist, and recover from the impact of a hazard. It involves a combination of factors that determine the degree to which someone’s life and livelihood is put at risk by events in nature or in society. Some groups in society are more prone (than others) to damage, loss, and suffering in the context of differing hazards. Key characteristics of these variations of impact include ethnicity, gender, disability, age or seniority. Also, the concept of vulnerability clearly involves varying magnitude, from high to low

levels of vulnerability, for different people, making some more vulnerable than others (Blaikie, *et al.* 1994; Dibben & Chester, 1999).

Since it is damaging to livelihood and not just life and property that is of concern the more vulnerable groups are, the more difficult they find it to reconstruct their livelihoods following a disaster. They therefore become even more vulnerable to the effects of subsequent hazard events (Anderson & Woodrow, 1989; Davis & Bellers, 1995; Harrell-Bond, 1986).

More importantly, by adopting an analytical approach which stresses that disasters are events that happen to vulnerable people, there is a major shift in focus. The emphasis is away from the natural hazard towards the need for a better understanding of the processes that generate vulnerability. Holloway (1999:35) interprets this as the people-centred approach where the emphasis shifts from the hazard to focus on socio-economic vulnerability. In other words, vulnerability represents the physical (buildings and infrastructure), economic (assets, industrial and agricultural productions), political (organisations, systems and structures) or social (livelihoods, incomes and community resilience) susceptibility of a community to damage in the case of a destabilising phenomenon (Blaikie, *et al.* 1994; Cannon, 1994; Wisner, *et al.* 2004). A series of extreme and often permanent conditions exist that make livelihood activities extremely fragile for certain social groups (Bankoff, *et al.* 2004:37 and Cardona, 2001:1). In other words, hazard and vulnerability are concomitant and lead to risk.

Ariyabandu (1999:57) and Cardona (2001:13) take this discussion to the next level by identifying a number of factors that compound social vulnerability. These include:

- livelihood circumstances - position and status in society, which in turn is usually related to wealth, gender, race, health and other such factors;
- location - the geographical proximity to the hazard in question;

- self protection - the capacity to protect oneself from harm, including access to materials, knowledge and information; and
- social protection - the extent to which the society, or group of individuals can provide assistance and support, including resources and technical knowledge.

Vulnerability, as is evident from the descriptions above, is the outcome of the complex interplay of a range of socio-economic and cultural factors and is mediated by political and/or institutional disempowerment, economic and educational discrimination (Boorse, 1975; Townsend, 1987; Sen, 1992; Doyal & Gough, 1991; Dibben & Chester, 1999). The causes of social vulnerability, for example, are usually explained by the underlying social conditions that are often ignored from the more technical assessments of a hazard event (Cutter, 1996). Furthermore, beliefs, attitudes and subjective judgments also play an important role in shaping human behaviour and action in response to any hazard thereby reflecting the relationship between hazard, vulnerability and risk (refer to Figure 6).

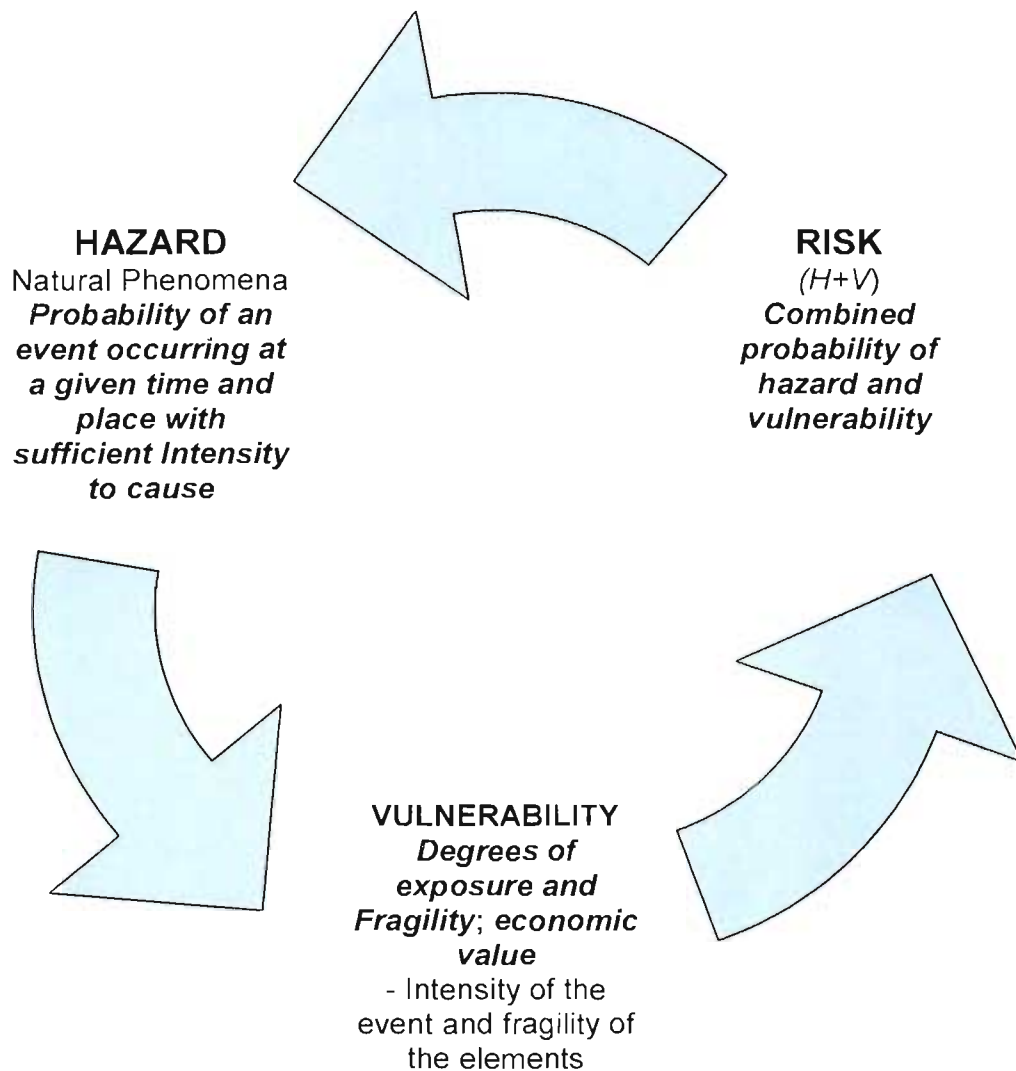


Figure: 6 Relationships among Hazard, Vulnerability and Risk
(Adapted from ECLAC & IDB, 2000:6)

The concepts of hazard, risk and vulnerability are dynamically related (IFRC, 2000:6). This relationship (described in Figure 6) can be expressed as a simple formula (***Risk = Hazard x Vulnerability***). Chen, *et al.* (2003:546) justify the issue

that the greater the potential occurrence of a hazard and the more vulnerable the population, the greater the degree of risk.

Vulnerability is therefore, a precondition that reveals itself during a disaster when less has been invested in prevention and mitigation and an excessively high risk level has been accepted. This situation then lends itself to the dynamic nature of vulnerability as will be revealed in the analysis that follows.

3.2.3.1 *The dynamics of vulnerability*

Vulnerability is not static but must be considered as a dynamic process, integrating changes and developments that alter and affect the probability of loss and damage of all the exposed elements. This is echoed by Lewis (1999:14) and Varley (1994:20) in their statements that the measure of vulnerability should not be regarded as static. Rather, vulnerability expresses changing social and economic conditions in relation to the nature of hazard and is part of a dynamic and evolutionary process (Thomalla, *et al.* 2006). In effect, it can be argued that vulnerability is embedded in complex social relations and processes. Furthermore, people's vulnerability builds up gradually over time but varies immensely through rapid variations in economic, environmental or social conditions especially when these are compounded by seasonal patterns of change (Davis & Bellers, 1995; Blaikie, *et al.* 1994; Dibben & Chester, 1999).

Degg (1992) aptly articulated that vulnerability is a dynamic factor continuously modified by social changes that can be seen as the outcome of the interplay of a wide range of socio-economic factors such as material welfare, education, politics, age, gender and religion. As a result of this, not all people suffer equally from any given disaster. However, there are questions that may guide one's logical reasoning, that is, why do disasters occur where and when they do, and why do they happen to some people and not to others? The answer lies in an examination of vulnerabilities. People become disaster "victims" because they

are vulnerable. Since people have different degrees of vulnerability, they suffer differently.

The most visible area of vulnerability is *physical/material* poverty. Poor people suffer more often from crisis than people who are richer, because they have less income and production options and limited resources (Blaikie, *et al.* 1994; Cannon, 1994). This category relates to buildings, agriculture, land, climate, environment, people's health, skills, infrastructure, food, housing, capital and physical technologies. Therefore, to understand physical vulnerabilities, involves reviewing the ways in which the community was physically vulnerable to become "victims". For example, were they disaster victims because of their economic activities (as when farmers cannot plant because of floods or nomads lose their grazing lands because of drought) or because of their geographical location (homes built on flood plains, or on mountains prone to mudslides)? Or, are they simply too poor and possess too few resources for long term sustenance? (Anderson & Woodrow, 1989; Blaikie, *et al.* 1994; Dibben & Chester, 1999)

Less obvious, but equally important are two other areas of vulnerability that may also contribute to victimisation of society. The first is the *social/organisational* realm that is how a society is organised, its internal conflicts and how it manages them (Sen, 1992). Therefore, to explore the social/organisational vulnerabilities and capacities, the starting point is to examine the social structures of the people before the disaster and whether it served them in face of the disaster. In effect, what has been the impact of the disaster on social organisation? This category can include the formal political structures and the informal systems through which people get things done, such as making decisions, establishing leadership or organising various social and economic activities. Divisions according to race, religion, ethnicity, language, or class can weaken the social fabric to such an extent that people are more vulnerable to crisis (Townsend, 1987; Sen, 1992). However, records of past disasters suggest that the following groups of people are particularly at risk and require special attention (Carter, 1991; Blaikie, *et al.* 1994; Wisner, *et al.* 2004):

- single parent families;
- women, particularly when pregnant;
- mentally or physically handicapped people;
- children; and
- the elderly.

The second is the *motivational/attitudinal* area, that is, how people in the society view themselves and their ability to affect their environment. Societies may either be vulnerable or have capacities in these areas and these vulnerabilities or capacities are as important as their material resources, or lack of them. For example, even poor societies which are well-organised and cohesive can withstand, or recover from a disaster better than those where there is little or no organisation and people are divided.

To understand this realm, it is important to establish exactly how the community views itself and its ability to deal effectively with its physical and social/political environment. What were the people's beliefs and motivations before the disaster happened and how did the disaster affect them?

Strength or weakness in this realm can make a significant difference in a society's ability to rebuild or improve its material base or its social institutions. When people share a sense of purpose, a feeling of empowerment or awareness that they are agents of their own lives and futures, they can produce more and create a more satisfying community (Harrell-Bond, 1986; Townsend, 1987; Cannon, 1994). Hence, the indicators of capacities and vulnerabilities in this realm vary with context and culture. These three areas of vulnerabilities and capacities are represented in a matrix in Figure 7. The analysis always refers to factors at the community level rather than at the individual level. The internal lines in the matrix are dotted because the categories overlap and there is constant interaction among them (Anderson & Woodrow, 1989:12-13).

	Vulnerabilities	Capacities
Physical/ Material <i>What productive resources, skills, and hazards exist?</i>		
Social/Organizational <i>What are the relations and organization among people?</i>		
Motivational /Atti- tudinal <i>How does the community view its ability to create change?</i>		

Figure: 7 Capacities and Vulnerabilities Analysis Matrix (Adapted from Anderson & Woodrow, 1989).

In summary, capacities and vulnerabilities analysis is not prescriptive. It does not tell what to do in any given situation. It serves as a diagnostic tool (Anderson & Woodrow, 1989; Carter, 1991; Holloway, 1999). As a tool it has power to organise and systematise knowledge and understanding of a situation so that important factors affecting people's lives can be recognised and more accurately predict the impact of planned interventions. Also, what is becoming increasingly clear is that to reduce vulnerability, disaster risk management needs to consider social issues linked to the sustainable livelihoods as articulated in the literature by Chambers & Conway (1991) and Carney (1999). The emphasis therefore is to consider policies and actions to enhance capacities, improve equity and increase social sustainability. The next logical step then, is to engage in a thorough vulnerability analysis process as a practical approach towards effective disaster risk assessment.

3.2.3.2 ***Vulnerability analysis***

As propagated in De Satgé, *et al.* (2002:267), the purpose of vulnerability analysis is highlighted as a means to provide a basis for the government at macro level, local authorities and communities to define strategies and to draw up feasible, prioritised, cost-effective plans of action to reduce risk and vulnerability, and to enhance preparedness towards effective disaster risk reduction. Therefore, this analysis must:

- identify the risks and vulnerabilities affecting different areas and populations and how risks and vulnerabilities might be changing;
- determine which risk and vulnerabilities are the most important and reducible and estimate the likely effectiveness and costs of various feasible reduction measures; and
- identify early warning indicators relevant to (and feasible in) the local situation (Kasperson & Kasperson, 2001; Turner, *et al.* 2003; Pelling, 2003a).

Varley (1994:7) further motivated this need and relevance by reviewing the logic of vulnerability analysis. The resultant effect is that smaller events are likely to grow into major disasters without a change in hazard input unless something is done to reduce vulnerability. The analysis of vulnerability comprises two main elements which are then brought together:

- hazard assessment and mapping; and
- analysis of effects and the causes of vulnerability.

According to Chapman (1994:138) and Carter (1991:348) the outcomes of vulnerability analysis are an understanding of the relationship between different intensities of the specified hazard and the resulting damages that occur. As such, the results are mapped to show the areas which have been, or are likely to be affected by specific hazards.

In reality, as alerted through the findings of Davis & Bellers (1995:11) and Bankoff, *et al.* (2004:139) there is minimal evidence of systematic vulnerability analysis in which the physical, economic and social data are comprehensively integrated together. Furthermore, where vulnerability assessment takes place, it is normally seen as a specific process in measuring what is certainly more tangible and static, rather than all the complexities of people within communities which are undergoing dynamic change. This reflects true upon the traditional practice where the systematic conception and analysis of risk assessment was practically dominated by experts and specialists in the natural sciences. The emphasis was centred on the knowledge of hazard due to the existing investigative and academic biases and the efforts of the natural scientists (Cutter, 1994). Humans were viewed as having no responsibility in creating natural hazard and as such they were impotent to do anything, or very little, to mitigate them. While technological advances during the twentieth century allowed for the reduction of disaster impacts through preparedness, mitigation and relief measures, the emphasis remained on the naturalness of disaster events.

The consequence of this was the emergence of a technocentric approach where science and technology were seen as the only means to cope with natural hazards. The application of measuring and monitoring techniques, sophisticated management strategies and engineering structures such as dams and levees, were seen as the only choices humanity had to withstand the forces of nature. Hence scientific effort was spent on the study of environmental triggers rather than on human actions (Bolt, *et al.* 1977; Bryant, 1991 and Smith, 2004).

During the mid-twentieth century there has been growing realisation by various researchers that the majority of disasters are not only the outcome of interactions between humans and the technological and environmental systems. The view of the social scientists is that disasters are also the result of interactions among humans themselves. In opposition to the technocentric approach, they supported the structural approach focussing on the human dimension and recognising the social, political and economic factors as the main causes of disasters directly influencing the vulnerability of the populations at risk (Mileti, 1980). To justify this notion, Susman, *et al.* (1994) describe vulnerability as the degree to which different social classes are differentially at risk. This explicitly denotes that vulnerability is established according to political, social and economic conditions of the population. In essence, human vulnerability amplifies the physical exposure to hazard through conditions of poverty and low socio-economic status (Torry, 1979; Wijkman & Timberlake, 1984; Smith, 2004).

This shift in emphasis from hazard to vulnerability (Quarantelli, 1998) has continued and the spotlight on human vulnerability has been maintained (White, *et al.* 2001). However, striking differences may be noted. For example, the success of the vulnerability-based approach is vested in refining the concept of poverty and vulnerability to help protect the most disadvantaged groups within society. Therefore, the tools used should include human vulnerability analysis and mapping, together with more quantitative risk surveys and geophysical assessments.

On the other hand, the hazard-based approach has its inherent weaknesses. For example, it has overlooked environmental quality in the past and was reluctant to recognise the role of global factors such as climate change and poverty in raising human vulnerability. The current priority is to harmonise these differences across the hazard-related disciplines in order to create a safer and more secure environment for all.

In effect, environmental hazard and vulnerability are two sides of the same coin. More importantly, they are inextricably linked to ongoing global environmental changes (Smith, 2004). Therefore, the risk assessment model facilitating the risk assessment process bears reference to and incorporates these crucial elements as part of the strategy.

Hence, having clarified the conceptual framework for Disaster Risk Assessment and its inherent components, the logical progression is to hone in on the core issues of Disaster Risk Assessment (DRA) and the DRA process.

3.3 DISASTER RISK ASSESSMENT

Poulsen (2004:2) postulates that the impact of disaster on vulnerable communities is growing each year. This statement is further justified by reviewing important statistical data (as outlined in Table 1 below).

Category of Data	Period 2005-2007		
	2005	2006	2007
Total number of reported disasters	811	721	657
Total number of people reported killed	100,496	33,802	23,167
Total number of people reported affected	161,436	140,298	201,303
Total amount of disaster estimated damage (in millions of US\$)	228,569	36,797	63,477

Table: 1 Current Statistical Data (Knight, 2008).

Based on these recent trends of increased toll on human lives, properties, economy and the environment due to disasters and the inadequacy of response and coping systems de Guzman (2003:8) claims that the disaster potential of natural hazards and the vulnerability of social systems have worsened. Therefore, as endorsed by O'Keefe, *et al.* (2004:2), reducing the impact of disasters both now and in the future is an absolute priority. Internationally, these alarm bells have sounded off swift and collective motions, in particular the study by the World Bank together with UNDP and the Columbia University on an analysis of Global Disaster Risk Hotspots (Sperling & Szekely, 2005:10). The objective is to help prioritise risk reduction effort (see www.proventionconsortium.org/projects.htm). This analysis aims at bringing together the understanding of physical exposure and socio-economic vulnerabilities (focus of disaster risk assessment). Which implies addressing the underlying social, economic and environmental vulnerabilities thereby reducing the probability of a disaster occurring resulting in minimising disaster impacts and the subsequent human and economic costs of disasters. The response from the World Bank is that economic losses could be reduced by as much as US \$280 billion by investing around one-seventh of that sum in risk reduction measures.

The Asian Disaster Preparedness Center (ADPC, 2004:23) describes risk assessment as a process to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability/capacity that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend. Quarantelli (2002:10) confirms the theory that a local risk assessment provides the starting point for understanding the most immediate threats and preparing appropriately. However, the essence of any effective assessment system is the collection, insertion and analysis of accurate, relevant and current data.

3.3.1 Informational needs for risk/hazard decisions

The National Research Council Report of 1989 highlighted five categories of information that are needed before decisions on risk can be made (Cutter, 1993:34-35). They are (also, refer to Table 2):

- the risks of an option must be clearly articulated;
- the benefits must be explored;
- alternative options and their risks and benefits must be presented, including the effectiveness of each alternative as well as costs associated with it;
- the level of certainty (or more likely uncertainty) associated with the risk and benefit must be determined; and
- how will these technical risk assessments be conveyed to decision-makers (that is, in what context and how will they be used to form policy)?

The above issues are explicitly delimited into critical questions (in Table: 2) to examine the core elements of hazard, vulnerability and risk profiling.

Table: 2 *Informational needs for Risk/Hazards Decisions* (Adapted from Cutter, 1993b:35)

Nature of the Risk

- What are the expected hazards?
- What is the probability of human exposure?
- What is the probability of harm or the potency of the exposure?
- What is the distribution of the exposure, and who is most affected?
- What are sensitivities of different populations such as children, the elderly, women, to potential exposures?
- What is the interactional nature of the exposure? Will it act as a blocking agent, or react with other elements to create synergistic effects?
- What are the characteristics of the hazard itself (that is, magnitude,

duration, potential to cause death, frequency, speed of onset, catastrophic potential)?

- What is the population at risk?

Nature of Benefits

- What are the benefits, who benefits and how?
- How many people benefit and for how long?
- What is the probability that the benefits will be realised? What events might intervene to reduce those benefits and how likely are these events to happen?
- Is there a disproportional distribution of benefits?
- What are the specific qualities of the benefits (example physical comfort, environmental quality, improved health, and improved welfare)?
- What is the sum total of societal benefit?

Alternatives

- What are the alternatives?
- What are the risks associated with these benefits?
- How effective are each of the alternatives in reducing risks?
- What are the costs of each alternative?
- Are the risks, benefits, and costs evenly distributed among relevant populations?

Uncertainty

- What are the weaknesses in the available data used to determine risks and benefits?
- What are the assumptions and models that the data are derived from?
- How much dispute is there over these assumptions and models?
- How sensitive are the estimates to changes in assumptions or changes in

the parameters of the model?

- Have there been other risk assessments conducted and how are they different from the current one?

Management

- Who is responsible for evaluating the data and rendering a decision?
- What are the legal ramifications of the risk and benefit determinations?
- Are there factors that constrain the decision such as technical issues, financial limits, time limits, scientific uncertainty, or political ideology?
- What resources are available for implementing decisions?

The quality of the above information in terms of its relevance, reliability and validity has a direct impact on the risk assessment process and the outcomes to be attained.

3.3.2 The Disaster Risk Assessment process

The process of conducting a risk assessment is based on a review of both technical features of hazards, such as: their location, intensity and probability; and the analysis of the physical, social and economic dimensions of vulnerability while taking particular account of the coping capabilities pertinent to the risk scenarios. A useful tool in such analysis may be the “asset vulnerability framework” (AVF) as purported by Moser (1998). The focus is an inclusive analysis of tangible assets for example labour and human capital (referring to health status, skills and education which are important variables in determining a person’s capacity to work and return on labour); as well as productive assets such as housing and intangible assets like household relations and social capital (which relates to community support structures or social ties).

The significance of the “asset vulnerability framework” is that in analysing vulnerability which implies identifying not only the threat but also the “resilience”, or responsiveness in positively exploiting opportunities and recovering or resisting negative impacts of a changing environment. Hence the means of resistance are the assets and entitlements that individuals or communities possess or can mobilise and manage in challenging and catastrophic situations.

According to Petak and Atkisson (1982:11), Carter (1991:22-23), and Ferrier and Haque (2003:275-282), risk assessment comprises three distinct steps:

- i) The identification of local hazards likely to result in disasters, that is, what hazardous events may occur?
- ii) The estimation of the risks and vulnerabilities of such events, that is, what is the probability of each event (probability is not linked to vulnerability but to hazard force (in other words a cyclone of 4 on Saffir-Simpson scale can most probably impact in three geographical areas due to the nature of its force. But the same cyclone cannot occur in Johannesburg, South Africa for instance, due to the relationship between the magnitude of expose and the probability of occurrence.
- iii) The evaluation of the social consequences of the derived risk, that is, what is the likely loss created by each event?

Collectively, these three steps/stages constitute the disaster risk assessment process as substantiated in the sections that follow.

3.3.2.1 ***Hazard identification***

Petak and Atkisson (1982:101), and Ferrier and Haque (2003:275-276), argued the necessity to understand both existing and future socio-economic and geophysical conditions in a hazard area. They determine the types and magnitudes of damages that may be expected.

The appropriate evaluation of a hazard requires a determination of the probability of the occurrence of an event at its various intensity levels, that is, wind velocities, water depth, ground shaking, or ground movement. Also, hazard intensity must be related to the quality of exposed structures or buildings. Similarly, structures or buildings vary in degree of vulnerability to the intensity of a hazard as a function of their design, materials, and quality of construction and maintenance (Anderson & Woodrow, 1989; Davis & Bellers, 1995; Dibben & Chester, 1999). Therefore, when establishing the frequency of occurrence for a given hazard, there are a number of issues that must be explored:

- When did the event last occur?
- Why did the event occur?
- What circumstances, if any, contributed to the occurrence of the event?
- Do these circumstances still exist or do they recur periodically?
- Where specifically in the community did the event occur?
- Has the area changed in a manner that would prevent recurrence or worsen effects if the event were to recur?
- If the event has occurred, have mitigation measures been taken to prevent or minimise recurrence?
- If the event has not occurred in this community before, why is this case?
- Are the local characteristics, such as topography or climate, which prevent the occurrence of a given event? (Alexander, 1993; Smith, 2001; Pelling, 2003b).

The answers to the above questions will permit:

- one to sort through the extensive list of natural hazards and focus upon those with any real potential for occurrence in the particular area; and
- provide disaster managers and practitioners with a credible description of past occurrences and a realistic understanding of the potential for future occurrences.

However, it is essential that data requirements for the assessment of hazards should be formulated and where gaps are identified, urgent steps should be taken to close them (UNDRO, 1980:8). In practice, the preparation of hazard maps presents no particular problems provided that they are given adequate data of reasonable quality. It should be noted however, that geographical information system (GIS) for risk assessment, is only as good as the data that was captured on computer.

In order to establish risk, a planner would expect to be provided with hazard maps for each phenomenon which is known to occur in the area under consideration as well as information on issues highlighted above. Furthermore, cognisance should be taken of the various constraints that may impact negatively on effective hazard analysis that is:

- foregoing benefits, that is, usually the benefits are as clear and tangible as the risks are ambiguous and elusive;
- a limited capacity to react;
- the perception of hazards, that is, there are systematic biases in people's perceptions of risk;
- value trade-offs, that is, reducing a hazard may conflict directly with some other widely held value or political goal; and
- institutional weaknesses, that is, perhaps the single greatest failure of institutions has been their frequent inability to deal with the most important hazards first (Drabek, 1986:377).

The outcomes of this phase (hazard identification) serves as a building block to the next step that is estimation of risk and vulnerability.

3.3.2.2 Estimation of Risk and Vulnerability

Information on vulnerability is less plentiful, less reliable and less clearly defined than the information usually available on hazards themselves. Various categories of data are required, relating not only to the details of possible material damage,

but also to the degree of social and economic disorganisation that may have take place (Mileti, 1980; Carter, 1991; Turner, *et al.* 2003).

Risk and Vulnerability estimation is aimed at identifying:

- the probability that particular events of specified intensities will occur over some indicated time frame;
- the area and/or population that will be exposed to the events (that is, the population at risk);
- the vulnerability of the area or exposed population to effects associated with the events; and
- the consequences to the populations at risk of exposure to the expected series and intensities of the events over some specified time frame (IFRC, 2000; Sperling & Szekely, 2005).

As noted above, the primary questions in this step involve “who”, “how” and “how much”? To clarify further, would mean the following (Varley, 1994; Carter, 1991; Turner, 2003):

- What is the probable impact in a ‘worst case’ scenario?
- What is the cost in human terms (example injury, loss of life and loss of the necessities of life)?
- What is the cost in economic terms (example cost of response and interruption of economic activities)?
- What is the cost in environmental terms (that is, loss of ecosystems)?
- Would some groups be more or less affected than others by the incident?

The value of the information on risk and vulnerability estimation cannot be over-emphasised. After all, it weights heavy in terms of financial and resource implications and directly informs the next step, that is, social consequence evaluation.

3.3.2.3 *Social consequence evaluation*

Much attention has been given to define the physical characteristics of earthquakes, storms and floods. Less has been done to carry the analysis one step further, that is, to increase the basic understanding of how these phenomena due to their severity, including the occurrence of disasters, can affect lives and property. It is necessary to estimate the casualty and damage potential of geophysical events on existing or future populations and property at risk (UNDRO, 1980:25; Smith, 2001; Cardona, 2001).

An evaluation of the social consequences of the derived risk, that is, the social evaluation of the loss created by the event is the final component of disaster risk assessment. However, the major concerns are as follows:

- Does the community have the resources to cope with this level of impact?
- If not, where would those resources have to come from?
- How will they have to be delivered and over what period?
- What is the composition of the affected community?
- What are the secondary costs, both in human and economic terms?
- Would critical infrastructure (example roads, bridges and water supply) be seriously damaged or destroyed?
- Does the community have the resources to re-establish or repair these infrastructure elements, and if not, from where would these resources have to come?
- How long would it take to restore the normal standards of living within the affected community? (Ariyabandu, 1999; Cardona, 2001; Thomalla, *et al.* 2006).

Attempting to find responses to the above questions may certainly not prove to be a straight forward task but is critical in providing structure, content and direction to the risk assessment process.

To further ensure the effectiveness and applicability of risk reduction measures, it is imperative that the issues of scientific uncertainty, cost-benefit analysis and risks and responsibilities concerns (that often pose problems in risk assessment as indicated below) are adequately considered and addressed.

3.3.3 Problems in risk assessment

Lowrance (1980) in Palm (1990:26-29) outlines three critical problems in dealing with risk assessment which are:

Firstly, *Scientific Uncertainty*; referring to the current inability of science to predict the timing, magnitude, and social distribution of the risk associated with natural or technological hazards over both the long and short term. Without such information, it becomes virtually impossible to conduct a rational cost-benefit analysis against which alternative mitigation strategies can be measured. One cannot predict when or where an earthquake, tornado, hazardous chemical accident or flood will occur with any precision. However, one can recognise what areas are susceptible to environmental hazards but not when sudden and serious onsets will take place (Thomalla, *et al.* 2006).

Secondly, *Costs and Benefits*; which is the problem recognised by economists attempting to extend the cost-benefit-analysis strategy to environmental regulation is the issue of quantifying the unquantifiable. What is the “cost” of a single human life? How much is the aesthetic of clean air worth? What is the cost of the disruption of a family as a result of trauma associated with the loss of one’s home from an earthquake? Although some analysts have simply assigned arbitrary values when calculating cost-benefit analysis of society-environment interactions, it is obvious that any conversion of human suffering or well-being or environmental degradation or improvement must be a highly subjective estimate (Zhai & Ikeda, 2006).

Thirdly, *Risks and Responsibilities*; the concern is that there is no clear-cut answer to how risks and responsibilities should be assigned. Should an individual

have the right to risk death by choosing to live in an area known to be subjected to flooding? To what extent does the government have the responsibility to protect society against known hazards? To what extent do private industries such as manufacturing plants have an obligation to protect workers from environmental hazards? In short, the issue of societal response to risk is riddled with complexities (Ahrens & Rudolph, 2006).

The problems highlighted in risk assessment allude to the fact that the entire process of disaster risk assessment should be undertaken in a systematic and integrated manner. Information on the various dynamics (as noted above) are collected, carefully reviewed and thoroughly analysed before plans of action and intervention are developed.

3.4 CONCLUSION

Emanating from the fore-going deliberations within this chapter, it can be deduced that tracing the connectivity and the resultant outcomes of the parallels between hazard, risk and vulnerability forms the nucleus of any effective strategy of risk reduction.

Equally important is the recognition and analysis of the changing nature of hazard, risk and vulnerability greatly influenced by the various micro and macro environmental changes; for example: global changes like the economic slow-down, climate change and adaptation and emerging health and environmental hazards. Risk assessment therefore needs to reflect the dynamic and complex issues of social, economic and demographic make-up of the community and its infrastructure to inform appropriate risk reduction strategies. The emphasis on the vulnerability-driven approach thus makes practical sense within this context. After all, the aim of the risk assessment process is to support rational decision-making and to ensure that the relevant and most appropriate measures are taken to promote risk reduction. Towards this end, the disaster risk assessment model being utilised is crucial in creating an enabling environment and in facilitating the

desired outcomes. The model serves as the key instrument towards structured and pro-active risk reduction interventions.

In the process of developing a disaster risk assessment model for local government in South Africa, Chapter Four of the thesis provides a thorough analysis and comparative study of three, vulnerability-focussed disaster risk assessment models promoting risk reduction.

CHAPTER 4

EXPLORATORY REVIEW OF THREE DISASTER RISK ASSESSMENT MODELS PROMOTING EFFECTIVE DISASTER RISK REDUCTION

4.1 INTRODUCTION

The main intention of this chapter is to analyse three vulnerability driven, disaster risk assessment models used as effective tools towards disaster risk reduction. The criteria, against which these models are to be examined, have been developed in light of the key international initiatives in disaster risk reduction. These criteria will therefore serve as a framework for the development of the South African model in Chapter Six of the thesis.

The flow of arguments used in this chapter is drawn from and builds on the previous chapters. The scene is set by reflecting on the practice where inordinate emphasis has been placed on response while prevention measures have been limited and halting. The paradigm shift towards disaster risk reduction explicitly explored in Chapter Two highlights key principles to be captured in disaster risk assessment models.

The cornerstones of disaster risk reduction so aptly summarised in Chapter Two as well as the key components and process of disaster risk assessment deliberated in Chapter Three feature strongly in the assessment of the various models. The review concentrates on the underpinning principles, salient characteristics and critical challenges confronted by these models.

As a means of accentuating the real value of these models, a comparative analysis is undertaken. Where the similarities are traced and the differences explained, elucidating the research objectives in this chapter. In addition, a comparative table is illustrated, embodying the influential points of note; further endorsed by the outcomes of the research findings in the next chapter. This also

sets the tone to be ascribed to in Chapter Six on the proposed disaster risk assessment model for Local Government in South Africa.

4.2 GUIDING CRITERIA FOR EFFECTIVE RISK ASSESSMENT MODELS

In light of the global strategies on risk reduction, reviewed in Chapter Two, five guiding criteria based on the principles of good governance (Ahrens & Rudolph, 2006; Lewis & Mioch, 2005; Jacobs, 2005) are considered to be relevant in promoting the key issues of the Yokohama Strategy and Plan of Action for a Safer World (1994), the Millennium Declaration (UNDP, 2004:15), the Hyogo Framework for Action (Kobe Report, 2005) and the Framework for Disaster Risk Reduction (ISDR, 2005) have been identified. Good governance serves as a vehicle for government, civil society (community) and all other relevant stakeholders to jointly participate, share input and enunciate their interests and priorities, reconcile their differing perceptions, and exercise their political and human rights, obligations and responsibilities (Ahrens & Rudolph, 2006; Lewis & Mioch, 2005; Jacobs, 2005). To interpret these rights and responsibilities within the context of disaster risk reduction implies that people have a right to feel safe and protected in their communities (South Africa, 1996) yet equally need to be aware of their shared responsibilities to protect themselves. Therefore strong political commitment, transparency through the collaborative engagement of the diverse disciplines and sectors, adaptability, community participation and resilience will contribute significantly in creating less vulnerable communities. These criteria are by no means exhaustive; however, they are intended to provide a generic framework for the review and development of the risk assessment models in this study.

4.2.1 Political commitment

Successful risk reduction depends on the political leadership's commitment and ability to implement and enforce appropriate policies (Ahrens & Rudolph, 2006). Real progress may be noted when vulnerability reduction and disaster risk

management are integrated into the day-to-day management of local, national, regional and international institutions. Furthermore, risk reduction should be a part of land-use planning, housing and infrastructure development, environmental and industrial management, natural resource management and the treasury. The role of government in institutionalising disaster risk reduction is therefore vital. This implies that legal and administrative policies and procedures should be enacted and corresponding procedures developed with proper structures, systems and resources to empower institutions in their disaster risk management mission. A case in point is the actions of the Indian government subsequent to the Gujarat Earthquake. The second largest recorded earthquake in India devastated the state of Gujarat, on January 26, 2001. It registered 7.9 on the Richter scale and caused more than 20,000 deaths. An estimated 600,000 people were left homeless and total asset losses amounted to US\$2.1 billion (World Bank, 2008).

The astronomical loss of life and assets convinced the Indian government to reorient their policy approach to disasters. The Indian government now aims at a long term goal which includes implementing a comprehensive disaster risk reduction programme and improving the disaster preparedness and emergency response capacity of the government to deal with future disasters. The key disaster risk reduction policy in India focus on institutional capacity building, a robust central co-ordination mechanism with clear lines of responsibility at different levels and mobilise resources at all levels to support policy implementation.

The above example clarifies the point that significant progress can be achieved in disaster risk reduction through political commitment and support; where the quality of appropriate policies and their effective implementation proves to be vital. Therefore political commitment is crucial to making informed decisions and taking resolute and effective actions. Hence, government is instrumental in directing (through appropriate legislative and policy frameworks), leading (with the creation of necessary structures, systems and processes) and guiding (by

means of procedures and the allocation of required resources) effective disaster risk assessment and risk reduction.

By enforcing relevant legislative and institutional requirements, government can be recognised as the enabler of the multi-disciplinary and multi-sectoral approach in disaster reduction.

4.2.2 Multi-disciplinary and multi-sectoral approach

The focus and concern of disaster risk management is broad, especially when considering the interactions among elements of the natural, social and human-built systems and its emerging aggregate patterns of vulnerability and risk (as substantiated in Chapter Two in contextualising disasters). Therefore, disaster risk management cannot be viewed as a single issue but a cluster of developments including physical and regional planning, environmental management, health, education, and rural development. This underscores the need for a multi-disciplinary and multi-sectoral approach to be adopted in disaster risk management. The integration of these different stakeholders improves disaster risk reduction strategies through collaborative initiatives and fosters the willingness to pursue individual responsibilities towards set goals of disaster reduction. For example, the case study on the Indian Ocean tsunami in Aceh and North Sumatra (Ahmad, Wong & Shiever in Nicklin, *et al.* 2008:100-101) highlights the importance of a multi-sectoral approach. In the aftermath of the 2004 Indian Ocean tsunami, despite the challenging terrains of Aceh, mercy relief was successful in securing early access into Meulaboh and Banda Aceh in the first week of the disaster. Medan (North Sumatra) served as the main launching pad for international aid into Aceh with rotary-wing aircrafts forming an air-bridge between Medan and the other parts of Aceh. Such an operation was possible due to the long-standing relations and goodwill shared by mercy relief and the North Sumatran Government through continuous engagements and collaborative projects on poverty reduction. Mercy relief was not only able to provide effective and efficient relief and assistance to the remote affected areas

of Aceh but also facilitated the process for other non-governmental organisations to set up their bases in Meulaboh. This collective prompt intervention together with other foreign non-governmental organisations and militaries helped to eradicate the risk of a secondary disaster such as an epidemic.

The important lesson is that an integrated approach in the form of a multi-disciplinary/sectoral perspective improves effectiveness of risk reduction interventions as a shared objective, saves time and is more economical. This, coupled with the reality that disasters have no boundaries and that disaster impacts on all facets of the environment (social, political, economic, technological, physical, and the like) justifies the need for the various disciplines and sectors to adopt the team approach in risk assessment to promote effective risk reduction.

Closely linked to the dynamics and ramifications of disaster is the issue of adaptability that will be expounded on in the section that follows.

4.2.3 Adaptability

The conceptualisation of disasters in Chapter Two of the thesis alludes to the disparities of vulnerability to disasters as a question of variability to physical processes as well as the demographic difference, political structure, economic system and social order (Weichselgartner & Obersteiner, 2002). Given this complexity and uncertainty, risk reduction actions and strategies must incorporate the principles of flexibility and adaptability.

The issue of global warming and abrupt climatic changes remains high on the global agenda (Schipper & Pelling, 2006) and is charged with uncertainty. The spiraling effects of climate change are changing disaster risk profiles underlying environmental, socio-economic vulnerabilities (such as the global economic recession) and introducing new environmental hazards (including the current health pandemic, that is the H1N1 strain, and all related viruses) that further challenge risk reduction initiatives. However, John Holmes, in his keynote

address of the Global Platform for Disaster Risk Reduction in 2007, identified disaster risk reduction as the front-line of defence in adapting to the impacts of climate change and preventing future loss of life and property from extreme natural hazards. Everything that is built has to be designed and managed taking climate variables into consideration. This is done through formal procedures such as building codes, standards for wind resistance, heating, ventilation and water levels. However, Kreimer and Arnold (2000:93) reinforce the fact that the significance of climate does not end with weather-dependent sectors such as agriculture and weather-sensitive infrastructure. It permeates into finance, trade, commercial activities and into human health. It is therefore expected that the public health protection system have in-built safeguards against disease vectors such as viruses, bacteria, insects and parasites.

Climate change is having an impact on how environments and communities respond to extreme weather events. Communities cannot rely solely on traditional means as environments are constantly changing. McNaughton (2009:15) and Pettengell (2010) purports that climate change adaptation should not be addressed as a side issue. Instead it should be acknowledged that climate change is introducing a range of new risk and hazards. As such, neither a vulnerability nor needs focus fully captures the responses needed for the current and long-term impacts of climate change. The risk of future climate change will be determined by the evolution of hazards and vulnerability (Adger & Brooks, 2003; Kreimer & Arnold, 2000). In light of the above it becomes necessary to revise and strengthen disaster risk assessments and risk reduction measures.

In effect, there is no single best or stable answer to the question of what adaptation measures are needed, when, where, and by how much, therefore reducing vulnerability by adaptation necessarily involves incremental learning from experience within an inclusive, dynamic and adaptable environment.

Reference to an inclusive environment alludes to all relevant stakeholders in the disaster risk assessment process, that is, various sectors of government,

specialist from different disciplines, the business sector, non-governmental organisations, community based organisations and the affected community. Of particular importance is the communities since they possess the local knowledge and first hand experiences required to drive the risk reduction processes forward.

4.2.4 Community participation

Participation of the community in disaster risk assessment and risk reduction processes enables them to voice their concerns and share their experiences. More specifically the inclusion of those groups from the community most likely to be affected by disasters, giving them the opportunity to explain their vulnerabilities and priorities. This ensures that risk reduction strategies that are developed are socially accepted and more responsive to actual needs of the community (Maskrey, 1990; Gurr & Harff, 2003). Equally important is the inclusion of local expertise and knowledge, facilitating a suitable response to disasters; as depicted in the case study that follows.

The case study of the post-flood shelter recovery programme in Rajasthan State, of Western India clearly illustrates the essence of community participation. The community in the Barmer District of Rajasthan experienced excessive floods in 2006. Gupta (in Nicklin, *et al.* 2008:58-61) reported that over 800,000 of Barmer's population of two million were affected. The official statistics revealed that 103 people died while 95 per cent of the villages were left homeless. Houses in the affected villages of the Barmer district were basically made of a mixture of soil, cow dung and some wooden components from the local area. These houses were circular structures called "Dhanis" The damage in these villages were widespread as most of the houses made of such material were easily washed away.

The shelter recovery programme was undertaken by the Sustainable Environment and Ecological Development Society (SEEDS) in India together with the support from the Christian Aid (a United Kingdom based charity) and the

European Commission's Humanitarian Office. Community participation was the core of this programme. Recipients of the shelter were identified through consensus in committee meetings attended by all residents of the village. The houses were specifically modeled to comply with the socio-cultural and environmental specifications of the village. The model adopted was similar to the previous structure, the traditional Dhanis but with strong earthquake-resistant interlocking earthen blocks. The completion of the houses was left to the beneficiaries and their families as a means of capacity building, education and awareness of community knowledge and practice.

The intention of involving the community is to work with them as partners and to instill a sense of ownership for their own safety outcomes so that they are better equipped to protect themselves and their environment (which is the underpinning motive for the proposed disaster risk assessment model explored in Chapter Six of the thesis). The ultimate goal is to create resilient communities.

4.2.5 Resilience

The process of working together can strengthen communities because it reinforces local organisation and builds trust, skills, capacity to co-operate and awareness. Hence, the potential of communities to reduce their vulnerability is increased and people are empowered as they are enabled to address common challenges through access to information and awareness raising. In turn, this builds on the local capacity and creates local ownership of initiatives, promoting the principles of sustainability and cost-effectiveness in disaster risk reduction (Ryscavage, 2003; Twigg, 2004b). An encouraging example is the "Get Ready and Get Thru" programme of New Zealand. Since its creation in 1999, the New Zealand Ministry of Civil Defence and Emergency Management has been to collaborate with its stakeholders to increase the capacity of communities and individuals to prepare for, respond to, and recover from disasters (Hamilton in Nicklin, *et al.* 2008:54-56). The Ministry's objective is to make New Zealand and its communities resilient by understanding and managing their hazards. The

underlying strategy for achieving resilience is through the risk management approach based on reduction, readiness, response and recovery. Hence, in 2006 the Ministry launched its “Get Ready and Get Thru” programme, a national public education programme directed at increasing individual and community preparedness for disasters. The strategy behind this national programme is to empower individuals and communities by supplying clear and appropriate information on what needs to be done to protect themselves and their loved ones during a disaster. People are reminded of the reality that government agencies and emergency services cannot get to respond to and support everyone at the same time. Therefore, it is the communities’ responsibility to protect each other and have interventions in place for at least three days until the authorities arrive.

Since the launch of the “Get Ready and Get Thru” campaign, annual benchmark research has been undertaken to monitor its effectiveness and identify issues and gaps that need to be addressed in the improvement and further development of the programme. Early indicators reflect that the primary messages are positively received with heightened levels of awareness of the need to take action in order to be prepared.

Promoting effective community resilience is dependent on access to relevant information, education, awareness and creation of appropriate community structures and systems. As such, good governance contributes to the reduction of vulnerability, enables the development of mitigation and recovery methodologies, and empowers the community to act on its own behalf.

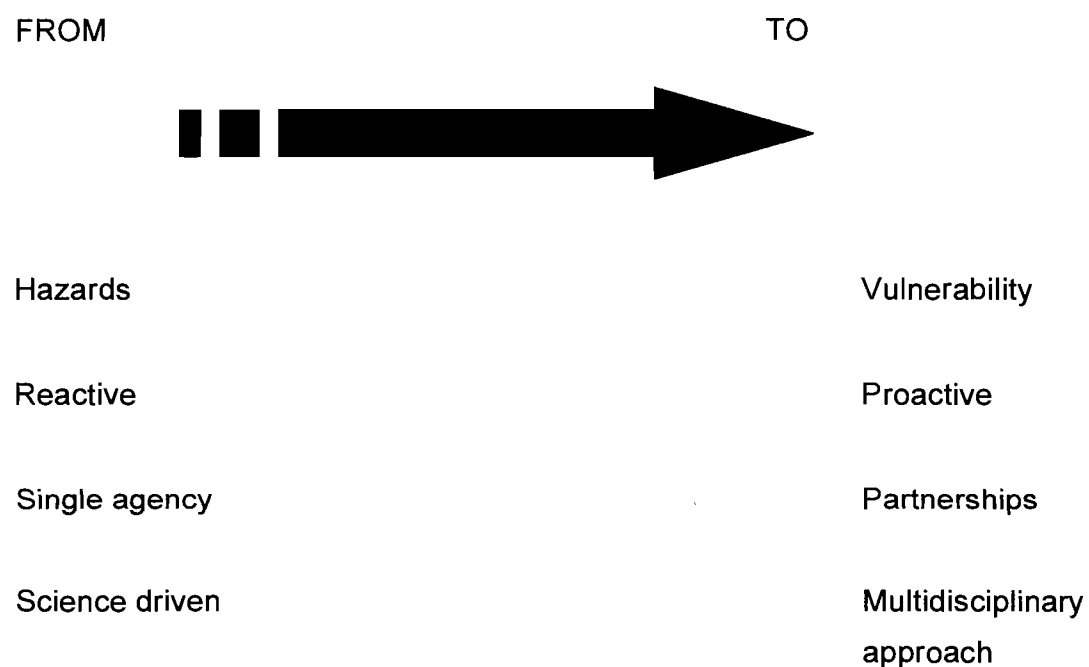
In summary, the above discussion on the selected criteria espouses to their relevance and importance in disaster risk assessment and risk reduction. As such, these criteria will be used to measure the effectiveness of the three disaster risk assessment models explored in the section below.

4.3 REVIEW OF THE THREE DISASTER RISK ASSESSMENT MODELS

As clearly elaborated in Chapter Two, disasters are no longer viewed as extreme events created entirely by natural forces. It is now widely recognised that risk (physical, social and economic) which are unmanaged (or mismanaged) over a period of time lead to the occurrence of disasters. The focus on disasters is therefore not only on the natural processes but also on its interaction with the human system and its broader environment. Hence, the emphasis on the vulnerability-driven approach in disaster risk assessment.

Another important consideration is the evolution of approaches in disaster management from response and recovery issues to that of risk management and mitigation.

Salter (in Disaster Preparedness Resources Centre, 1998:179) summarises this shift in disaster management as follows:



Response management

Risk management

Planning for communities

Planning with
communities

Communicating to communities

Communicating
with communities

Figure: 8 Shift in Disaster Management Strategies (Adapted from Salter, 1998; Jeggle, 2001; Comfort, 2004; Jeggle, 2007)

As reflected in Figure 8 there are several interesting aspects to this evolution in disaster management and to highlight the following:

- it takes the focus away from specific hazards and incorporates general vulnerabilities into the disaster risk reduction process;
- the shift from reactive to proactive measures moves the emphasis from response and recovery to that of planning, preparedness, and risk reduction measures;
- this multidisciplinary approach strives to create partnerships and attempts to foster the notion of integrative, co-ordinated efforts towards common goals;
- emphasis on working and relating with communities demands a strong onus on disaster managers and other public management practitioners, to actively engage the community;
- continuous information flow is crucial in the planning and implementation phases and must incorporate change and adaptation, to promote effective results; and
- maintaining creativity for disaster reduction through a broader comprehension of the shared goals (Salter, 1998; Jeggle, 2001; Comfort, 2004; Jeggle, 2007).

These new dimensions help in sketching out the changing landscape of the disaster risk management practice and should therefore form the basis of all disaster risk reduction and prevention strategies. In effect, the development and implementation of disaster risk assessment models should be guided by these key principles.

As a point of departure, the Community-Wide Vulnerability and Capacity Assessment (CVCA) Model (Kuban & MacKenzie-Carey, 2001), the Community-Based Risk Reduction Model (Yodmani, 2002), and the South African Disaster Risk Assessment Model (Adapted from ISDR, 2004 and South Africa, 2005) will be analysed and compared. These models have been carefully selected since they reflect on the arguments substantiated on in Chapters Two and Three of the thesis; and positively depict the contemporary disaster risk management practice. Where effective disaster risk reduction strategies must begin with an acknowledgement and conceptualisation of the complex and dynamic ways in which social, political, economic and physical structures result in important differences in the vulnerability of those they are expected to protect and serve. Hence, this can best be attained through community risk assessment beginning at the local level (Morrow, 1999; ADPC, 2000; Haghebaert, 2007). Further, over the last two decades there has been an increasing awareness that disaster risk assessment is most effective at the community level where specific local needs, resources and capacities are met. As aptly described by Haghebaert (2007), the top-down disaster risk reduction interventions often fail to adequately address the specific vulnerabilities, needs and demands of the community. It is at the local level that these vulnerabilities and needs encountered by the community can be adequately assessed and managed through the application of appropriate disaster risk assessment models, as will be proven in the review that follows.

4.3.1 The Community-Wide Vulnerability and Capacity Assessment (CVCA) Model

This model was developed with the intent of being applicable universally across diverse cultures, community sizes, geographic locations, and resource levels (Kuban & MacKenzie-Carey, 2001). The primary purpose of the model is to guide and enhance the disaster risk assessment process at local level thereby promoting disaster planning towards effective disaster risk reduction. These goals are further driven by the strong and clear principles underpinning this model.

4.3.1.1 *Underlying Principles of the model*

The CVCA model is founded on a number of principles which emphasise the following (IFRC, 1996; IFRC, 1999):

- That the population of every community, regardless of size, demographics and geographical location, contains a diversity of needs and expectations. Therefore, it is necessary to begin with a clear understanding of people as victims, survivors or vulnerable communities in order to contribute to capacity building and vulnerability reduction at the grassroots level. The community-wide vulnerability and capacity assessment model demands a self-reflection process by bringing to light the strengths and shortcomings of current activities and highlighting the unfulfilled needs of the vulnerable groups.
- The primary responsibility to prepare for and respond to disaster rests with the individual. As such, this model assists to raise public awareness of hazards, vulnerabilities, capacities and risk taken by society (Comfort, 2004; Smith, 2004). This in turn triggers positive responses by communities to initiate programmes of mitigation against the “shocks” to their community.

- Individual capacity to respond to disaster varies from person to person and changes over time. This is so because vulnerability is dynamic and varies amongst different people and over time (Brooks, 2003). Certain people are therefore more vulnerable to certain hazards or threats than others due to their exposure to the hazards, their level of resilience and ability to cope. However, this model supports effective targeting of the most vulnerable groups to ensure they are not driven further into destitution by repeat events. The focus is on empowerment of people at risk.
- The planning process must consider the unique needs of the “most vulnerable” and enhance their capacity to respond and recover from disasters. For this reason, the model requires the participation of the vulnerable groups in the planning, implementation and analysis process. Their active involvement is expected to contribute to the development of a greater understanding of core problems associated with vulnerability such as strengths and coping mechanisms already existing locally. Such engagement can offer insights into the development of programmes that can help the vulnerable groups achieve self-sufficiency (Smith, 2004).
- The community-wide vulnerability and capacity assessment process does not necessarily require specific equipment like computers and GIS mapping or a sophisticated level of detail about the population. However, the more detail-rich the process and visually supported through well structured maps, the more precise and meaningful the outcome.

These core principles form the basis on which this model is structured and implemented as is reflected in the dialogue on its characteristics (Kuban and MacKenzie-Carey, 2001; IFRC, 2007/8a).

4.3.1.2 ***Characteristics of the model***

The striking feature of this model is that it is sequential in nature, as illustrated in Figure 9 below.

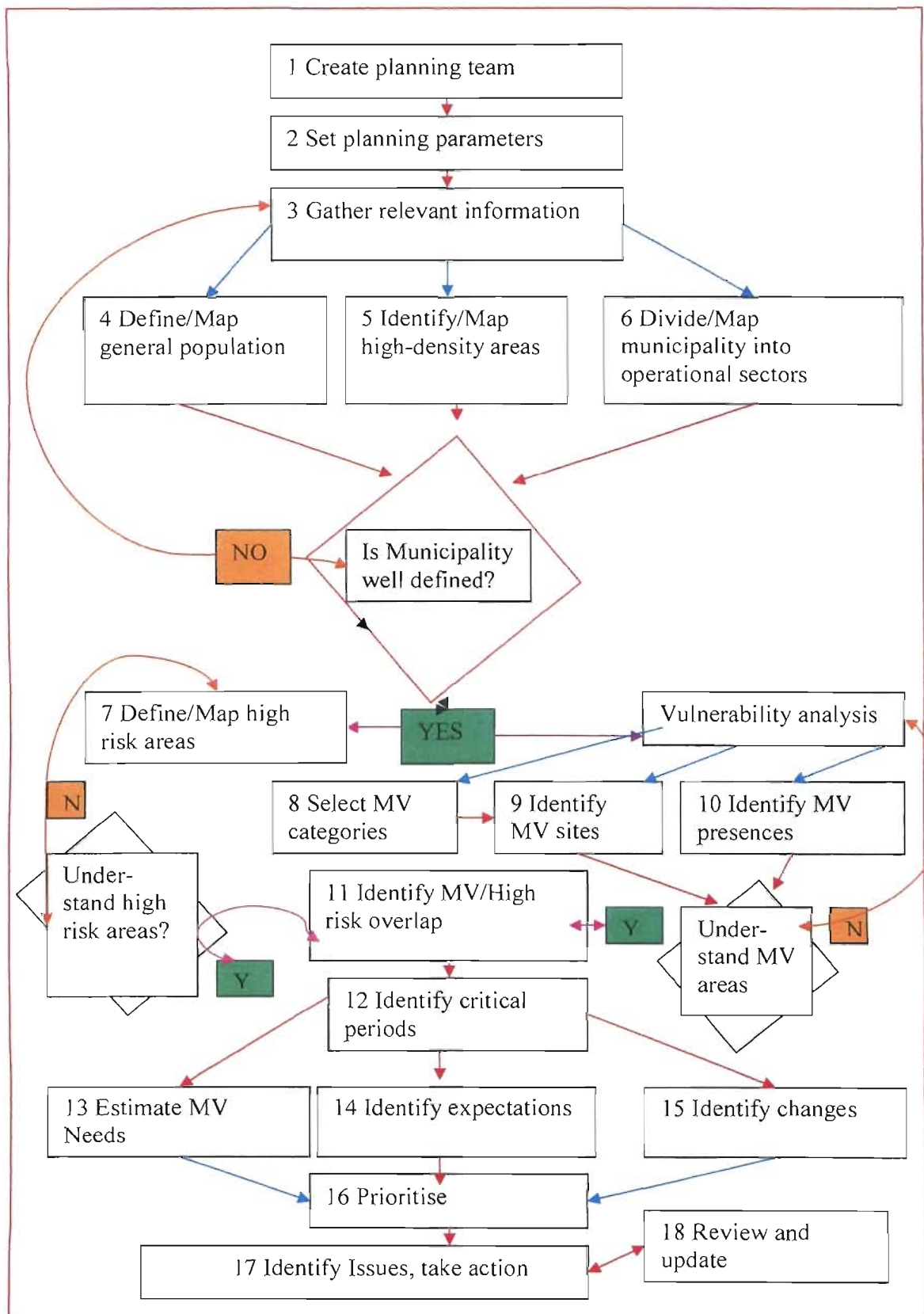


Figure: 9 The Community-Wide Vulnerability and Capacity Assessment model
(Adapted from Kuban and MacKenzie-Carey, 2001)

The rationale in the CVCA model is to ensure a firm understanding of each step before proceeding to the next. The intent of each step is to provide greater context to the understanding of the “most vulnerable” segment of the population. The review of the eighteen critical steps (Kuban and MacKenzie-Carey, 2001; IFRC, 2007; IFRC, 2008) will help to trace the relevant characteristics and elements of this model.

Step: 1 Create the planning team

This step involves establishing a multi-disciplinary team of “experts” or people knowledgeable about a diversity of issues (Jeggle, 2007) relating to disaster risk management. The composition of the team should also be based on the information that is required and the best possible role-players to provide and access the desired information.

The team should include: representatives from disaster risk management; response/emergency organisations like fire, police and emergency medical services; municipal planners; health services; social services; from the business sector; non-governmental organisations (NGOs); and key volunteer organisations. While not all of these are required on a continual basis, they should all provide input into the determination of “vulnerability” and in the development of a meaningful solution to the problem.

The involvement of community-based organisations (CBOs) is critical to the success of this process. Typically, these organisations have direct link, knowledge and the confidence of members of the vulnerable groups. Therefore inclusion of their representatives could provide much needed and valuable information, reliable communication channels or networks with these populations,

and increased credibility of the process. These CBOs are often volunteer-based, thus having a greater degree of flexibility and adaptability than public organisations and could better access donors.

Once the team has been created, with a leader identified and respective roles allocated amongst team members, it becomes necessary to consider the terms of reference of the team.

Step: 2 Set the planning parameters for the team

Immediately after the team has been properly constituted, they should engage in determining parameters for their planning process. This requires defining the boundaries of what they will strive to achieve, how they will function, clarification of their roles and responsibilities, logistical arrangements and resource needs, meeting procedures, and broader network and communication links (Ahrens & Rudolph, 2006).

Having set the guidelines for the effective management and functioning of the team enables the team to commence with the collection of data and information.

Step: 3 Gather relevant information

Team members should be advised of the basic information required and be tasked to gather it before any other activity is commenced. The emphasis should be on accurate, comprehensive and timely information collected from the correct and appropriate sources. As a rule, all data and information should be presented as visually as possible to provide a better understanding within the set context.

This information on the population and their immediate environment serves as a base in critically analysing the community.

Step: 4 Define and map the general population

This step is intended to establish a broad view of the municipality and its population as a foundation upon which additional information is based. The input for this step may be population statistics, census data and development plans. Whilst the output is a marked map detailing the boundary of the municipality, key facilities within it, as well as a comprehensive list of relevant information on the municipality. This visual map makes it easier to demarcate the “high density” areas.

Step: 5 Identify and map high-density areas

Using well defined criteria, the team is expected to highlight and capture the “high-density” areas onto the municipal map. For planning, response and intervention purposes, this categorisation of information is crucial as most of the vulnerable are likely to be inhabitants of this zone. To further improve efficiency within the municipality, the next step entails dividing the municipality into distinctive sectors of operation.

Step: 6 Divide and map the municipality into operational sectors

An analysis of the municipality is more readily understood and action is more easily defined when classified as manageable segments according to geography and population size. Each sector should be: clearly described; easily identifiable (as conspicuous zones on the map); and manageable during the planning and response processes. Once this information is loaded onto the municipal map, the risk identification process can commence.

Step: 7 Define and map “high-risk” areas

The focus of this step is to gain a broader perspective of risk which would then provide a more meaningful context for the subsequent discussion on the “most vulnerable” segments of the population. Therefore, historical records, geographical analyses, industrial records, and all reports and records on hazard analyses are vital source of information. The desired output is a set of markings on the municipal map that identify those areas that are relatively “high-risk”. The contextualisation of the risk factors in terms of the possible or anticipated hazards pave the way for the examination of the vulnerable groups (Bogardi & Birkmann, 2004; Smith, 2004).

Step: 8 Select applicable categories for the “most vulnerable”

Well structured criteria to define and determine the “most vulnerable” is developed through broad consultation with representatives from interest groups, social services, education, and the municipal planning section. The team is also required to create a list of identifiable population groups that are deemed to be “most vulnerable” to disasters that is, those who are at the greatest likelihood of being at risk. The next point of concern is for the team to ascertain the location of the “most vulnerable” groups.

Step: 9 Identify, categorise and map sites related or specific to the “most vulnerable” groups

The emphasis here is to trace the sites that either relate to or service the needs of this identified group (“most vulnerable”). Such sites or facilities may include seniors’ homes, frail care facilities, social service access points and health clinics. Each of these sites should be recorded within its appropriate sector and marked on the map to visibly identify its location. Distinct marking on the map

makes it easier to move on to the next step and to verify where the large concentrations of the “most vulnerable” group spend their time.

Step: 10 Identify and map other areas where each of the “most vulnerable” groups has significant numerical presence

An understanding of the nature, lifestyle and limitations of the “most vulnerable” leads to a pattern which points to their presence. Also useful is to solicit information from those who work closely with this group of people for example: health services, recreational services, financial services, social services and shopping centre. The outcome is a list of key locations within the community where a high concentration of the most vulnerable is, corresponding to precise markings on the map. This output links on to the following action of determining the overlap between the most vulnerable groups and the high-risk areas.

Step: 11 Identify overlap of the most vulnerable groupings or sites and high-risk areas

The aim of this step is to understand where the two vulnerabilities (that is, of people and activities or things) intersect to result in a relatively higher risk level. These overlaps should be abundantly clear if the map has been marked correctly (with the use of different colours, codes and shading). After all, each step of action forms the building block to the next. Likewise, this leads to the review of the most critical periods of vulnerability.

Step: 12 Identify critical periods when each group is particularly vulnerable

Vulnerability and risk change over time, with relocation or with changes in activity making it is necessary to provide another layer of clarity regarding the change of vulnerability over time. A simple three-category time-frame analysis is recommended where the distinction involves the workday hours (D), workday

night hours (N) and weekend or holiday hours (H). Simultaneously, a review of the “most vulnerable” groups vulnerability levels (that is High, Medium, Low) during each of the three categories of time need to be clarified and captured. This process reveals the impact of time and the level of vulnerability thereby introducing thought to the possible emergency needs of the most vulnerable.

Step: 13 Estimate likely emergency needs of the “most vulnerable”

The intent of this step is to gain a broad understanding of the possible emergency needs of the various vulnerable populations. This is expected to be an on-going effort of refining one’s perception of the unique needs, services or resources that may be required by each vulnerable group and within each sector. The outcome should be a comprehensive matrix reflecting the various hazards within the three categories of time against the various sectors of the identified vulnerable groups and the corresponding needs and services (Cardona, 2001). This information will add on to the following section on the actual capacity of the vulnerable groups.

Step: 14 Identify realistic expectations regarding the capacity of each identified group

Having identified who is involved, where they may be located, and what services or resources they might need, leads to the point of analysing the capacity of these group members to responding or recovering from disasters (Bogardi & Birkmann, 2004). The outcome should be a list of general expectations by the vulnerable group, prioritised into High, Medium or Low to reflect the impact which they may have on planning or response processes. Further, issues of change on levels of vulnerability need to be incorporated onto the comprehensive matrix that has been developed.

Step: 15 Consider conditions that change the presence or vulnerability level of the identified group

An important starting point of note is that the community does not remain static. They are constantly adapting to changes in their environment. It is therefore necessary to capture these changes and the impact it has on the vulnerability and risk levels of the most vulnerable groups before the process of prioritisation can commence.

Step: 16 Categorise sectors, facilities or community segments into relative levels of priority

Having gained all of the above information, it is possible to undertake a more informed assessment regarding risk and the most vulnerable population of the community. Each community sector, vulnerable-group facility, or vulnerable-group concentration should be categorised into one of three priority levels (with 1 being the highest and 3 being the lowest). This prioritisation informs the planning process and may also be a priority during the response and recovery processes. It is therefore crucial to consider related and broader issues that impact on the process and its outcomes.

Step: 17 Identify issues or groups for further consideration or action

The process is likely never over, if for no other reason, because people and their capacity undergo change on an ongoing basis. In addition, people physically move in and out of the municipality as well as within it. This results in new and added dimensions to the determined levels of risk and vulnerability. As such, broader and related issues should be reviewed and appropriately addressed to meet the desired outcomes (Comfort, 2004; Jeggle, 2007). Therefore, continuous review and monitoring is vital for the success of this process.

Step: 18 Review and update

This process demands that its results be reviewed at least annually and revised and updated accordingly. Revisions must be considered if conditions change significantly (for example, vulnerability of a group can change due to evolving environmental, social, political, or economic conditions).

The above steps clearly map out and capture the complete process of the community-wide vulnerability and capacity assessment model. Each step requires forethought, adequate planning and the layering of information in a way that makes it meaningful and visible, at a glance. Also, the successful implementation of the model is dependant upon the continuous review, and amendment and modification of the information to maintain its relevance and appropriateness.

This model has been implemented in various countries and programmes yielding positive results, for example integrating community disaster planning programme in the Philippine; targeting the most vulnerable in Canada; understanding vulnerability and distress in Finland; and participatory methods for assessing vulnerable communities in Bolivia and Argentina (IFRC, 1999).

The case study of the Swedish programme “Local vulnerability and capacity assessment has a mobilising effect” (IFRC, 1999 and Kuban & MacKenzie-Carey, 2001) illustrates the benefits of utilising such a model. The Swedish Red Cross (SRC) has been undertaking community-wide vulnerability and capacity assessment since 1994. At the outset, the SRC studied all existing research available such as the standard of living survey. It then examined local assessments of vulnerability and capacity. The main aim of the community-wide vulnerability and capacity assessment was to identify the most vulnerable groups and their capacity to respond. Equally important was the need to raise awareness of the local volunteers and community and to mobilise them to take

responsibility for the changing environment challenging their livelihood. Other important aims included the development of local voluntary work and the promotion of improved co-operation with the local authorities and organisations within the community.

As part of the information strategy which included videos and magazine articles, the SRC's chairperson informed the communities about community-wide vulnerability and capacity assessment and actively encouraged them to undertake these assessments. The outcomes achieved were the identification of the most vulnerable groups within the community concerned and better relations between local authorities and other voluntary organisations. In effect, it was clear that this model produced positive results and was effective in mobilising relations between government, voluntary organisations, the business sector and the community.

Although the community-wide vulnerability and capacity assessment model promotes effective community disaster risk assessment, there are certain setbacks that may be encountered in the process.

4.3.1.3 *Challenges encountered by this model*

Despite the well structured and logical flow of activities within the model, there are various challenges (IFRC, 2006; IFRC, 2008a) that come to the fore. The major difficulty is that this assessment process is often regarded and used as an end-all-be-all process and is assumed to provide the whole picture. This is certainly not the case nor the intention of this model. More especially with the dynamic nature of risk, the perspective of every analysis changes rapidly and easily with time. The collection of meaningful information must therefore involve process layering and be subjected to continuous review and update. "Layering" involves the use of various analyses to refine the current reality. One layer of analysis-gained information helps clarify or refine previously-gained information.

The outcome is a further refinement of the analysis with each successive layer. This indicates that the model should be based on a continuous review and adjustment of information reflecting the changing environment to be relevant and appropriate.

Another crucial stumbling block is the quality of data and information available. In most cases the data may not be available in the time period involved, or usually out of date, inaccurate, partial and not accessible in a format for analysis, which is essential in stimulating appropriate actions and feeding into the planning process. There is a vast quantity of undocumented local knowledge in the field but because of the lack of format with which to systematically collect it and the debate around its unscientific nature; such valuable information is often excluded from the process.

Finally, the fact that this model requires a participatory approach implies a greater need for sensitivity, time and resources to conduct the disaster risk assessment process. The issue of sensitivity begins with securing political will and support to ensure a smooth process. The next stage may be to develop a strategy to sensitise management, staff, volunteers, and all role-players involved. This in turn requires time and resources. During the initiation and planning phases of this model it is critical to secure the necessary resources and take care of all logistical requirements to support such a project. It is also important to take note that the process may be time consuming and costly because of the level and degree of broad participation. However, the “data rich” information derived as a result of this process is invaluable to the success of the model and its outcomes.

Contextualisation and examination of the community-wide vulnerability and capacity assessment model, assists in setting the parameters for the next model which is the community-based risk reduction model.

4.3.2 Community-Based Risk Reduction Model

The overarching aim of this model is to reduce vulnerabilities and strengthen people's capacity to cope with hazards. A thorough assessment of a community's exposure to hazards and an analysis of their specific vulnerabilities and capacities form the basis for all activities, projects and programmes directed towards disaster risk reduction (Yodmani, 2002). These issues are further elaborated on within the context of the principles of the model.

4.3.2.1 *Main Principles of the model*

This model recognises community risk assessment as an essential precursor to a bottom up decision making process for the development of policies, strategies and plans towards effective disaster risk reduction. As such, the driving principles are (ISDR, 2007a; ISDR, 2007c):

- To prioritise the community's risks which need to be reduced through the active participation of the community (Jeggle, 2001). The intent of this model is for the community to address all its disaster risks but its actions and resources need to be prioritised according to frequency, extent of damage and other pertinent considerations which the community members decide on.
- Ensure that the risk reduction interventions are going to be adequate and appropriate in light of the risk assessment process. The risk reduction planning should incorporate a balance between preparedness and long term mitigation planning (Comfort, 2004; Jeggle, 2007).
- Ensure that risk reduction will be cost effective and sustainable. In effect this requires reducing vulnerabilities by increasing the community's capacities. All existing material, social and attitudinal capacities should be strengthened and areas and strategies for capacity building identified.

- To identify external resources and risk reduction strategies which have to be tapped to address vulnerabilities which the community on its own cannot address. This includes community capacity building through training and education activities and materials, network linkages with relevant government organisations, non-governmental organisations and the business sector to access the required resources and information (Jeggle, 2001; Comfort, 2004; Haghebaert, 2007).

These above principles are further substantiated in the discussion that follows on the characteristics and various phases of the model.

4.3.2.2 *Characteristics of the model*

The implementation process of the community based risk reduction model points to the following essential features:

- The key resource in disaster risk reduction is the community, both as the main actor as well as the primary beneficiary. The community participates in the whole process from situational analysis to planning and implementation.
- Disaster risk reduction is the foundation of this model. The focus is on reducing vulnerable conditions and the root causes of vulnerability (Aryal, 2003; Brooks, 2003). The primary strategy of vulnerability reduction is to increase the community's capacity, their resources and coping mechanisms.
- The involvement of a multitude of community stakeholders to expand their resource base and promote a multi-sectoral and multi-disciplinary approach towards disaster risk reduction. The local community level links

up with the intermediate, national and international levels and related sectors to address the complexity of vulnerability issues.

- Maintain a dynamic framework where the lessons from practice continue to build into the refining of the actions and outcomes of the process. This flexibility is in correlation with the ever-changing environment and its impact on vulnerabilities and risk factors within the community (Comfort, 2004; Jeggle, 2007).

The significance of the above characteristics is best determined within the community based risk reduction process outlined in Figure 11 below. The six sequential stages imply that each step grows out of the preceding stage and leads to further action (Yodmani, 2002). Together, the sequence builds up a planning and implementation system for effective disaster risk reduction as follows:

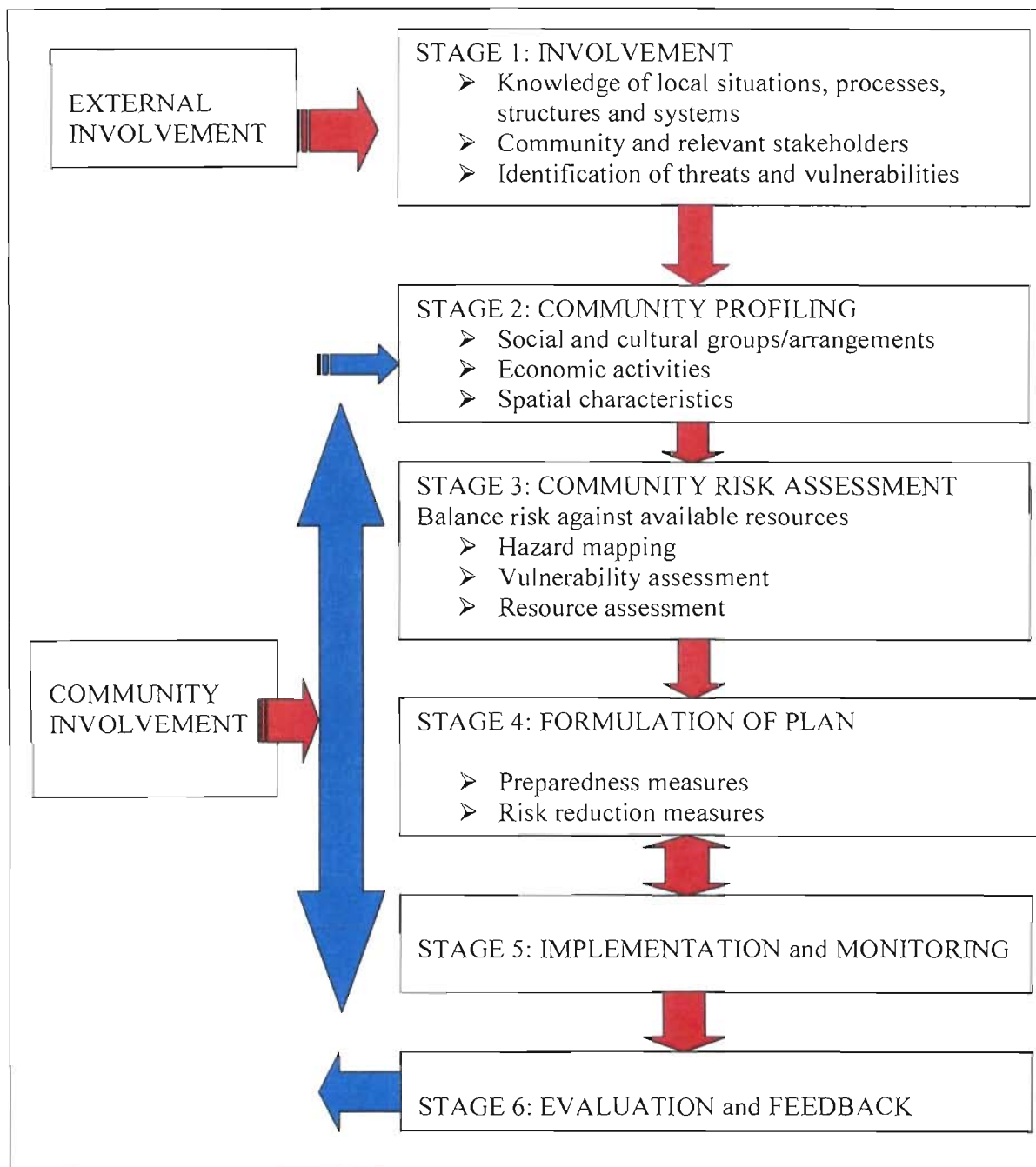


Figure: 10 Community Based Risk Reduction Model (Adapted from Yodmani, 2002).

Stage: 1 Initiating the disaster reduction process

At present, government departments responsible for disaster management, non-governmental organisations and donor organisations play a key role in activating the process of community risk assessment. This action is usually in response to requests received from vulnerable communities or to identify vulnerable communities where anticipated risk reduction programmes need to be prioritised. This should lead to the close examination of the community and their immediate environment.

Stage: 2 Community profiling

Here the importance is on creating a picture of the nature, needs and resources of the community as a result of their active participation. It is also a valuable preliminary step in any planning process where the intent is on building rapport and gaining trust of the community through gathering information on the general community profiling (Hamilton, 2008). The next step will then be to undertake the community risk assessment.

Stage: 3 Community risk assessment

This is a diagnostic process to balance known disaster risks against available resources. Through the risk assessment process, the community comes to a common understanding of its disaster risks. The dimension of the problem as well as the resources and opportunities involved are identified and analysed. These clarifications facilitate the development of the risk reduction plan.

Stage: 4 Formulation of the disaster risk reduction plan

The critical factor is to start off the risk reduction process through community mobilisation based on existing capacities and resources within the community's

immediate reach (Smith, 2004). The overall objectives and strategies are translated into operational plans, with due consideration given to the resource requirements. At this stage of planning, agreements with intermediary organisations are formalised regarding their support in the implementation process and their commitment to mobilise the required resources. Once the necessary resources are secured and the plan finalised, the implementation process can begin.

Stage: 5 Implementation and monitoring

The formation and/or strengthening of organisational arrangements (made up of community organisations, volunteer teams and the like) are useful in the implementation of the plan. This core team is responsible for monitoring the progress of implementation and motivates the community through translation of plan objectives and targets into disaster reduction activities. This group is also instrumental in amending targets and plans to keep on course with the set objectives to reduce vulnerabilities and increase capacities in the immediate and long-term. Linking on to the final phase of evaluation and feedback of the disaster risk assessment process.

Stage: 6 Evaluation and feedback

Evaluation is concerned with the effects of the risk reduction measures in terms of reducing the vulnerability situation of the community and determining the impact of risk reduction measures on the community; and the overall quality of their life. The lessons drawn are shared with other groups and communities to promote the concept of effective community risk assessment.

The above process reveals that community risk assessment is a participatory approach of determining the nature, scope and magnitude of negative effects of

hazards to the community and its households within an anticipated period of time.

In practice, the community based risk reduction model has been supported for the favourable outputs that it delivers. These are evident in the various projects based on this model, for example, the Bangladesh Urban disaster mitigation project; the Kathmandu Valley risk mitigation programme of Nepal; the Community Based Flood mitigation project in Cambodia (AUDMP, 2000), and the most recent one being community based risk reduction and climate change in Nicaragua (Red Cross and Red Crescent, 2009).

The benefits of this model had been identified as early as 1998 in the “community based flood mitigation project in Cambodia”. This project was initiated to reduce the vulnerability of rural villagers to natural hazards. The project aimed to establish sustainable, replicable non-governmental mechanisms for disaster mitigation and preparedness and improve the capacity and skill of the communities to manage the risk and apply appropriate mitigation skills (AUDMP, 2000). As such, it required the involvement of various stakeholders to oversee and implement the programme in the selected communities of the three provinces (that is, Kandal, Prey Veng and Kompong Cham). Each community relied on traditional community processes like village leaders, ward committee members and the village elders to undertake advisory and or organisational roles to mobilise community involvement and resources. However, the main constraint facing the community was the scarcity of materials and financial resources. Most of the financial support had to be secured from outside the community. These cost-sharing funds were obtained from non-governmental organisations and donor agencies operating in Cambodia.

The results achieved were enhanced awareness and disaster risk reduction initiatives by the communities themselves and improved community processes and partnerships with non-governmental organisations, the business sector,

donor agencies, community-based organisations, and government. These outputs reflect the true value of the community based disaster risk reduction model.

However, the smooth implementation process is often delayed by subtle difficulties and stumbling blocks created by the participatory nature of this model.

4.3.2.3 *Challenges facing the model*

One of the most common difficulties is that the community members and external stakeholders usually have differing perceptions of the community's levels of risk and vulnerabilities. The setback here is that the actual resource requirements and intervention measures are determined by the above dynamics. Fortunately, this participatory risk assessment process provides the platform to reach consensus on issues and gain a common understanding of local risk issues within the actual environment.

The level and extent of community participation demands a sound knowledge base of disaster risk management in general and a good understanding of the nature and process of disaster risk assessment. This is usually a slow process, especially trying to get the community to comprehend the basics and ensure that everyone involved is on the same page. An added problem is that the community capacity building has resource implications which mean that appropriate steps need to be taken to acquire the necessary tools. Also, negotiations around materials, funding and skilled personnel to undertake training and education of the community create further strain and delays on the time-frames for implementation. This process may therefore prove to be long drawn and time consuming. However, the entire structure and implementation of this model is based on the pivotal role of the community. Community participation cannot be compromised irrespective of the draw-backs that may be experienced.

Finally, getting together a multi-sectoral and multi-disciplinary team in itself is a tall order. The issue of availability is usually linked to the degree of priority they attach to disaster risk reduction. If disaster related issues feature high up on their agenda, then their response and co-operation is easily guaranteed. In other cases, further attempts are required to demonstrate the relevance, importance and impact of their involvement before they can be convinced to engage as partners.

A further dimension to this difficulty is that these different sectors and disciplines view disaster risk reduction from varying spectrums largely influenced by the thinking and practice within their respective disciplines and sectors. This model allows for the gradual integration and participation of all role-players through a collective engagement process lead by a common agenda of disaster risk reduction.

The third and final model under review, that is the South African Disaster Risk Assessment Model, also hones in on the participatory approach to disaster risk assessment.

4.3.3 South African Disaster Risk Assessment Model

As set out in the National Disaster Management Framework (South Africa, 2005:57-63), this model provides a generic guideline for undertaking disaster risk assessment within South Africa. Emanating from a progressive piece of legislation (that is, the Disaster Management Act 57 of 2002), the core principles of this model accentuate the current disaster risk reduction concerns and practice.

4.3.3.1 ***Key Principles of the model***

Fundamentally, disaster risk assessment is expected to inform effective disaster planning and risk reduction strategies (AS/NZ 4360, 2004; NRAAG, 2007). The primary principles of the model may be regarded as strategic enablers towards this end.

First and foremost, disaster risk assessment should be conducted in a systematic and sequential manner. This approach allows for the outcomes of the various stages to be in consonance with and directly inform the requirements of the disaster risk planning process (South Africa, 2005:63).

Secondly, disaster risk assessment is to be successively integrated into the development plans of national, provincial and local government so as to ensure that it is considered as part of the strategic planning and resource allocation process. For example, the inclusion of disaster risk assessment requirements and outcomes in the Integrated Development Plans is a means of securing political support and resources for implementation purposes.

Thirdly, as a means of increasing the capacity of communities towards minimising the risk and impact of disasters (South Africa, 2002), community-based disaster risk assessment is essential. The active involvement of the community improves the quality of the disaster risk assessment process and findings (Smith, 2004) through the application of local and indigenous knowledge (supplementing the technical and scientific information) and experiences.

Fourthly, disaster risk assessment requires a diverse team of experts and relevant stakeholders (Jeggle, 2001; De Guzman, 2003; Jeggle, 2007). For example, the process of auditing and compiling disaster risk information must be inclusive of the various disciplines and sectors, government departments, business sector, non-governmental organisations, community based

organisations, and relevant experts and specialists in the field. It could therefore be described as an integrated and multi-disciplinary/sectoral process.

Lastly, disaster risk assessment must be reliable and valid in order to inform disaster risk reduction planning. The consultative process of risk assessment methods and findings must be subjected to appropriate quality assurance (South Africa, 2005:77-78) prior to the implementation of the outcomes.

These principles encompass the structure and characteristics of the model as depicted below.

4.3.3.2 *Characteristics of the model*

The South African Disaster Risk Assessment Model reflects the various stages/phases of the disaster risk assessment process (as adapted from AS/NZ 4360, 2004; NRAAG, 2007) wherein:

- Stage 1: concentrates on identifying the specific disaster risk to be assessed;
- Stage 2: focuses on analysing the disaster risk concerned;
- Stage 3: involves an evaluation of the disaster risk being assessed; and
- Stage 4: pertains to monitoring disaster risk reduction initiatives and disseminating disaster risk assessment information.

These different stages function as a collective whole towards disaster risk reduction. Figure 11 clarifies the progression of activities within the risk assessment process.

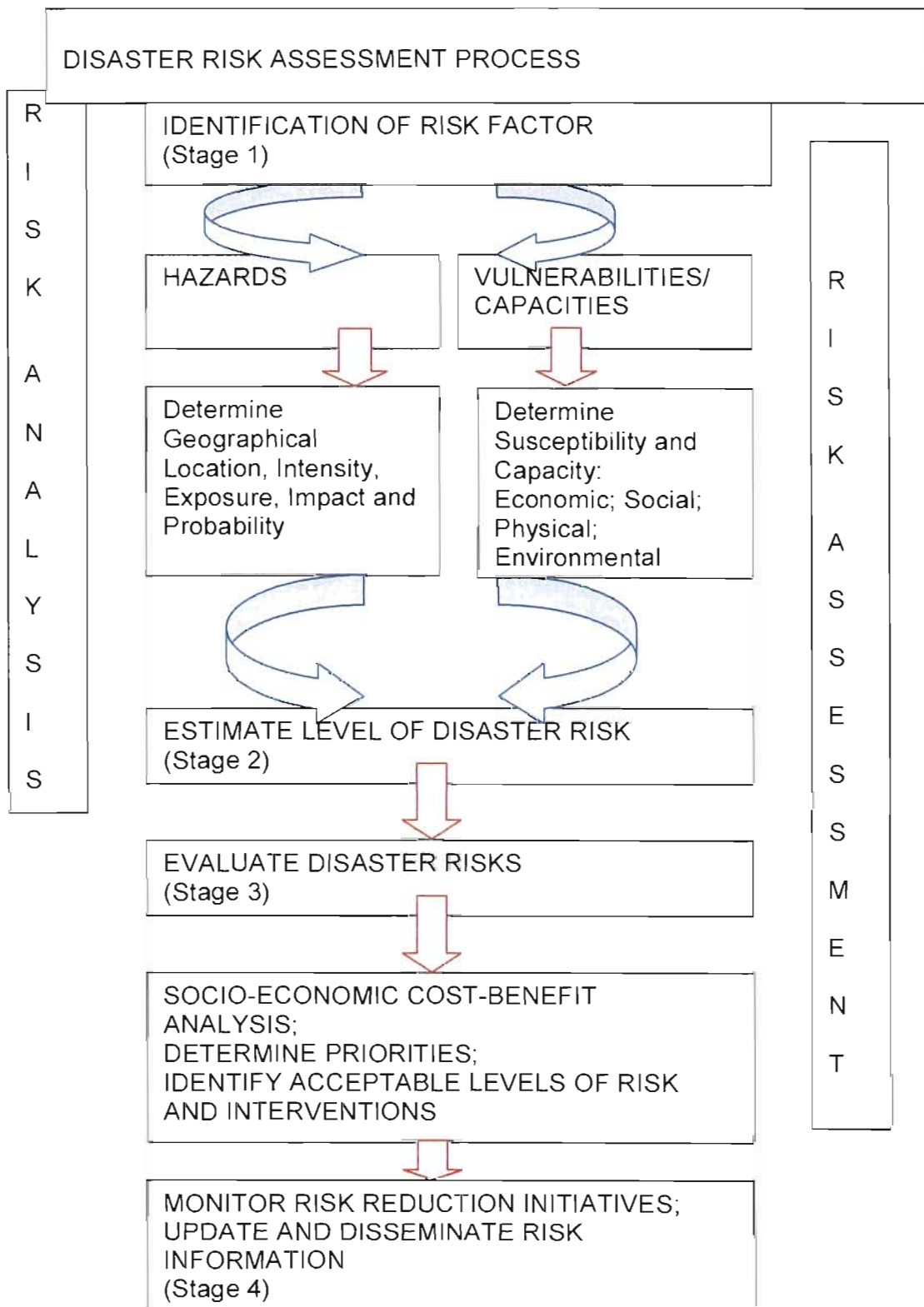


Figure: 11 South African Disaster Risk Assessment Model (Adapted from ISDR, 2005; AS/NZ 4360, 2004; South Africa, 2005).

As accentuated in the illustration above, the requirements of the various stages as prescribed within the Disaster Management Framework are briefly described.

Stage: 1 Identify the Specific Disaster Risk

This phase involves the clarification of the hazard with respect to its frequency, magnitude, speed of onset, affected area and duration (Tobin & Montz, 1997). It is necessary to analyse and quantify vulnerability to ascertain susceptibilities and capacities. This is undertaken by examining the vulnerability of the people, infrastructure, services, economic activities and natural resources exposed to the hazard. Resulting in determining the most likely losses to be suffered from the action of the hazard on those that are vulnerable and to estimate all likely consequences or impacts of the disaster. In preparation, a review of the relevant capacities, methods and resources available to manage the risk, should be undertaken.

Once the hazards have been clearly identified and the vulnerabilities/capacities determined, it becomes crucial to consider the level of disaster risk.

Stage: 2 Analyse the Disaster Risk

During this phase the focus is on estimating the level of risk associated with a specific threat so as to determine whether the resulting risk is a priority or not based on its anticipated impact or consequences (Cutter, 1993; Rogers, 1997). The next step then is to evaluate these risk in order to rank them.

Stage: 3 Evaluate the Disaster Risk

This stage entails the further prioritisation of disaster risks when there are multiple threats to assess against the background of limited financial and other resources. Risk evaluation is essential as it is not possible to address all disaster risks at the same time (Smith, 2004; Comfort, 2004). Only those classified as absolute priority and marked on the red danger zone are given immediate attention, however, this does not mean that it is the end-all and be-all of the intervention stage. Rather, it is only the start, which implies that all intervention measures in respect of the risk/s have to be closely managed and monitored.

Stage: 4 Monitor Disaster Risk Reduction Initiatives, Update and disseminate Disaster Risk Assessment Information

During this phase the emphasis is on continuous monitoring to measure the effectiveness of disaster risk reduction initiatives, recognise changing patterns and new developments in risk profiles. Equally important is the updating and dissemination of the information to inform the disaster risk management planning process. Information is the “life-blood” for the success of the disaster risk assessment process thereby developing effective risk reduction measures for implementation.

This model is currently adopted by all spheres of government engaging in disaster risk assessment. The well defined and clear process facilitates the easy application thereof. In particular, the example of the Western Cape programme on participatory risk assessment for informal settlements bears reference (Holloway & Roomaney, 2008). The main outcomes of this programme are to:

- involve those most at risk in the consultative process;
- encourage those most at risk to understand the risk better; and
- enable and support those most at risk to reduce recurrent disaster losses that affect their health, assets and livelihoods.

As such, the community-based disaster risk management approach is utilised to reduce local risk through participatory assessment and planning methods. Participatory risk assessment is a bottom-up approach that strives to empower communities by engaging them in defining real problems within their environment, deciding on practical solutions, implementing activities and assessing the results of the interventions. This integrated participatory risk assessment and planning process entails three distinct phases (aligned to the South African Disaster Risk Assessment Model) with specific activities and outcomes linked to estimated time frames. The core element is that of a participatory and inclusive process. In effect, participatory risk assessment is instrumental in guiding immediate risk reduction measures, strengthening co-operation and trust among stakeholders involved in the process, and informing medium to long term planning (that is, integration into the Integrated Development Planning process).

The success of this programme has been recognised by the Western Cape Provincial Government as participants in this process. The Western Cape Provincial Government is therefore currently marketing this programme as an example of “disaster risk assessment-good practice” in South Africa (Holloway & Roomaney, 2008).

In spite of the successful implementation and practice of this model, there are a few critical challenges that need to be recognised and appropriately managed.

4.3.3.3 ***Challenges confronting the model***

Like all other participatory, community-based disaster risk assessment models, the difficulties challenging the South African model are not that different. In particular, five problem areas may be isolated for discussion within this context as disclosed below:

- Issues surrounding effective community engagement especially where the community is regarded as the most crucial role player in the disaster risk assessment process. The degree of community participation is often hindered by their limited background, understanding and knowledge of disaster risk reduction. Active community participation should be encouraged through a process of education, training and awareness. Such intervention, as necessary as it may be, has major resource implications, for example: materials, finances, personnel, time and generic logistics. Very often this intervention is excluded or forgotten during the planning process and becomes a problem in the implementation phase resulting in unnecessary delays to the approved disaster risk assessment programme of action.
- The diverse and inclusive consultation process hinges on appropriate timing. Given the fact that a right mix of role players are required to ensure the effectiveness of the process implies that the timing of such activities should be suitable and agreed upon by the respective stakeholders. However, in many municipalities, disaster risk assessment is an after thought, demanding that a schedule of risk assessment activities be drawn up to fit into a specific time frame to meet legislative or policy imperatives before the end of the budget period where remaining funds have to be utilised. This limits participation as some role players may not be available during the identified period impacting negatively on the assessment results.

- The involvement of the different disciplines, government departments and sectors are undertaken on a piece meal approach based on their availability and interest in this process. As much as these multi-disciplinary and multi-sectoral stakeholders recognise their role in disaster risk assessment, their commitment to the process is often lacking, for example, attendance at meetings and workshops is represented by different person/s, instead of a dedicated authority figure. This delays the decision process and follow-up action that is usually required.
- The difficulties experienced with accessing or retrieving the relevant information to commence the risk assessment process is often linked to conventional practices. Within most municipalities, historical data on previous disaster encounters may be available but may not be in a usable format. For example, original copies of records may be available but to be useful in the risk assessment process, it would have to be captured in the required format to provide the desired output for ascertaining levels of risk and vulnerabilities and determining the associated consequences thereof. Furthermore, communities do not maintain records of incidents and experiences within their environment, yet they possess rich data that is essential to create the parameters of the disaster risk assessment process. Municipalities are therefore expected to explore strategies to involve the community in the information gathering, sharing and analysis stages.
- Staffing problems within the disaster risk management units, like the shortage of staff and the lack of adequately skilled personnel to carry out the disaster risk assessment process. This constitutes one of the major draw-backs of pursuing the core activities of disaster risk reduction. Many municipalities are forced to engage the services of consultants or technical specialists to carry out the disaster risk assessment for their municipality.

In so doing, municipalities are required to specify clear terms of reference (South Africa, 2005:76) to guarantee the outcomes and output of the process. However, many municipalities, in a haste to fulfill the procurement requirements of government, fail to stipulate specific terms of reference to be adhered to by the service provider/s. With the omission of such criteria, municipalities usually have limited control over the deliverables and methodology applied in the risk assessment process.

The foregoing discussion presented both the positive attributes of the models as well as the various obstacles impacting on their progress. The next logical point of interest is to undertake a comparison of these models. The similarities that they share will be highlighted and the striking differences that set them apart, clarified.

4.4 COMPARATIVE ANALYSIS OF THE THREE MODELS

The purpose of this exercise is to trace the common threads running through these models, to clarify their differences and the resultant effect on the disaster risk assessment process. This analysis will be undertaken against the set criteria developed and expounded on at the beginning of this chapter. The lessons drawn out of this process will serve as the foundation for the development of the proposed model for Local Government in South Africa in Chapter Six of the thesis.

At the outset, it is interesting to note that the similarities shared by these models are in consonance with the cornerstones of disaster risk reduction presented as a key component of Chapter Two in the thesis.

Firstly, recognising the value and importance of engaging the political-office-bearers and community leaders in securing their political commitment and support in disaster risk reduction. This unveiled a host of opportunities by placing disaster risk assessment and risk reduction in the political spot light. Beginning

with raising awareness and developing a culture of prevention at the community level and extending towards a more strategic level of acquiring resource support and over-all commitment in encouraging effective disaster risk assessment practice.

All three models reviewed in this chapter, show strong support for political commitment through the emphasis on the involvement of these political-office-bearers and community leaders throughout the disaster risk assessment process. Such engagement is crucial in changing the “mind set” towards disaster preparedness, prevention and risk reduction. By being intimately involved at the practical level, these role players begin to grasp the relevance and merits of disaster risk assessment and risk reduction. As such, they may be instrumental in channeling the outputs of the process into tangible risk reduction initiatives. Since these political-office-bearers serve on government decision-making bodies, they are better informed through their involvement in the process, to clarify any misunderstandings and uncertainties that may arise during deliberations; and rally positive support and commitment for the implementation process.

This is however, the intended outcome of soliciting political commitment, but the reality is somewhat different. For example, in the above models, there is no question around political participation but this seems to be confined to the activities within the disaster risk assessment process. It is therefore necessary to link the risk assessment and implementation process to clear actions and responsibilities for follow through and accountability.

Secondly, the need to create multi-disciplinary and multi-sectoral teams to promote integrated disaster risk reduction is expressed as non-negotiable. Such diverse teams of experts and relevant stakeholders serve to lead the process of integrated planning thereby ensuring that disaster risk reduction initiatives are cost-effective and sustainable. After all, disaster risk exists in all ambits of society and all segments of their environment. An inclusive, multi-disciplinary/sectoral

approach promotes the notion of shared responsibilities as equal partners in this quest to reduce disaster risk. More importantly, the issue of shared governance is acknowledged within these models and appropriately addressed through a clear understanding and acceptance of roles and responsibilities towards the pre-determined goals for effective disaster risk assessment and risk reduction.

The diverse planning team approach is central to the success of all three models. Specific input from the respective disciplines, sectors and broader stakeholder groups is vital in setting the risk assessment process into motion. This type of arrangement based on trust and transparency, encourages “ownership” of the process and its outputs. Hence, there is commitment in integrated planning and sharing of resources and responsibilities (as a team) towards effective risk reduction.

Thirdly, the structure and processes of the models allow for flexibility and adaptability. The firm point of departure is that risk assessment issues are dynamic and ever-changing in line with the constantly changing landscape and environment within which it prevails. The true value and relevance of the process can only be maintained through constant and appropriate adaptation.

An important component of these models is that of the monitoring, evaluation and feedback. This guarantees the relevancy of the process and its outcomes by reviewing the effectiveness of the risk reduction interventions against set targets by taking into consideration changing climatic conditions and new developments within the broader environment, for example, increasing environmental degradation plagued by new infections and viruses (N1H1, bird flu, foot and mouth disease) and the escalating cost of living due to the global economic recession resulting in increased poverty levels. Hence, giving rise to the necessary adjustments, amendments and modifications to the action plans and risk reduction strategies to sustain the relevance and effectiveness of these interventions.

Fourthly, community participation forms the nucleus of the disaster risk assessment and risk reduction initiatives within all three models. The community is identified as a critical resource and is required to guide the disaster risk assessment process through their wealth of local and indigenous knowledge. As such, the community is instrumental in identifying the risk and vulnerability realities within their environment. The focus is a bottom-up approach where the community is afforded the lead role in sketching out the persistent problems, concerns and challenges affecting their safety and livelihood. This serves to ensure that all disaster risk reviews, risk prioritisation and subsequent decisions and plans of action are grounded within the context of the community and their respective environment.

Fifthly, the models display a genuine and intentional drive in empowering the community at risk, towards resilience. This is initiated through the active engagement of the community throughout the risk assessment process. As partners in the various activities, the community develops a sense of trust and belonging. This becomes evident in the interactive involvement of the community volunteering valuable information and sharing personal experiences and past practices. Community capacity is further improved through education, training and awareness programmes. Being more informed, the community begins to share ownership of risk reduction initiatives within their environment. More importantly, the community is empowered to recognise that minimising disaster risk is their primary responsibility thus challenging them into a process of self reflection of daily risk practices within their environment; so that they may equip themselves to cope with and adapt to anticipated risk situations as and when they occur.

In addition to the five guiding criteria, these models accentuated two further principles, that is:

Information is the essence of successful disaster risk assessment. The risk assessment process is reliant on clear, correct, timely, reliable and valid

information; hence risk assessment is only as good as the information that is applied to its process. In turn, the information is only as good as the team that strives to collect, analyse, communicate and act on it. This reinforces the concept of a well represented and inclusive team of relevant stakeholders sharing in the activities. The emphasis is not necessarily on the most expensive and highly technical equipment, system and methodology being administered in the process; instead the caution is to keep it simple, understandable and reliable (especially within this context of community risk assessment). Also relevant is the promotion of local and indigenous knowledge to supplement the scientific and technical information in a logical and structured manner.

Lastly, disaster risk assessment is described as an iterative process. In this light, the outcomes are construed as a means to an end and not an end in itself, that is to say, that the recommended risk reduction strategies may not necessarily be the final product and are subject to change and adaptation given the ever evolving environment of disaster risk management. These models encourage process monitoring and reviewing of the intended outcomes and action plans, thus allowing for the relevant adjustments and modifications to be incorporated without unnecessary delays and chances of compromising the disaster risk reduction measures.

The above analysis reveals that the three models measure positively against the key international agenda and initiatives on disaster risk reduction (UNDP, 2004; UN, 2005; Kobe Report, 2005 and ISDR, 2005) and the subsequent criteria emanating from them. All five principles were adequately addressed and attained by the models. In effect, these models portray an appropriate starting point towards effective disaster risk assessment and risk reduction. This is further exemplified in the selected examples of successful practice of these models.

To progressively enhance the practice and benefits of these models, it is imperative that the challenges confronting them are critically reviewed and

appropriately sanctioned. It is important to link the disaster risk assessment process to enabling systems, structures and procedures within government (like the reporting and decision-making systems and structures, and the procurement/supply chain procedures) and the community (for example, existing community based organisations, volunteer groups and active non-governmental organisations). Such mechanisms are vital in providing support and facilitating the outcomes and actions of the risk assessment process.

In light of the above deliberations, all five criteria, that is: political commitment; multi-disciplinary and multi-sectoral approach; adaptability; community participation; and resilience will be used as the framework in the creation of the proposed model for local government in South Africa. These salient principles are compulsory in the pursuit towards the international agenda on disaster risk reduction. The similarities shared by the above mentioned models crystallises their core principles, characteristics and functioning. As such, these similarities overshadow the apparent differences that arise.

The primary differences between these models occur during the planning and resource allocation stage. In model one (community-wide vulnerability and capacity assessment model), the planning process considers resource needs and demands for immediate intervention to reduce vulnerability and positively alter the risk profile of the community. The next step of planning dwells on the medium to long-term goals in accordance with priority settings linked to the critical levels of risks and vulnerabilities of the community.

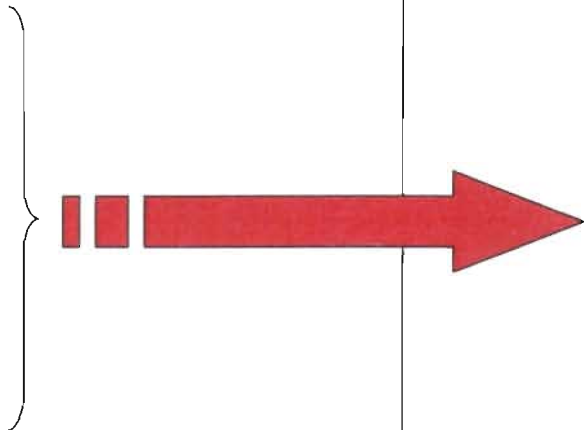
In model two (community based risk reduction model), during the planning stage, due cognisance is taken of the resource imperatives for effective implementation of the risk reduction measures. At this point the commitment and support of government and relevant stakeholders are solicited to guarantee access to and ensure the availability of resources, materials and equipment, facilitating the implementation of the planned risk reduction interventions.

In the third model (South African Disaster Risk Assessment Model), the focus is on the disaster risk assessment process and is not so strong on the implementation process. Disaster risk reduction initiatives are usually overlooked during the planning and budgetary process which implies that risk reduction is usually placed lower down on the political agenda. As such, the limited resource base available to government is usually allocated to priority areas before risk reduction issues are tabled, debated and considered for government intervention and support. Fortunately for integrated planning through the multi-disciplinary and multi-sectoral approach currently being encouraged by this model, disaster risk reduction measures may be pursued through for example: environmental management, poverty eradication and national social and economic development programmes.

The above differences once again strengthen the argument around commitment and support as being the driving force of the disaster risk assessment process and the lack thereof delays and challenges the whole process. The worse case scenario is when the entire process is derailed and all hopes of progress and success are confined to a beautifully developed disaster risk reduction plan. After all, well structured and carefully devised risk reduction plans lose their value if not timely implemented.

During the initiation and planning stage, it is imperative to harness the necessary support and commitment from all relevant stakeholders who will be crucial in unleashing the resources required to promote effective disaster risk assessment and enhance the practice of disaster risk reduction.

In summary, to further enunciate the comparative review of the three models, a simple table (refer to Table 3) has been developed, tracing the key variables of comparison.

Categories of Comparison	Model 1 Community-Wide Vulnerability and Capacity Assessment Model	Model 2 Community-Based Risk Reduction Model	Model 3 South African Disaster Risk Assessment Model
Similarities	<ul style="list-style-type: none"> ▪ Endorses political commitment ▪ Encourages a multi-disciplinary and multi-sectoral approach ▪ Promotes flexibility and adaptability ▪ Hinges on community participation ▪ Influences community resilience ▪ Emphasises information (indigenous knowledge) ▪ Maintains the iterative process 		
Differences	<ul style="list-style-type: none"> ▪ Focuses on short-term planning and resource 	<ul style="list-style-type: none"> ▪ Planning and resource allocation linked to 	<ul style="list-style-type: none"> ▪ Planning confined to disaster risk assessment

	provisioning	implementation process	process and not the implementation stage
Challenges	<ul style="list-style-type: none"> ▪ The assessment process is misconstrued as the end result ▪ Quality and availability of data and information ▪ Pre-requisites of a participatory approach 	<ul style="list-style-type: none"> ▪ Differing perceptions of risk ▪ Level and extent of community participation ▪ Co-ordination of a multi-disciplinary and multi-sectoral team 	<ul style="list-style-type: none"> ▪ Staff shortages in disaster management units/divisions ▪ Degree and extent of community participation ▪ Co-ordination of a multi-disciplinary and multi-sectoral team ▪ Access and availability of relevant information ▪ Diverse and inclusive consultative process

Table: 3 Comparative Perspective of the three models

The above analysis portrays a visual context for the interpretations and deliberations on the comparison of the three models (presented in 4.4). These significant elements will be depicted in the development of the disaster risk assessment model for local government in Chapter Six.

4.5 CONCLUSION

In view of the above exposition of the models, it is evident that strategies for the reduction and prevention of disasters may be universal but their applicability needs to take into account the particular characteristics of the threatened entity. The intention should be to get a better understanding of the hazards, risk and vulnerabilities of that society and their environment. This leads to the development of appropriate risk assessment tools and risk reduction strategies for the society concerned in light of their peculiarities within the context of their broader dynamic environment. In essence, risk assessment is the outcome of the investigation of the cause-effect relationship between hazard and vulnerabilities. A thorough analysis of these factors through the use of an appropriate risk assessment model enables the identification and implementation of relevant disaster risk reduction interventions.

With this background the initial concerns echoed by Blaikie, *et al.* (1994) and Twigg (2004a), at the outset of this chapter becomes less troublesome and a strategic challenge for purposes of planning and implementation. Furthermore, the shift in focus from the hazard intensive review to a more holistic approach with growing emphasis on the human/social dimensions, signals a step in the right direction. In keeping with this perspective, it is necessary to stress that the underlying principles, structures and processes of the models presented above are based on flexibility, adaptability, continuous monitoring, review and modifications. This notion is further supported by the fact that these models are merely tools enabling the process of risk reduction and they should be

recognised as a means to an end and not an end-in-itself; promoting the concept of inherent modification and adaptation.

The critical issues emanating from this chapter of the thesis will be fundamental in providing insight, guiding parameters and depth to deliberations in Chapter Six of the thesis on the development of a disaster risk assessment model for local government in South Africa. The vulnerability driven approach, aligned to the guiding criteria will form the frame of reference together with the lessons drawn from the review and comparison of the three models presented. The ultimate goal in the following chapter is to carefully examine the research findings so as to provide sound recommendations to be pursued in Chapters Six and Seven of the thesis.

CHAPTER 5

RESEARCH METHODOLOGY AND EMPIRICAL FINDINGS

5.1 INTRODUCTION

This chapter clarifies the research methodology and data collection process that appraises the research findings and deductions aimed at substantiating the research objectives. In particular, the perceptions and an investigation into the current disaster risk assessment practice within local government in South Africa (as represented by the selected focus groups) are of primary focus. Thus, the significant points of deliberation begin with a justification of the research methodology and techniques applied in the collection of the data in operationalising these research objectives. Since both the quantitative and qualitative measures were utilised, a comparative analysis of these approaches are presented verifying the value they add to the research process.

The quality and validity of the research and the findings are enunciated through a process of triangulation and the structured flow is maintained in analysing and interpreting the data. Thus, contributing to the clear research findings traced within the quantitative and qualitative perspective; and supported by visual instruments (such as the Likert Scale, the Quintile Classification table and a variation of graphs). Leading to the ultimate contextualisation, comprehension and disclosing current status of disaster risk assessment and providing practical recommendations for its improvement and future application within local government in South Africa.

Chapter Six of the thesis will acknowledge the salient issues and recommendations proposed in the previous chapters, by articulating and detailing the disaster risk assessment model for local government. Possible

recommendations for the effective implementation of the model will be outlined in Chapter Seven of the thesis.

5.2 RESEARCH METHODOLOGY AND DATA COLLECTION PROCESS

The purpose of the research is directed towards the development of a proposed disaster risk assessment model for local government in South Africa. In pursuing this goal, the research methods adopted in the study ranged from critical literature reviews, conceptual analysis, exploratory reviews, comparative analysis, administering of questionnaires, and field surveys, to focus group discussions and interviews (Silverman, 2000; Bak, 2004; Fox & Bayat, 2007). Complemented by a diverse source of data from academic books, legislation, journal articles, periodicals, research papers, websites, conference proceedings, national and international reports and publications. Since it was physically impossible to solicit information and data from all the municipalities in South Africa, a sample was selected. Hence, the non-probability sampling technique (Fox & Bayat, 2007; Welman, *et al.* 2005; Brynard, *et al.* 1997) in particular the purposive sampling style was explored in determining the sample in this study. Where the selected sample best represents the relevant population of the research focus, in this case the four chosen (that is eThekweni metropolitan, Ekurhuleni metropolitan, Bojanala district and Stellenbosch local) municipalities represent the three categories of municipalities (metropolitan, district and local) in South Africa. An added dimension to this diverse but fairly representative sample was to ensure that the municipalities were identified across different geographic boundaries to promote effective comparison and correlation between them, thus validating the research findings and operationalising the research objectives. The biographical data (refer to Annexure B) of these four municipalities provide an in-depth comprehension of the key variables influencing their disaster risk assessment activities. These arguments are interrogated in Figures 15, 16, 17 and 18 (refer to research findings below).

Chapters Two and Three of the thesis demonstrated the conceptual analysis and critical literature study providing a strong theoretical basis for the value of the study further asserting the prominent link between disaster risk assessment and disaster risk reduction.

A combination of the exploratory review and comparative analysis method was applied in Chapter Four allowing for a thorough assessment and comparison of the three identified disaster risk assessment models. These models were selected on the basis of their relevance and emphasis to the bottom-up, vulnerability and community driven perspectives to disaster risk assessment, an approach recommended for local government practice.

The empirical data (Delamont, *et al.* 1997; Welman, *et al.* 2005) and information collection process acquired through the use of a variety of research techniques, informs the research findings in Chapter Five of the thesis. This primary data is from the focus group questionnaires, deliberations and interviews as well as field surveys. The information collection process was thorough and stemmed over a period of two years. The researcher embarked on initial drafting and planning of strategic questions that are reflected in the questionnaire and interview schedule (Annexure A). The total staff complement of the Disaster Management Sections of all four municipalities constitutes the focus group (Annexure B). This comprises of the Disaster Managers, Practitioners and Officers/Functionaries. As such, electronic versions of the questionnaire and interview schedule were forwarded to the focus group to allow for adequate time, flexibility and application in responding to the questions prior to the researcher's on site visit. During this process the researcher spent a week with the respective municipalities, that is eThekweni (3-7 November 2008), Ekurhuleni (12-16 January 2009), Bojanala (1-5 December 2008) and Stellenbosch (15-19 December 2008) engaging in discussions, meetings, and workshops on the critical issues contained in the questionnaire and interview schedule (Silverman, 2000; Bak, 2004; Welman, *et al.* 2005; Fox & Bayat, 2007). Also important was the interaction with the

community during field surveys and disaster risk assessment workshops complementing the information provided by the disaster management functionaries (Annexure B). The responses received from the various municipalities were in a consolidated form as depicted in Annexure B due to the scope and focus of the study thereby providing a collective voice on the current disaster risk assessment conception and practice within their municipalities and as determined by the current management system and procedures in place.

In essence, the research analysis and findings enlighten the progressive development of the model in Chapter Six of the thesis. Corroborating the legislative stipulations (South Africa, 2002; South Africa, 2005) guiding the disaster risk assessment practice within local government in South Africa. Resulting in the formulation of well informed recommendations and conclusions (in Chapter Seven of the thesis) for the successful application of the proposed disaster risk assessment model for local government in South Africa. Further, the nature and scope of this research required the use of both the quantitative and qualitative approaches. Although some social science researchers (Lincoln & Guba, 1985; Schwandt, 2001) believe that qualitative and quantitative approaches are incompatible, others (Patton, 2002; Glesne & Peshkin, 1992) argue that skilled researchers can successfully combine approaches as will be disclosed in the research interpretation and deduction process.

5.2.1 The Quantitative Approach versus the Qualitative Approach

The descriptive method of the quantitative approach was employed (Fox & Bayat, 2007; Welman, *et al.* 2005; Brynard, *et al.* 1997). With reference to this research, it involved the systematic collection of data through descriptive survey questions (refer to Annexure B, questions B4, B5, and B6) to examine the prevailing conceptualisation of disaster risk assessment. The instruments used to analyse the data in this context are the Likert Scale and Quintile Classification as reflected by excerpts B4, B5 and B6 below. On the other hand, since the

qualitative approach allows for more diversity in responses as well as the capacity to adapt to new developments and issues during the research process (Flick, 2009; Woods, 1999; Silverman, 2000), it formed the thrust of the research methodology in this study.

The four focus groups were subjected to field surveys, group questionnaires, discussions and interview schedules (refer to Annexure A). As such, the questions covered were open and was accordingly adapted to the practices and experiences portrayed by the participants within the study. This openness enabled a comprehensive approach in the collection of data through qualitative evaluation drawing on both critical thinking as a means of being open to multiple possibilities and scrutinising various possibilities to gain a fresh perspective (Strauss & Corbin, 1998; Denzin & Lincoln, 2000).

The research aimed to gather in-depth apprehension of the environment, events and activities (Woods, 1999; Silverman, 2000). Hence, smaller but focused samples were selected (as justified above) rather than large random samples. The important point in using these focus groups was to introduce informality in the discussion and data collection process so as to encourage true and natural responses. However, it was crucial that the process be content specific and content driven in order to guide the outcomes in line with the research objectives.

The study involved fieldwork where the researcher physically visited and worked with the people, settings, sites and institutions to observe and record activities and experiences within the environment (Marshall & Rossman, 1980). A period of a week per institution was spent exploring the processes and meanings of events, activities and actions, and ascertaining how and why certain outcomes were achieved and not just focusing on what was achieved.

In effect, qualitative research is a descriptive, flexible, intuitive, inductive and an open way of doing research (Flick, 2009; Silverman, 2000; Shaw, 1999) enabling

the researcher to construct abstractions, concepts and hypotheses from the details (Merriam, 1988; Creswell, 1994) offering substance and deep understandings of the complexities and challenges to the real world experiences (Smit, 2003). Delamont, *et al.* (1997) affirmed this thinking by categorically stating that a modest volume of high quality data analysed in great depth and with methodological precision will often be far better than a lot of data superficially analysed.

To summarise and further clarify the direct contrast between the quantitative and qualitative methodologies (Wolcott, 1990; Denzin & Lincoln, 2000) the following table is presented.

Quantitative Research	Qualitative Research
Evaluates objective data consisting of numbers.	Deals with subjective data, presented in language (by people) instead of numbers.
Analysis is based on complex structured methods, limiting flexibility and bias in presenting the results.	Flexible and exploratory methods are used to enable the researcher to change the data progressively so that a deeper understanding of what is being investigated can be achieved.
Deals with an abstraction of reality.	Investigates the day-to-day events and bases their results on events and behaviours of people.
Focuses on facts from an outsider's perspective.	Achieves an insider's view by talking to and observing behaviour (first hand experience) in a subjective manner.
Maintains stability in the research process.	Occurs within a dynamic and changeable nature of reality.
Emphasises reliability through the replication of data that is consistent	Validity is considered more important in representing the research objectives.

and stable.	
Usually aims for large numbers of cases.	Involves small samples of people, studied by means of in-depth methods.

Table: 4 Differences between Quantitative and Qualitative Research Methodologies (Adapted from Wolcott, 1990; Denzin & Lincoln, 2000; Welman, *et al.* 2005; Fox & Bayat, 2007).

The striking comparisons tabulated above portray the key features of these methodologies thus justifying the merit they add to the research process (as declared in 5.2.1). In addition, the issues of quality and validity of the research had to be proven to give impetus to the research findings and deductions.

5.2.1.1 ***Maintaining Quality and Validity in the research***

According to Patton (2002), Holliday (2007), and Flick (2009) there is no single, correct method in qualitative research. Therefore, the research should be methodologically planned and based on clear principles and reflections. After all, the data collection and inductive analysis process demonstrates the value of utilising the qualitative approach (Glesne & Peshkin, 1992; Shaw, 1999). Hence, strategies of triangulation and analytical induction provide insights into the quality of qualitative research.

The triangulation of information in this research is two-fold. In the first instance the use of a variety of data collection methods and sources (as substantiated above). Secondly, the use of different approaches in building of the interpretive text (Flick, 2009; Fox & Bayat, 2007; Welman, *et al.* 2005; Henning, *et al.* 2004). Hence triangulation is used as an approach for further grounding the knowledge obtained through the qualitative methods, that is: the field surveys, focus group interviews and discussions; the subject knowledge (reference to the theory or

literature review); and the inductive interpretation. Figure 12 clarifies this triangulation process.

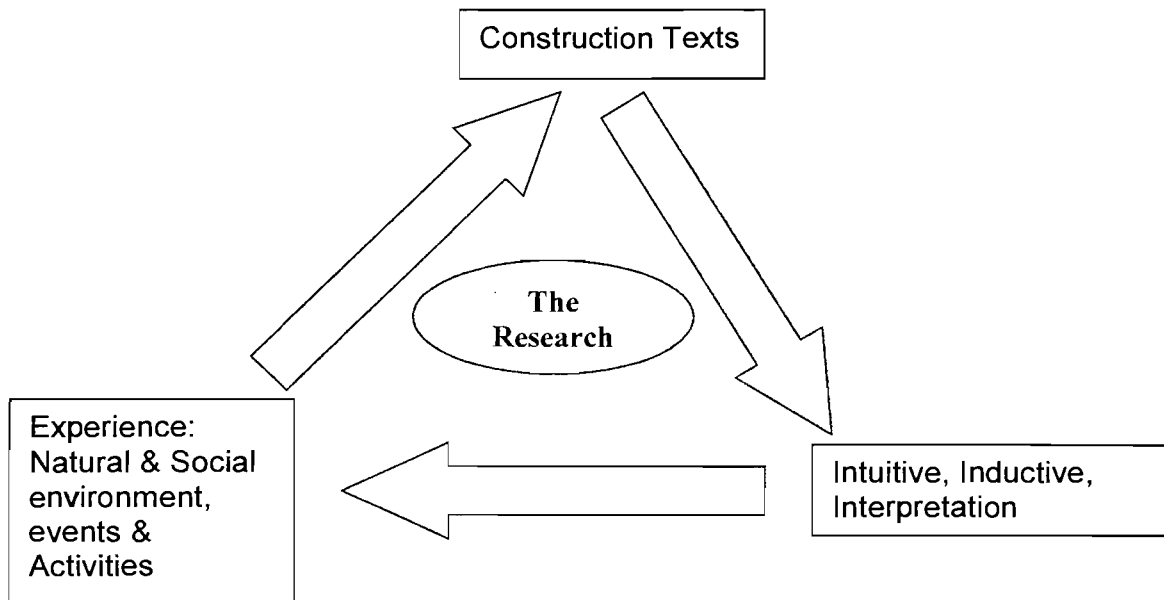


Figure: 12 Process of Triangulation (Adapted from Flick, 2009:78).

Figure 12 reveals that reading and understanding texts become active processes of producing reality. This is then regarded as construction of reality (Flick, 2009; Fox & Bayat, 2007; Welman, *et al.* 2005). In turn, everyday and scientific interpretations are based on a preconception and/or 'snap shot' of human activity and of their social and natural environment and experiences and outlines the triangulation process implemented in this research.

In support of the above principle, Patton (2002), Smit (2003), and Holliday (2007) elucidate that systematic and transparent approaches to analysis are essential for enforce rigour in the research process. Therefore, an added strategy is to carefully code the data collected in a consistent and reliable manner (Woods, 1999; Silverman, 2000).

The coding process applied in this research was to both organise the data in a logical frame and facilitate a systematic method of interpreting it. A simple five step process (as exemplified in Figure 13) serves as the guiding tool for this interpretive technique.

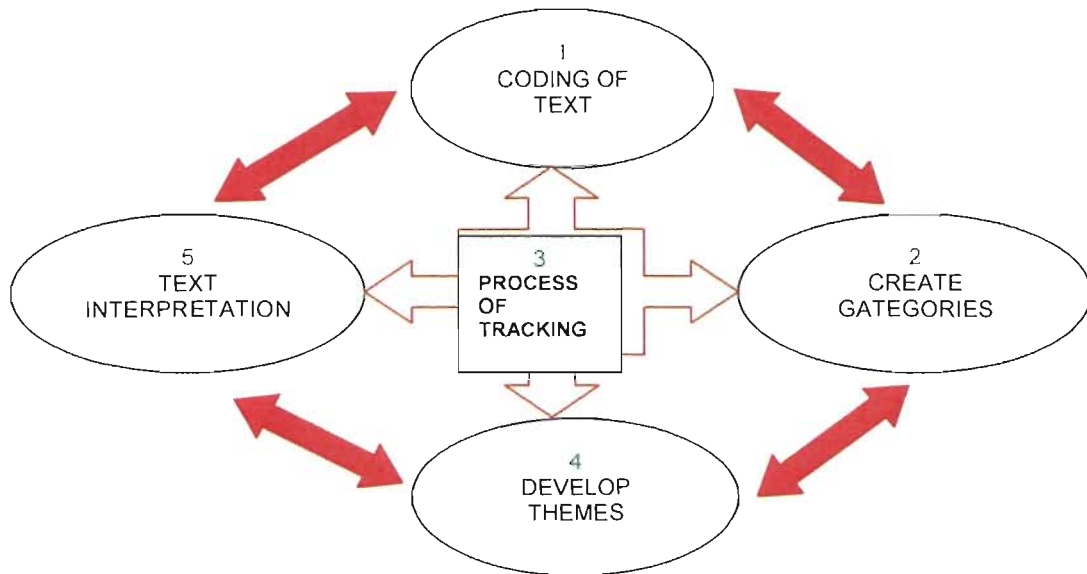


Figure: 13 Data Analysis and Interpretive Process (Adapted from Holliday, 2007).

In keeping with the process specified in Figure 13, the data collected was firstly coded into different units or segments. Second, all related codes were linked or grouped together into categories. Even at this stage there was constant reference to the coding process and back to the “raw” data, just to verify that the coding and subsequent clusters or categories created were appropriate and logical before moving forward to the development of themes. The fourth phase entailed the construction of themes that purposefully and meaningfully encapsulated the core issues that emerged from the categories. Leading on to the fifth stage of the process, that is the recontextualisation of the data text where the final data is integrated as evidence in the arguments are constructed together

with the merging of the empirical and theoretical texts to produce the research findings. However, it should be emphasised that the process of tracking or review is iterative and was observed throughout the data analysis and interpretation process, facilitating a systematic, consistent and quality driven methodology (Strauss & Corbin, 1998; Denzin & Lincoln, 2000; Patton, 2002; Holliday, 2007; Flick, 2009).

Table 5 outlines the various codes linking them to the “raw” data from Annexure B and further connecting them to the appropriate research themes identified in Table 6.

Codes	Reference
i. Attitude towards disaster risk assessment (ARA) (5.3.2.1.1.2)	B 1,2,3/5.5,5.6,5.7/7,8
ii. Reasons for undertaking disaster risk assessment (RFRA) (5.3.2.1.1.1)	B 4; I 3,4
iii. Conceptualisation of the disaster risk assessment process (CORAP) (5.3.2.1.1.1)	B 5.1,5.2, 5.3, 5.4; I 1
iv. Perceptions around disaster risk assessment (PARA) (5.3.2.1.1.1)	B 6.1, 6.2, 6.3, 6.4
v. Challenges associated with disaster risk assessment (CARA) (5.3.2.1.4.2)	B 6.5, 6.6
vi. Role-players in disaster risk assessment (RPRA) (5.3.2.1.2.1/5.3.2.1.3.1/5.3.2.1.3.2)	B 10,15,16
vii. Role of consultants in disaster risk assessment (RCRA) (5.3.2.1.4.1/2)	B 11,12,13 / C 3,4,5,6,7
viii. Training and development of disaster risk assessment role-players (TDORP) (5.3.2.1.2.3/5.3.2.1.3.3)	B 14,17
ix. Structures and systems facilitating disaster risk assessment (SSRA) (5.3.2.1.1.3)	B 18,19,20 / I 2

ix. Staff capacity and resource support to undertake disaster risk assessment (SCRRA) (5.3.2.1.4.1/3)	C 1,2
x. Current disaster risk assessment practice (CRP) (5.3.2.1.4.1/2/3)	C 8 / I 6,7,8

Table: 5 Data coding process (Application from Holliday, 2007).

The above common codes were clustered together as categories from which themes were devised as highlighted in Table 6, below.

5.3.2.1 Themes	Categories
5.3.2.1.1 Political commitment	5.3.2.1.1.1 legal and regulatory framework 5.3.2.1.1.2 Political support 5.3.2.1.1.3 Institutional framework
5.3.2.1.2 Multi-disciplinary and multi-sectoral approach	5.3.2.1.2.1 Role-players in disaster risk assessment 5.3.2.1.2.2 Relevance of a diverse approach 5.3.2.1.2.3 Training and skills development
5.3.2.1.3 Community participation and resilience	5.3.2.1.3.1 Need for community participation 5.3.2.1.3.2 Role of community 5.3.2.1.3.3 Significance of training and awareness
5.3.2.1.4 Disaster risk assessment process	5.3.2.1.4.1 Organisational capacity to undertake disaster risk assessment 5.3.2.1.4.2 Current disaster risk assessment practice 5.3.2.1.4.2 Challenges encountered in undertaking disaster risk assessment 5.3.2.1.4.3 Possible solutions for implementation

Table: 6 Structured Themes and Categories (Application from Holliday, 2007).

The above analysis will be expounded on (within 5.3.2.1) as part of the qualitative research findings providing a clearer perspective of the disaster risk assessment practice within the respective municipalities; and justifying a way forward towards an appropriate disaster risk assessment model for local government in the following chapter.

Having traced the research methods administered and the data collection and review process sketched out, the research findings are examined.

5.3 RESEARCH FINDINGS

The quantitative and qualitative approaches informed the research process therefore the research findings will be articulated within the two respective categories.

5.3.1 Quantitative Research Findings

The data collected from all four municipalities (as detailed above in 5.2) was captured within the Likert Scale and the Quintile Classification Table, to provide a visual picture and at a glance the common trends and differences can be identified. Further enabling a thorough analysis of the findings within the determined categories in relation to the grade assigned by the respondents as represented in the extracts from questions B4, B4 and B6 of Annexure B.

B4. Currently, DRA is undertaken as: (Likert Scale)

	1 Strongly Agree	2 Agree	3 Neither Disagree nor Agree	4 Disagree	5 Strongly Disagree
4.1 compliance with legislative requirements.	B	EK; S	eT		
4.2 a pro-active disaster reduction mechanism	B	EK; S	eT		
4.3 the first step towards developing a disaster plan	B; S	EK	eT		
4.4 a means to responding to disaster situations	B; S		eT; EK		
4.5 part of the disaster recovery & rehabilitation process		S	eT; EK; B		

Codes used above represent the following municipalities (identified focus groups):

- eT: eThekweni
- EK: Ekurhuleni
- B: Bojanala
- S: Stellenbosch

In the Likert scale (B4 above) a grade is applied between 1 and 5, starting with the greatest influence through to the weakest in ascending order of numeric value. In light of the theoretical underpinnings and legislative framework of disaster risk reduction and disaster risk assessment, clarified in Chapters Two, Three and Five (above) there is strong support for the pro-active implementation of disaster risk assessment. The initiating factor is recognising disaster risk assessment as a crucial and mandatory process towards the development of effective disaster plans and disaster risk reduction strategies. However, the only

concern is that if this process is driven by the need to comply with national and legislative time-frames then the commitment and true value of the process and its outcomes may be questionable. This argument is especially relevant within the context of this survey where three out of the four municipalities that have undertaken disaster risk assessment to inform their disaster plans. However, the implementation of the disaster risk assessment recommendations are yet to be incorporated into the departmental action plans. Such delays raise the issue of seriousness attached to the process and may result in the outcomes being less suitable or even inappropriate within the changing risk and vulnerability profiles of the community.

In addition, it is encouraging to note that there is reduced emphasis on the reactive approach to disaster risk management. Depending on the circumstances and if the need arises, disaster risk assessment is carried out within the response, recovery and rehabilitation ambit. However, the intervention measures are linked and updated onto the disaster plans for continuous and on-going progress.

Having explored the primary reasons for investing in disaster risk assessment, it is equally important to verify the extent to which the process is comprehended.

B5. Conceptualisation of DRA process within the institution (Quintile Classification).

	1 Zero to Very Low	2 Low	3 Moderate	4 High	5 Very High
5.1 knowledge of the DRA process by managers	eT	EK	S		B
5.2 understanding of the DRA process by disaster management functionaries				eT; EK; B; S	
5.3 understanding of the DRA process by service	eT	EK	B; S		

departments					
5.4 understanding of the DRA process by other departments	eT; EK		B; S		
5.5 recognition of the purpose of DRA by management	eT	EK; S	B		
5.6 value assigned to DRA process within the organisation	eT	EK; S	B		
5.7 importance linked to the outcome/results of DRA by management	eT	S	EK; B		
5.8 DRA practice is directed towards disaster risk reduction	eT	S	EK	B	

On the basis of this classification by quintile a grade is applied between 1 and 5, with the weakest value signifying a weak influence and the highest value signifying a great influence. Hence, the following deductions may be drawn.

Firstly, the apprehension of the disaster risk assessment process by managers across the various municipalities covers a scattered range from very low through to very high. This is in direct contradiction to the key principle (that is, political commitment and support) of the Framework for Disaster Risk Reduction (ISDR, 2005). Three out of the four municipalities examined, reflect low or limited political support. However, for the exception of Bojanala which seems to enjoy positive support as illustrated in Figure 18, resulting in Bojanala being appropriately poised in terms of resource support when compared to the other municipalities.

Secondly, the disaster management functionaries display a good grasp of the disaster risk assessment process. This may be attributed to the relevant qualification and experience within the disaster risk management field (refer to

Figure 17) as well as the training and development programmes instituted within the organisation.

Thirdly, it is apparent that service departments, and other departments, and sectors of government have not fully embraced the disaster risk assessment process. As such, the ratings hover between very low to moderate. However, it is worth noting that this argument on service departments and related sectors is closely influenced by the nature and extent of political will experienced within the organisations. Further, relevant structures and systems (reviewed in Figure 18) provide the mechanism for effective collaboration, deliberations and information dissemination amongst all stakeholders. In Figure 18, the creation and existence of structures and systems facilitating the disaster risk assessment process was appraised as high. This then signals a conflicting perspective where related departments and sectors are aloof and not as actively engaged in disaster risk assessment as they should be (refer to further arguments in current challenges confronting disaster risk assessment practice). Also, this poses serious contentions in respect of the effectiveness (alluding to the composition, terms of reference and functions) of these structures and systems.

Lastly, there is a general lack of appreciation by management for the true purpose, value, intention and outcomes of the disaster risk assessment process. This is shared by all municipalities with the majority of the scores featuring in the very low and low categories and a few ranked as moderate. The implications hereof are the negative effects on operationalising of the outcomes from the process. In general, this is derailed by the other more important service provision issues or poorly supported as a result of the lack of sufficient strategic positioning (see Figure 18) of disaster risk assessment and disaster risk management activities within the organisations' strategic goals.

The next step is to scrutinise the perceptions around the disaster risk assessment function.

B6. Current practice suggest that DRA is a Specialised Function

	1 Absolutely True	2 Largely True	3 Moderately True	4 Sometimes True	5 Never True
6.1 DRA is a scientific process	EK; B		eT	S	
6.2 DRA needs to be undertaken by experts with specialised knowledge & skills	EK	B	eT; S		
6.3 DRA requires professional education, training & development	EK	B	eT	S	
6.4 DRA can only be undertaken by individuals with relevant qualifications			eT; B	EK	S
6.5 DRA is a costly process	EK		eT	B	S
6.6 DRA is time-consuming	EK	B; S	eT		

The intention of the above questions is to determine the current conception associated with the disaster risk assessment process since it directs the approach to be adopted. Alexander (1991); Cardona (2001); Ahrens and Rudolph (2006); and South Africa (2005) substantiate that the scientific and technical components of the disaster risk assessment process require specialist input. In essence, this technical approach prevails among natural and physical scientists (Smith, 1985; Alexander, 1991).

In correlation with this perspective, the municipalities strongly support the notion that disaster risk assessment is a scientific process, requiring expert, specialised and professional skills and knowledge to enable the effective application thereof. In effect, 10 out of the 12 scores clearly demonstrate a common discernment on this issue. Therefore, there is great reliance on outsourcing this function to identified service providers (consultants) as emphasised in Figure 18. The cost

implications are not really a major concern since the benefits of having the disaster risk assessment process completed and the disaster plan compiled outweighs any financial strain. In addition, this process is regarded as a special project (comments from municipalities) as such dedicated funding is made available within a stipulated time line. Here again the time saved by awarding the project to service providers resulting in cost savings on the part of the municipalities to comply with legislative requirements despite the numerous resource constraints. After all, the process has to be methodological which implies added demands on staff workloads, limited resources and dedicated time periods to conduct the disaster risk assessment. In effect, the municipalities find it economical to engage the services of consultants to undertake the disaster risk assessment process.

From the sociological perspective (Quarantelli, 1978; Drabek, 1986; Dynes, *et al.* 1987) as expounded in Chapter Two, the role of disaster management functionaries and other relevant stakeholders becomes necessary. Therefore, municipalities rated the need for individuals with relevant qualification to carry out the disaster risk assessment process as moderately true and below (that is, sometimes true and never true). This response has a direct link to the staff profile of the institutions (see Figure 17). The heads of the disaster management units of the above municipalities clearly expressed (during the interviews) that disaster management functionaries with appropriate disaster risk management practical experience and/or qualifications are sufficiently equipped to be involved in the disaster risk assessment process. As a way forward, this has to be factored into the project plan of the consultants allowing for a co-ordinated approach to disaster risk assessment.

In summary, the above inspection proves that the level and degree of comprehension of the disaster risk assessment process is the determining factor in terms of the prominence, commitment and approach to the process and its results. The following section on the qualitative research findings will interrogate

the various activities, actions and processes to provide further substance to the above deductions and critically examine the practice of disaster risk assessment within the selected focus groups representing local government in South Africa.

5.3.2 Qualitative Research Findings

The findings articulated herein have been derived through the application of data analysis and interpretive process justified in Figure 13. Hence the development of research themes to guide and structure the arguments presented within the respective context.

5.3.2.1 Research Themes

The deliberations that follow will be confined to the various themes and categories, as outlined in Table 6. These themes complement the global strategies on risk reduction reviewed in Chapter Two, and the five guiding criteria for effective disaster risk assessment justified in Chapter Four.

5.3.2.1.1 Political Commitment

As purported by Bendimerad (2002); Ahrens and Rudolph (2006) (in Chapter Two of the thesis), government uses legal instruments and institutional arrangements to impose a set of societal rules that order and protect society. To examine this argument, three specific areas will be reviewed, that is, the legal and regulatory framework, political support and institutional framework.

5.3.2.1.1.1 Legal and regulatory framework

The Disaster Management Act and the National Disaster Management Framework provide the necessary guidelines and clearly spell out the requirements for effective disaster risk assessment and disaster risk reduction. Further, the United Nation's (UN, 2005:1) International Strategy for Disaster

Reduction (discussed in Chapter Two of the thesis) challenged Governments and related international organisations to consider disaster risk assessment as an integral component of development plans and poverty eradication programmes. All four focus groups (refer to Annexure B, Interview Schedule) acknowledged a strong compliance with the legislative framework. In addition, all groups expressed a good knowledge and awareness of the legislative and policy requirements around disaster risk assessment. In particular, eThekweni noted that although there is a firm grasp of the legal imperatives, unfortunately slow progress is being made in relation to the implementation of a comprehensive approach to disaster risk management. Disaster risk assessment is therefore currently undertaken in a piece-meal or ad-hoc fashion when and where the need arises. This is despite the fact that disaster risk assessment features as a strategic goal of the organisation identified as a specific item in the local Disaster Management Framework.

Ekurhuleni revealed that disaster risk assessment is carried out within a two year cycle. The outcomes of which informs their contingency plans and the Corporate Disaster Management Plan giving direction to development initiatives within the municipality. However, recognising disaster risk assessment as a strategic goal of the organisation is flagged as work in progress together with the inclusion of the disaster plans into the Integrated Development Plans of the municipality.

Bojanala highlighted that disaster risk assessment is implemented in accordance with the specifications of the National Disaster Management Framework. The primary purposes of the disaster risk assessment process are to mitigate, prevent and reduce risks. In support, having disaster risk assessment accepted as a strategic goal of the organisation, facilitates the acquisition and provisioning of resources, administrative and technical assistance for continuous and on-going disaster risk assessment. Therefore, good progress was reported in relation to community based disaster risk assessment.

Stellenbosch exhibited positive legislative practice by completing the disaster management plan, disaster management policy and the Integrated Development Plan for the municipality. In addition, there is constant reference and application to related legislation, for example Water Pollution and Environmental Conservation in the practice of on-going, pro-active disaster risk assessment and disaster risk reduction. The next priority action in its incipient phase, is for disaster risk assessment to be proclaimed as a strategic goal of the organisation facilitating a co-ordinated approach to disaster risk reduction.

In view of the promising legislative mandate, it will be interesting to inspect the nature and degree of political support received within the various municipalities.

5.3.2.1.1.2 *Political support*

The Hyogo Framework for Action (clarified in Chapter Two of the thesis) emphasises that political support and commitment by public and private policy-makers and local community leaders, based on an understanding of risks and disaster reduction concepts is fundamental to achieving change.

In this spirit, the South African legislative documents set the tone to be ascribed. Thereafter, it becomes a matter for effective execution and practice. However, to the contrary, the focus groups in this study noted the concern of limited political support. Although all municipalities conceded to disaster risk assessment being important and necessary, this notion did not translate into action. For example, in eThekweni, as much as disaster risk assessment is identified as a priority, the implementation has been delayed (for reasons elaborated on in figure 18), and is still in the planning phase. In Ekurhuleni and Stellenbosch where disaster risk assessment is undertaken on an on-going basis and is not acknowledged as a priority. The focus is on infrastructure development and service delivery, for instance, water, sanitation and electrification projects.

Once again, Bojanala discloses disaster risk assessment as a priority with the approved where-withal to action the process (refer to Figure 18).

The above analysis may be traced back and linked to the debate on management support within the municipalities (refer to the quintile classification of extracts from Annexure B, B5). Further, it is also advisable to consider the institutional arrangements and their role in promoting effective disaster risk assessment.

5.3.2.1.1.3 *Institutional framework*

The Framework for Disaster Risk Reduction (ISDR, 2005) propagates institutional arrangements as a critical element for guiding and monitoring disaster risk reduction.

As such, all municipalities, except eThekweni ratified the establishment and functioning of relevant structures and systems. The formal process in eThekweni (at the municipal level) is unfolding very slowly, but it should be noted that eThekweni Disaster Management is actively involved at the Provincial level within the Provincial Disaster Management Advisory Forum. On the other hand, Ekurhuleni declared the support of political structures with identified ward councillors within the respective communities, community development workers, and the Municipal Advisory Forum. The ward councillors provide the necessary political support within the municipal council and also serve as a crucial link between the community and the municipality. These councillors work jointly with the community development workers who are mandated to advise local political leaders on the local needs and challenges. Working closely within the community, these community development workers assist in co-ordinating and leading meetings, workshops and field surveys within the respective communities thereby feeding into the community based disaster risk assessment process of the municipality. The disaster management officials together with the above role-

players assist the consultants in the information gathering process within the respective communities. The Municipal Advisory Forum consists of representatives from the different municipal departments and sectors who meet twice a year. The focus at present is to consider incidents and or disasters and to report on the management thereof. Special attention is given to problems, challenges and recommendations for consideration and implementation.

In a similar vein, Bojanala justifies the efficient functioning of both formal and informal structures, that is, the Municipal Advisory Forum, the Interdepartmental Committee on Disaster Management, and the community-based forums. The formal structures meet once a quarter, whereas the community structures gather as the need arises (more frequently and informally). Ward councilors and volunteers from the respective communities are the vital links between the community and the municipality. They are the municipality's first point of contact in setting up meetings, risk assessment workshops and field surveys in the community. All these role-players are involved in the information gathering, risk and vulnerability profiling and prioritising, and possible risk reduction measures for consideration. In practice, they are effectively utilised in the disaster risk assessment process. Once the data is properly captured and reviewed, the necessary recommendations are reported to the Municipal Advisory Forum and the Interdepartmental Committee on Disaster Management for support and onward submission to the municipal council for approval.

The Interdepartmental Committee on Disaster Management complements the functioning of the Advisory Forum by co-ordinating internal planning and allocation of departmental responsibilities. Hence, the principles of co-operative governance are promoted.

Stellenbosch also demonstrates the existence of formal and informal structures. In the first instance, Stellenbosch Municipality (Disaster Management) has formal arrangements through a Memorandum of Agreement signed with the University

of Cape Town and the Cape Peninsula University of Technology (Higher Education Institutions). These institutions are responsible for undertaking the disaster risk assessment of the municipality through incorporated skills development and transfer programmes for the disaster management officials.

Ward councillors and volunteers provide a valuable link between the community and the municipality. They arrange community gatherings, field studies and all related disaster risk assessment activities within the community. These stakeholders form the core of the community based disaster risk assessment process by undertaking and co-ordinating transect walks and interviews with the community and the service providers. This activity enables them to collect current data whilst assessing the real challenges confronting the community. Thus, sketching a true reflection of the current status within the community which serves to ratify all the available data gathered in the process, positively informing the data analysis phase. The outputs that are reported to the Municipal Advisory Forum are practical and well substantiated through a collective process of community based disaster risk assessment. Here again, the Advisory Forum re-examines the report and provides further recommendations and advice on critical issues of concern before endorsing the submission for approval to the Municipal Council.

The above exposition proves that various institutional arrangements are necessary in facilitating effective disaster risk assessment. Now that these structures have been created and are operational, they need to embrace the various functions stipulated in the National Disaster Management Framework (South Africa, 2005:34-37) attesting to the integrated and co-ordinated perspective of disaster risk reduction. Hence, the need for a multi-disciplinary and multi-sectoral team, managing the disaster risks assessment process.

5.3.2.1.2 *Multi-disciplinary and multi-sectoral approach*

Enunciated within the Hyogo Framework for Action (in Chapter Two of the thesis) there is a need for disaster and risk reduction to be an essential part of the broader concerns of sustainable development hence the need to make sure that risk assessments and vulnerability reduction measures are taken into account in different fields such as environment management and poverty reduction. This initiative firmly proposes the multi-disciplinary and multi-sectoral approach to disaster risk reduction. In support of this proposal, the various role-players and their relevance to the disaster risk assessment process, together with the need for training and skills development of the diverse team will be illustrated in the sections that follow.

5.3.2.1.2.1 *Role-players in disaster risk assessment*

In light of the analysis on the institutional arrangements (refer to 5.3.2.1.1.3) it is evident that the different municipal departments and divisions, representatives from various sectors of the state (with functions related to disaster risk management), consultants or service providers, and the business sector (for example ESKOM, SASOL, TELKOM) are involved at some stage in the disaster risk assessment process. The next step therefore, is to reflect on the value they add to the entire process.

5.3.2.1.2.2 *Relevance of a diverse approach*

With the aim of promoting the principles of co-operative governance and integrated and co-ordinated disaster risk management planning (in terms of the South African legal requirements), the need for a diverse team cannot be stressed enough.

All four municipalities were unanimous in respect of the benefits of maintaining a multi-disciplinary and multi-sectoral team. The expression of ideas and the sharing of expertise in the relevant fields are perceived as enriching the debate towards better planning; giving rise to structured but shared multi-disciplinary and multi-sectoral responsibilities in a well guided and co-ordinated manner. Such efficient administration eases the process of a diverse team functioning in unison towards the common goal of disaster risk reduction. To further enhance the strengths of the team, training and skills development is inevitable.

5.3.2.1.2.3 *Training and skills development*

Appropriate training and skills development should be recognised as the mechanism to foster a uniform comprehension of disaster risk management. This unfolds into providing a discerning perspective of the different expectations, roles and responsibilities of the respective role-players. Further, such interventions aid in strengthening the collaboration of the various disciplines and sectors into a partnership approach. This enforces the concept of commitment to the success of the process and its outcomes through the distinguished roles and responsibilities allocated within the diverse team.

In practice, eThekweni endorses the crucial purpose of training and development, however, financial constraints hinder such efforts. Currently, no formal training programmes are instituted. It is envisaged that this situation will be remedied once the comprehensive Disaster Risk Management Plan is formally approved. In stark contrast, all the other municipalities display an active array of training and skills development measures. Ekurhuleni had formal Disaster Risk Management training linked to the National Qualifications Framework (level 3) being offered to all their disaster management officials. In addition, continuous training and development programmes are planned and implemented.

Bojanala also engages in formal Risk Assessment training of the disaster management practitioners. Staff are afforded the opportunity to attend formal training at the University of Cape Town. Similarly, Stellenbosch, through its partnership agreement with University of Cape Town and Cape Peninsula University of Technology, co-ordinate and offer a variety of skills development training to its staff.

The indisputable benefit of continuous training and development interventions is that staff are well informed and kept abreast of new developments within the discipline. More importantly, the issue of staff competencies (refer to Figures 17 and 18) are addressed. However, the concern is that these programmes should be offered to the diverse team in a co-ordinated manner and not be confined to the disaster management functionaries. After all, information and knowledge equip the team to function efficiently, producing soundly, co-ordinated and planned disaster risk reduction strategies. Another key role-player in this process is the community, as will be established by the deliberations presented below.

5.3.2.1.3 Community participation and resilience

Two of the important cornerstones of disaster risk reduction (justified in Chapter Two of the thesis), as purported by Bendimerad (2002: 59-69), Ahrens (2002), Kelman (2003) Eade and Williams (1995) and Maskrey (1990) are community participation and resilience. These issues will be interrogated within the context of the need for and role of community participation adding to the significance of training and awareness (linked to resilience).

5.3.2.1.3.1 Need for community participation

The legislative imperatives (as expounded in 5.2) warrant the need for community participation as improving stakeholder participation in disaster risk management. More specifically, the call for disaster risk assessment to be

“ground-truthed” and community-based. This ensures that risk reduction strategies that are developed, are socially acceptable and more responsive to the actual needs of the community (Maskrey, 1990; Gurr & Harff, 2003). Hence, community involvement is non-negotiable but the quality assigned to their role in the disaster risk assessment process is critical to the end result.

5.3.2.1.3.2 *Role of the community*

As substantiated by Arnold (2003), Burkle (2003), and Gurr and Harff (2003) (in Chapter Two of the thesis) community engagement should be a participatory process that enables communities to make informed decisions about environmental and resource allocation issues. Further corroborated by Myers (1997) and Godschalk, *et al.* (1998) that to be successful, communities should be construed as “being part of” rather than “taking part in” an activity.

In this respect, all focus groups confirmed their support for effective community participation. This is intimated through community consultative meetings or forums that serve as catalysts to encourage communities to become part of the disaster risk management process. Community briefing sessions are planned and the ward councillors and volunteers (as strategic links) are advised to inform the community accordingly. These sessions are intended for information sharing and dissemination and to provide clarity on issues that the community may raise. Stemming from this, the disaster risk assessment process commences with a series of workshops targeting the community and all other relevant stakeholders. These workshops are interactive in nature, providing a platform for the community to share their experiences and draw on their indigenous knowledge. The facilitators of these sessions guide the discussions with activities and probing questions directed towards the outcomes of the disaster risk assessment process. All the information gathered through these deliberations, interviews, historical records and field surveys are contextualised and analysed by the specialists and/or consultants before being shared with the community.

These workshops indicate the pivotal role of the community in disaster risk assessment asserting the bottom-up approach. Ryscavage (2003) and Twigg (2004b) take this argument a step further by claiming that such community involvement builds on the local capacity and creates local ownership of initiatives, promoting the principles of sustainability and cost-effectiveness in disaster risk reduction. Therefore, to further develop local capacity and cultivate a sense of resilience, training and awareness are compulsory.

5.3.2.1.3.3 *Significance of training and awareness*

The United Nation's (UN, 2005:1) International Strategy for Disaster Reduction (considered in Chapter Two), recognised the need to continue to develop, build and further strengthen community capacity to cope with disaster risks. In keeping with this strategy, Kelman (2003) stresses that awareness raising makes individuals, communities and institutions aware of vulnerabilities and the negative impacts of disasters on their livelihoods. Hence, knowledge is an instrument of empowerment, denoting that a community that is aware of its vulnerability to disasters is more likely to take action (Ahrens & Rudolph, 2006; Smith, 2004; and Bendimerad, 2002). The above reasons sufficiently prove the relevance of community training and awareness raising.

In principle, training and awareness form an integral component of the disaster risk assessment process. Thus, all four municipalities drew reference to the training of volunteers on: key disaster risk management issues; workshops and briefing sessions on the disaster risk assessment process and the implications thereof; and the distribution of print material in the form of posters, brochures, pamphlets, and the like. The mere fact that these measures have been adopted, is a good start towards encouraging community participation, however, it is evident that this process needs to be driven more vigorously.

The underlying principle to effective community participation and risk reduction as propagated by Twigg (2004b), Pelling (2003a), and Maskrey (1990) is that the process requires an honest commitment from government, community leaders and stakeholders alike where the interests of the community at risk determine the final goal. Therefore, it is imperative that an exposition of the current disaster risk assessment process be revealed to ascertain the trends and their shortcomings so that corrective measures may be recommended in improving the results of the disaster risk assessment process.

5.3.2.1.4 *Disaster risk assessment process*

An investigation and review of the current disaster risk assessment process was undertaken within the four identified focus groups (as illustrated in 5.2) that is, eThekweni Metropolitan Municipality, Ekurhuleni Metropolitan Municipality, Bojanala District Municipality and Stellenbosch Local Municipality. Thus, the information collected (as contained in Annexure B) and processed, is portrayed with graph representations (Flick, 2009; Fox & Bayat, 2007; Welman, *et al.* 2005; Henning, *et al.* 2004), in the form of bar charts (depicted in Figures 14, 15 and 16), and histograms (reflected in Figures 17 and 18) so as to accentuate the results. These connected and disconnected rectangles display the frequency of values assigned by the respective municipality (focus group) in terms of the category under review. As such, the feedback received for the relevant areas under discussion will form the basis of the arguments, justifying the outcomes within the given environment.

At the outset an explicit overview of the institutions is traced before going on to examine the status of disaster risk assessment practice and the associated challenges and hindrances being experienced by these groups. As a way forward, possible solutions are outlined for due consideration and implementation towards promoting effective disaster risk assessment practice and the development of the proposed disaster risk assessment model.

5.3.2.1.4.1 *Organisational capacity to undertake disaster risk assessment*

The purpose of this section is to provide the context for the analysis and interpretation of data by sketching out the key variables of these organisations (refer to Annexure A, section A, questions 1, 4, 5, 7, 9, 10). As such, the primary issues of review concentrated on, firstly, the classification of the municipality, its physical area of jurisdiction (in km²), and the population size of its area (as captured in Figures 14, 15 and 16). Secondly, the staff capacity was analysed by examining the staff allocation and their respective and related disaster risk management qualifications and practical work experience (refer to Figure 17). The underlying rationale was to review the correlation between the municipal category and its staff competence in performing the required disaster risk management activities. In this respect, the graphs in Figures 14, 15, 16 and 17 present an illustrative context for the effective interpretation of the data.

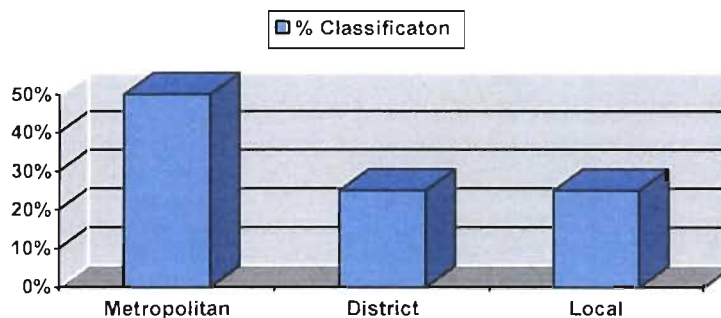


Figure: 14 Percentage (%) classification of Municipality.

This graph reflects the percentage of the different categories of the municipalities used in this study. A cross section of all three categories was selected with fifty percent making up the metropolitan municipalities (eThekweni and Ehurhuleni) and the remaining fifty percent, split equally between the district (Bojanala) and the local (Stellenbosch) municipalities. To add value to this comparative study, municipalities were chosen from selected provinces based on the researcher's

experience and previous interactions with these organisations. In particular, the intention was to cover a wide geographical radius with varying dynamics for example, demographic profile, risk and vulnerability factors and resource influences.

The next two layers of the comparison relate to the physical area (in km²) and population size of the municipality as illustrated below.

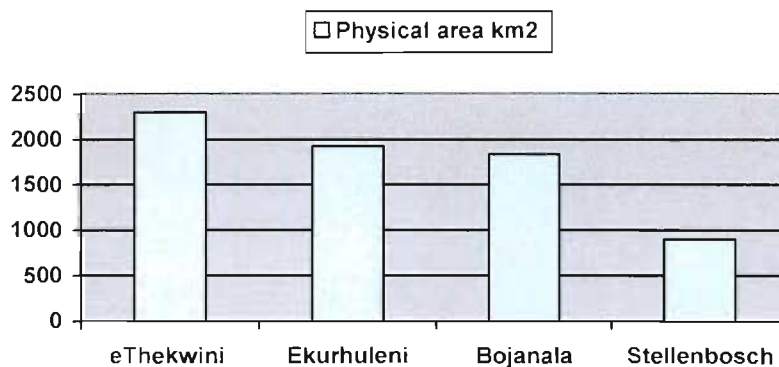


Figure: 15 Physical Area of Municipality (in km²)

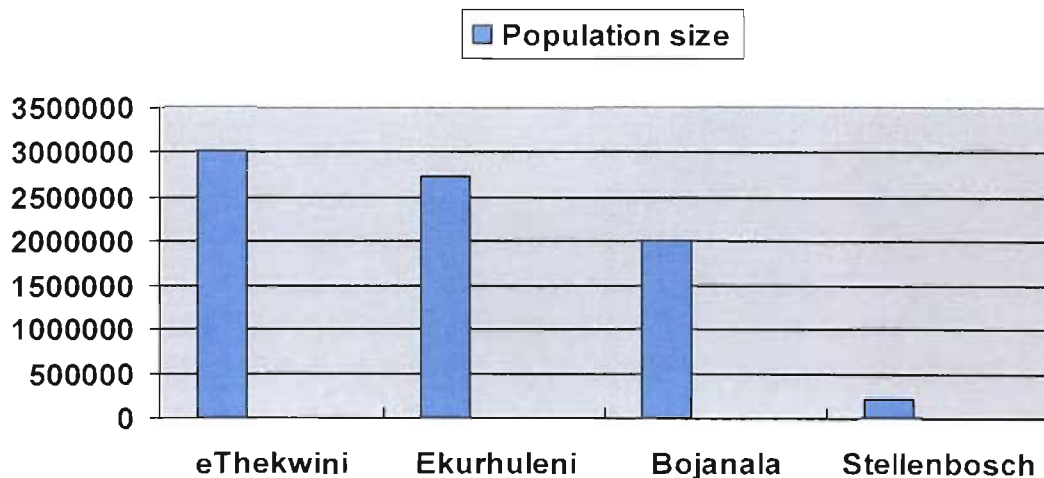


Figure: 16 Population Size of Municipality

The data summarised in Figures 15 and 16 correlate with the classification of the municipalities. The physical area of jurisdiction and population size increase proportionately from local to district, to metropolitan. Suggesting that the disaster risk management activities and demands within the metropolitan municipalities will be greater and more complex in comparison to that of the local municipalities; justifying the need for increased resource allocation in respect of the municipal classification. It is therefore expected that the human resource allocation should be commensurate with the scope and extent of the disaster risk management functions and activities to be pursued by the respective municipality. Figure 17 highlights the staff provisions and competencies of the focus groups.

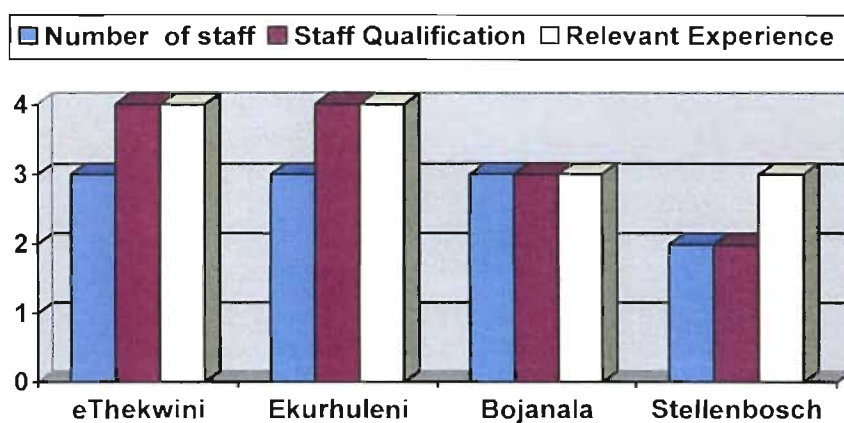


Figure: 17 Staff Profile of Focus Groups

To quantify the responses, it is captured within a scale of 1 to 5. The numeric values denote the following:

- 1: zero to very low
- 2: low
- 3: moderate
- 4: high
- 5: very high.

The above graph outlines the staffing reality within the four focus groups. When analysed in relation to the questionnaire feedback provided in the sections delimited above, eThekweni and Ekurhuleni scored their total staff complement as moderate (five and eleven staff, respectively) and the staff qualification and experience as high. This is the case because four out of the five staff members (in eThekweni) possess qualifications in Disaster Management and the relevant work experience of all staff range between fourteen to twenty nine years. However, in Ekurhuleni, eight of the eleven staff members have appropriate Disaster Management qualifications with three at a Masters level. In addition, staff experience in the field ranges from four to fifteen years with the exception of one new recruit (approximately 10 months) in the division. In comparison, Bojanala is rated as moderate in all three categories under review. Although there are twelve formally approved and budgeted post establishments within the division, there are nine permanent staff and three vacant positions created through staff resignations. This comprises of three senior staff with relevant disaster qualification and practical work experience between five to ten years. The remaining six junior staff members hold a basic disaster certificate and have minimum experience (between one to two years) in this field.

In the extreme, Stellenbosch features very poorly (with scores reflecting low, low and moderate). In essence, there is only one staff member in the department with a generic Administration qualification. The five years practical disaster management experience may be noted as a positive development within the division.

The above exposition shows that there is no real correlation between the category of municipality, its locus and focus of disaster risk management activities and its staff provisioning. This has been stressed as one of the core obstacles in the path of effective disaster risk assessment and risk reduction, confronting all four focus groups. The resultant effect of the limited human resource supply is that disaster risk reduction practice is automatically

compromised or deferred since the focus is on reacting to current priorities as a response mode. In general, most of the current staff is equipped with appropriate educational qualifications and practical experience to undertake disaster risk assessment. However, the nature and scope of the functions performed by the institutions are vast (refer to Figures 15 and 16) and demand-driven thereby compelling the deployment of the available staff in day to day operations with limited attention being directed to proactive interventions. This then draws the spotlight onto the current status of disaster risk assessment within these institutions.

5.3.2.1.4.2 *Current disaster risk assessment practice*

In investigating the actual status of disaster risk assessment practice within these organisations, specific categories of questions were developed (as depicted in Figure 18, below). The questions were directed towards ascertaining the institutional capacity and procedure (Annexure B, section C, questions 1, 2, and 3, and interview schedule with questions 1, 2, 4 and 6) in undertaking disaster risk assessment. Figure 18 captures the responses to the various categories within a simple tool to enable a clear analysis of the data and ensure that appropriate deductions are forthcoming.

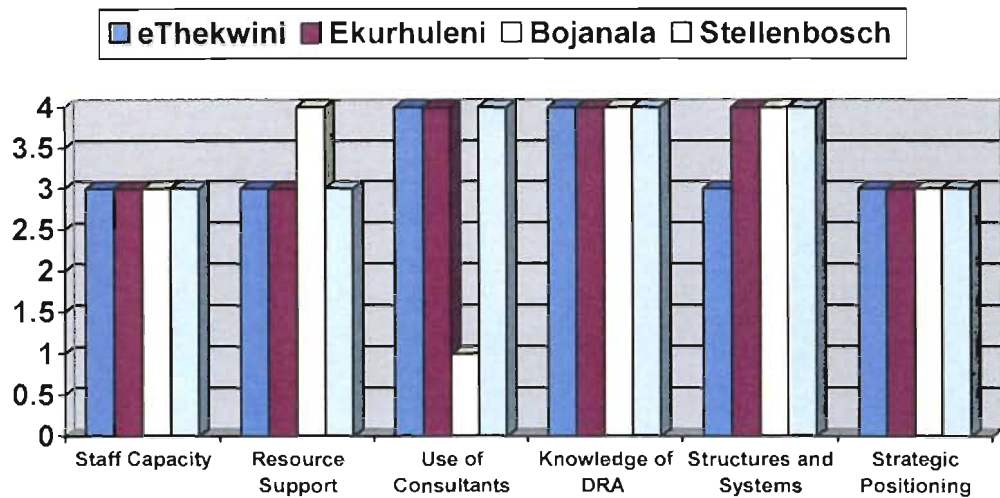


Figure: 18 Summary of the current status of disaster risk assessment within the four focus groups.

As in Figure 17 above, the same numeric principle is applicable in this illustration. For purposes of effective comparison and interpretation numerical values of 1 to 5 are attached to the feedback received reflecting the quantifiable differences and/or similarities between municipalities. The values represent the following:

- 1: zero to very low
- 2: low
- 3: moderate
- 4: high
- 5: very high.

The above picture captures the critical elements of disaster risk assessment (as argued in Chapters Three and Four). Staff capacity and resource support feature strongly as a common area of concern across the institutions. All four institutions show limited staff capacity. The number of staff available does not match up to the functions and responsibilities of the Disaster Management Division. In most instances, staff possess relevant disaster qualifications and experience but since

disaster risk assessment requires specific knowledge and application, the necessary training and development process is slow. This links to poor resource support wherein three of the four institutions encounter major resource limitations. This includes basic and essential resources like computers and related technological equipment and tools, appropriate vehicles, and the necessary financial support for disaster risk management initiatives.

In light of the afore-mentioned constraints, the same three municipalities (that is eThekweni, Ekurhuleni and Stellenbosch) rely extensively on the services of consultants to prepare and undertake the disaster risk assessment for their institutions. In contrast, Bojanala claims that acquiring the necessary resources enables them to plan and action developmental, disaster risk assessment as a team. Therefore, the services of consultants are confined to the technical and scientific aspects of the disaster risk assessment process.

The fourth and fifth categories that are knowledge of the legislative and policy requirements and relevant structures and systems were noted as good progress by almost all the institutions. Arising out of the focus group discussions, this positive response was attributed to the compliance requirements enforced through the National and Provincial Disaster Management Advisory Forums. Wherein disaster risk assessment, disaster plans and related disaster risk management structures and systems form part of the standing items on the agenda of Advisory Forum meetings compelling feed back on these issues. However, in the case of eThekweni not much progress was reported in terms of establishing proper structures and systems to facilitate disaster risk assessment. This is due to the fact that eThekweni Disaster Management has not yet commenced with undertaking disaster risk assessment which is still in the initial planning phases of the municipality. Once again referring to the poor staff complement as the root cause of the given situation.

The strategic positioning of disaster risk assessment is low in all the municipalities. This is associated with the poor and/or lack of management support and commitment towards disaster risk management activities (as noted by the respondents). In essence, the above interpretation reveals that more effort has to be made by senior management towards improving institutional development and capacity, and to promote effective disaster risk assessment practice.

Having critically examined the current status of disaster risk assessment within the identified municipalities, it is necessary to explore some of the key challenges experienced by these institutions.

5.3.2.1.4.3 *Challenges encountered in undertaking disaster risk assessment*

The various challenges as clarified in Annexure B (of the interview schedule, question 7) bears reference to the limited resources and support, unnecessary political interference, planning and functional concerns impacting on the current disaster risk assessment practice within local government.

The overarching problem stems from the lack of political will and commitment resulting in senior management adopting a “relaxed” approach towards disaster risk management requirements and interventions. Furthermore, there seems to be major misconceptions (by political-office-bearers and senior management) of core functions and activities of the disaster management divisions. The common perception alluded to by the various focus groups is that disaster risk management was recognised as responding to disaster situations (if and when they occurred) with little acknowledgement shown to the pro-active, disaster risk reduction concerns. Thus, assigning low priority to disaster related requests and demands in particular inadequate levels of urgency are attached to the recruitment and appointment of appropriate personnel and the provision of the necessary resource support to perform their functions effectively and efficiently.

In addition, disaster risk assessment is often carried out in compliance with the legislative requirements. As such, the services of consultants are solicited and tasked with the entire process from planning to that of implementation. The ultimate objective of this process is to have disaster risk assessment completed within the stipulated period of time and have a comprehensive report ready for submission to the Provincial Disaster Management Centre and the appropriate Disaster Management Advisory Board. Due to the time constraints, the consultants often follow a rushed process not allowing for regular consultation, participation and feedback.

On the operational level, community based disaster risk assessment is still largely being carried out in a silo fashion by the various sectors of government; resulting in confusion among the community as differing approaches and methodologies are employed. Such processes are costly and time-consuming, adding to the negativity around the duplication of these functions and fruitless expenditure of state funds. With these challenges the quest is to consider practical suggestions as counter measures.

5.3.2.1.4.4 Possible solutions for implementation

These recommendations are in light of the Hyogo Framework for Action (Kobe Report, 2005), the Framework for Disaster Risk Reduction (ISDR, 2005), the guiding criteria for effective disaster risk assessment developed in Chapter Four of the thesis, and the responses provided in Annexure B (the interview schedule, question 8).

First and foremost, the issue of political commitment has to be secured. This may be pursued through properly planned advocacy sessions and presentations to political-office-bearers and senior managers. The message has to be clearly spelt out, showing the relevance and importance of disaster risk reduction within a cost-benefit framework. Also crucial is to allude to the national, regional and

international strategies on disaster risk reduction and the pre-requisite plan of action as a measuring instrument.

Once the necessary interest has been aroused, workshops should be undertaken. The outcomes of these workshops should be awareness raising, information dissemination, clarity on roles and responsibilities of political-office-bearers and senior management in disaster risk management. Such strategies, if positively supported will be instrumental in yielding successful results. An important break-through will be to have disaster risk management and disaster risk reduction feature prominently on the political agenda. This will provide the necessary impetus to the strategic value and positioning of the function and its requirements.

Secondly, community participation should form the crux of the disaster risk assessment process, fostering the partnership concept. Stakeholder engagement should not be restricted to certain steps in the process or be an 'add-on' if and when the time permits (which is currently the case). The entire process should be transparent and participatory, entrenching a sense of ownership in the community. The role of consultants as facilitators has to therefore be formally mandated, to ensure the reliability and validity of the outcomes. Further, clear and specific terms of reference, processes, systems and tools to be implemented, have to be agreed upon.

Thirdly, training and development programmes should be carried out on an on-going basis. This should include both public awareness campaigns and skills programmes for the disaster management functionaries and practitioners. Such interventions, as simple as they are, add great value to disaster risk management. For example, education, awareness and information dissemination to the community helps in developing and strengthening capacity within the community. This in turn influences community resilience and promotes a conscious effort towards disaster risk reduction in the community.

On the other hand, training of staff should be an integral part of their continuous professional development. As such, funds for the purposes of skills training and development may be accessed through the skills development levies fund (The Skills Development Act & the Skills Development Levies Act) without imposing on the department's limited budget; improving the skills, knowledge and competencies of the staff and accelerating their work performance.

Lastly, a multi-disciplinary, multi-sectoral and integrated approach should be adopted in the practice of disaster risk assessment. This implies that at a strategic level, the planning of disaster risk assessment should be jointly co-ordinated by all the relevant role-players. Such team effort will help to facilitate a common understanding of disaster risk assessment and disaster risk reduction; thereby encouraging a co-ordinated and shared approach to the process with clearly delimited roles and responsibilities to avoid unnecessary duplication and wastage of resources.

The above recommendations are in response to the key challenges identified by the focus groups, however, their application should not be confined to these groups only, it should become common practice within all sectors of government responsible for and involved in disaster risk assessment.

5.4 CONCLUSION

The South African Disaster Management Act and Framework in conjunction with the international agenda on disaster risk reduction and the theoretical underpinnings from the previous chapters formed the basis for the evaluation of the current disaster risk assessment practice within local government as represented by the selected focus groups.

Evidently, disaster risk assessment was construed as significant in advancing effective disaster risk reduction but management support proved to be limited. This was reflected in the major resource constraints experienced by the various

focus groups resulting in staff shortages, limited equipment and machinery, and an unrealistic budget to administer the varied and multi-dimensional nature of the disaster risk management activities. In addition, the lack of a uniformed, co-ordinated and multi-disciplinary and multi-sectoral approach to disaster risk planning exacerbated the existing resource challenges which yielded duplication and confusion in pursuing disaster risk reduction measures. However, gaining political commitment through appropriate stakeholder participation signifies a positive starting point in wielding constructive management support, and encouraging the pro-active disaster risk management agenda.

Increasing the capacity of communities to minimise risk and the impact of disasters that may occur is crucial and may be more practical and attainable within the context of community based disaster risk assessment. In response to the requirements of the National Disaster Management Framework (in Enabler 2) some of the regular trends in South Africa are community awareness campaigns, workshop and training sessions for the community, political-office-bearers and disaster management functionaries, and the distribution of printed material like pamphlets and posters. In many instances, these interventions are pursued on an ad-hoc basis linked to legislative and policy compliance, resource availability and political will. Despite these special circumstances, the astounding result is always a constant support and demand for additional and ongoing awareness and training programmes. The challenge therefore is to integrate awareness and training into the disaster risk assessment process as a critical link towards disaster risk reduction.

These recommendations are pursued further in the next chapter strategically informing the development of the appropriate disaster risk assessment model for local government. Thus, enunciating the lessons learnt and ratifying the deductions formulated by guiding closing arguments towards effective disaster risk assessment and disaster risk reduction in the final chapter (Chapter Seven of the thesis).

CHAPTER 6

THE PROPOSED DISASTER RISK ASSESSMENT MODEL FOR LOCAL GOVERNMENT IN SOUTH AFRICA

6.1 INTRODUCTION

The focus of this chapter is on the development of an appropriate disaster risk assessment model for local government in South Africa. In addition, a thorough analysis of the legislative guidelines facilitating disaster risk assessment and disaster risk reduction practices are defined.

In achieving the afore-mentioned research objectives and the overall purpose of this chapter, the discussion is confined to two critical areas, that is: an overview of the research; and the development of the model. All two aspects justify the essence of the study thus providing an appropriate point of departure for disclosing the issues of connectivity within the research and leading to informed recommendations and conclusions in Chapter Seven of the thesis. In this respect, the research overview traces the main aspects of the study linking the theory with the research findings. Also explicit are the contextualisation of the various chapters and the operationalisation of the respective research objectives.

The final development of the model commences with illustrating the legal implications governing the disaster risk assessment process by local government in South Africa. Thereafter, the proposed model is articulated with special emphasis on its core principles that are greatly influenced through the research findings of the study. The justification of the model alludes to the approach adopted in developing the structure, examines the various constituent components and details the implementation process. This is further supported by a flow process clarifying the dynamics of the application of the model within a

simplified step-by-step illustration of the comprehensive form (refer to Figure 20) encapsulated within a systems perspective.

The concluding statements (in Chapter Seven of the thesis) correlate with the primary focus of Chapter One, reinforcing the purpose of the study whilst identifying the pertinent contributions of the research findings and possible avenues for further research.

6.2 OVERVIEW OF THE RESEARCH

The research assists in the first instance to strengthen the link between disaster risk assessment and disaster risk reduction. As critical elements of Chapter Two, the valuable principles and characteristics of the Disaster Risk Reduction Model (ISDR, 2005) and the significant objectives and cornerstones of disaster risk reduction are implicit throughout the study. The research findings acknowledge disaster risk assessment as a pro-active disaster reduction mechanism directed towards disaster risk reduction.

The fundamental components and process of disaster risk assessment were analysed in the research highlighting that disaster risk assessment should be undertaken in a systematic manner so as to ensure and enhance the quality and validity of the process and its outcomes. After all, the results of the process are instrumental in shaping the disaster risk reduction strategies and interventions for implementation (as clarified in Chapter Three of the thesis).

The national and international imperatives of disaster risk assessment and disaster risk reduction were interrogated as the basis for leading the comparative study of the three disaster risk assessment models. The comparison and evaluation of these models (expounded on in Chapter Four of the thesis) revealed the prominent characteristics, commonalities and distinction between these models. These findings further enunciated the important principles and

characteristics of the disaster risk reduction model (as depicted in Chapter Two, already) and informs the development of the proposed disaster risk assessment model in Chapter Six of the thesis.

The research outcomes accentuate the conceptualisation and provide a review of the current disaster risk assessment practice within local government in South Africa (as represented by the selected focus groups). The research methodology and data collection process (substantiated in Chapter Five of the thesis) facilitated the achievement of these research findings which inspires the development of the appropriate model and guides the recommendations for further improvement of disaster risk assessment by local government in Chapters Six and Seven, respectively.

The development of the disaster risk assessment model for local government in South Africa emanates from the crucial principles and lessons drawn throughout the study. The primary pillars on which the model is developed is that of a vulnerability-driven, community-based, bottom-up approach (as pronounced in Chapters Three, Four and Six); further asserted in the legislative requirements promoting disaster risk assessment within South Africa.

The integrated disaster risk assessment model for local government is appropriately contextualised and justified (within Chapter Six of the thesis) prompting recommendations for further improvement of disaster risk assessment by local government (in Chapter Seven of the thesis).

The above review proves that the research objectives (declared in Chapter One of the thesis) were carefully and strategically operationalised within the study thus accentuating the scope, value and outcomes of the research process; in the development of the model as examined in the sections that follow.

6.3 DEVELOPMENT OF AN APPROPRIATE MODEL FOR SOUTH AFRICA

The culmination of the theoretical underpinnings together with the research findings and interpretations of the study ultimately influences the development of the disaster risk assessment model for local government. In addition, the legislative parameters (of the Disaster Management Act and the National Disaster Management Framework) are explored to further regulate and provide insight to ensure that an appropriate model is developed.

6.3.1 Legislative Implications for Disaster Risk Assessment within South Africa

The paradigm shift from merely “managing disaster events” to proactive risk reduction initiatives as accentuated in Chapters Two and Four of the thesis, becomes evident as one draws reference to the disaster management legislative process in South Africa. Hence, a review of both the Disaster Management Act of 2002 and the National Disaster Management Framework of 2005, provides clarity about the legislative imperatives governing disaster risk assessment and the specific disaster risk assessment requirements to be adhered to by local government in South Africa.

Towards this end, the primary aim of the Green Paper on Disaster Management (1998) is to create and sustain a holistic disaster management structure and practice through risk management. The basis therefore is to establish a conceptual framework for disaster management and risk reduction practice. The intended outcome is directed towards identifying and recommending strategies to deal with disasters and risk in a more comprehensive manner.

The underlying principles of the White Paper on Disaster Management (1999) reinforced the concept of proactive disaster management through risk reduction programmes and emphasised the practice of integrated and co-ordinated

disaster management through partnerships between different stakeholders and through co-operative relations between all spheres of government. Further, the Disaster Management Act and the National Disaster Management Framework, crystallise the issues around disaster risk reduction and disaster risk assessment by providing clear guidelines with respect to disasters, hazards, vulnerability and risk likely to affect South Africa. Also, aligned to international best practice, these legislative guidelines emphasise the implementation of risk reduction strategies to prevent and or mitigate the negative consequences of disasters.

The disaster management legislation promotes proactive, disaster risk reduction through effective and appropriate prevention, preparedness and mitigation measures. Also, high on the agenda, is the integrated, co-ordinated and multi-disciplinary approach to deal with disasters and risk in a more uniformed and comprehensive manner. Simply stated, it is a paradigm shift in the disaster management approach, from a reactive and relief-centred focus to a more holistic and integrated approach, placing strong emphasis on proactive disaster risk management. It can therefore be deduced that the primary goal is that of conserving development progress and minimising the loss of life, livelihood and destruction to property and infrastructure through effective disaster risk assessment.

The logical point of departure therefore, is the acceptance that disaster risk is complex and dynamic in nature as eloquently debated in Chapters Two and Three of the thesis. Especially, in light of the fact that vulnerability factors are often the common initiators of disaster risk, than external hazard processes; it is critical that society is aware of the causes and risk, and know the steps to be taken to safeguard themselves and their environment. This brings to the spotlight the role of government in ensuring that people live in a safe and protected environment free of danger to their health or well-being (South Africa, 1996:11). It is unquestionable that the responsibility to provide a safe environment for its citizens lies with government. Therefore, it is necessary to consider the

legislative provisions that guide government in its endeavour to promote effective disaster risk assessment.

Sections 20, 33 and 47 of the Disaster Management Act and Key Performance Area 2 of the National Disaster Management Framework, outline the need for disaster risk assessment to guide national, provincial and municipal disaster risk reduction efforts including disaster risk management planning. This implies that the National, Provincial and Municipal Disaster Management Centres must provide guidance to organs of the state, the private sector, non-governmental organisations, communities and individuals to assess and prevent or reduce the risk of disasters. The underpinning notion is the adoption of a more consistent and integrated approach to the identification and management of risk that would ultimately improve the relevance, design, quality and sustainability of risk reduction strategies and programmes in South Africa.

A sound approach therefore, will be to expound on this theory of a consistent and integrated system at the local government sphere where the actual disaster risk and its consequences are experienced. As such, the outcome of this chapter is the development of an integrated disaster risk assessment model for local government in South Africa.

Having clearly demarcated the legal imperatives for disaster risk assessment in South Africa, it becomes necessary to consider the specific requirements applicable to local government to ensure its efficient functioning.

6.3.1.1 *Analysis of the disaster risk assessment requirements for local government in South Africa*

Key Performance Area 2 of the National Disaster Management Framework (South Africa, 2005:25-38) and the Provincial Disaster Management Framework of the different provinces (in particular: KwaZulu-Natal, Western Cape and

Gauteng) detail the specific requirements for implementing disaster risk assessment.

As such, it is incumbent upon all sectors of government to conduct disaster risk assessment. Each metropolitan, district and local municipality is required to undertake disaster risk assessments to identify priority disaster risk, reduce vulnerability and develop effective disaster management plans and risk reduction programmes for implementation.

Another crucial necessity is the active engagement of the vulnerable communities through a community-based disaster risk assessment approach. Municipalities must therefore include local communities in the development of their disaster risk profiles based on the needs and priorities of that community. Further, this community-driven process, rich in local and indigenous knowledge, is expected to add merit to the scientific and technical risk information of the community.

A third specification is for disaster risk assessment to be ground-truthed, as vulnerability factors are often the major catalysts of disaster risk in South Africa rather than external hazard processes. Therefore, the emphasis should be on the practical realities that exist within the community.

The fourth condition relates to the use of specialist and technical experts in undertaking the disaster risk assessment. In such instances, municipalities must provide clear terms of reference on the process, methodology and reporting structure to be adhered to by these specialists. In particular, the guiding principles should entail an inclusive process of consultation, skills transfer and capacity-building.

The fifth provision alludes to the quality assurance and validation mechanism. The completed disaster risk assessment process must be “externally validated”,

by nationally recognised specialist. This validation process should ratify the methodologies and findings before any action and development plans, strategies and programmes based on the assessments, are taken. However, in the event of complex assessments (like those undertaken by metropolitan municipalities) a “Technical Advisory Committee” must be appointed. Such a committee should include experts in specialist fields who may be engaged throughout the disaster risk assessment process.

In addition, the risk assessment undertaken should include documented evidence of appropriate consultation including the technical consultation with the relevant disaster management centre, prior to implementation of the action plans and strategies. All completed disaster risk assessments of metropolitan municipalities must be subjected to review by the national, and the appropriate provincial disaster management centre. However, in the case of district and local municipalities, all submissions must be forwarded to the relevant provincial and municipal disaster management centre respectively, for validation.

From the above, the following important deductions may be argued. Firstly, that disaster risk assessment should be a systematic and planned process which comprises a series of activities within a structured framework over a defined period of time. This formal arrangement of activities requires appropriate planning, backed by political will to consider and secure the various resources and to fulfill the necessary administrative and procedural implications to inform disaster risk reduction plans and strategies.

Secondly, the emphasis on community participation alludes to a “bottom-up” approach where community involvement is central to the success of the risk assessment process and the subsequent risk reduction interventions. As recognised role-players, the community derives a sense of ownership from the process. As such, their role and commitment towards risk reduction is enhanced

through sharing their local knowledge and experiences. This serves as an important precursor to the development of the risk profile of the community.

Furthermore, as active participants in the entire process of disaster risk assessment, the community becomes more aware, informed and educated in disaster and disaster risk reduction issues. Thus creating and promoting an ethos of self-reliance and resilience within the community.

Thirdly, the relevance of risk assessment being “ground truthed” is reflective of governments’ commitment to addressing the real disaster risk issues by highlighting realities within communities. This enables a thorough review of the root causes of disaster risk by examining the existing social, economic, political, physical and natural conditions and their impact on the community. With this clear and practical approach of zooming into the community and their environment, the disaster risk assessment process and its outcomes are made more meaningful and accurate; adding value in terms of providing realistic solutions and interventions, to real priority areas identified within the community.

Fourthly, the reference to experts in specialist fields serves to affirm that risk assessment requires an integrated and co-ordinated approach led by a multi-disciplinary and multi-sectoral team. It is therefore crucial for disaster managers and practitioners to actively involve engineers, environmentalists, economists, sociologists and meteorologists in the risk assessment process. Such inclusion and collaboration will guarantee a more holistic and comprehensive perspective to the disaster risk assessment process.

Further, the formal requirement around skills transfer and capacity-building enforces the partnership concept. The risk assessment consultants and specialists are expected to work jointly with the relevant stakeholders, sharing information and their expertise. This collaborative process is meant to strengthen commitment and support of all role-players whilst creating the platform for

capacity building and skills transfer. Through an inclusive and transparent process, facilitated by means of awareness campaigns, training and workshop sessions, field surveys (and the like), and structured reporting the capacity and skills of the broader community and the disaster management practitioners and officials are further developed and sustained.

Finally, the external validation process implies that risk assessment be undertaken with rigour, based on accurate and reliable information. As such, the principles of objectivity and adherence to quality standards must be assured. Therefore, tracking of evidence in terms of the process instituted, methodology utilised and outcomes derived are quintessential to the quality assurance and validation of the findings. After all, any disaster risk reduction plan or strategy has serious financial implications, therefore, it would be considered 'fruitless' expenditure if unverified disaster risk assessment findings were to inform the planning process.

When these legislative requirements are compared to the international guidelines for disaster risk reduction (reviewed in Chapters Three and Four of the thesis), they depict a proactive and optimistic perspective of disaster risk reduction in South Africa. Towards this end of effective disaster risk reduction, the following section will progressively build on the lessons accumulated throughout the previous chapters and propose a disaster risk assessment model for local government in South Africa.

6.3.2 Proposed Disaster Risk Assessment Model for Local Government in South Africa

The logical progression of discussion in this section commences with contextualising the lessons drawn from the previous chapters and sections; followed by a thorough interrogation of the key principles that provide structure and form for the development of the proposed model. All arguments and

recommendations considered in the formation of the model are guided by the legislative requirements (as articulated at the beginning of this chapter) and the five salient criteria for effective disaster risk assessment models (developed and applied in Chapter Four of the thesis). This will ultimately unfold the path for the development of an appropriate disaster risk assessment model for local government in South Africa.

At the outset of this study (in Chapter Two), the substantive deliberations on contextualising disasters clearly highlighted that disasters are not the inevitable consequence of natural hazards. Rather, it is the human dimension of disasters as aptly endorsed by Twigg (2001), and the result of a whole range of social, political, cultural, economic, physical and even psychological factors that shape people's lives and creates the environment in which they live.

The world over, it is acknowledged that lives are at risk everywhere, everyday (Wisner, *et al.* 2004; Smith, 2004; Twigg, 2004a; Twigg, 2004b; ISDR, 2005). Statistics and numbers alone do not reveal the true story but help in visualising the scale of the problem that disaster risk management teams have to confront. As a simple means of illustrating this point the World Disasters Report (2008b:209-211) noted the following data for the period 1998 to 2007:

Total number of people reported killed	Total number of people reported affected (in thousands)	Total amount of disaster estimated damage (in millions of US Dollars)
1, 134, 073	2, 817, 440	US \$ 966, 980

Table: 7 Summary of World Disaster Impact: 1998 to 2007 (Adapted from World Disasters Report, 2008b).

The underlying principle is to recognise that while natural hazards may not be totally prevented, it is important to understand the causes, risks and implications

for the community and their environment. By addressing the impact and consequences of the hazard/s, the focus is automatically on measures for reducing risks, reduction in loss of life and damage to infrastructure and managing the impact when they occur. This falls in line with the international call for renewed and improved measures towards disaster risk reduction (ISDR, 2007a and 2007b).

Finding a suitable theoretical framework that begins to capture such complex social and biophysical dimensions and includes temporal and spatial perspectives, is fundamental to risk and vulnerability analysis. Twigg (2002) reiterate that vulnerability is too complicated to be captured by models and frameworks. There are many dimensions to vulnerability that is: economic, social, demographic, political and psychological; and there are various factors making people vulnerable, not just a range of immediate causes but a host of root causes too; creating this complex situation.

Wisner, *et al.* (2004:49-86) through the “pressure and release” framework offered a means to describe and examine the progression of factors that connect impacts of a hazard on people through a series of social factors that contribute to vulnerability. Using this framework, they illustrated for example, that vulnerability in specific contexts is linked to processes that are sometimes remote and lie embedded in wider economic and political spheres. Further, the model shows disasters as the result of two opposing processes: on the one side, there are those processes generating vulnerability and on the other, factors of physical exposure. Those processes contributing to vulnerability can be linked to several “root causes” (that is, political and economic systems) and “dynamic pressure” (that is, lack of investment and training). While the impact of the event will depend on the pressure generated from either side, the “release” idea conceptualises disaster reduction, therefore, in order to relieve the pressure, vulnerability has to be reduced.

As Wisner, *et al.* pointed out, the model is rather simplistic since the hazard is seen as isolated “from the conditions that create vulnerability”. Moreover, it does not provide for changes in vulnerability following a disaster event. The application of the pressure and release model is useful in visualising causal factors and processes that heighten peoples’ risk. However, the model could be integrated with a comprehensive livelihood analysis that will illustrate the composition of current livelihood strategies. As examples, one might cite the “pressure and release” and “access” models advanced by Blaikie, Cannon, Davis and Wisner that allow one to trace the “progression” of vulnerability by working back from the immediate to the root causes, and provide a framework for investigating vulnerable people’s access to assets, income and other resources in society (Wisner, *et al.* 2004:87-124). The underpinning principle of this model is that poverty refers to basic unsatisfied needs and restrictions of access to resources while vulnerability implies the lack of capacity to sufficiently protect oneself to survive a disaster. Hence, the intention is to identify the limitations and facilities through which accumulation is achieved or the decrease in important capacities when faced with potential disaster (Sen, 1981; Winchester, 1992). This argument is based upon the fact that when confronted with an equivalent hazard or when facing the same potential for physical damage, the risk could be different depending upon the capacity of an individual, group or community to absorb the impact. An important aspect of vulnerability is the extent to which an individual, group or community can cope with physical extremes. Anderson and Woodrow (1989) clarified the physical (for example, food storage and emergency shelter) and non-physical (such as support from social groups, skills and knowledge) factors that allow people to cope as capacity. Though in many disasters physical assets may be destroyed, the non-physical elements that allow coping continue to be available even under the most demanding conditions (Harrell-Bond, 1986). These issues are at the core of the vulnerability driven approach. To echo the perspective of Weichselgartner and Obersteiner (2002), “know better and lose less”, the ultimate aim of disaster risk assessment is to move beyond an

understanding of the hazard to a more comprehensive conceptualisation of the disaster risk towards a vulnerability driven perspective.

After all, disaster risk assessment focused on vulnerability as elucidated by Salter (1997:64) provides a flexible and holistic framework to better inform disaster risk reduction. This is the case because the underpinning emphasis is on the vulnerability factors that so greatly influence the disaster risk within society. More significantly, this thinking is further entrenched in the South African legal guidelines (South Africa, 2005:68; 76) that spells out that disaster risk in South Africa is predominantly influenced by the social, political, cultural, economic and environmental factors and not by external threats. As such, it is imperative for disaster risk assessment to explore the vulnerability factors so as to provide insight and impetus for the development of effective disaster risk reduction interventions.

In essence, the vulnerability-driven approach resonates with the evolving nature and practice of disaster risk management (as illustrated by Salter, 1998; Jeggle, 2001 & 2007; and Comfort, 1998 in Chapter Four of the thesis) accentuating a proactive, vulnerability-specific domain (Haghebaert, 2007). This inevitably justifies the sense of direction to be adopted in proposing a practical model for local government in South Africa. The first critical step is to establish the relevant principles that should embody such a model.

6.3.2.1 *Core principles of the proposed disaster risk assessment model*

The next level of clarity required is in terms of the vital and distinguishing characteristics that should encompass the proposed model. In this regard, the international and national criteria guiding effective disaster risk assessment set the tone to be ascribed to in accomplishing the common agenda towards disaster risk reduction. In view thereof, it may be useful to tabulate these principles so as

to ascertain the correlation that exists between them and appreciate their true value within this context. In particular, the important criteria emanating from the evolution of the disaster risk management practice (traced in Chapter Four of the thesis), those promoting effective disaster risk assessment models (based on the leading international disaster reduction specifications and strategies, as substantiated on in Chapters Two and Four of the thesis) and the South African legal requirements (analysed at the beginning of this chapter) are captured in Table 8 below.

Contemporary disaster risk management practice	Guiding criteria for effective disaster risk assessment models	South African legislative stipulations
Partnerships		Community-based disaster risk assessment
Multi-disciplinary approach	Multi-disciplinary and multi-sectoral approach	Experts from specialist fields
Disaster risk reduction		Disaster risk reduction
Planning with communities		"Ground-truthing"
Communicating with communities	Community participation and resilience	Community participation and resilience
	Political commitment	Political will
	Adaptability (monitoring and evaluation)	Quality assurance and validation (monitoring and evaluation)

Table: 8 Criteria promoting effective disaster risk assessment practice

The above table provides a visual context to the critical and common elements required to facilitate successful disaster risk management. Hence, it becomes abundantly clear that these key issues, cutting across all three frameworks (as illustrated in the table above), corroborate with the research findings (refer to Annexure B); wherein the focus groups highlighted the following salient

characteristics to constitute a disaster risk assessment model for local government in South Africa:

- multi-disciplinary and multi-sectoral (integrated) approach;
- community involvement (community-based);
- transparent;
- monitoring and evaluation; and
- training and development.

As such, these features should represent the quintessence of any current disaster risk assessment tool enabling disaster risk reduction interventions and strategies. This positively influences the parameters of the proposed model for local government in South Africa.

In light of the above argument, five core underpinning principles have been chosen to encompass the proposed disaster risk assessment model being developed, as will be substantiated in the discussion that follows:

- Community participation and resilience. Bankoff, *et al.* (2004:126-127) articulate that the participation of people at risk is essential for effective disaster risk reduction. Local people have knowledge about their locality, the history of local disasters and how vulnerability to disasters has changed over time. They have the right to participate in decisions that affect their lives. People's participation is basic because safety, stability of livelihood, well-being and disaster risk reduction are their concerns and not solely that of "experts" such as government, scientists and aid agencies. Therefore, scientists and disaster managers should recognise the value of people's perceptions as complementary. The success of participatory risk assessments depends upon the ability of the different role-players to discuss, reason and plan together.

Hence, Bankoff, *et al.* (2004:32-33) view the current emphasis on the importance of this local knowledge in disaster situations as a belated recognition. The previous assumption that a community's own methods of coping with risk were too primitive, too ineffective or too inefficient to deal with the situation, only reinforced belief in the power of the technical fix, alluding to the ability of the external expertise to correctly identify the problems and introduce the appropriate solutions. However, the respect now accorded to coping practices forms part of a wider attempt to broaden local participation in the entire development process through bottom-up planning and to empower local people through encouraging community participation. Local knowledge is seen as the key to success as it is the only resource controlled by the most vulnerable, is already present at a potential disaster site, and in many cases constitutes a viable operational strategy for effective disaster risk assessment.

To further support this principle, the Asian Disaster Preparedness Center (ADPC) believes that community action for disaster risk management is a crucial element in promoting a "culture of prevention" and creating safer communities. Therefore, community based approaches have been an integral part of the various projects and programs of ADPC since mid and late 1990s (as reflected in the various cases alluded to in Chapter Four of the thesis, within the community-based risk reduction model). This participatory risk assessment is part of a capacity building process to transform communities at risk into resilient communities. Community involvement also entails making the local communities aware of the root causes of vulnerability and what they can do about it. People's participation is not just the process of consultation and providing information to outsiders during assessments. If one is serious about addressing vulnerabilities, then people's participation should be made part of an empowerment process where the joint assessment of capacities and vulnerabilities builds awareness. Also, the disaster-pressure model

developed by Blaikie *et al.* (1994, and revised in 2004) is a very effective instrument to encourage local people to analyse their conditions and to discover root causes of why they endure hardship. It raises people's awareness about the political origins of a disaster and their vulnerability. Hence, disaster vulnerability can only be reduced if conscious and organised communities and the public can pressurise governments in such a way that their interests are no longer ignored in government's decision-making and planning (Heijmans & Victoria, 2001:16) through their active engagement in these processes.

- Supporting a multi-disciplinary and multi-sectoral disaster risk assessment approach. As purported by Emmi and Horton (1995), risk assessment requires a diverse range of physical and socio-economic knowledge and expertise and is therefore multi-disciplinary in nature. To illustrate by means of an analogy, risk assessment is likened to a jigsaw puzzle (Bankoff, 2004:138). There are often missing pieces because the individuals assembling the picture, lack an awareness or understanding of the elements that are needed to comprise an integrated "whole". Assessors from social backgrounds may typically lack an understanding of engineering aspects of vulnerability; economists may be unfamiliar with environmental considerations, and so on. Improved inter-disciplinary and inter-sectoral teamwork is therefore required at all levels to tackle problems and to synthesise issues of disaster risk assessment (Burby, 1998:275-276). This further emphasises the need for an integrated and systematic approach in assessing vulnerability and risk, establishing integrated planning processes through information and working collaboratively with stakeholders (including experts and specialists from different disciplines and sectors), and developing appropriate disaster risk reduction strategies.

- Ensuring flexibility and adaptability within the disaster risk assessment framework. As succinctly noted by John Holmes within his keynote address of the Global Platform for Disaster Risk Reduction in 2007, climate change adaptation is the key driver of the increased urgency of risk reduction efforts across the world (Holmes, 2007). Further, the Intergovernmental Panel on Climate Change (IPCC, 2001) highlights the concerns around global warming; where hundreds of millions of people are expected to be placed at increased risk from climate-related hazards. That is, increased flooding, droughts, heat waves, more intense storms, and rising sea levels, are some of the common challenges awaiting society.

Dilley (in Kreimer & Arnold, 2000:45) contextualises the above argument by elaborating that hazards related to climate and weather affect more people and cause more economic damage worldwide than any other type of natural hazard; for example over the past three decades disasters triggered by: cyclones; droughts; and floods occurred five times more frequently and killed or affected seventy times as many people, and caused twice as much damage (IPCC, 2001; Kreimer & Arnold, 2000) when compared to earthquakes and volcanoes (the two major geological hazards).

However, on a more positive note, this growing understanding and awareness, makes it possible to invest in proactive measures to prepare for them and to minimize their impacts in high-risk areas. This is achieved through a flexible and adaptable framework which facilitates institutional, procedural and administrative change and adaptation in line with the dynamic and ever-transforming technological, climatic, environmental, and societal conditions and preferences.

- Promoting political will and commitment within the realm of disaster risk management. Christoplos, Mitchell and Liljelund (2001:195) echo the

importance of this principle by propagating that disaster risk management depends on political will. Political will relies on political leadership amid shifting set incentives and pressures. The political costs of redirecting priorities from visible, development projects to addressing abstract long-term threats are great. It is hard to gain votes by pointing out that a disaster did not happen. However, disasters as indicators of failed development also provide opportunities for reformers who can draw attention to failure of current development models.

In consonance with the above frame of thought, McNaughton (2009:17) clarifies the fact that disaster risk reduction focuses on long-term goals. It is therefore not always treated with the urgency that other more visible and immediate projects are afforded. Furthermore, the results may also be difficult to quantify. As described by former UN Secretary-General, Kofi Annan, building a culture of prevention is certainly not easy; especially when the costs of prevention have to be paid in the present and its benefits lie in the distant future.

Holmes (2007:5) emphatically argues that it is crucial to convince those who control governments' purse strings and those who write and enforce legislations, construct buildings and the like, that acting today helps to save lives and reduce costs in the future. Hence, disaster risk reduction has to become a top priority for government, the business sector, community leaders and the local communities.

- Maintaining an iterative process as a means of promoting completeness to the disaster risk assessment process. Smith (2001:59) substantiates that in practice, very few studies have followed risk assessment through to ask what happened after the assessment was undertaken and to ascertain whether the recommended actions taken were effective. The general lack

of such feedback is one of the most serious deficiencies in the disaster risk reduction practice.

Allowing for a continuous feedback loop between the various phases of the disaster risk assessment process is absolutely necessary. Such a mechanism plays a pivotal role in assuring quality in the process and in its outputs. In effect this iterative process ensures that monitoring, reviewing and evaluation is undertaken throughout the risk assessment process.

To elucidate the relevance and practicality of these five principles within an appropriate framework may be depicted as follows (Figure 19 and 20 below).

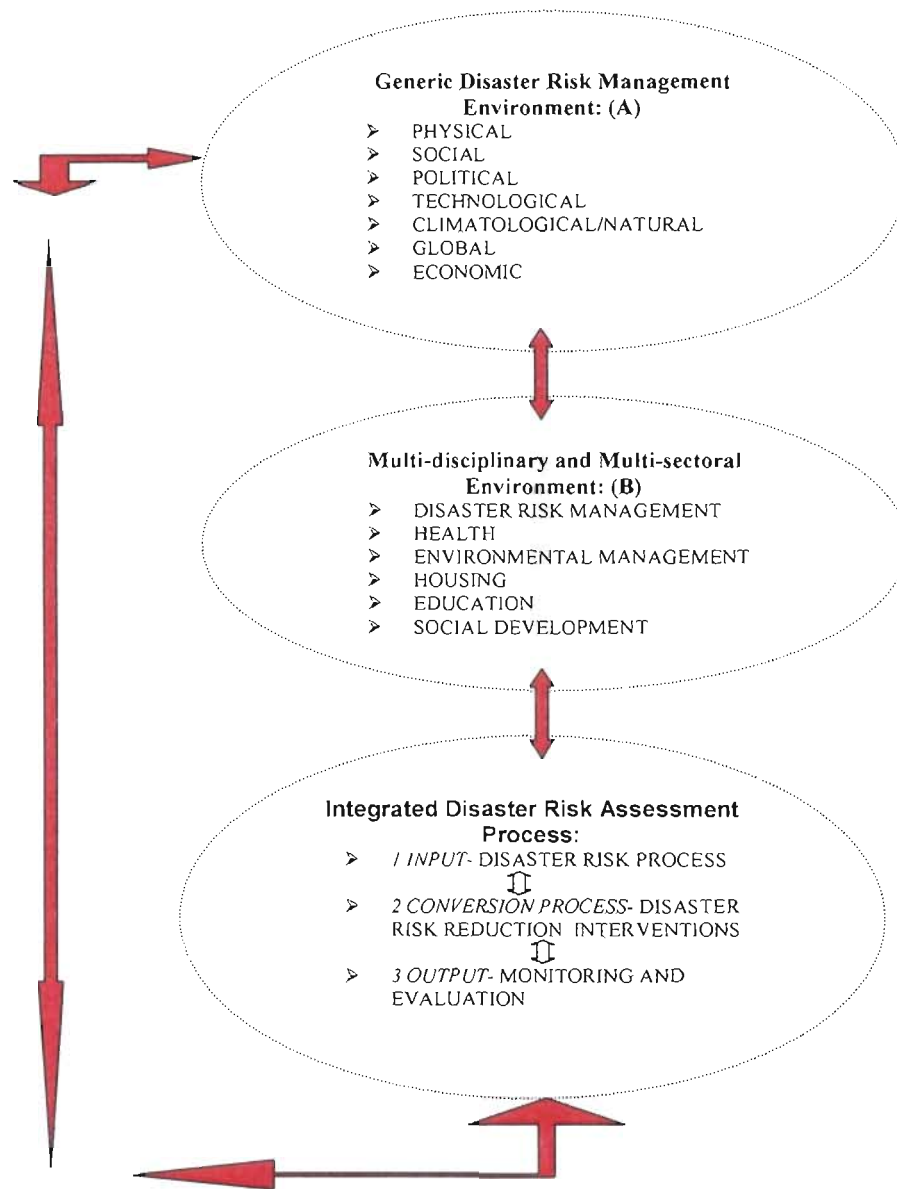


Figure: 19 Flow Process of the Proposed Model in Figure 20.

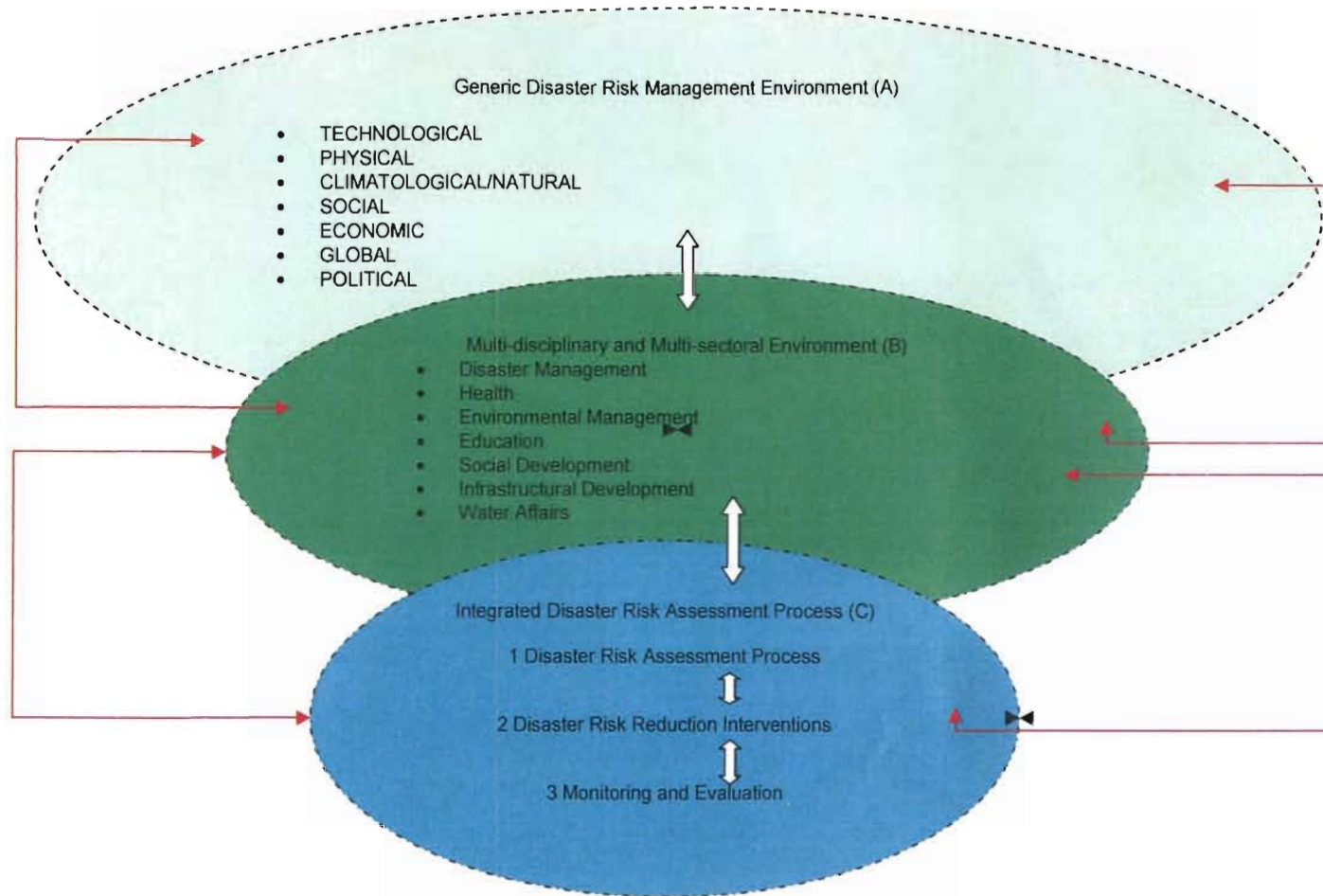


Figure: 20 Integrated Disaster Risk Assessment Model for Local Government in South Africa

To substantiate these illustrations, the prominent elements of the above model are clarified below:

- Three levels of interaction:

The outer-level representing the generic (broader) disaster risk management environment (A),

The middle-level denoting the different disciplines and sectors (B),

The inner-level which exemplifies the integrated disaster risk assessment process (C).

- The Arrows:

Within the respective levels, indicating the integrated and co-ordinated influence and functioning within the specific environment,

Across the different levels, expressing the link and influence between environments,

Within the inner-level, tracing the iterative process of integrated disaster risk assessment.

Also, the arrows are two-directional, indicating a continuous flow within an iterative domain.

- The broken lines demarcating the various levels of environment, reflect influences (through various factors, activities and actions) permeating between environments and also incorporating the notion of adaptability (flexibility).
- The numbers 1, 2, and 3 represent Input, Conversion Process and Output (respectively).

The inter-relationship of the various objects within and between the outer-levels (A) and the middle-level (B) is demonstrated through the use of two-directional arrows. This confirms that the components of the generic environment (which is the outer-level, A) whilst constantly impelling each other, have a ripple effect onto the different disciplines and sectors (featured in the middle-level, B) and *vice-versa*. Thus linking on and initiating the process within the system (referring to the inner-level, C) and the output feeds back into the environment in an iterative

fashion. This connection is further encouraged through the permeable structures (expressed by the broken lines) distinguishing and enclosing the three levels of functioning within the model. Such a structure also symbolises flexibility, promoting ease of change and adaptation that is essential in this constantly transforming environments.

The visible inter-relatedness and inter-dependence within and between all three levels (reflected by the two-directional arrows) affirms the merit of a co-ordinated and integrated perspective in dealing with the influences and their consequences, thereby recommending a holistic approach towards disaster risk reduction. This implies that the disaster risk assessment process must employ a multi-disciplinary and multi-sectoral style in interrogating the impact of the evolving environments (refer to the outer-level, A) on the risk levels of the specific community or society under review. Hence, this diverse team of experts and specialists (in their respective fields and sectors, B) together with the community and other respective stakeholders must jointly plan and co-ordinate the unfolding of the disaster risk assessment process. This alludes to the integrated and uniformed measure of community-based disaster risk assessment being put into practice.

Another level of integration is when the recommendations of the disaster risk assessment process are translated into disaster risk reduction interventions. Challenging the immediate implementation of these strategies which are to be pursued with the continuous review, monitoring and evaluation of these actions. The ultimate quest is to assess the appropriateness and effectiveness of the interventions in practice. Verifying as to whether the desired effects or results are being attained and also to trace all possible discrepancies that may have emerged and modifications that may be required due to the constantly changing environments. If warranted, all amendments and variations must be ensued through the iterative and collaborative process; and administered without further delays, closing the feedback loop from the system into the environments.

In effect, the underlying principles of the model are enunciated within context, verifying the relevance and application thereof. In particular, the concept of integrated and co-ordinated disaster risk management is prominent across three planes that is, within the levels, between the levels, and within the actual system (from the input phase, through to the conversion process and to the output phase). Further, the multi-disciplinary and multi-sectoral team functioning collectively depicts the issue of uniformity and highlights the integrated and holistic perspective of disaster risk assessment. In addition, the community involvement (together with other relevant stakeholders) through strong political commitment and endurance, displays dedication to an inclusive and transparent process thus signifying the community-driven method that is community-based disaster risk assessment.

Finally, the iterative process epitomises the thoroughness as well as the systematic and methodological measure conceded to in the process. Strategically complemented by the rigorous review, monitoring, evaluation and feedback system throughout the process. Thus ratifying the inherent quality-driven and adaptable mechanism that guarantees appropriate, realistic and practical outcomes towards effective disaster risk reduction.

In essence, the above analysis forms the crux of the proposed, integrated disaster risk assessment model for local government in South Africa. Distinctively asserting the legislative specifications in terms of a pro-active, co-ordinated, integrated, uniformed and community-based disaster risk assessment and disaster risk reduction perspective. Further-more the model is simple, practical, flexible and easy to apply; guided by a comprehensive structure. However, it is important to stress that the structure of the model is generic and adaptable therefore it is envisaged to be adopted across all spheres of government.

More importantly, the model is reflective of and encapsulates the essence of the national and international imperatives of disaster risk reduction; thus illustrating the relevance and appropriateness of the model and signifying its effective

application. A thorough disclosure of the guiding principles in the development of the model (as inspired by the findings in the previous chapters of the thesis) will assist in conceiving the rationale for this model.

6.3.2.2 ***Operationalisation of the model***

Disaster risk management exists and functions within a broader, generic environment closely interacting, influencing and being influenced by the various dynamics within these environments thereby functioning as a system. Such a system brings together the different interactions, influences and outcomes in a structured and cohesive form.

The above background justifies the adoption of the systems approach in the development of the proposed disaster risk assessment model. In essence the systems concept of the environment and disaster (as adapted from Alcántara-Ayala, 2002) together with the divergent perspectives of disaster and the various environments (analysed in Chapter Two of the thesis) contributes to the theoretical framework of this model. As such the following exposition will provide a clearer discernment into the pragmatic nature of the model.

Model phase	Principles and issues	Checklist for compliance (YES/NO)
1. community and government initiate the disaster risk assessment process	<ul style="list-style-type: none"> • political commitment • valid, reliable, timely, accurate and comprehensive information 	<p>to:</p> <ul style="list-style-type: none"> • identify priority risk • reduce vulnerability • develop effective disaster management plans • pro-actively formulate disaster risk reduction programmes for intervention • respond to disaster situation
2. establish a core planning team	<ul style="list-style-type: none"> • diverse team of experts • multi-disciplinary and multi-sectoral perspective • community participation • inclusive team 	<p>of:</p> <ul style="list-style-type: none"> • experts from different disciplines • representative from different sectors of government • community representative • identified specialist • political-office-bearers
3. planning team to jointly develop a process map of activities	<ul style="list-style-type: none"> • co-ordinated planning • systematic process • project management approach • shared vision and goals • iterative process 	<p>by:</p> <ul style="list-style-type: none"> • identifying/selecting a project leader • defining the terms of reference (specifications) of the planning team • categorising the disaster risk assessment process according to different phases • assigning team members with specific responsibilities and functions

		<ul style="list-style-type: none"> • attaching time-frames, resources and criteria to assess progress made in the various activities
4. define and map out the profile of the community and the environment	<ul style="list-style-type: none"> • community driven • dynamic environment • flexibility and adaptability • information 	<p>through:</p> <ul style="list-style-type: none"> • historical and existing data base • developing the disaster risk profile of the community • a community driven process • identifying the needs and resources of the community • determining the important facilities and critical infrastructure available in the community
5. engage in the community based disaster risk assessment process	<ul style="list-style-type: none"> • bottom-up approach • partnership • community participation • community resilience • systematic • iterative process • information 	<p>by:</p> <ul style="list-style-type: none"> • workshop sessions on the disaster risk assessment process • information and data gathering process within the community • highlighting the important roles and responsibilities of the community within the disaster risk assessment process • determining and setting up communication and network channels between the community and the planning team • investing in training, awareness campaigns and robust advocacy

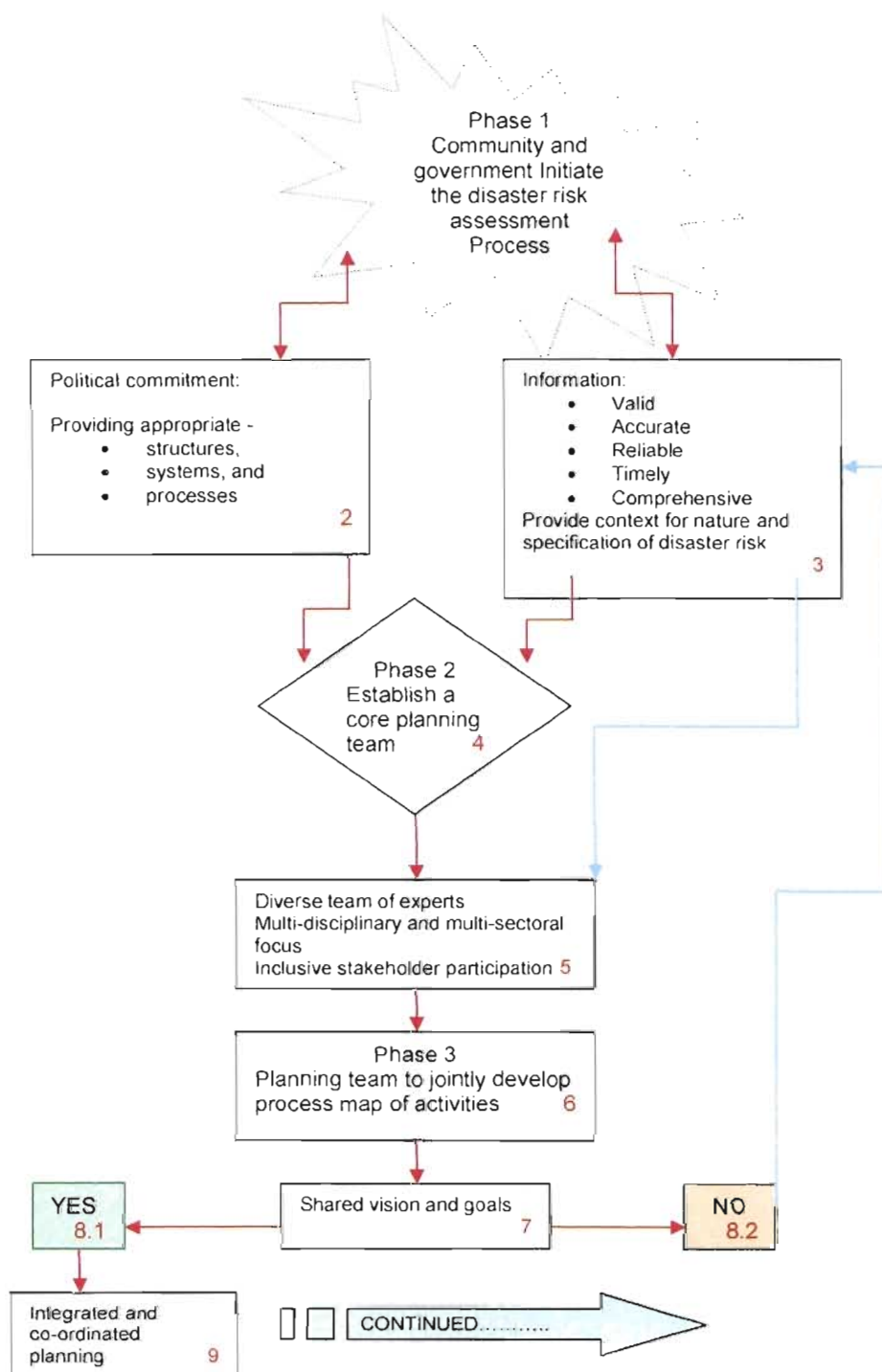
		programmes
6. identify and map the prevalent disaster risk	<ul style="list-style-type: none"> • political commitment • multi-disciplinary and multi-sectoral approach • community participation • indigenous knowledge • flexibility and adaptability • systematic 	<p>by:</p> <ul style="list-style-type: none"> • embarking on field visits/surveys of the community • mapping out proclaimed "high risk" areas in the community • mapping out the "most vulnerable" groups within the community • visual representation through the use of appropriate codes, symbols and colour schemes
7. highlight the critical periods when the community is most vulnerable	<ul style="list-style-type: none"> • community participation • information • co-ordinated planning • flexibility and adaptability 	<p>as:</p> <ul style="list-style-type: none"> • an indicator for planning purposes • influenced by the natural and/or environmental (physical) conditions • instigated through the social dynamics of the community • means of establishing patterns of frequency, duration and time frames • the process of differentiating the different levels of vulnerability
8. analyse and prioritise the various disaster risk	<ul style="list-style-type: none"> • systematic • information • partnership • monitor and evaluate 	<p>through:</p> <ul style="list-style-type: none"> • categorising the risk according to set criteria • reviewing the new information and data collected with the historical data to trace

		<p>emerging risk trends</p> <ul style="list-style-type: none"> • rank the identified "high risk" areas • rate the "most vulnerable" groups
<p>9. core planning team to develop and implement disaster risk reduction plan</p>	<ul style="list-style-type: none"> • co-ordinated planning • shared vision and goals • integrated approach • iterative process • reliability and validity • systematic • community resilience • flexibility and adaptability • political commitment 	<p>by:</p> <ul style="list-style-type: none"> • firstly ratifying the findings of the disaster risk assessment process • engaging in the external validation process of the disaster risk assessment outcomes • acknowledging the existing capacity of the community • recognising the available resources within the community • operationalising the objectives and strategies into detailed action plans • promptly effecting the approved disaster risk reduction strategies and programmes of interventions
<p>10. monitor and evaluate disaster risk reduction interventions</p>	<ul style="list-style-type: none"> • reliability and validity • flexibility and adaptability • political commitment • community participation • community resilience 	<p>to:</p> <ul style="list-style-type: none"> • determine the effectiveness and relevance of the applied disaster risk reduction measures • identify gaps in the planning and implementation process • institute corrective actions within a reasonable time span • modify, amend and

		update the disaster risk reduction programmes to meet the needs and demands of the changing environment
--	--	---

Table: 8 An Operational Guide to the Application of the Integrated Disaster Risk Assessment Model

The summary of fundamental issues tabulated above reflects the simple and practical nature and structure of the integrated disaster risk assessment model intended for its universal relevance and application. The flow process articulated in Table 8 may be illustrated as follows (refer to Figure 21):



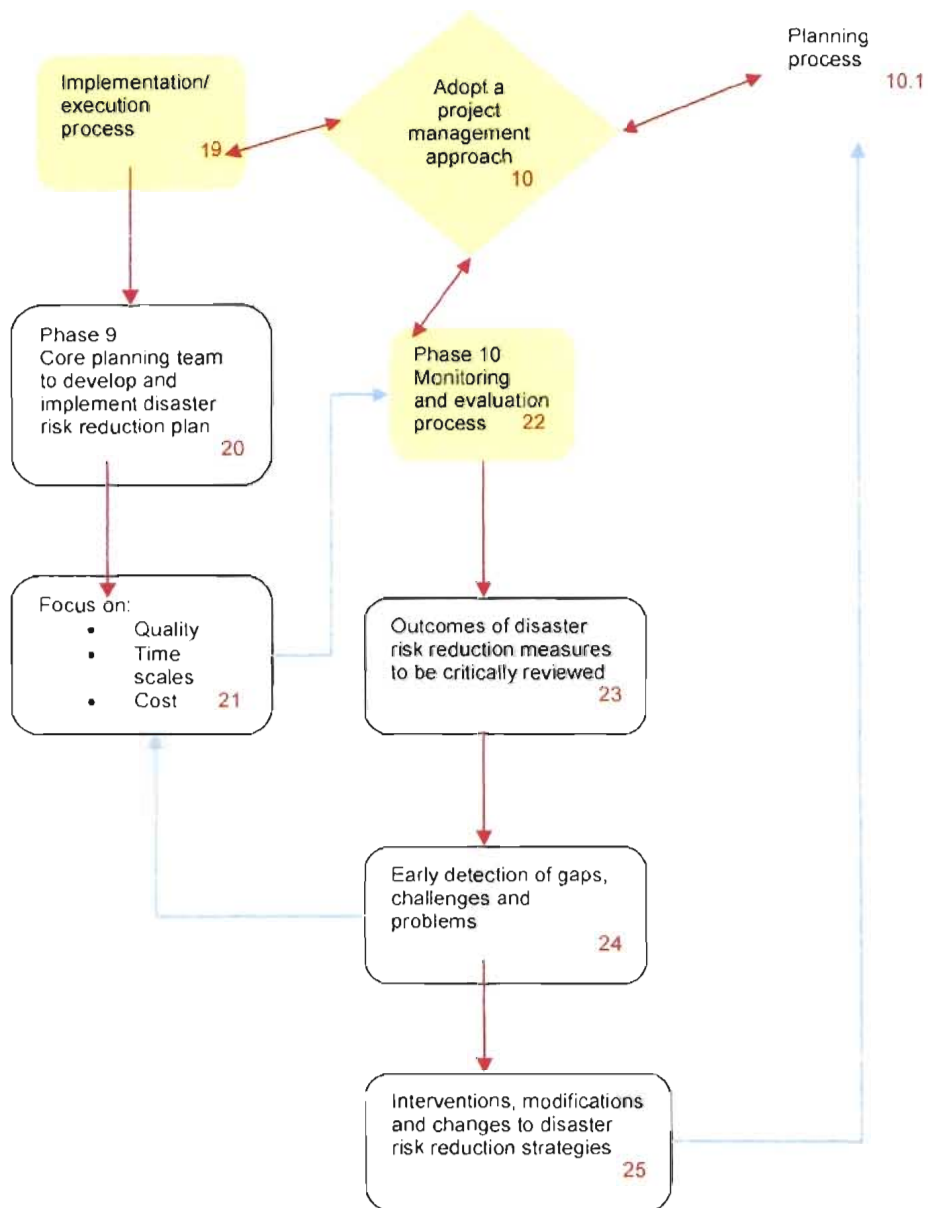


Figure: 21 Implementation Process of the Integrated Disaster Risk Assessment Model

The flow process of activities outlined in Figure 21 construes a systematic, integrated, and iterative approach to the practice of disaster risk assessment.

The implications of operationalising the model is thoroughly considered in Chapter Seven and appropriate recommendations and conclusions are highlighted.

6.4 CONCLUSION

The different chapters in this study served as a vehicle in the accomplishment of the research goal through the operationalisation of the key research objectives. As strategic enablers these research objectives assisted in establishing the foundation for the development of the model. In a progressive method the conclusive research findings and deductions served to provide the structure and form of the model, thus culminating in the development of an Integrated Disaster Risk Assessment Model for Local Government in South Africa.

In adding value and support to the implementation of the developed model, isolated challenges are cited and appropriate recommendations are expressed in bridging the gaps and promoting the key objectives of the model, in Chapter Seven of the thesis.

CHAPTER 7

RECOMMENDATIONS AND CONCLUSIONS

The following recommendations and conclusions serve to ratify the deductions formulated through the research findings by guiding closing arguments towards effective disaster risk assessment and disaster risk reduction.

7.1 RECOMMENDATIONS

The integrated disaster risk assessment model is a purposive perspective that holistically and comprehensively addresses the various concerns, challenges and gaps obstructing the pursuance of effective disaster risk management and disaster risk reduction actions.

In this regard, the model focuses on the following fundamental elements:

- encouraging community participation and resilience;
- facilitating a multi-disciplinary and multi-sectoral team;
- promoting an adaptable and flexible framework;
- advancing political will and commitment;
- maintaining an iterative process;

towards achieving effective disaster risk reduction. Hence, this approach is intended to integrate, complement and enhance existing disaster risk reduction strategies.

In corroborating the above viewpoint, the research findings as elucidated from the focus group interview schedules (refer to Annexure B) strongly advocate the implementation of a disaster risk assessment model for local government. The arguments presented recognise the value of a disaster risk assessment model as:

- promoting a co-ordinated, uniformed and standardised approach in undertaking disaster risk assessment in line with the requirements of the Disaster Management Legislation;
- providing proper guidance, structure and logic to improve disaster risk assessment planning and facilitation processes;
- adding value to the process by integrating and co-ordinating the various activities across different disciplines and sectors;
- facilitating the sharing and harmonising of resources towards the attainment of common goals; and
- fostering the principles of co-operative governance by encouraging and supporting stakeholder participation.

However, the reality as sketched out by the research findings is that there are certain anticipated challenges that need to be addressed before such a tool is successfully implemented.

At the outset, appropriate structures, systems and processes will have to be developed, improved upon and implemented to support such a mechanism. The existing formal and informal structures, systems and processes will have to be adapted to incorporate the distinct principles of the integrated disaster risk assessment model. The emphasis should be on effectively operationalising these institutional arrangements through clear terms of references and a detailed exposition of the assigned functions and responsibilities facilitating the prompt implementation thereof.

In addition, appropriate procedures (such as reports and action plans) should be administered to verify whether the institutional arrangements are supporting and maintaining the required outcomes in accordance with the approved mandate. If necessary, the appropriate amendments to these arrangements can be made without delaying the implementation process.

Resource planning, provisioning and acquisition need to be completed by means of an integrated and co-ordinated planning process pursued by a multi-disciplinary and multi-sectoral team. This should encourage the optimal utilisation of limited resources through a shared and common vision of disaster risk assessment and disaster risk reduction. Further, the progressive inclusion of disaster risk assessment into development and disaster risk management plans linked to the Integrated Development Plan of the municipality as a strategic measure to unlock more resources and giving prominence to the disaster risk management activities, are essential. In effect, this process should advance the positioning of disaster risk assessment and disaster risk reduction onto the political agenda together with the other important service delivery and development issues.

Sufficient awareness campaigns, training and development of all stakeholders, to advocate and effectively implement such an approach are prerequisite that should be satisfied or achieved prior to implementation. The primary goal should be to prepare all stakeholders with the relevant knowledge and information so as to promote and sustain their decisive and active engagement throughout the disaster risk assessment process. As such, justifying the notion of effective stakeholder participation and demonstrating the principles of co-operative governance.

Lastly, a paradigm shift for those who firmly believe in maintaining the status quo of the current disaster risk assessment practice through the policy process formally adopting the implementation of the integrated disaster risk assessment model across all sectors of government. This in turn will enforce the implementation of the model thereby assisting in promoting and securing senior management support, for the disaster risk management functions and impacting positively on the disaster risk assessment process and its outcomes.

In essence, the efficient practice of the disaster risk reduction interventions and strategies should be ensued soon after its finalisation (without prolonged delays)

to enhance its relevance and appropriateness; whilst maintaining the continuous (on-going) monitoring, review and evaluation of these interventions and its impact so as to assure and uphold the applicability and currency of these disaster risk reduction strategies.

The above recommendations should be viewed from a logical, practical and cost-effective perspective pronouncing its ease of implementation and effectiveness in the disaster risk management environment as reflected in the concluding remarks.

7.2 CONCLUSIONS

The lack of a uniformed, structured and co-ordinated framework to guide the disaster risk assessment practice within local government provided impetus to engage in the study. Hence, the development of an integrated disaster risk assessment model for local government in contributing to a standardised, structured, uniformed and co-ordinated manner in promoting pro-active disaster risk assessment and disaster risk reduction practices; is paramount.

The model informs and guides co-ordinated and integrated disaster risk assessment and disaster risk reduction planning and implementation by linking and converting the results of the disaster risk assessment process into appropriate disaster risk reduction actions to be applied. More importantly the comprehensive, yet generic and flexible structure of the model encourages its portability and adaptability across all sectors of government nationally, regionally and internationally, by all those engaging in disaster risk assessment and disaster risk reduction activities.

The effective and successful implementation of the developed model warrants the necessary policy intervention by government to be mandated into practice. It is at this stage of implementation that further research to the study may be undertaken focusing on a critical review of the application of the model for further

improvements to disaster risk assessment and disaster risk reduction approaches nationally, regionally and internationally.

BIBLIOGRAPHY

(ADPC) Asian Disaster Preparedness Center. (2000). *Community Based Disaster Management: Trainer's Guide*. [Web:<http://www.adpc.ait.ac.th>]. [Date of Access: 31 May 2007].

(ADPC) Asian Disaster Preparedness Center. (2004). *Environmental Degradation and Disaster Risk*. [Web:<http://www.unisdr.org/eng/risk-reduction/wssd/pdf>]. [Date of Access: 23 November 2005].

Adger, W.N. & Brooks, N. (2003). *Country level risk measures of climate-related natural disasters and implications for adaptation to climate change*. In Working Paper 26. Tyndall Centre for Climate Change Research.

Ahmad, H., Wong, A. & Shiever, S.R. (2008). Peacetime Strategies for Disaster Risk Mitigation. In Nicklin, S., Cornwell, B., Dodd, J., Griffiths, J. & Townsend, S. (eds), *Risk Wise*. United Kingdom: Tudor Rose.

Ahrens, J. (2002). *Governance and Economic Development: A Comparative Institutional Approach*. Cheltenham: Elgar Publications.

Ahrens, J. & Rudolph, P.M. (2006). The Importance of Governance in Risk Reduction and Disaster Management. *Journal of Contingencies and Crisis Management*, 14(4): 207-220.

Albala-Bertrand, J.M. (1993). *Political Economy of Large Natural Disasters: With Special Reference to Developing Countries*. London: Oxford University Press.

Alcantara-Ayala, I. (2002). Geomorphology, Natural Hazards, Vulnerability and Prevention of Natural Disasters in Developing Countries. *Science-Direct Geomorphology*, 47(2-4): 107-124.

Alexander, D. (1991). Natural Disasters: A Framework for Research and Teaching. *Disasters*, 15(3): 209-226.

Alexander, D.E. (1993). *Natural Disasters*. London: UCL Press.

Anderson, M.B. & Woodrow, P.J. (1989). *Rising from the Ashes: Development Strategies in Times of Disaster*. Boulder: Westview Press.

Annan, K. (2003). *Message for the International Day for Disaster Reduction – 8 October 2003*. [Web:<http://www.unisdr.org/eng/public>]. [Date of Access: 02 March 2009].

Ariyabandu, M. M. (1999). *Defeating Disasters: Ideas for Action*. South Asia: Duryog Nivaran Publishers

Arnold, T. (2003). Concern Worldwide's Approach to Water and Sanitation and Shelter Needs in Emergencies. *Emergency Relief Operations*, 5(1): 80-112.

Aryal, K.R. (2003). *Vulnerables' Perceptions of Disaster and a Disaster Management Project: A Case Study from Nepal*. DPRI – IIASA 3rd International Conference on Integrated Disaster Risk Management, Japan, 3-5 July.

AS/NZ 4360. (2004). *Risk Management: Standards Australia/ Standards New Zealand*. [Web:<http://www.standards.org.au/downloads>]. [Date of Access: 16 November 2009].

AUDMP (Asian Urban Disaster Mitigation Program). (2000). *Community Based Risk Reduction Projects*. Compiled for the 5th Working Group Meeting of the Asian Urban Disaster Mitigation Program. Cambodia, 23-25 February.

Bak, N. (2004). *Completing your Thesis: A Practical Guide*. Pretoria: Van Schaik Publishers.

Bankoff, G., Frerks, G. & Hilhorst, D. (eds). (2004). *Mapping Vulnerability: Disasters, Development & People*. London: Earthscan Publishers.

Barkun, M. (1974). *Disaster and the Millennium*. New Haven: Yale University Press.

Bendimerad, F. (2002). *Disaster Risk Reduction and Sustainable Development*. [Web:<http://www.info.worldbank.org/etools>]. [Date of Access: 02 June 2005].

Bhatt, M.R. (2002). *Corporate Social Responsibility and Disaster Reduction: Local overview of Gujarat. Case Study for Corporate Social Responsibility and Disaster Reduction: A Global Overview*. [web:<http://www.benfieldhrc.org/SiteRoot/disaster-studies/csr/csr>]. [Date of Access: 24 August 2005].

Blaikie, P., Cannon, T., Davis, I. & Wisner, B. (1994). *At Risk: Natural Hazards, People's Vulnerability and Disasters*. London: Routledge.

Bogardi, J. & Birkmann, J. (2004). Vulnerability Assessment the First Step Towards Sustainable Risk Reduction. *Disaster and Society*: 75-82.

Bolt, B.A., Horn, W.L., MacDonald, G.A. & Scott, R.F. (1977). *Geological Hazards: Earthquakes, Tsunamis, Volcanoes, Avalanches, Landslides, Floods*. 2nd ed. New York: Springer-Verlag.

Boorse, C. (1975). On the Distinction between Disease and Illness. *Philosophy and Public Affairs*, 5: 7-10.

Briceño, S. (2004). Global Challenges in Disaster Reduction. *The Australian Journal of Emergency Management*, 19(1): 3-5.

Brooks, N. (2003). *Vulnerability, Risk and Adaptation: A Conceptual Framework*. Tyndall Centre Working Paper No.38. Norwich: University of East Anglia.

Bryant, E.A. (1991). *Natural Hazards*. Cambridge: Cambridge University Press.

Brynard, P.A. & Hanekom, S.X. (1997). *Introduction to Research in Public Administration and related Academic Disciplines*. Pretoria: Van Schaik Publishers.

Burby, R (ed). (1998). *Policies for Sustainable land use, co-operating with Nature*. Washington: Joseph Henry Press.

Burkle, F.M. (2003). Evidence-Based Health Assessment Process in Complex Emergencies. *Emergency Relief Operations*: 55-79.

Burton, I. & Kates, R W. (1964). The perception of Natural Hazards in Resource Management. *Natural Resource Journal*, 3: 412-441.

Burton, I., Kates, R.W. & White, G.F. (1993). *The Environment as Hazard*. 2nd ed. New York: The Guilford Press.

Cannon, T. (1994). *Vulnerability Analysis and the Explanations of Natural Disasters*. England: Wiley & Sons Ltd.

Cardona, O. D. (2001). *The Need for Rethinking the Concepts of Vulnerability and Risks from a Holistic Perspective: A Necessary Review and Criticism for Effective Risk Management*. [Web:<http://www.desenredando.org/public>]. [Date of Access: 24 August 2005].

Carney, D. (1999). Approaches to Sustainable Livelihoods for the Rural Poor. *Poverty Briefing*, Overseas Development Institute.

Carter, W.N. (1991). *Disaster Management: A Disaster Manager's Handbook*. Manila:Asian Development Bank (ADB).

Chambers, R. (1983). *Rural Development: Putting the Last First*. Harlow: Longman Scientific and Technical.

Chambers, R. (1989). Vulnerability, Coping and Policy. *IDS Bulletin*, 20.

Chambers, R. & Conway, G.R. (1991). Sustainable Rural Livelihoods: Practical Concepts for the 21st Century. *Institute of Development Studies: Discussion Paper 296*.

Chapman, D. (1994). *Natural Hazards*. New York: Oxford University Press.

Chen, K., Blong, R. & Jacobson, C. (2003). Towards an Integrated Approach to Natural Hazards Risk Assessment using GIS: With Reference to Bushfires. *Environmental Management*, 31(4): 546-560.

Christoplos, I., Mitchell, J. & Liljelund, A. (2001). Reframing Risk: The Changing Context of Disaster Mitigation and Preparedness. *Disasters*, 25(3): 185-198.

Coetzee, C. (2009). *The Development, Implementation and Transformation of the Disaster Management Cycle*. South Africa: North-West University.

Comfort, L.K. (1988). *Managing Disaster: Strategies and Policy Perspectives*. London: Duke Press Policy Studies.

Comfort, L.K. (2004). Disaster: Agent of Diplomacy or Change in International Affairs? *Cambridge Review of International Affairs*, XIV (1): 277-294.

Creswell, J.W. (1994). *Research Design: Qualitative and Quantitative Approaches*. Thousand Oaks, CA: Sage Publications.

Cuny, F.C. (1983). *Disasters and Development*. New York: Oxford University Press.

Cutter, S.L. (1993). *Living with Risks: The Geography of Technological Hazards*. London: Edward Arnold.

Cutter, S.L. (ed). (1994). *Environmental Risks and Hazards*. New Jersey: Prentice Hall.

Cutter, S.L. (1996). Vulnerability to environmental Hazards. *Progress in Human Geography*, 20(4): 529-539.

(DFID) Department for International Development. (2004). *Disaster Risk Reduction: A Development Concern*. [web:<http://www.dfid.gov.uk/pubs/files/drrr>]. [Date of Access: 05 September 2008].

Davis, I. & Bellers, R. (1995). *The Context of Community Vulnerability Assessment (CVA)*. London: UN/IDNDR.

De Blij, H. (1994). *Nature on the Rampage*. Washington, DC: Smithsonian Books.

De Guzman, E.M. (2003). *Towards Total Disaster Risk Management Approach*. [web:<http://www.adrc.or.jp/publications/Asian-Conference>]. [Date of Access: 02 June 2005].

- De Satgé, R., Holloway, A., Mullins, D., Nchabaleng, L. & Ward, P. (2002). *Learning About Livelihoods: Insights from Southern Africa*. Oxford: Oxfam Publishing.
- Degg, M.R. (1992). Reducing Vulnerability to Earthquake Hazard in the Third World: Recent Initiatives by the International Reinsurance Market. In Varley, A. (ed), *Disasters, Development and the Environment*. London: Belhaven Press.
- Delamont, S., Atkinson, P. & Parry, O. (1997). *Supervising the Ph.D.* Buckingham: Open University Press.
- Denzin, N.K. & Lincoln, Y.S. (2000). *Handbook of Qualitative Research*. 2nd ed. Thousand Oaks, CA: Sage Publications.
- Dibben & Chester, D.K. (1999). Human Vulnerability in Volcanic Environments: The Case of Furnas. *Journal of Volcanology & Geothermal Research*, 92: 133-150.
- Dilley, M. (2000). Climate, Change and Disasters. In Kreimer, A. & Arnold, M. (eds), *Managing Disaster Risk in Emerging Economies: Disaster Risk Management*. Washington, D.C.: The World Bank: 45-50.
- Dorcey, A.H.J. & McDaniels, T. (1999). *Great Expectations, mixed results: Trends in citizen involvement in Canadian Environmental Governance*. [web:<http://www.interchg.ubc.ca/dorcey/trends>]. [Date of Access: 06 June 2007].
- Doyal, L. & Gough, I. (1991). *A Theory of Human Need*. London: Macmillan.
- Drabek, T.E. (1986). *Human System Responses to Disaster: An Inventory of Sociological Findings*. New York: Springer-Verlag.

Drabek, T.E. (1989). Disasters as non-routine social problems. *International Journal of Mass Emergencies and Disasters*, 7(3): 253-264.

Dynes, R.R., De Marchi, B. & Pelanda, C. (eds). (1987). *Sociology of Disasters: Contribution of Sociology to Disaster Research*. Milan: Franco Angeli.

Eade, D. & Williams, S. (1995). *The Oxfam Handbook of Development and Relief*. Oxford: Oxfam Publishing.

Ebert, C. (1993). *Disasters: Violence of Nature, Threats by Man*. Dubuque, IO: Kendall.

(ECLAC) Economic Commission for Latin America & the Caribbean & (IDB) Inter-American Development Bank. (2000). *A Matter of Development: How to Reduce Vulnerability in the Face of Natural Disasters*. Seminar on "Confronting Natural Disasters: A Matter of Development". New Orleans, 25-26 March 2000.

Elo, O. (1995). Environment and Disasters, Stop Disasters. *Building a Culture of Prevention*, 27(1): 3.

Emmi, P.C., & Horton, C.A. (1995). A Monte Carlo simulation of error propagation in a GIS-based assessment of seismic risk. *International Journal of Geographical Information Systems*, 9(4): 447-461.

Ferrier, N. & Haque, C. E. (2003). Hazards Risk Assessment Methodology for Emergency Managers: A Standardised Framework for Application. *Natural Hazards*, 28: 271-290.

Flick, U.W.E. (2009). *An Introduction to Qualitative Research*. 4th ed. London: Sage Publications.

Foster, H.D. (1980). *Disaster Planning: The Preservation of Life and Property*. New York: Springer-Verlag.

Fox, W. & Bayat, M.S. (2007). *A Guide to Managing Research*. Cape Town: Juta & Co.

Frazier, K. (1979). *The Violent Face of Nature*. New York: William Morrow.

Fritz, C.E. (1961). Disasters. *Contemporary Social Problems*. New York: Harcourt: 651-694.

Giddens, A. (2000). *Runaway World*. New York: Routledge.

Glesne, C. & Peshkin, A. (1992). *Becoming Qualitative Researchers: An Introduction*. White Plains, NY: Longman Publications.

Godschalk, D.R., Kaiser, E.J. & Berke, P.R. (1998). Hazard Assessment: the factual basis for planning and mitigation. In Burby, R. (ed), *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*. Washington, DC: Joseph Henry.

Gooneratne, W. & Obudho, R.A. (eds). (1997). *Contemporary Issues in Regional Development Policy: Perspectives from Eastern and Southern Africa*. Kenya: Ashgate Publishing Ltd.

Gupta, M. (2008). Building Inherent Resilience. In Nicklin, S., Cornwell, B., Dodd, J., Griffiths, J. & Townsend, S. (eds), *Risk Wise*. United Kingdom: Tudor Rose.

Gurr, T.R. & Harff, B. (2003). From Surveillance to Risk Assessment to Action. *Emergency Relief Operations*: 3-31.

Haghebaert, B. (2007). Working with Vulnerable Communities to Assess and Reduce Disaster Risk. *Humanitarian Exchange Magazine*, 38: 1-4.

Hall, A.D. (1962). *Some Fundamental Concepts of Systems Engineering*. Harmondsworth: Penguin.

Hamilton, J. (2008). Working with Communities to Get Ready and Get Thru. In Nicklin, S., Cornwell, B., Dodd, J., Griffiths, J. & Townsend, S. (eds), *Risk Wise*. United Kingdom: Tudor Rose.

Harrell-Bond, B. (1986). *Imposing Aid: Emergency Assistance to Refugees*. Oxford: Oxford Univ. Press.

Heijmans, A. & Victoria, L. (2001). *Citizenry-Based and Development-Oriented Disaster Response: Experience and Practice in Disaster Management of the Citizens' Disaster Response Network in the Philippines*. Manila: Center for Disaster Preparedness.

Henning, E.; Van Rensburg, W. & Smit, B. (2004). *Finding your way in Qualitative Research*. Pretoria: Van Schaik Publishers.

Holliday, A.R. (2007). *Doing and Writing Qualitative Research*. 2nd ed. London: Sage Publications.

Holloway, A. (ed). (1999). *Risk, Sustainable Development and Disasters: Southern Perspectives*. South Africa: Peri peri Publications.

Holloway, A. (2003). Disaster Risk Reduction in Southern Africa: Hot Rhetoric-Cold Reality. *African Security Review*, 12(1): 29-38.

Holloway, A. & Roomaney, R. (2008). *Weathering the Storm: Participatory Risk Assessment for Informal Settlements*. Cape Town: Periperi Publications.

Holmes, J. (2007). Global Platform for Disaster Risk Reduction: Keynote Speech. *Disasters Update*, 712: 3-6.

(IDNDR) International Decade for Natural Disaster Reduction. (1992). *Report of the Scientific and Technical Committee on its Third Session*, Geneva: 16-20 March.

(IFRC) International Federation of Red Cross (IFRC) and Red Crescent Societies. (1996). *Vulnerability and Capacity Assessment Toolbox*. Geneva: InterWorks.

(IFRC) International Federation of Red Cross (IFRC) and Red Crescent Societies. (1997). *World Disaster Report 1997*. Oxford: Oxford University Press.

(IFRC) International Federation of Red Cross (IFRC) and Red Crescent Societies. (1999). *Vulnerability and Capacity Assessment Guide*. Geneva: InterWorks.

(IFRC) International Federation of Red Cross (IFRC) and Red Crescent Societies. (2000). *Risk Reduction: Disaster Preparedness Training Programme*. [Web:<http://www.ifrc.org/what/dp/manual/risk>]. [Date of Access: 04 May 2005].

(IFRC) International Federation of Red Cross (IFRC) and Red Crescent Societies. (2006). *Vulnerability and Capacity Assessment: Lessons Learnt and Recommendations*. Geneva: InterWorks.

(IFRC) International Federation of Red Cross (IFRC) and Red Crescent Societies. (2007). *How to do a Vulnerability and Capacity Assessment: A Practical step-by-step Guide*. Geneva: InterWorks.

(IFRC) International Federation of Red Cross (IFRC) and Red Crescent Societies. (2008a). *Vulnerability and Capacity Assessment Training Guide: Classroom training and learning-by-doing*. Geneva: InterWorks.

(IFRC) International Federation of Red Cross (IFRC) and Red Crescent Societies. (2008b). *World Disasters Report 2008: Focus on HIV and AIDS*. Switzerland: ATAR Roto Press.

(IPCC) Intergovernmental Panel on Climate Change. (2001). *Climate Change 2001: The Scientific Basis*. Contributions of the Working Group 1 to the Third Assessment Report of the IPCC. Cambridge: Cambridge University Press.

(ISDR) International Strategy for Disaster Reduction. (2002). *Living with Risk: A Global Review of Disaster Reduction Initiatives*. Preliminary version. [web:<http://www.unisdr.org/unisdr/Globalreport>]. [Date of Access: 5 January 2005].

(ISDR) International Strategy for Disaster Reduction. (2005). *Living with Risk: A Global Review of Disaster Reduction Initiatives. Future Challenges: A Common Vision for Disaster Risk Reduction*. [web:<http://www.unisdr.org/dialogue>]. [Date of Access: 21 April 2005].

(ISDR) International Strategy for Disaster Reduction. (2007a). *Words into Action: A Guide for Implementing the Hyogo Framework*. Switzerland: United Nations Secretariat of ISDR.

(ISDR) International Strategy for Disaster Reduction. (2007b). A Summary Report of the First Session of the Global Platform for Disaster Risk Reduction. *Global Platform for Disaster Risk Reduction Bulletin*, 141(1).

(ISDR) International Strategy for Disaster Reduction. (2007c). *Disaster Risk Reduction: Global Review*. Switzerland: United Nations Secretariat of ISDR.

Integrated Management for Disaster Risk. (2005). *Integrated Disaster Risk Management*. [web:<http://www.dpri.kyoto-u.ac.jp>]. [Date of Access: 5 January 2005].

Jacobs, B. (2005). Urban Vulnerability: Public Management in a Changing World. *Journal of Contingencies and Crisis Management*, 13(2): 39-43.

Jeggle, T. (2001). In Rosenthal, U. Comfort, L.F. & Boin, A. *Managing Crisis: A Global Perspective*. USA: CC Thomas Publishers.

Jeggle, T. (2007). In (ISDR) International Strategy for Disaster Reduction and (DFID) Department for International Development. *Disasters and Development: From Relief to Preparedness and Risk Reduction*. [Web:<http://www.DFID/UNISDR/meetingseries/org.ac/download>]. [Date of Access: 16 November 2009].

Kasperson, J.X. & Kasperson, R.E. (2001). *International Workshop on Vulnerability and Global Environmental Change*. Stockholm: Stockholm Environment Institute: 17-19 May 2001.

Kelman, I. (2003). Beyond Disasters, Beyond Diplomacy. *Natural Disasters and Development in a Globalising World*: 110-123.

Knight, L. (ed). (2008). *World Disaster Report (AFRC): Focus on HIV & AIDS*. Switzerland: ATAR Roto Press.

Kobe Report. (2005). *Environmental Management and Disaster Reduction: Building a Multi-stakeholder Partnership*. World Conference on Disaster Reduction. Japan, 18-22 January.

Kreimer, A. & Arnold, M. (eds). (2000). *Managing Disaster Risk in Emerging Economies. Disaster Risk Management Series*. Washington, D.C: The World Bank.

Kuban, R. & Mackenzie-Carey, H. (2001). *Community-Wide Vulnerability and Capacity Assessment (CVCA)*. Ottawa: Office of Critical Infrastructure Protection and Emergency Preparedness.

Lewis, J. (1999). *Development in Disaster-Prone Places: Studies of Vulnerability*. London: Intermediate Technology Publications.

Lewis, D. & Mioch, J. (2005). Urban Vulnerability and Good Governance. *Journal of Contingencies and Crisis Management*, 13(2): 50-53.

Lincoln, Y.S. & Guba, E.G. (1985). *Naturalistic Inquiry*. Newbury Park, CA: Sage Publications.

Marshall, C., & Rossman, G. (1980). *Designing Qualitative Research*. Newbury Park, CA: Sage Publications.

Maskrey, A. (1989). *Disaster Mitigation: A Community Based Approach. Development Guide*, 3. Oxford: Oxfam.

Maskrey, A. (1990). Disaster Mitigation as a Development Tool. *The Futurist*, 24(5): 51.

May, P.J. & Williams, W. (1986). *Disaster Policy Implementation: Managing Programs under Shared Governance*. New York: Plenum Press.

Maybury, R (ed). (1986). *Violent Forces of Nature*. Mt Airy,MD: Lomond Publications and UNESCO.

McNaughton, E. (2009). *Disaster Risk Reduction: Building Safer Communities*. [Web:<http://www.nzaid.gov.nz/library>]. [Date of Access: 27 July 2009].

Merriam, S.B. (1988). *Case Study Research in Education: A Qualitative Approach*. San Francisco: Jossey-Bass.

Mgquba, S.K. & Vogel, C. (2004). Living with Environmental Risks and Change in Alexandra Township. *South African Geographical Journal*, 86(1): 30-38.

Mileti, D.S. (1980). Human adjustment to the risk of environmental extremes. *Sociology and Social Research*, 64(3): 327-347.

Mitchell, T. (2003). *An Operational Framework for Mainstreaming disaster risk reduction*. [Web:[http://www.montserrat2020.org/disaster studies](http://www.montserrat2020.org/disaster%20studies)]. [Date of Access: 16 July 2008].

Morrow, B.H. (1999). Identifying and Mapping Community Vulnerability. *Disasters*, 23(1): 1-18.

Moser, C.O.N. (1998). The Asset Vulnerability Framework: Reassessing Urban Poverty Reduction Strategies. *World Development*, 26(1): 1-19.

MRM (Research Group for Major Risk Management). (2003). Integrated "Natural" Risk Management: The Basic Assessment; An Essay. *DRPI-IIASA 3rd International Conference on Integrated Disaster Risk Management*, 3-5th July: Japan.

Myers, M.F. (1997). *Insights Emerging from the Assessment of Research and Applications for Natural Hazards in the United States*. Vancouver: Disaster Preparedness Resources Centre: University of British Columbia.

(NRAAG) National Risk Assessment Advisory Group. (2007). *A National Risk Assessment Framework for sudden onset Natural Hazards*.
[[www:http://www.ga.gov.au](http://www.ga.gov.au)]. [Date of Access: 16 November 2009].

o'Keefe, P., o'Brien, G. & Rose, J. (2004). *Climate Change and Pre-disaster Planning*. [Web:<http://www.nccsap.net/html>]. [Date of Access: 29 August 2005].

(UNDRO) Office of the United Nations Disaster Relief Co-ordinator. (1980). *Natural Disasters and Vulnerability Analysis*. Report of Expert Group Meeting on Vulnerability Analysis. Geneva: United Nations.

Oliver-Smith, A. (1990). Post-disaster housing reconstruction and social inequality: a Challenge to Policy and Practice. *Disasters*, 14(1): 7-19.

Optner, S.L. (1973). *Systems Analysis*. Harmondsworth: Penguin.

Palm, R.I. (1990). *Natural Hazards: An Integrative Framework for Research and Planning*. USA: John Hopkins University Press.

Patton, M.Q. (2002). *Qualitative Research and Evaluation Methods*. 3rd ed. Thousand Oaks, CA: Sage Publications.

Pelling, M. (2003a). *The Vulnerability of Cities: Natural Disasters and Social Resilience*. London: Earthscan Publications.

Pelling, M. (ed). (2003b). *Natural Disasters and Development in a Globalizing World*. London: Routledge.

Perry, R.W. & Mushkatel, A.H. (1984). *Disaster Management: Warning Response and Community Relocation*. England: Quorum Books.

Petak, W.J. & Atkisson, A.A. (1982). *Natural Hazard Risk Assessment and Public Policy: Anticipating the Unexpected*. New York: Springer-Verlag.

Pettengell, C. (2010). *Climate Change Adaptation: Enabling People Living in Poverty to Adapt*. Oxfam International Research Report.

Poulsen, J. (2004). *Red Cross Red Crescent News: Opinion Piece*. [Web:<http://www.ifrc.org/docs/news>]. [Date of Access: 04 May 2005].

Quarantelli, E.L. (ed). (1978). *Disasters: Theory and Research*. California: Sage.

Quarantelli, E.L. (ed). (1998). *What is a Disaster?*. London: Routledge.

Quarantelli, E.L. (2002). *Urban Vulnerability to Disasters in Developing Countries: Managing Risk*.

[Web:<http://www.worldbank.org/hazards/files/conference>]. [Date of Access: 01 September 2005].

Red Cross and Red Crescent. (2009). *Community Based Risk Reduction and Climate Change*. [Web:<http://www.climatecentre.org/site/community-risk-reduction>]. [Date of Access: 27 July 2009].

Rogers, G. (1997). The Dynamics of Risk Perception: How does perceived risk respond to risk events?. *Risk Analysis*, 17: 745-757.

Ryscavage, R. (2003). The Transition from Conflict to Peace. *Emergency Relief Operations*: 284-294.

Salter, J. (1997). Trend Report: Risk Management in a Disaster Management Context. *Journal of Contingencies and Crisis Management*, 5(1): 60-65.

Salter, J. (1998). The Mitigation Symposium: Towards a Canadian Mitigation Strategy. In Disaster Preparedness Resources Centre. *Comprehensive Symposium Proceedings*. Vancouver, BC: University of British Columbia.

Scheidegger, A. E. (1994). Hazards: Singularities in Geomorphic Systems. *Geomorphology*, 10: 19-25.

Schipper, L. & Pelling, M. (2006). Disaster Risk, Climate Change and International Development: Scope for, and Challenges to, Integration. *Disasters*, 30(1): 19-38.

Schwandt, T.D. (2001). *Dictionary of Qualitative Inquiry*. 2nd ed. Thousand Oaks, CA: Sage Publications.

Sen, A. (1981). *Poverty and Famine: An Essay on Entitlement and Deprivation*. Oxford: Clarendon Press.

Sen, A. (1992). *Inequality Re-examined*. Oxford: Clarendon Press.

Shaw, E. (1999). A Guide to the Qualitative Research Process: Evidence from a small firm study. *Qualitative Market Research: An International Journal*, 2(2): 59-70.

Silverman, D. (2000). *Doing Qualitative Research: A Practical Handbook*. London: Sage Publications.

Smit, B. (2003). Can Qualitative Research Inform Policy Implementation? Evidence and Arguments from a Developing Country Context. *Forum: Qualitative Social Research*, 4(3): 45-52.

Smith, J.V. (1985). Protecting the human race against natural hazards: asteroids, comets, volcanoes, earthquakes. *Geology*, 13: 675-678.

Smith, K. (2001). *Environmental Hazards : Assessing Risk and Reducing Disaster*. 3rd ed. London: Routledge.

Smith, K. (2004). *Environmental Hazards: Assessing Risk and Reducing Disaster*. 4th ed. London & New York: Routledge.

South Africa. (1996). *Constitution of the Republic of South Africa Act 108 of 1996*. Pretoria: Government Printer.

South Africa. (1998). *Skills Development Act No 97 of 1998*. Pretoria: Government Printer.

South Africa. (1999). *Skills Development Levies Act No 9 of 1999*. Pretoria: Government Printer.

South Africa. (2002). *Disaster Management Act No 57 of 2002*. Pretoria: Government Printer.

South Africa. (2005). *National Disaster Management Framework*. Pretoria: Government Printer.

Sperling, F & Szekely, F. (2005). *Disaster Risk Management in a Changing Climate*. Informal Discussion paper prepared for the World Conference on Disaster Reduction on behalf of the Vulnerability & Adaptation Resource Group (VARG). [Web:<http://Siteresources.worldbank.org/INTDISMGMT/resources>]. [Date of Access: 06 September 2005].

Steinbrugge, K.V. (1982). *Earthquakes, Volcanoes and Tsunamis: An Anatomy of Hazards*. New York: Skandia America Corporation.

Strauss, A. & Corbin, J. (1998). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. California: Sage Publications, Inc.

Susman, P., o' Keefe, P. & Wisner, B. (1984). Global Disasters: A Radical Interpretation. In Hewitt, K. (ed), *Interpretations of Calamity from the Viewpoint of Human Ecology*. Boston: Allen & Unwin: 264-283.

Thomalla, F., Downing, T., Spanger-Siegfried, E., Han, G., & Rockström, J. (2006). Reducing Hazard Vulnerability: Towards a common approach between Disaster Risk Reduction and Climate Adaptation. *Disasters*, 30(1): 39-48.

Tobin, G.A. & Montz, B.E. (1997). *Natural Hazards: Explanations and Integration*. New York: The Guilford Press.

Torry, W.I. (1979). Hazards, Hazes and Holes: a Critique of the Environment as Hazard and General Reflections on Disaster Research. *Canadian Geographer*, 23(4): 368-383.

Townsend, P. (1987). Deprivation. *Social Policy*, 16(2): 125-164.

Turner, B.A. (1976). The development of disasters; a Sequence Model for the analysis of the origin of Disasters. *The Sociological Review*, 24(4): 753-774.

Turner, B.L., Kasperson, R.E., Matson, P.A., McCarthy, J.J. & Corell, R.W. (2003). A Framework for Vulnerability Analysis in Sustainability Science. *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, 100(14): 8074-8079.

Twigg, J. (2001). *Corporate Social Responsibility and Disaster Reduction: An Overview*. London: Benfield Greig Hazard Research Centre.

Twigg, J. (2002). The Human Factor in Early Warnings: Risk Perception and Appropriate Communications. *Early Warning Systems for Natural Disaster Reduction*: Springer-Verlag: 19-26.

Twigg, J. (2004a). *Good Practice Review: Disaster Risk Reduction – Mitigation and Preparedness in Development and Emergency Programming*. London: Humanitarian Practice Network (HPN).

Twigg, M. (2004b). *Disaster Risk Reduction: Mitigation and Preparedness in Development and Emergency Programming*. London: Overseas Development Institute.

(UN) United Nations. (2005). International Strategy for Disaster Reduction. *General Assembly Resolution/RES /59/231*: 22 February.

(UNDP) United Nations Development Programme. (2002). *Gujarat Transition Recovery Team: A Synopsis*. New York: United Nations Development Programme.

(UNDP) United Nations Development Programme. (2004). *A Global Report: Reducing Disaster Risk – A Challenge for Development*. [Web:<http://www.undp.org/bcpr>]. [Date of Access: 18th February 2005].

(UNDRO) Office of the United Nations Disaster Relief Co-ordinator. (1980). Natural Disasters and Vulnerability Analysis. *Report of the Expert group Meeting on Vulnerability Analysis*, 9-12 July.

Varley, A. (ed). (1994). *Disasters, Development and Environment*. England: John Wiley & Sons Ltd.

Vermaak, J & Van Niekerk, D. (2004). Development Debate & Practice: Disaster Risk Reduction initiatives in South Africa. *Development Southern Africa*, 21(3): 555-574.

Weichselgartner, J & Obersteiner, M. (2002). Knowing Sufficient and Applying More: Challenges in Hazards Management. *Environmental Hazards*, 4: 73-77.

Welman, C.; Kruger, F. & Mitchell, B. (2005). *Research Methodology*. 3rd ed. Cape Town: Oxford University Press.

Westgate, K.N. & o'Keefe, P. (1976). *Some Definitions of Disaster*. Disaster Research Unit Occasional Paper No 4, Department of Geography, University of Bradford.

White, G.F. (1973). An Interaction of People and Nature. In Alcantara-Ayala, I. *Science-Direct Geomorphology*, 47(2-4).

White, G.F., Kates, R.W. & Burton, I. (2001). Knowing Better and Losing even more: The use of Knowledge in Hazards Management. *Environmental Hazards*, 3: 81-92.

Wijkman, A. & Timberlake, L. (1984). *Natural Disasters : Acts of God or Acts of Man?*. London: Earthscan.

Winchester, P. (1992). *Power, Choice and Vulnerability: A Case Study in Disaster Mismanagement in South India*. London: James and James.

Wisner, B. (2003). Disaster Vulnerability: Scale, Power and Daily Life. *GeoJournal*, 30(2): 127-140.

Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2004). *At Risk: Natural Hazards, People's Vulnerability and Disasters*. 2nd Ed. New York:Routledge.

Wolcott, H.F. (1990). *Writing up Qualitative Research*. San Francisco: Sage Publications.

Woods, P. (1999). *Successful Writing for Qualitative Researchers*. London: Routledge.

World Bank. (2008). *World Bank Good Practice: Disaster Risk Reduction*. [Web:<http://www.worldbank.org>]. [Date of Access: 19 June 2009].

World Summit on Sustainable Development (WSSD). (2002). *United Nations: Johannesburg Summit*. [Web:<http://www.un.org/jsummit/htm>]. [Date of Access: 6 September 2005].

Yodmani, S. (2002). *Disaster Risk Management and Vulnerability Reduction: Protecting the Poor*. [Web:<http://www.unpan1.un.org/intradoc>]. [Date of Access: 19 April 2005].

Zhai, G. & Ikeda, S. (2006). Flood Risk Acceptability and Economic Value of Evacuation. *Risk Analysis*, 26(3): 683-694.

ANNEXURE: A

SAMPLE OF DISASTER RISK ASSESSMENT QUESTIONNAIRE AND INTERVIEW SCHEDULE

SECTION: A

BIOGRAPHICAL DATA

1. Name of Organization:.....

2. Municipal Category/Classification:

Metro	District	local
-------	----------	-------

3. Directorate /Section:

4. Physical Area of Jurisdiction: From Zone.....To
Zone.....

5. Size of Area (Radius covered in m2).....

6. Demographic Breakdown of physical Area/Zones: (Example Zone A- Umlazi:
60 % Urban and 40 % rural)

% Urban.....and % Rural.....

.....
.....

7. Population Size of Area:

8. Delimitation of population size according to Zones

.....
.....

9. Staff Profile within the Disaster Management Directorate/Section:

Designation/Rank	Field of Specialisation	Qualification	Years of Experience	Allocated Zone/s

10. Total Number of Staff:

SECTION: B

RELATIONSHIP BETWEEN DISASTER RISK ASSESSMENT & DISASTER RISK REDUCTION:

1. Does your organization regard Disaster Risk Assessment as important?

YES	NO
-----	----

2. Is Disaster Risk Assessment (DRA) necessary within your institution?

YES	NO
-----	----

3. Do you believe that DRA is a priority within your organization?

YES	NO
-----	----

4. Currently, DRA is undertaken as: (Likert Scale)

	1 Strongly Agree	2 Agree	3 Neither Disagree nor Agree	4 Disagree	5 Strongly Disagree
4.1 compliance with legislative Requirements.					
4.2 a pro-active disaster reduction mechanism					
4.3 the first step towards developing a disaster plan					
4.4 a means to responding to disaster situations					
4.5 part of the disaster recovery & rehabilitation process					

5. Conceptualization of DRA process within the institution (Quintile Classification)

	1 Zero to Very Low	2 Low	3 Moderate	4 High	5 Very High
5.1 knowledge of the DRA process by Managers					
5.2 understanding of the DRA process by Disaster Management functionaries					

5.3 understanding of the DRA process by Service Departments					
5.4 understanding of the DRA process by other departments					
5.5 recognition of the purpose of DRA by Management					
5.6 value assigned to DRA process within the organization					
5.7 importance linked to the outcome/results of DRA by Management					
5.8 DRA practice is directed towards disaster risk reduction					

6. Current practice suggest that DRA is a Specialised Function

	1 Absolutely True	2 Largely True	3 Moderately True	4 Sometimes True	5 Never True
6.1 DRA is a Scientific process					
6.2 DRA needs to be undertaken by experts with speacialised knowledge & skills					
6.3 DRA requires professional education, training & development					
6.4 DRA can only be undertaken by individuals with relevant qualifications					
6.5 DRA is a costly process					
6.6 DRA is time-consuming					

7. Is DRA undertaken within your organization?

YES	NO
-----	----

8. What is the frequency of the DRA process within your organization?

On-going	Yearly	Once every 3 years	Once every 5 years	When the need arises
----------	--------	--------------------	--------------------	----------------------

9. Does your institution regard the DRA process as a strategy towards Disaster Risk Reduction (DRR)?

YES NO

9.1 If YES, state how DRA is linked to DRR initiatives within your institution.....

.....

9.2 If NO, provide evidence of other strategies used in DRR within your institution

.....

10. Who is involved in the DRA process within your organization? Identify all stakeholders, both internal & external to the organization.....

.....

11. Does your organization make use of consultants in the DRA process?

YES NO

12. Is the DRA process driven by the consultants (as experts in the field)?

YES NO

13. What role does the consultant play in the DRA process within your organisation?

.....

14. Does your institution invest in training and development of disaster management functionaries as role-players in DRA?

YES NO

14.1 If YES, Specify the various training & development actions and programmes within your institution

.....

15. Does your institution engage the community in the DRA process?

YES NO

15.1 To what extent is the community consulted in DRA? Elaborate as to what stage (when?) and to what degree (how?) the community is included in DRA.....

15.2 Clarify the role of the community, presently in DRA in your organization

.....

 16. Are there other stakeholders (besides the consultants & the community) involved in the DRA process?

☐ YES ☐ NO

16.2 Identify and describe the critical role they play in DRA.....

17. Does your organization offer training and capacity development programmes targeting the community and all other stakeholders involved in DRA?

☐ YES ☐ NO

17.1 If YES, provide details and evidence in respect of training & capacity building programmes within your organization

18. Within your organization, are there structures and systems in place to support stake-holder participation?

☐ YES ☐ NO

18.1 If YES, Specify the various disaster management structures & systems within your organization.....

19. How often do they meet?

Once every quarter	Twice a year	Once a year	When the need arises
--------------------	--------------	-------------	----------------------

20. How do these structures and systems operate? Substantiate in terms of its composition, purpose and functions

SECTION: C

CURRENT DRA PRACTICE

1. Does your institution have the necessary staff capacity to undertake DRA?

Absolutely Yes	Not Really	No
----------------	------------	----

1.1 If YES, substantiate your response to the effectiveness in undertaking DRA within your institution

.....

.....

.....

1.2 If NO, provide evidence in relation to the ineffectiveness & problems experienced in undertaking DRA within your institution

.....

.....

.....

2. Do you think that your organization has the relevant resource support to effectively carry out DRA?

Absolutely Yes	Not Really	No
----------------	------------	----

2.1 If YES, support your answer by drawing on practical examples within your organization.....

.....

.....

2.2 If NO, explain the problems encountered within your organization, as a result of the lack of resource support to carry out DRA

.....

.....

.....

3. Does your institution outsource the DRA function to consultants?

Absolutely Yes	Not Really	No
----------------	------------	----

3.1 If YES, share your institutions' reasoning around outsourcing the DRA function

.....

.....

.....

3.2 If NO, present your institutions' logical deductions against outsourcing of the DRA function

.....

.....

4. To what extent does your organization employ the use of consultants' services in DRA?

A	B	C	D
0 %	10 % - 40 %	50 % - 70 %	80 % - 100 %

5. Do you consider the services of consultants necessary in DRA?

Absolutely Yes	Not Really	No
----------------	------------	----

5.1 If YES, justify your arguments by presenting the merits (value) of utilizing the services of consultants in DRA

.....

5.2 If NO, explain the demerits and problems anticipated in pursuing the services of consultants in DRA

.....

.....

6. Does the use of consultants provide added value to the DRA process?

Absolutely Yes	Not Really	No
----------------	------------	----

6.1 If YES, Elaborate on issues like Guidance, Leadership, Structure and Disaster Plan

.....

.....

.....

7. What are your personal views on the issue of outsourcing or the use of consultants in DRA?

.....

.....

8. General Remarks/Comments on DRA within your organization

.....

.....

INTERVIEW SCHEDULE:

DATE :.....

CURRENT DRA PRACTICE WITHIN.....

1. Evidence in relation to knowledge and awareness of Legislative and policy requirements around DRA (structures, systems, procedures and guidelines)

.....
.....

2. Identify the formal and non-formal structures and systems established, by your organization, to facilitate DRA

.....
.....
.....

3. Primary purpose/objective of DRA in your organization

.....
.....
.....

4. Is DRA identified as one of the strategic goals of the organization?
Elaborate

.....
.....
.....

5. What would you regard as the key elements of DRA at local government level?

.....
.....
.....

6. Provide insight into the current DRA practice within your institution (phases, stakeholders & their roles and instruments used)

.....
.....
.....
.....

7. What are the real challenges and difficulties experienced, by your organization, in the DRA process?

.....
.....

.....
.....
.....
.....
.....

8. Suggest practical solutions to the problems highlighted in (7) above

.....
.....
.....

9. With your Disaster Management experiences, what in your opinion should be done to promote effective DRA within Local Government

.....
.....
.....

10. Would you consider the use of a model valuable in providing an appropriate structure for conducting risk assessment?

Absolutely Yes	Not Really	No
----------------	------------	----

10.1 If YES, provide motivation in support of the use of Models in DRA

.....
.....

10.2 If NO, consider arguments against the use of Models in DRA.....

.....
.....

11. What do you foresee as the benefits in adopting a model approach in undertaking DRA within your organisation

.....
.....

12. Can you identify challenges in implementing a DRA model within your institution?

.....
.....
.....

13. In your opinion, what constitutes an ideal DRA Model for Local Government in S A?

.....
.....

ANNEXURE B:

FOCUS GROUP FEEDBACK ON QUESTIONNAIRE AND INTERVIEW SCHEDULE

SECTION: A

BIOGRAPHICAL DATA

1. Name of Organization: **Ethekwini Municipality**

2. Municipal Category/Classification:

<input checked="" type="checkbox"/> Metro	<input type="checkbox"/> District	<input type="checkbox"/> local
---	-----------------------------------	--------------------------------

3. Directorate /Section: **Emergency Services Unit, Fire And Disaster Management**

4. Physical Area of Jurisdiction: From Zone **Stanger/Umkomaas/Hamersdale**.....To Zone.....

5. Size of Area (Radius covered in m2) **+ - 2300 Sq Km**

6. Demographic Breakdown of physical Area/Zones: (Example Zone A- Umlazi:
60 % Urban and 40 % rural)
% Urban 70 and % Rural 30

7. Population Size of Area: **3.3million**

8. Delimitation of population size according to Zones
No delimitation, Zone structure does not exist

9. Staff Profile within the Disaster Management Directorate/Section:

Designation/Rank	Field of Specialisation	Qualification	Years of Experience	Allocated Zone/s
Manager 1	Generic DM	M degree	29yrs	Nil
Disaster Management Co-ordinator 1	Generic DM	Nil	14yrs	Nil
Disaster Management Officer 3	Generic DM	National Dip (1)	14yrs	Nil

10. Total Number of Staff: ...**5 staff**

SECTION: B

RELATIONSHIP BETWEEN DISASTER RISK ASSESSMENT & DISASTER RISK REDUCTION:

1. Does your organization regard Disaster Risk Assessment as important?

YES X	NO
-------	----

2. Is Disaster Risk Assessment (DRA) necessary within your institution?

YES X	NO
-------	----

3. Do you believe that DRA is a priority within your organization?

YES X	NO
-------	----

4. Currently, DRA is undertaken as: (Likert Scale)

	1 Strongly Agree	2 Agree	3 Neither Disagree nor Agree	4 Disagree	5 Strongly Disagree
4.1 compliance with legislative Requirements.			X		
4.2 a pro-active disaster reduction mechanism			X		
4.3 the first step towards developing a disaster plan			X		
4.4 a means to responding to disaster situations			X		
4.5 part of the disaster recovery & rehabilitation process			X		

5. Conceptualization of DRA process within the institution (Quintile Classification)

	1 Zero to Very Low	2 Low	3 Moderate	4 High	5 Very High
5.1 knowledge of the DRA process by Managers	X				
5.2 understanding of the DRA process by Disaster Management functionaries				X	

5.3 understanding of the DRA process by Service Departments	X				
5.4 understanding of the DRA process by other departments	X				
5.5 recognition of the purpose of DRA by Management	X				
5.6 value assigned to DRA process within the organization	X				
5.7 importance linked to the outcome/results of DRA by Management	X				
5.8 DRA practice is directed towards disaster risk reduction	X				

6. Current practice suggest that DRA is a Specialised Function

	1 Absolutely True	2 Largely True	3 Moderately True	4 Sometimes True	5 Never True
6.1 DRA is a Scientific process			X		
6.2 DRA needs to be undertaken by experts with speacialised knowledge & skills			X		
6.3 DRA requires professional education, training & development			X		
6.4 DRA can only be undertaken by individuals with relevant qualifications			X		
6.5 DRA is a costly process			X		
6.6 DRA is time-consuming		X			

7. Is DRA undertaken within your organization?

YES ☐ NO ☒

8. What is the frequency of the DRA process within your organization?

On-going	Yearly	Once every 3 years	Once every 5 years	When the need arises <input checked="" type="checkbox"/>
----------	--------	--------------------	--------------------	--

9. Does your institution regard the DRA process as a strategy towards Disaster Risk Reduction (DRR)?

YES	NO <input checked="" type="checkbox"/>
-----	--

9.1 If YES, state how DRA is linked to DRR initiatives within your institution

.....

.....

9.2 If NO, provide evidence of other strategies used in DRR within your institution

Process been budgeted for but not implemented as yet......

10. Who is involved in the DRA process within your organization? Identify all stakeholders, both internal & external to the organization .

All stakeholders – Business/private sector/Community structures/other organs of state/electorate/line function Depts.....

.....

11. Does your organization make use of consultants in the DRA process?

YES <input checked="" type="checkbox"/>	NO
---	----

12. Is the DRA process driven by the consultants (as experts in the field)?

YES <input checked="" type="checkbox"/>	NO
---	----

13. What role does the consultant play in the DRA process within your organisation?

Manage the whole process

.....

.....

14. Does your institution invest in training and development of disaster management functionaries as role-players in DRA?

YES	NO <input checked="" type="checkbox"/>
-----	--

14.1 If YES, Specify the various training & development actions and programmes within your institution.....

.....

.....

15. Does your institution engage the community in the DRA process?

YES <input checked="" type="checkbox"/>	NO
---	----

15.1 To what extent is the community consulted in DRA? Elaborate as to what stage (when?) and to what degree (how?) the community is included in DRA
It is envisaged that community structures will be consulted to make use of “grass roots” knowledge.....

15.2 Clarify the role of the community, presently in DRA in your organization
NIL. Still in planning phase.....

16. Are there other stakeholders (besides the consultants & the community) involved in the DRA process?

YES	NO
------------	----

16.2 Identify and describe the critical role they play in DRA
Risk assessments are a multi-disciplinary responsibility – other role players would have vital strengths/capacities/expertise important to the process.....

17. Does your organization offer training and capacity development programmes targeting the community and all other stakeholders involved in DRA?

YES	NO
------------	----

17.1 If YES, provide details and evidence in respect of training & capacity building programmes within your organization

Volunteer training programs/learnerships.....

18. Within your organization, are there structures and systems in place to support stake-holder participation?

YES	NO
-----	-----------

18.1 If YES, Specify the various disaster management structures & systems within your organization.....

19. How often do they meet? N/A

Once every quarter	Twice a year	Once a year	When the need arises
--------------------	--------------	-------------	-----------------------------

20. How do these structures and systems operate? Substantiate in terms of its composition, purpose and functions... **N/A. To be created in due course**

SECTION: C

CURRENT DRA PRACTICE

1. Does your institution have the necessary staff capacity to undertake DRA?

Absolutely Yes	Not Really	No X
----------------	------------	------

1.1 If YES, substantiate your response to the effectiveness in undertaking DRA within your institution

1.2 If NO, provide evidence in relation to the ineffectiveness & problems experienced in undertaking DRA within your institution

Process to be undertaken

2. Do you think that your organization has the relevant resource support to effectively carry out DRA?

Absolutely Yes	Not Really	No X
----------------	------------	------

2.1 If YES, support your answer by drawing on practical examples within your organization.

2.2 If NO, explain the problems encountered within your organization, as a result of the lack of resource support to carry out DRA...

Process of DRA has been delayed/deferred as a result.

3. Does your institution outsource the DRA function to consultants?

Absolutely Yes X	Not Really	No
------------------	------------	----

3.1 If YES, share your institutions' reasoning around outsourcing the DRA function.

Speed of service being provided versus capacity/resource challenges

3.2 If NO, present your institutions' logical deductions against outsourcing of the DRA function

.....

.....

4. To what extent does your organization employ the use of consultants' services in DRA?

A 0 %	B 10 % - 40 %	C 50 % - 70 %	D 80 % - 100 % X
----------	------------------	------------------	---------------------

5. Do you consider the services of consultants necessary in DRA?

Absolutely Yes	Not Really X	No
----------------	--------------	----

5.1 If YES, justify your arguments by presenting the merits (value) of utilizing the services of consultants in DRA

.....

.....

5.2 If NO, explain the demerits and problems anticipated in pursuing the services of consultants in DRA.....

The expertise exists within the Branch. Own staff familiar with area of jurisdiction/validity and accuracy of the study may be questionable/recommendations may be impractical

.....

.....

6. Does the use of consultants provide added value to the DRA process?

Absolutely Yes	Not Really X	No
----------------	--------------	----

6.1 If YES, Elaborate on issues like Guidance, Leadership, Structure and Disaster Plan....

...In terms of providing guidance and instruction use of specialized tools also "one cannot be a prophet in own home town"

.....

.....

.....

7. What are your personal views on the issue of outsourcing or the use of consultants in DRA?

There is a place for them in the process. They should form part of the DM team for the duration of the exercise

.....

.....

8. General Remarks/Comments on DRA within your organization...

It is fundamental and should inform the IDP. DRA should be an integrated tool to inform developmental initiatives

.....

INTERVIEW SCHEDULE:

DATE : October 2009

CURRENT DRA PRACTICE WITHIN... **Formal and comprehensive DRA still to be implemented withn the EM.....**
.....

1. Evidence in relation to knowledge and awareness of Legislative and policy requirements around DRA (structures, systems, procedures and guidelines)

A comprehensive approach is still to be implemented – consequently the process follows a “when and where” necessary approach.....
.....

2. Identify the formal and non-formal structures and systems established, by your organization, to facilitate DRA...

Structures are still to be established
.....

3. Primary purpose/objective of DRA in your organization...

DRA's are undertaken on an Ad-hoc basis.....
.....

4. Is DRA identified as one of the strategic goals of the organization?

Elaborate

Yes – it features as a specific item in the local DM Framework still to be adopted.....
.....

5. What would you regard as the key elements of DRA at local government level?

Multi-disciplinary/multi-dimensional/integrated/transparent
.....

6. Provide insight into the current DRA practice within your institution (phases, stakeholders & their roles and instruments used)

It must follow thye SMART Principle –sustainable – measureable – achievable – relevant – time frames related.....
.....

7. What are the real challenges and difficulties experienced, by your organization, in the DRA process?

Lack of resources and senior management support
.....
.....

8. Suggest practical solutions to the problems highlighted in (7) above...
**staff/funding/resources/recognition of strategic value of the
function/training/public education/internal education.....**

9. With your Disaster Management experiences, what in your opinion should
be done to promote effective DRA within Local Government
**It should be a strategic goal that features prominently in the
IDP.....**

10. Would you consider the use of a model valuable in providing an
appropriate structure for conducting risk assessment?

<input checked="" type="radio"/> Absolutely Yes	<input type="radio"/> Not Really	<input type="radio"/> No
---	----------------------------------	--------------------------

10.1 If YES, provide motivation in support of the use of Models in DRA
**The process must be mandated and conducted in a structured and
standardized/uniform manner across all organs of State.....**

10.2 If NO, consider arguments against the use of Models in
DRA.....

11. What do you foresee as the benefits in adopting a model approach in
undertaking DRA within your organization
**Uniformity/integration/standardization/adding value to the
process/promotes management support for the function/compliance/good
business sense/informs planning/impossible to do
without.....**

12. Can you identify challenges in implementing a DRA model within your
institution....
**Funding/training and development/structures and systems needed to
support the approach/paradigm
shift.....**

13. In your opinion, what constitutes an ideal DRA Model for Local Government
in S A? An ideal model would act as a catalyst/platform in promoting all aspects
of Disaster Management.
**Key principles to include consultation/multi disciplinary/multi-
sectoral/transparent/integrated**

SECTION: A

BIOGRAPHICAL DATA

1. Name of Organization: **Ekurhuleni Metropolitan Municipality**

2. Municipal Category/Classification: **Metro**

Metro X	District	local
------------	----------	-------

3. Directorate /Section: **Community Safety: Disaster Management Centre Division**

4. Physical Area of Jurisdiction: **From Zone 1 to Zone 9 (It must be noted that these zones are further clustered per regions i.e. Eastern, Northern and Southern Region)**

5. Size of Area (Radius covered in m²): 1924m²

6. Demographic Breakdown of physical Area/Zones: (Example Zone A- Umlazi: 60 % Urban and 40 % rural) **Ekurhuleni: Urban...95% and %...Rural.5%**

Most of the zones/ regions are 100% Urban

Southern Region: 100% Urban

Zone 1: Germiston, Alberton, including Boksburg, Bedfordview and Primrose = **100% urban**

Zone 2: Thokoza and large part of Katlehong including Palmridge and Eden Park = **100% urban**

Zone 3: Vosloorus and smaller part Katlehong including Dawn Park, Spruitview and Leondale = **100% urban**

Eastern Region: 80% Urban and 10% Rural

Zone 4: Entire Benoni and surrounding townships = **100% urban**

Zone 5: Tsakane, Duduza, and Nigel = **80% urban and 20% Rural**

Zone 6: Entire Kwa Thema and Springs = **100% urban**

Zone 7: Entire Daveyton and Etwatwa = **100% urban**

Northern Region: 100% Urban

Zone 8: Entire Kempton Park and Phomolong including surrounding areas = **100% urban**

Zone 9: Entire Tembisa including Informal Settlement = **100% urban**

7. Population Size of Area: **2 724 230** (Stats SA: 2007/07/01)

8. Delimitation of population size according to Zones

Southern Region: Population Size: Estimated at 945 750

Zone 1: Germiston, Alberton, including Boksburg, Bedfordview and Primrose

Zone 2: Thokoza and large part of Katlehong including Palmridge and Eden Park

Zone 3: Vosloorus and smaller part Katlehong including Dawn Park, Spruitview and Leondale

Eastern Region: Population Size: Estimated at 755 656

Zone 4: Entire Benoni and surrounding townships

Zone 5: Tsakane, Duduza, and Nigel

Zone 6: Entire Kwa Thema and Springs

Zone 7: Entire Daveyton and Etwatwa

Northern Region: Population Size: Estimated at 1022824

Zone 8: Entire Kempton Park and Phomolong including surrounding areas

Zone 9: Entire Tembisa including Informal Settlement

9. Staff Profile within the Disaster Management Directorate/Section:

Designation/Rank	Numbers M F		Field of Specialization	Qualification	Years of Experience	Allocated Zone/s
Executive Director	X		Management	Fire B-Tech and Masters in Disaster Management	15 Yrs	None
Director		X	Management	Masters in Disaster Management	11 Yrs	None
Executive Manager	X		Management and Disaster Operations	Masters in Disaster Management	+_15 Yrs	Corporate
Manager Disaster Management Centre	X		Management and Disaster Operations	B Art, Human Resource Diploma and Disaster Management Diploma	9 Yrs	Corporate
Assistant Manager	X		Disaster	Disaster	8 Yrs	Corporate

Disaster Management Centre			Operations	Management Diploma		
Assistant Manager Disaster Management Centre		X	Disaster Operations	In a process of studying Disaster Management Masters	6 Months	Corporate
Manager Southern Region	X		Management and Disaster Operations	Not Sure	+ _15 Yrs	Southern Region
Snr. Disaster Management Officer Southern Region		X	Disaster Operations	Disaster Management Diploma	+ _4 Yrs	Southern Region
Manager Northern Region		X	Management and Disaster Operations	Disaster Management Diploma	+ _7Yrs	Northern Region
Manager Eastern Region	X		Management and Disaster Operations	Not Sure	+ _15 Yrs	Eastern Region
Deputy Manager Eastern Region	X		Disaster Operations	Not Sure	+ _10 Yrs	Eastern Region

10. Total Number of Staff: 11

SECTION: B

DISASTER RISK ASSESSMENT:

1. Does your organization regard Disaster Risk Assessment as important?

☒ YES ☐ NO

2. Is Disaster Risk Assessment (DRA) necessary within your institution?

☒ YES ☐ NO

3. Do you believe that DRA is a priority within your organization?

☐ YES ☒ NO

The focus is more on Ekurhuleni Municipality is on infrastructural development and service provision e.g. water, electricity, sanitation, etc.

4. Currently, DRA is undertaken as: (Linker Scale)

	1 Strongly Agree	2 Agree	3 Neither Disagree Or Agree	4 Disagree	5 Strongly Disagree
4.1 compliance with legislative requirements.		X			
4.2 a pro-active disaster reduction mechanism		X			
4.3 the first step towards developing a disaster plan		X			
4.4 a means to responding to disaster situations			X		
4.5 part of the disaster recovery & rehabilitation process			X		

5. Conceptualization of DRA process within the institution (Quintile Classification)

	1 Zero to Very Low	2 Low	3 Moderate	4 High	5 Very High
5.1 knowledge of the DRA process by Managers		X			
5.2 understanding of the DRA process by Disaster Management functionaries				X	
5.3 understanding of the DRA process by Service Departments		X			
5.4 understanding of the DRA process by other departments	X				
5.5 recognition of the purpose of DRA by Management		X			
5.6 value assigned to DRA process within the organization		X			
5.7 importance linked to the outcome/results of DRA by Management			X		
5.8 DRA practice is directed towards disaster risk reduction			X		

6. Current practice suggest that DRA is a Specialized Function

	1 Absolutely True	2 Largely True	3 Moderately True	4 Sometimes True	5 Never True
6.1 DRA is a Scientific process	X				
6.2 DRA needs to be undertaken by experts with specialized knowledge & skills	X				
6.3 DRA requires professional education, training & development	X				
6.4 DRA can only be undertaken by individuals with relevant qualifications				X	
6.5 DRA is a costly process	X				
6.6 DRA is time-consuming	X				

7. Is DRA undertaken within your organization?

YES	NO
------------	----

8. When is DRA undertaken? Explain:

DRA should be undertaken on the regular basis. However the current practice in Ekurhuleni is that it is undertaken biannually.

9. What is the frequency of this process (DRA)?

On-going	Yearly	Once every 3 years	Once every 5 years	When the need arises
----------	--------	---------------------------	--------------------	----------------------

10. Who is involved in the DRA process?

DRA process involves the following stakeholders:

- ❖ The community
- ❖ The Disaster Management functionaries
- ❖ Other structures of government; i.e. CDW
- ❖ SAPS
- ❖ Private Companies e.g. Sasol, Eskom, Rand Water, ACSA etc
- ❖ Consultants
- ❖ Other municipal departments

❖ Local Political Structure

11. Does your organization make use of consultants in this process?

YES	NO
------------	----

12. Is this process driven by the consultants (as experts in the field)?

YES	NO
------------	----

13. What role does the consultant play in the DRA process?

The consultants are involved the entire process of structuring the process of DRA and collection, and analysis of the information and thereafter they put in their recommendations.

14. Does the institution invest in training and development of disaster management functionaries as role-players in DRA?

YES	NO
------------	----

14.1 If YES, Specify the various actions and programmes in this respect

Actions conducted: Research with what the institution has, they do presentations, and an on job application of lessons learnt.

The Ekurhuleni Disaster Management Centre sent their functionaries to formal training course such as Disaster Risk Management which is equivalent to NQF Level 3.

15. Does your institution engage the community during the DRA process?

YES	NO
------------	----

15.1 To what extent is the community consulted in DRA? Elaborate

The communities were involved in the process in terms of Briefings, Information Gathering and Risk Prioritization. However they were not involved in Risk Review and Feedback.

15.2 Clarify the role of the community, presently in DRA

The communities give inputs in the whole process in terms of data collection i.e. risks/hazards they are facing in the particular community.

16. Are there other stakeholders involved in the process?

YES	NO
------------	----

16.2 Identify and describe the critical role they play in DRA

The Community Development Workers (CDWs) were also involved in the process. They assist in coordinating of the communities as well as providing the link between the local communities, Disaster Management office and the provincial government.

17. Does your organization offer training and capacity development programmes targeting the community and all other stakeholders involved in DRA?

YES ☐ NO ☐

17.1 If YES, provide details and evidence in this respect

During the DRA process the community was briefed before gathering the information as to what entails DRA and why it is important for the communities.

18. Within your organization, are there structures and systems in place to support stake-holder participation?

YES ☐ NO ☐

18.1 If YES, Specify them

The following structures provide platform which support stakeholders' participation:

- ❖ Political Structures in a form of councilors
- ❖ Provincial Structure in the form of CDWs
- ❖ Municipal Advisory Forum in which all departments are represented.

19. How often do they meet?

Once every quarter	Twice a year	Once a year	When the need arises
--------------------	---------------------	-------------	----------------------

20. How do these structures and systems operate? Substantiate

- ❖ **Political Structures in a form of councilors: This structure operates based on the Municipal Structural Act and Municipal Systems Act.**
- ❖ **Provincial Structure in the form of CDWs: The CDW advise the local political leaders in identification of local development needs and challenges. They also have a responsibility to profile the local communities in terms of their vulnerabilities, risks and capacity and channel that information to provincial government and local councilors who will forward the information to the Municipality.**

- ❖ **Municipal Advisory Forum in which all departments are represented:
This structure operates based on the Disaster Management ACT.**

SECTION: C

1. Does your institution have the necessary staff capacity to undertake DRA?

Absolutely Yes	Not Really	No
----------------	------------	----

1.1 Provide arguments for your response in (1) above

Taking in to account the number of officials which is less than 10 and the magnitude of Ekurhuleni area as well as the radius which is huge disaster management officials cannot be expected to perform DRA without consultants. Moreover the disaster functionaries do not have management support to their function. Mostly is because the function is seen as reactive function which has no proactive part to play in the municipality.

2. Do you think that your organisation has the relevant resource support to effectively carry out DRA?

Absolutely Yes	Not Really	No
----------------	------------	----

The organization has insufficient resources in terms of:

- ❖ **Staff capacity and skills**
- ❖ **Relevant equipments e.g. appropriate cars**

2.1 Clarify your answer by drawing on practical examples within your organisation

The DRA is a scientific process that requires information gathering, information analysis and regular updates as well as giving feedback to all the stakeholders. For Ekurhuleni to undertake this using its employees it will mean that staff members will have to concentrate on DRA and overlook other responsibilities.

3. Does your institution outsource this function to consultants?

Absolutely Yes	Not Really	No
----------------	------------	----

3.1 Explain the above (3) situation

There is not enough staff/ officers and no ICT equipment.

4. To what extent does your organisation employ the use of consultants' services in DRA?

The Ekurhuleni uses the consultants in the DRA to the large extent.

5. Do you consider the **services** of consultants necessary in DRA?

Absolutely Yes	Not Really	No
----------------	-------------------	----

5.1 Justify your arguments by presenting the merits and demerits of utilizing the services of consultants

The merits of using the consultants are as follows:

- ❖ **Saves time for the disaster management functionaries to concentrate on our assignments.**
- ❖ **They are impartial and objective in carrying out the DRA**

The demerits of using the consultants are as follows:

- ❖ **The consultants are costly compare to employing extra officials.**
- ❖ **They are more concerned about profit which can be detrimental to the quality of DRA**
- ❖ **They don't transfer the skills to the functionaries.**

6. Does the use of consultants provide added value to the DRA process?

Absolutely Yes	Not Really	No
----------------	-------------------	----

6.1 Elaborate your response to (6) above

On one hand, the consultants are not transferring the material skill to the functionaries to carry out the DRA in future. Moreover to them the opportunity to conduct consultancy is a business opportunity to make profit. However on the other hand the add value I the process as they are neutral during DRA.

7. What are your personal views on the issue of outsourcing or the use of consultants in DRA?

Personally the outsourcing or the use of consultants has it merits and demerits depending on the resource in the organization in terms of human and equipments at the organization disposal.

INTERVIEW SCHEDULE:

DATE: January 2009

CURRENT PRACTICE OF DRA WITHIN...Ekurhuleni Metropolitan Municipality

1. Evidence in relation to knowledge and awareness of Legislative and policy requirements around DRA:

- ❖ **The Ekurhuleni Metropolitan Municipality has conducted the Risk Assessment Study which is expected to be update in every two years. (Copy was handed to the Researcher)**

2. Identify the formal and non-formal structures and systems established to facilitate DRA:

- ❖ **Municipal Advisory Forum**
- ❖ **Dolomite Task Team**
- ❖ **Community Development Workers**
- ❖ **Ward Councilors**
- ❖ **Customer Care Centers**

3. Primary purpose/objective of DRA:

- ❖ **The primary purpose of the DRA in Ekurhuleni is to inform the contingency plans on identified hazards and vulnerabilities. Moreover it is inform the Corporate Disaster Management Plan as well as the direction of development that needs to be undertaken in the municipality.**

4. Is DRA identified as one of the strategic goals of the organization? Elaborate:

- ❖ **One cannot say that DRA is regarded as one of the strategic goals of the organization. For example the Ekurhuleni corporate Integrated Development Plans (IDP) which are required to be informed by DRA according to the Municipal Systems Act were not taken into consideration during the process of developing the IDP in the last years.**

5. What are the key elements of DRA at local government level? :

- ❖ **The involvement of every stakeholder, especially the communities.**
- ❖ **Consultation of the ward councilors**

6. Share the current DRA practice within your institution (phases, stakeholders & their roles and instruments used):

- ❖ All stakeholders were involved in the following DRA phases: Briefings, Information Gathering and Risk Prioritization. But all the stakeholders were not involved in Risk Review. On Feedback it was only the Community Safety Department that was involved in the process. The consultants were the only ones that were responsible for analyzing and giving recommendation to the municipality.

7. What are the real challenges and difficulties experienced in the DRA process? :

- ❖ The attendance of briefing sessions
- ❖ Political interference by the ward councilors

8. Suggest practical solutions to the problems highlighted above:

- ❖ Awareness campaigns on the importance of disaster management and its processes and requirements.
- ❖ Workshops for the politicians on disaster management and their responsibilities as well as our expectations from them.

9. With your experiences, what in your opinion should be done to promote effective DRA within Local Government:

- ❖ The CDW should be utilized effectively in terms of DRA. This means that they and disaster functionaries should be utilized for the DRA to collect information, risk prioritization, risk review and feedback as well as recommendation. However to provide this information to the municipalities the CDWs need to appreciate that they also have the responsibility to the local governments.

10. Would you consider the use of a model valuable in providing an appropriate structure for conducting risk assessment?

Absolutely Yes		Not Really		No
----------------	--	------------	--	----

10.1 If YES, provide motivation in support of the use of Models in DRA.

- a. Strongly lacking, resulting in a disjointed effort towards DRA and disaster risk reduction measures.
- b. Such a framework will assist disaster functionaries to become more involved in the DRA process, rather than relying too heavily on the use of consultants. A clear and practical model should serve to guide the various activities and processes of DRA.

11. What do you foresee as the benefits in adopting a model approach in undertaking DRA within your organization?

- ❖ **Co-ordination of activities will be improved through the use of a common tool.**
- ❖ **Will promote uniformity and standardization in undertaking DRA.**
- ❖ **DRA planning will be drastically improved, if guided by a clear and understandable model. This will positively impact on the DRA process and its outcomes.**

12. Can you identify challenges in implementing a DRA model within your institution?

- ❖ **Necessary budgetary provisions will have to be made to incorporate such a tool.**
- ❖ **Training and development will be crucial to ensure the successful implementation of such approach.**

13. In your opinion, what constitutes an ideal DRA Model for Local Government in South Africa?

- ❖ **A simple and practical, step-by-step model.**
- ❖ **Allows for community participation.**
- ❖ **Includes review and feedback processes.**

SECTION: A

BIOGRAPHICAL DATA

1. Name of Organization:.....Bojanala district municipality.....

2. Municipal Category/Classification:

	District	
--	----------	--

3. Directorate /Section:disaster management centre.....

4. Physical Area of Jurisdiction: From Zone **Moretele** To Zone **Kgetleng Rivier**

5. Size of Area (Radius covered in m2) **1833**

6. Demographic Breakdown of physical Area/Zones: (Example Zone A- Umlazi:
60 % Urban and 40 % rural)

% Urban **22 %** and % Rural **44 %**

Rustenburg 20 % Urban and 80 % Rural

Moretele 10 % Urban and 90 % Rural

Madibeng 60 % Urban and 40 % Rural

Moses Kotane 70 % Urban and 30 % Rural

Kgetleng Rivier 55 % Urban and 45 % Rural

7. Population Size of Area: **estimated at 1.5 to 2million...people**

8. Delimitation of population size according to Zones

.....

.....

9. Staff Profile within the Disaster Management Directorate/Section:

Designation/Rank	Field of Specialisation	Qualification	Years of Experience	Allocated Zone/s
Head	management	Diploma Disaster	10	
IT/GIS officer	IT and GIS	Bsc(Hon)Geography	5	
Risk management officer	Focus on KPA 3 and enabler 2 of national policy	Bsc (Hon)Geography	5	
Risk assessment	Focus on	BAA Basic	1	

officer	KPA 2 of national policy	Ambulance Assistance-paramedic		
2x field officers	Collection of data and disaster relief	BAA	2	
3x radio ops room	Operate radios	BAA	2	

10. Total Number of Staff:**12**... (Actual 9, 3 to be appointed)

SECTION: B

RELATIONSHIP BETWEEN DISASTER RISK ASSESSMENT & DISASTER RISK REDUCTION:

1. Does your organization regard Disaster Risk Assessment as important?

<input checked="" type="checkbox"/>	YES	<input type="checkbox"/> NO
-------------------------------------	------------	-----------------------------

2. Is Disaster Risk Assessment (DRA) necessary within your institution?

<input checked="" type="checkbox"/>	YES	<input type="checkbox"/> NO
-------------------------------------	------------	-----------------------------

3. Do you believe that DRA is a priority within your organization?

<input checked="" type="checkbox"/>	YES	<input type="checkbox"/> NO
-------------------------------------	------------	-----------------------------

4. Currently, DRA is undertaken as: (Likert Scale)

	1 Strongly Agree	2 Agree	3 Neither Disagree nor Agree	4 Disagree	5 Strongly Disagree
4.1 compliance with legislative Requirements.	<input checked="" type="checkbox"/>				
4.2 a pro-active disaster reduction mechanism	<input checked="" type="checkbox"/>				
4.3 the first step towards developing a disaster plan	<input checked="" type="checkbox"/>				
4.4 a means to responding to disaster situations	<input checked="" type="checkbox"/>				
4.5 part of the disaster recovery & rehabilitation			<input checked="" type="checkbox"/> Depends on the		

process			interpretation of the question		
---------	--	--	--------------------------------	--	--

5. Conceptualization of DRA process within the institution (Quintile Classification)

	1 Zero to Very Low	2 Low	3 Moderate	4 High	5 Very High
5.1 knowledge of the DRA process by Managers					✓
5.2 understanding of the DRA process by Disaster Management functionaries				✓	
5.3 understanding of the DRA process by Service Departments			✓		
5.4 understanding of the DRA process by other departments			✓		
5.5 recognition of the purpose of DRA by Management					
5.6 value assigned to DRA process within the organization			✓		
5.7 importance linked to the outcome/results of DRA by Management			✓		
5.8 DRA practice is directed towards disaster risk reduction				✓	

6. Current practice suggest that DRA is a Specialised Function

	1 Absolutely True	2 Largely True	3 Moderately True	4 Sometimes True	5 Never True
6.1 DRA is a Scientific process	✓				
6.2 DRA needs to be undertaken by experts with specialised knowledge & skills		✓			
6.3 DRA requires professional education, training & development		✓			
6.4 DRA can only be undertaken by individuals with relevant qualifications			✓		
6.5 DRA is a costly				✓	

process					
6.6 DRA is time-consuming		✓			

7. Is DRA undertaken within your organization?

✓	YES	NO
---	------------	----

8. What is the frequency of the DRA process within your organization?

✓	On-going	Yearly	Once every 3 years	Once every 5 years	When the need arises
---	-----------------	--------	--------------------	--------------------	----------------------

9. Does your institution regard the DRA process as a strategy towards Disaster Risk Reduction (DRR)?

✓	YES	NO
---	------------	----

9.1 If YES, state how DRA is linked to DRR initiatives within your institution
the results of the DRA process are integrated into the municipal IDP based on a priority rating

9.2 If NO, provide evidence of other strategies used in DRR within your institution

10. Who is involved in the DRA process within your organisation? Identify all stakeholders, both internal & external to the organisation

Staff of the district disaster centre,staff of disaster centres of local municipalities, members of communities where the DRA is undertaken, ward councilors, community development workers.as well as administrative support. Where appropriate we engage individual departments.

11. Does your organization make use of consultants in the DRA process?

YES	✓	NO
-----	---	-----------

12. Is the DRA process driven by the consultants (as experts in the field)?

YES	✓	NO
-----	---	-----------

13. What role does the consultant play in the DRA process within your organisation?

14. Does your institution invest in training and development of disaster management functionaries as role-players in DRA?

✓	YES	NO
---	------------	----

14.1 If YES, Specify the various training & development actions and programmes within your institution

Training programme at the University of Cape Town in Risk Assessment. Staff of the district disaster centre as well as those of the local municipalities have been on this programme

15. Does your institution engage the community in the DRA process?

✓	YES	NO
---	------------	----

15.1 To what extent is the community consulted in DRA? Elaborate as to what stage (when?) and to what degree (how?) the community is included in DRA
Community consultative meetings are held to ensure their participation in the programme. The district disaster centre also uses trained volunteers to ensure a proper link between the disaster centre and communities. The volunteers have been trained through district intervention in 1st adi, use of GPS, practicals of CBRA, basic fire fighting and paraffin safety.

15.2 Clarify the role of the community, presently in DRA in your organization
Provision of data based on local history and knowledge, verification of priorities as affected communities and participation in field exercises in DRA

16. Are there other stakeholders (besides the consultants & the community) involved in the DRA process?

✓	YES	NO
---	------------	----

16.2 Identify and describe the critical role they play in DRA
as in point 10 above. Clrs and CDW;s facilitate the interactive process between the disaster centre and communities

17. Does your organization offer training and capacity development programmes targeting the community and all other stakeholders involved in DRA?

✓	YES	NO
---	------------	----

17.1 If YES, provide details and evidence in respect of training & capacity building programmes within your organization**as in point 15.1 above**.....

18. Within your organization, are there structures and systems in place to support stake-holder participation?

✓	YES	NO
---	------------	----

18.1 If YES, Specify the various disaster management structures & systems within your organisation

Municipal advisory forum and the Interdepartmental Committee on disaster management which is made up of management of the municipality

19. How often do they meet?

<input checked="" type="checkbox"/> Once every quarter	<input type="checkbox"/> Twice a year	<input type="checkbox"/> Once a year	<input type="checkbox"/> When the need arises
---	---------------------------------------	--------------------------------------	---

20. How do these structures and systems operate? Substantiate in terms of its composition, purpose and functions

the Interdepartmental Committee is where internal planning and allocation of departmental responsibilities is done. The Forum includes municipal management as well as all other stakeholders

SECTION: C

CURRENT DRA PRACTICE

1. Does your institution have the necessary staff capacity to undertake DRA?

<input type="checkbox"/> Absolutely Yes	<input checked="" type="checkbox"/> Not Really	<input type="checkbox"/> No
---	---	-----------------------------

1.1 If YES, substantiate your response to the effectiveness in undertaking DRA within your institution

.....

1.2 If NO, provide evidence in relation to the ineffectiveness & problems experienced in undertaking DRA within your Institution

.....
.....
.....

2. Do you think that your organization has the relevant resource support to effectively carry out DRA?

<input checked="" type="checkbox"/> Absolutely Yes	<input type="checkbox"/> Not Really	<input type="checkbox"/> No
---	-------------------------------------	-----------------------------

2.1 If YES, support your answer by drawing on practical examples within your organisation

The disaster centre has 5 field vehicles, a physical disaster centre, basic personnel numbers, a basic radio control room, GPS units, computers, a GIS system, photographic equipment, political support in engaging local communities, administrative support, internet connectivity, telephone systems...

2.2 If NO, explain the problems encountered within your organization, as a result of the lack of resource support to carry out DRA

.....

3. Does your institution outsource the DRA function to consultants?

Absolutely Yes	Not Really	✓ No
----------------	------------	------

3.1 If YES, share your institutions' reasoning around outsourcing the DRA function

.....

3.2 If NO, present your institutions' logical deductions against outsourcing of the DRA Function

DRA is an ongoing process. The DRA process and content must be owned by the disaster centre, the communities and the broader municipality. This approach helps communities to internalize and understand risk and risk avoidance much better. In this way all parties get to have a practical experience which stays with them permanently. In this way affected communities are encouraged to report to the disaster centre any new evolving or developing risks which they become aware of The majority of consultants are not interested in leaving a legacy after completing the task - only the money. The majority of consultants also undertake a desktop computer exercise which is mainly divorced from reality or fact.

4. To what extent does your organization employ the use of consultants' services in DRA?

A ✓ 0 %	B 10 % - 40 %	C 50 % - 70 %	D 80 % - 100 %
------------	------------------	------------------	-------------------

5. Do you consider the services of consultants necessary in DRA?

✓ Absolutely Yes	Not Really	No
------------------	------------	----

5.1 If YES, justify your arguments by presenting the merits (value) of utilising the services of consultants in DRA

only in those situations where we need a scientific verification or analysis of data

5.2 If NO, explain the demerits and problems anticipated in pursuing the services of consultants in DRA

.....

6. Does the use of consultants provide added value to the DRA process?

Absolutely Yes	✓	Not Really	No
----------------	---	------------	----

6.1 If YES, Elaborate on issues like Guidance, Leadership, Structure and Disaster Plan....

.....

7. What are your personal views on the issue of outsourcing or the use of consultants in DRA?

as in 3.2 above

8. General Remarks/Comments on DRA within your organisation
we believe in learning how to do it ourselves with guidance in certain instances, which is why we attend relevant University programmes.

INTERVIEW SCHEDULE:

DATE: **December 2008**

CURRENT DRA PRACTICE WITHIN **Bojanala District Municipality**

1. Evidence in relation to knowledge and awareness of Legislative and policy requirements around DRA (structures, systems, procedures and guidelines).....

Disaster risk assessment is undertaken according to the DRA process, in the Disaster Management Framework.

2. Identify the formal and non-formal structures and systems established, by your organization, to facilitate DRA **Community based forums; Municipal advisory forum and the Interdepartmental Committee on disaster management which is made up of management of the municipality**

3. Primary purpose/objective of DRA in your organization... **To mitigate, prevent and reduce risks**

4. Is DRA identified as one of the strategic goals of the organization? Elaborate ...**YES. Disaster risk assessment features strongly on the strategic plan of the Dept. As such, resources and necessary planning to undertake DRA is an on-going process. Therefore, good progress is being made in terms of community based DRA.**

5. What would you regard as the key elements of DRA at local government level?

The involvement of the community, Ward Councillors, reliance on an inter-disciplinary team of experts, continuous training and development of role-players in the process

6. Provide insight into the current DRA practice within your institution (phases, stakeholders & their roles and instruments used).....

Community based disaster risk assessment is undertaken. The planning begins with communicating with the Ward Councillors in terms of proposed dates to undertake DRA within the specific community. The Ward Councillor serves as a strategic link between the community and the Bojanala District Municipality: Disaster Management Centre. The Councillor confirms the period and assists with the venue to be used. The DRA begins with a day of community workshop on the process and reasons for undertaking such. The informal training and information dissemination process helps with the collection of valuable data from the community members. Volunteers, together with Ward Councillors

are identified for day two, which is the field study. This entails the environmental scanning, using the GPS and other tools to identify the hazards and risks alluded to by the community in Day 1 session. Photos of the respective realities are captured for reporting and necessary review and intervention.. The field survey is is lead by the volunteers and Ward Councillors from the community, identifying the critical areas of concern. This process is usually time-consuming, due to attention to detail, therefore it usually takes 3 to 4 days or longer, depending on various factors influencing the survey of the communities. After the field survey, a meeting of the community to prioritise the high risk and vulnerabilities, as encountered. Thereafter, the disaster team collectively draws up the DRA report and motivates for the necessary interventions and actions to be undertaken within the community. The report is tabled for action at the Interdepartmental Comm on Disaster Management.

.....

.....

.....

7. What are the real challenges and difficulties experienced, by your organization, in the DRA process?

Ward Councillors sometimes fail to inform the community timeously about planned consultative meetings. Resulting in poor attendance at meeting. This means rescheduling, delaying the DRA process. Also, Community complain about different teams demanding their time to look at similar issues, example department of health, environment and education. This is confusing to the community because of expectations created in terms of service delivery

.....

8. Suggest practical solutions to the problems highlighted in (7) above

Ward Councillors and Volunteers must recognize their role in the community and take it seriously and fairly. All members of the community must be informed in good time and be urged to be part of the process. DRA should be carried out with a common voice by all departments affected; working together as a team.....

9. With your Disaster Management experiences, what in your opinion should be done to promote effective DRA within Local Government... **proper practical guidelines to carry out DRA. The planning process of DRA should involve all related departments and sectors, as a core team to carry out the process. The community participation in the process must be encouraged through on-going information sharing and awareness.**

.....

10. Would you consider the use of a model valuable in providing an appropriate structure for conducting risk assessment?

Absolutely Yes

Not Really

No

10.1 If YES, provide motivation in support of the use of Models in DRA

A model will be ideal in guiding the practice of disaster risk assessment. This will help in a co-ordinated and uniformed approach; as specified in the Disaster Management Act.

10.2 If NO, consider arguments against the use of Models in DRA

11. What do you foresee as the benefits in adopting a model approach in undertaking DRA within your organization... **As a tool, it will provide structure and logic to the planning and facilitation process; overcoming the current challenges encountered in carrying out DRA, within the organisation (refer to Question 7, above)**

12. Can you identify challenges in implementing a DRA model within your institution?

Planning in terms of resource needs and training & education of all role-players to support and implement such a tool.

13. In your opinion, what constitutes an ideal DRA Model for Local Government in S A?**It has to focus on community based risk assessment, involving the community; it must be based on integrating and co-ordinating different departments and sectors in the process; it must be simple and easy to use and follow by all role-players; must be transparent.**

SECTION: A

BIOGRAPHICAL DATA

1. Name of Organisation: **STELLENBOSCH MUNICIPALITY**

2. Municipal Category/Classification:

Metro	District	Local
-------	----------	--------------

3. Directorate /Section: **DIRECTORATE: PUBLIC SAFETY
DEPARTMENT: FIRE & RESCUE, DISASTER**

MANAGEMENT

4. Physical Area of Jurisdiction: From **WARD 1 TO WARD 19**

5. Size of Area (Radius covered in m2)...**900km2 or 900 x 900 000 000m²**

6. Demographic Breakdown of physical Area/Zones: (Example Zone A- Umlazi:
60 % Urban and 40 % rural)

WARD 1	50	% URBAN	50	% RURAL
WARD 2	50	% URBAN	50	% RURAL
WARD 3	50	% URBAN	50	% RURAL
WARD 4	50	% URBAN	50	% RURAL
WARD 5	100	% URBAN	0	% RURAL
WARD 6	100	% URBAN	0	% RURAL
WARD 7	100	% URBAN	0	% RURAL
WARD 8	100	% URBAN	0	% RURAL
WARD 9	100	% URBAN	0	% RURAL
WARD 10	60	% URBAN	40	% RURAL
WARD 11	100	% URBAN	0	% RURAL
WARD 12	100	% URBAN	0	% RURAL
WARD 13	100	% URBAN	0	% RURAL
WARD 14	100	% URBAN	0	% RURAL
WARD 15	100	% URBAN	0	% RURAL
WARD 16	100	% URBAN	0	% RURAL
WARD 17	80	% URBAN	20	% RURAL
WARD 18	10	% URBAN	80	% RURAL
WARD 19	40	% URBAN	60	% RURAL

7. Population Size of Area: **Projected average population totals for 2009 is 207 315**.....

8. Delimitation of population size according to Zones **Ward 1 to 19 (above)**
.....

9. Staff Profile within the Disaster Management Directorate/Section:

Designation/Rank	Numbers M F		Field of Specialisation	Qualification	Years of Experience	Allocated Zone/s
HEAD: DM		X	ADMIN / OPERATIONS	?	5 YEARS	GREATER STELLENBOSCH

10. Total Number of Staff: **1 (ONE)**

SECTION: B

DISASTER RISK ASSESSMENT:

1. Does your organization regard Disaster Risk Assessment as important?

YES NO

2. Is Disaster Risk Assessment (DRA) necessary within your institution?

YES NO

3. Do you believe that DRA is a priority within your organization?

YES **NO**

4. Currently, DRA is undertaken as: (Likert Scale)

	1 Strongly Agree	2 Agree	3 Neither Disagree nor Agree	4 Disagree	5 Strongly Disagree
4.1 compliance with legislative requirements.		X			
4.2 a pro-active disaster reduction mechanism		X			
4.3 the first step towards developing a disaster plan	X				
4.4 a means to responding to disaster situations	X				
4.5 part of the disaster recovery & rehabilitation process		X			

5. Conceptualization of DRA process within the institution (Quintile Classification)

	1 Zero to Very Low	2 Low	3 Moderate	4 High	5 Very High

5.1 knowledge of the DRA process by Managers			X		
5.2 understanding of the DRA process by Disaster Management functionaries				X	
5.3 understanding of the DRA process by Service Departments			X		
5.4 understanding of the DRA process by other departments			X		
5.5 recognition of the purpose of DRA by Management		X			
5.6 value assigned to DRA process within the organization		X			
5.7 importance linked to the outcome/results of DRA by Management		X			
5.8 DRA practice is directed towards disaster risk reduction		X			

6. Current practice suggest that DRA is a Specialised Function

	1 Absolutely True	2 Largely True	3 Moderately True	4 Sometimes True	5 Never True
6.1 DRA is a Scientific process				X	
6.2 DRA needs to be undertaken by experts with speacialised knowledge & skills			X		
6.3 DRA requires professional education, training & development				X	
6.4 DRA can only be undertaken by individuals with relevant qualifications					X
6.5 DRA is a costly process					X
6.6 DRA is time-consuming		X			

7. Is DRA undertaken within your organization?

YES	NO
-----	----

8. When is DRA undertaken? Explain

The Cape Winelands District Municipality appointed the Cape Peninsula University of Technology (CPUT) to conduct a DRA program.

A community meeting was held on 15 August 2007, at this meeting, Kayamandi was identified as the area with the highest risk within Stellenbosch Municipality. Subsequent to this the District and CPUT conducted a Participatory Rapid Appraisal Process in Kayamandi on 20 September 2007.

Following a said period of 18 months a similar program was enrolled in the second largest informal settlement in Stellenbosch, namely Langrug Squatter Camp Franschhoek.

The agenda pertained:

- Introduction to disaster, risks and vulnerability concepts
- Hazard identification
- Hazard Prioritization
- The causes and outcomes of hazards

9. What is the frequency of this process (DRA)?

On-going	Yearly	Once every 3 years	Once every 5 years	When the need arises
----------	--------	--------------------	--------------------	----------------------

10. Who is involved in the DRA process?

- Cape Winelands District Municipality
- Team appointed to co-ordinate process (CPUT / UCT)
- Stellenbosch Municipality
- Councillors
- Ward Committee Members
- Members of the community

11. Does your organization make use of consultants in this process?

YES	NO	Other
-----	----	-------

Before 2007 Stellenbosch Municipality made use of consultants.

12. Is this process driven by the consultants (as experts in the field)?

YES	NO	Other
-----	----	-------

13. What role does the consultant play in the DRA process?

Pre 2007:

From previous experience, the consultants appointed only co-ordinated the process, accumulated the info and put it down on paper...

After 2007:

The teams appointed at UCT/CPUT are skilled in mastering the DRA process.

14. Does the institution invest in training and development of disaster management functionaries as role-players in DRA?

☐ YES ☒ NO

14.1 If YES, Specify the various actions and programmes in this respect

.....
.....

15. Does your institution engage the community during the DRA process?

☒ YES ☐ NO

15.1 To what extent is the community consulted in DRA?

Elaborate.....

The community affected is involved throughout the process.

Under mentioned are but a few hazards identified during this public participation process and are fully unpacked during the next phase/s:

1. Fires in informal settlements
2. Veld fires
3. Pollution in rivers
4. Poor hygiene
5. Crime
6. Hazardous materials
7. Aircraft crash
8. Railway accidents
9. Shortage of electricity

15.2 Clarify the role of the community, presently in DRA.....

The only way the above-mentioned examples can be considered as risk / hazards would be to communicate directly with the residents of the specific area identified. Indigenous knowledge plays a vital role during this public participating process.

16. Are there other stakeholders involved in the process?

YES	NO
-----	----

16.2 Identify and describe the critical role they play in DRA.....

Intedepartmental relations as well as a relationship with other stakeholders.

17. Does your organization offer training and capacity development programmes targeting the community and all other stakeholders involved in DRA?

YES	NO	Other
-----	----	-------

- Lack of funds in the division DM.
- Lack of interest from Management to drive the process.

17.1 If YES, provide details and evidence in this respect.....

18. Within your organization, are there structures and systems in place to support stake-holder participation?

YES	NO
-----	----

18.1 If YES, Specify them.....

The Directorates: IDP & Social Development Services interact with the relevant stake-holders to regulate these systems / structures.

19. How often do they meet?

Once every quarter	Twice a year	Once a year	When the need arises
--------------------	--------------	-------------	----------------------

20. How do these structures and systems operate? Substantiate.....

Partnerships between Stellenbosch Municipality and the relevant stake-holders are met to sustain their livelihood.

SECTION: C

1. Does your institution have the necessary staff capacity to undertake DRA?

Absolutely Yes	Not Really	No
----------------	------------	----

1.1 Provide arguments for your response in (1) above.....

DM believes that the Municipality has very component officials to render its services for any DRA to be undertaken. Unfortunately, the divisions work totally in silos which makes the tasks of DM much worse i.e. support and even skills transfer.

2. Do you think that your organization has the relevant resource support to effectively carry out DRA?

Absolutely Yes	Not Really	No
----------------	------------	----

2.1 Clarify your answer by drawing on practical examples within your organization.....

Certain individuals as well as management have a could-care-less attitude towards DM and its initiatives.

3. Does your institution outsource this function to consultants?

Absolutely Yes	Not Really	No
----------------	------------	----

3.1 Explain the above (3) situation.....

On an ongoing basis the District Council source services from providers to render the process of DRA to all local municipalities within its district.

4. To what extent does your organization employ the use of consultants' services in DRA?

None

5. Do you consider the services of consultants necessary in DRA?

Absolutely Yes	Not Really	No
----------------	------------	----

5.1 Justify your arguments by presenting the merits and demerits of utilizing the services of consultants.....

Officials identified within our institution should undergo training to be capable and skilled to perform DRA within its jurisdiction of services. The question remains whether our organisation deems fit to appoint a provider to train the staff identified to lead the DRA process on long term basis.

6. Does the use of consultants provide added value to the DRA process?

Absolutely Yes	Not Really	No
----------------	------------	----

6.1 Elaborate your response to (6) above.....

Indirectly most of the officials within our organisation in some way or the other embark upon the DRA process. By means of training and co-ordination from DM it can be ensured that the process is done efficient and effectively by the different divisions and that we comply with legislative requirements.

7. What are your personal views on the issue of outsourcing or the use of consultants in DRA?

I do not support the idea of outsourcing DRA programs.

INTERVIEW SCHEDULE:

DATE: September 2009

CURRENT PRACTICE OF DRA WITHIN...Stellenbosch Municipal Area

1. Evidence in relation to knowledge and awareness of Legislative and policy requirements around DRA.....

- Disaster Management Plan for the Stellenbosch Municipality.
- Disaster Management Policy for the Stellenbosch Municipality.
- Integrated Development Plans for the Stellenbosch Municipality.
- Portfolio of Evidence submitted to the intervention between the Cape Winelands project and the Cape Peninsula University of Technology and UCT-based on a Community Risk Assessment done for identified informal settlement.
- Occupational Health and Safety and related Legislation, i.e. Water Pollution, Environmental Conservation, as well as the Disaster Management Act and additional Municipal By-Laws, etc.
- The distribution of flyers, pamphlets, brochures, etc. in affected areas.

2. Identify the formal and non-formal structures and systems established to facilitate DRA

- Formal: Cape Winelands District initiative was to train and transfer Community Risk Assessment Skills therefore there was a portfolio of evidence completed for formal assessment and registration of 12 credits in NQF National Data Base. As A result a non-formal relationship with the CWSS Unit in CRA to participate in research.

It was here where it has been realized and acknowledged that Occupational Health and Safety has a vital role to play in disaster risk assessments and risk reduction with vulnerable communities, for it is municipal personnel who are giving effect to this function/duty.

3. Primary purpose/objective of

DRA.....

- Disaster Risk Assessment is aimed at preventing disasters by planning and addressing risks and hazards that increases the vulnerability of communities to a disaster or incident.

4. Is DRA identified as one of the strategic goals of the organization?

Elaborate

- It could be, or shall I say it possibly is as it should be, however I don't think that necessary line directorates, departments, or the municipality as a whole has sought to integrate efforts by linking across one another. The institution as a whole does not ensure that structured and regular integration across department mechanisms for giving effect to this are minimal.

5. What are the key elements of DRA at local government level?

.....

- This are meant to be a way of linking across departments during risk assessment so that planning can be an integrated effort based on inputs from across specialist sectors. Sharing information and perspectives would be an essential element, however ways to implement this are lacking, although the IDP is meant to be the culmination of shared assessments.

At present the municipality only responds and re-acts towards disasters at hand, but a lot still needs to be done as far as preparedness and prevention.

6. Share the current DRA practice within your institution (phases, stakeholders & their roles and instruments

used).....

- After DRA processes in a specific area the relative info are work shopped with internal role-players.
- Further interaction is non-existent. An ideal situation would be for DM to maintain a good relationship with all relevant role-players / stakeholders.

- Occupational Health and Safety Legislation states that employers like the municipality need to protect also other persons (persons affected by the activities of their employees), than their own employees. Administrative tools as well as visual tools were applied in all DRA processes.

7. What are the real challenges and difficulties experienced in the DRA process?

- In especially the larger informal settlements Kayamandi and Langrug, Franschhoek DRA processes tremendous gaps were identified and it became evident that linking across departments during disaster risk assessments are vital so that planning can be so much an integrated effort by all specialist sectors i.e. Law Enforcement and Water Services(Civil), for protection and order and water pollution control respectively.

8. Suggest practical solutions to the problems highlighted above.....

- The integration of efforts by all role-players / stakeholders, specialist etc. involved
- Establishment of a forum to ensure the existence of such a link.

9. With your experiences, what in your opinion should be done to promote effective DRA within Local Government.....

- Co-ordination
- Joint Planning
- Joint Operations
- Commitment towards building a safe, secure environment and a healthy nation.

10. Would you consider the use of a model valuable in providing an appropriate structure for conducting risk assessment?

Absolutely Yes	Not Really	No
----------------	------------	----

10.1 If YES, provide motivation in support of the use of Models in DRA

- Models provide a structured framework to effectively guide the process of disaster risk assessment.

-

11. What do you foresee as the benefits in adopting a model approach in undertaking DRA within your organisation

- Assists in promoting a uniformed and standardized perspective to carrying out disaster risk assessment.
- Will facilitate the sharing and co-ordination of resources.

12. Can you identify challenges in implementing a DRA model within your institution

- Need for structures, systems and processes to be developed and implemented to support such changes.

13. In your opinion, what constitutes an ideal DRA Model for Local Government in S A?

- To be based on a consultative and transparent process
- To involve the community
- Focus on a co-ordinated and multi-disciplinary approach