The Inclusion of Indigenous Knowledge Systems into Disaster Risk Reduction Policy: The Case of Zimbabwe

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DECLARATION

I, Wilfred Lunga, hereby declare that: “The Inclusion of Indigenous Knowledge Systems into Disaster Risk Reduction Policy. The case of Zimbabwe” is my own work, that all sources used or quoted have been indicated and acknowledged by means of complete references, and that this thesis was not previously submitted by me or any other person for degree purposes at this or any other university

Signature **Date**

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ABSTRACT

The need for the focus for inclusion of Indigenous Knowledge (IK) into policy is largely informed by a globalisation process that is characterised by increased knowledge sharing of different cultural and lingual groups. Indigenous knowledge has been an essential survival tool for humans since time immemorial and there is a connection between IK and disaster risk reduction (DRR). Increasingly indigenous knowledge is being valued internationally as a useful resource for dealing with modern problems. The thesis made a case of effectively including IK into DRR policy in Zimbabwe. Focus group discussion, transect walks, document analysis and participatory interviewing methods involving more than 138 participants were employed to gain insights of IK practices and measures used for DRR in four districts (Mangwe, Hwedza, Lupane and Guruve) in Zimbabwe. There are no easy answers for advocating for the inclusion of IK into DRR policy for obtaining IK from participants take time and there is need for patience. However, the main categories of IK emerging from this study contribute to the emerging IK/DRR practices body of knowledge, spanning social science disciplines.

The research found that the most used IK domains for components of DRR identified are individual inherited knowledge and knowledge known to the community. Other IK domains used are knowledge practiced by individuals if known to individuals, acquired the skill to practice it faithfully without modification, individual rights to use the modified and unmodified knowledge according to same rules and acquired the skill to practice it faithfully with modification. Communities that have inherited IK, have abilities to observe their surroundings using plants (environmental ethic) and animals (ecological ethic) to develop indicators that can be used to predict disaster risk. There are many IK experts in rural communities for human and animal health. IK use in DRR is about agency, notwithstanding political and economic context. Rural communities' agency are continuously reviving and becoming more innovative in developing IK technologies for DRR. The inclusion of IK into DRR policy becomes very relevant in that IK categories identified can be used for DRR. Finally, on the basis of the findings suggestions and road map for the inclusion of IK through a broader education strategy has been provided. The suggestion for the inclusion of IK into DRR is either through decentralisation, partnership or devolution. With decentralisation, responsibilities can be delegated with limited authority to dispersed units of hierarchical jurisdiction while in devolution there is a creation of some realms of authority that have

autonomy. The thesis recommended that IK requires institutional linkages reinforcement between DRR and rural sectors (local government, village assemblies, traditional leaders, IK experts) and improving quality of education, and incorporating IK for DRR in the education curriculum from primary schools to university level.

Key words

Indigenous knowledge, Disaster risk reduction, Strategy, policy, Zimbabwe

ACRONYMS

AGRITEX	-	Agriculture Extension
AIDS	-	Acquired Immune Deficiency Syndrome
AZTREC	-	Association of Zimbabwe Traditional Environmental Conservationists
CAMPFIRE	-	Communal Areas Management Programme for Indigenous Resources
CBDRR	-	Community Based Disaster Risk Reduction
CBOs	-	Community Based Organisations
CEO	-	Chief Executive Officer
CPO	-	Civil Protection Organisation
DA	-	District Administrator
DCP	-	Department of Civil Protection
DCPPC	-	District Civil Protection and Planning Committee
DFID	-	Department for International Development
DNPWM	-	Department of National Parks and Wildlife Management
DRR	-	Disaster Risk Reduction
EMA	-	Environmental Management Agency
ENIAKA	-	Enhancing Indigenous Agricultural Knowledge in Africa
FAO	-	Food Agricultural Organization
FGDs	-	Focus Group Discussions
GMB	-	Grain Marketing Board
GNDR	-	Global Network for Disaster Reduction
GOZ	-	Government of Zimbabwe
HFA	-	Hyogo Framework of Action
HIV	-	Human Immunodeficiency virus
IDRC	-	International Development Research Centre
IK	-	Indigenous Knowledge
IKS	-	Indigenous Knowledge Systems
IPCC	-	International Panel for Climate Change
ISDR	-	International Strategy for Disaster Reduction
MLGPRUD	-	Minister of Local Government, Rural and Urban Development
MLGPRUP	-	Minister of Local Government, Rural and Urban Planning
MOHCW	-	Ministry of Health and Child Welfare

NCDM	-	Nepal Centre for Disaster Management
NCPCC	-	National Civil Protection Coordination Committee
NDRMP	-	National Disaster Risk Management Platform
NGO	-	Non Governmental Organisation
PA	-	Provincial Administrator
PAR	-	Pressure and Release
PCPPC	-	Provincial Civil Protection and Planning Committee
PDMT	-	Provincial Disaster Management Team
RDCS	-	Rural Districts Councils
RDDC	-	Rural District Development Committee
SADC	-	Southern Africa Development Community
SL	-	Sustainable Livelihoods
SLF	-	Sustainable Livelihoods Framework
SSDD	-	Social Sciences Disease of Definitions'
UN	-	United Nations
UNDP	-	United Nations Development Programme
UNDRO	-	United Nations Disaster Relief Organization
UNEP	-	United Nations Environment Programme
UNESCO	-	United Nations Educational, Scientific and Cultural Organization
UNICEF	-	United Nations International Children's Emergency Fund
UNISDR	-	United Nations International Strategy for Disaster Reduction
VACS	-	Vulnerability Assessments Committees
VIDCOS	-	Village Development Committees
WSSD	-	World Summit on Sustainable Development
ZESA	-	Zimbabwe Electricity Supply Authority
ZIMVAC	-	Zimbabwe Vulnerability Assessment Committee
ZNA	-	Zimbabwe National Army
ZNEPS	-	Zimbabwe's National Environmental Policy and Strategies
ZRP	-	Zimbabwe Republic Police

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CHAPTER 1

INTRODUCTION AND OVERVIEW OF THE STUDY

1.1 INTRODUCTION

The issue of effectively including indigenous knowledge (IK) into disaster risk reduction policies (DRR) in societies is an emerging paradigm (Cronin *et al.*, 2004a, 2004b; Dekens, 2007a, 2007b). This is largely informed by a globalisation process that is characterised by freedom of international trade, but increasingly, regional economic and political integration initiatives that facilitate increased knowledge sharing by different cultural and lingual groups (Dekens, 2007a). IK has been an essential survival tool for humans since time immemorial (Wisner, 2004; Baumwoll, 2008; Mapara, 2009; Donovan, 2010; Mercer, 2012). In our current period of fast technological and social development, much traditional wisdom has been replaced with modernist global values and has almost been forgotten (Gonese, 1999; Mapara, 2009; Mawere, 2012). However, IK is increasingly being valued internationally as a useful resource for dealing with modern problems (Baumwoll, 2008; Mercer, 2012; Wisner, 2014). This renewed respect for ancient social survival skills partially sprung from the emergence of postmodernism, which recognises diversity as strength, and partially from the current global paradigm of promoting democracy, which values self-determination for communities in favour of imposed colonialist domination (UNEP, 2009; Gandure, 2011). Gandure (2011) further state that domination by colonialists meant the generation and dissemination of knowledge was a vertical process.

Historically, generation and dissemination of disaster risk information and knowledge has adopted a top-down centralised process (Pelling & Uitto, 2001; Alexander, 2006). In that regard, decision- making has historically been the forte of the intellectual community and disaster risk reduction planners (Pelling &Uitto, 2001; Archer, 2010). The shortcomings of this approach in terms of its ability to maximise participation of and partnership with communities has spawned the emergent paradigm of community-based disaster management planning as the more efficient strategy for disaster loss reduction (Rodolfo & Siringan, 2006, Baumwoll, 2008; Arunotai *et al.*, 2008). This new approach has the capacity to galvanize mass participation in disaster risk reduction decision making, thereby creating the public

'buy-in' that is a prerequisite for creating the culture of awareness that is necessary for DRR (Dekens, 2007a; Arunotai *et al.*, 2008; Audet, 2012). Although the new initiatives for reducing the impacts of hazards have gained momentum, it is still true that in many developing societies the process of comprehensive disaster risk reduction has lagged behind (Gonese, 2004; Wisner, 2004, 2010, 2014). The inclusion of IK into policy is also lagging behind, since many scientists, including geographers, belittle it (Donovan, 2010; Wisner, 2004, 2010, and 2014).

Increasing levels of exposure to disaster risk associated with both natural and technological disasters has gone hand-in-hand with human evolution and developments (Badola & Hussain 2005). Many kinds of developments have prompted humankind to occupy more sites in Zimbabwe (Owens *et al*., 2003). In moving forward with a DRR strategy for Zimbabwe, it is clear that alongside the physical hazard risk, the interrelated human, societal and cultural factors surrounding this risk should also be taken into account (Wisner *et al.*, 2004). Thus, the growing interest in IK for DRR in recent years and the increase in disaster events stimulated interest in the topic of the research.

The section below states research objectives, research questions and theoretical grounding for the study. The aim is to improve the practice of disaster risk reduction in Zimbabwe and later the Southern Africa Development Community (SADC) region. The thesis includes a review of the relevant literature, methodology as separate chapters, a synthesis of findings and discussion and conclusion. The following sections provide highlights of the contents of this thesis starting with the orientation and problem statement.

1.2 ORIENTATION AND PROBLEM STATEMENT

Indigenous communities have managed many hazards and disasters, using traditional knowledge to this end for many generations (Sillitoe, 2000, 2004: Baumwoll, 2008). Indigenus communities in many parts of the world have used IK for their needs (Chigora *et al*., 2007, Wisner, 2010). Kuokkanen (2000) and Chigora *et al*., (2007) have posited that natural resources have been used to deal with many calamities for a historically long time. However, the globalisation process, which is characterised by freedom of international trade and political integration including climate change initiatives, has facilitated increased

knowledge sharing by different cultural and lingual groups (Archer, 2010, Audet, 2010). Alexander (2006) explains that the globalisation process, including growth of worldwide travel and telecommunications has also brought regional and local problems to the global agenda. In the current period of fast technological and social development, much traditional wisdom has been replaced with modernist global values and has almost been forgotten (Bane *et al*., 1986; Berkes *et al*., 1995). IK has been an essential survival tool for humans since time immemorial (Wisner, 2010, 2012, 2014). Dekens (2007) posits that IK is increasingly being valued internationally as a useful resource for dealing with modern problems.

A large body of literature has since 1970s highlighted the significance of integrating IK into development and conservation (Dekens, 2007, Baumwoll, 2008; Wisner, 2010). However, the realisation of the importance of IK has not resulted in its incorporation in DRR models and strategies (Babier, 2006, 2007; Nyong *et al*., 2007). Wisner (2010) affirms that the institutions responsible for disaster risk reduction has for sometime ignored local knowledge. It is not until recent years that the existence and usefulness of local knowledge has started to receive recognition (Barnett, 2005; Dekens, 2007a; Baumwoll, 2008). Barrett (1999) and Bakter *et al*., (2010) explains that the work in academia at national and international levels has been on the use of the latest technology on the market as solutions to disaster response and recovery mechanisms. Indigenous bodies of knowledge have remained marginalised, including its custodians, who are not consulted (Berkes, 2008, Wisner, 2010, 2012). Gonese, (1999) and Mapara, (2009) affirms that the empowerment of rural citizens has left much to be desired and most civil society has shunned building on IK coping mechanisms. Authorities in many developing countries failed to realise that serious participation of local political realities is the core of successful DRR and recovery interventions (Pelling, 2007; Mercer *et al*., 2009; Gaillard & Mercer, 2012). The Zimbabwean context is lacking in the area of framing disaster reduction procedures that integrate indigenous worldviews into DRR procedures (Mawere, 2013, Manyena, 2013). The shortcoming of this approach is non-maximisation of participation and partnership with rural communities. Although there are new initiatives for reducing the impacts of hazards that have gained momentum, it is still true that in many developing societies the process of comprehensive disaster risk reduction has lagged behind (Pelling, 2007; Chitakira, 2012). Increasing levels of exposure to disaster risk associated with both natural and technological disasters is affecting humankind in the world (Alexander, 2006).

Modernist values, neo-liberal economics and consumerism, lie at the heart of post-industrial human development (Alexander, 2006). Alexander (2006) asserts that these share a high ranking on the list of causes of current disasters, including climate change. Mitigation and adaptation strategies become essential components of the need to address the current disasters affecting communities (Battista and Baas, 2004; Huntington, 2011). Little attention has been paid to the international political stage to challenge our modern mindsets and lifestyles, or to tap into the lessons we can learn from tried and tested indigenous ways of dealing with disasters (Berkes, 2008; Wisner, 2010; Gundure, 2011).

Zimbabwe, just like any other country in the world, is aware of the many threats that climate change and other disasters presents. Thus, without losing its focus on meeting the challenges presented by disasters and poverty, strategies to deal with climate change should have begun to inculcate IK in its policy thinking to influence its action plans (Manyena, 2013). Mushonga (2009) points out that, despite having access to IK, as in most parts of the world response is mostly reactive, and little thought is being given to how Zimbabwean ancestors might have dealt with the problem and what we can learn from their past actions. Disaster phenomena have been in existence and have periodically affected human survival since the dawn of humanity (Mapara, 2009; Mushonga, 2009; Mushonga *et al*., 2012). It is appropriate to explore some of the indigenous responses to disasters, climate change, both past and present, in the country. This can provide a coherent mosaic of a sensible approach to DRR that is worth considering and affordable to most vulnerable rural communities.

Mawere (2013) has noted that there has been a failure to review and develop appropriate risk reduction strategies and models that are effective, efficient and economic for disaster reduction. The Civil Protection Act of Zimbabwe (1982) defines the basic institutional arrangements for the nation's disaster risk management system and coordinates the various pieces of legislation that relates to fire prevention, integrated water resources management, environmental protection, climate change, land-use, building and land management codes, and risk transfer. Zimbabwe has not moved forward with disaster reduction initiatives that take into account the interaction between human, societal and cultural factors surrounding disaster risk. The Civil Protection Act No. 5 of 1989 of Zimbabwe empowers the Minister of Local Government, Rural and Urban Planning (MLGPRUP) to coordinate disaster

management (GoZ, 1989). This means that the minister's role is to coordinate all the sectors identified in the Civil Protection Act of 1982. The Act is, however, silent on issues that are related to IK that most people use when disasters strike in their communities.

There are challenges in most countries (Mercer *et al*., 2007b; Mercer *et al*., 2010) related to how to reconcile modern science and IK without substituting each other. It is also a challenge to respect both sets of values, beliefs and culture and to build on their respective strengths. The generation of the policies, its formatting, comprehensiveness and extent to which people's perceptions and cultural nuances are considered in the provision of policies are not well pronounced in the Civil Protection Act, Chapter 10 of 2001 (analysed in chapter 5). There are various provisions in the Civil Protection Act. Some of these provisions provide for the establishment of the Civil Protection Directorate. The Civil Protection Directorate's responsibilities include establishing, promoting and directing civil protection organisations, including civil protection provinces and civil protection areas. The overarching goal is to assist institutions, ministries, departments, private and non-government organisations to develop plans for emergency preparedness and disaster prevention (GoZ, 2011). The low budgetary allocation for disaster and flood management means no input from vulnerable communities, hence only the elite ideas, models and strategies for disaster reduction prevail (Chinamora, 1995; Chikoto *et al*., 2004).

The legal provisions for setting up a National Civil Protection Fund to finance the development and promotion of civil protection measures are quite encouraging. However, the effectiveness of such a provision is dependent on the Government of Zimbabwe's fiscal budget (UNDP, 2010; GoZ, 2011a). Usually a system on paper coupled with a shortage of corresponding financial commitment, is likely to yield poor outcomes. It is this gap in Zimbabwe's draft disaster management framework that this thesis seeks to address by including IK in DRR policy. DRR reflects this idea of viewing disasters as originating from socio-economic and political challenges, rather than natural hazards (Wisner *et al*., 2004; Gaillard *et al*., 2007; Wisner, 2014). There has been acknowledgment through research and development organisations of the existence and importance of IK and strategies related to DRR (Baumwoll, 2008; Audet, 2012). However, in practice, there is little documentation that shows how it can function through official channels (Dekens, 2007; Wisner, 2014). In Papua New Guinea (PNG) for instance, the National DRR and Disaster Management Framework for

Action 2005–2015, identified the need to incorporate traditional knowledge into disaster management systems. The matter of how it may be achieved is not specified (Dekens, 2007a; Gero *et al*., 2010).

Mercer *et al*., (2007) points out that IK should be harnessed to address the changes in today's global world. IK can reduce the impact of environmental hazards, and the subsequent consequences for communities found within hazard prone areas (Baumwoll, 2008). IK is composed of different knowledge types, practices and beliefs, values, and worldviews (Mercer, 2010). An understanding is required of IK and practices as adaptive responses to internal and external changes, which result (or not) in disaster preparedness at local level. In order to identify local knowledge on disaster preparedness, one should focus on four key aspects: people's ability to observe their local surroundings, people's anticipation of environmental indicators, people's adaptation strategies, and people's ability to communicate about natural hazards within the community and between generations (Wisner, 2010; Mercer, 2010). Understanding the broader context of livelihood security and sustainability of local communities may assist to prepare for disaster risk. This may also help in building up community resilience in the long term (Langton *et al*., 2005; Gaillard, 2007, Donovan 2010).

Science and technology measures for DRR have gained significant momentum in recent years (Berkes, 2008). Wisner *et al*., (2004) identifies the following for DRR measures:

- The design and implementation of an early warning system that can detect a threat and quickly and accurately warn populations of the threat they face;
- The use of scientific policies to improve public participation in DRR activities;
- The enhancement of knowledge sharing, validation and adaptation of sound practices and lessons learnt in disaster risk management.

The impact of reducing losses has been overshadowed by a combination of higher levels of exposure and higher incidences of failed development that contribute to greater social and environmental risks (Huntington, 2011). As a result, social and economic losses from disaster impacts are at an unprecedented level (Alexander, 2006; Drabek, 2007). The application of measuring techniques, monitoring techniques, sophisticated management strategies and engineering structures, are today seen as the common choices humanity can

utilise to withstand the natural hazards. Manyena, (2013) posited that policy making in the Southern Africa Development Community (SADC) region dealing with disasters is still heavily influenced by this approach. Alexander (2006:3) affirms that there is tendency to regard the modern world as dominated by technology: the ability to speak on the telephone, and receive news by satellite in real time from anywhere in the world. This is despite the fact that most communities of the world's population are excluded from science and technology benefits (Wisner, 2010). As such, it is important to highlight that although strategies and models for the disaster reduction and prevention are universal, their applicability should take into consideration the characteristics of the threatened variables to have a better understanding of the hazards, risk and vulnerabilities of that society (Mercer *et al*., 2009).

Disasters that occurred from 1992 to 2000 in Zimbabwe, particularly floods, drought, HIV/AIDS, birds and armyworm manifestations have set back progress and quality of life for many communities (Maphosa, 1994; Madamombe, 2004; Mazzeo, 2011). The Zimbabwe Rural Vulnerability Assessment Committee (ZIMVAC, 2011) indicates that most of the disasters in the Southern Africa Development Community (SADC) region are not large-scale sudden onset events, and as a result, the region is often not viewed as vulnerable to natural hazards. Alexander (2006) explains that environmental vulnerability can lead to disastrous consequences from even modest hazards. Vulnerability to hazards is the product of a physical and socio-economic phenomenon (Mercer, 2005; Mushongah, 2009) and other factors that can increase or decrease a community's ability to cope and adapt to changes (Wisner, 2001; Wisner, 2003). It can be deduced from the above that if knowledge is equal between local and formal sciences, this may result in opportunity, empowerment and security for local communities (Mercer *et al*., 2007). The inclusion of IK into policy may reduce the social barriers to participation, thus enhancing the capacity of the local communities to solve their own challenges (Yodmani, 2001).

It is important to highlight that DRR cannot afford to be the subject of just any single body of knowledge. The plurality of knowledge systems, that is Western science and IK, has to be taken into consideration for DRR. The application of both scientific research and local knowledge can contribute to equity, opportunity, security and empowerment of local communities (Berkes *et al*., 1995; Berkes *et al*., 2000; Agrawal, 2009a, Wisner, 2012). Proponents of IK (Agrawal, 1995; Baumwoll, 2008a; Mercer *et al*., 2012) argue that local

knowledge helps in scenario analysis, data collection, and management planning, designing of the adaptive strategies to learn and get feedback. They further assert indigenous support institutions to put policies into practice.

External experts focus on technical and scientific aspects, often overlooking local knowledge and traditional coping mechanisms (Berkes *et al*., 1995, 2000, 2009; Alexander, 2006, Blessing Ossai, 2011). Holloway (2003) points out that community in the SADC region have developed a range of coping mechanisms that can easily be disrupted by wrong interventions. There is furthermore a growing concern that the magnitude of the human consequences of disasters is growing with time (Adger *et al*., 2004; Wisner, 2011). The International Panel for Climate Change (IPCC) highlighted that global climate change might be increasing the frequency of El Niño events, which lead with regularity to drought, fires, flooding and famine (Agrawal, 2010; Adger *et al*., 2002; Adger *et al*., 2004). In the context of global warming, assessing vulnerability is an important component of any attempt to define the magnitude of the threat. The International Panel for Climate Change (IPCC) proclaims that there is now little doubt that human-induced climate change is happening (IPCC, 2001a). Societies should learn to cope with changes predicting warmer temperatures, drier soils and changes in weather extremes (IPCC, 2001a).

The analysis of vulnerability provides a starting point for determining effective means of promoting remedial action to limit disaster impacts. Vulnerability analysis can support coping strategies and facilitate adaptation (IPCC, 2001b). When one focuses on the vulnerability of human individuals and communities to climate stress, there is a need to clarify the links between vulnerability and adaptation (Adger *et al*., 2004). Adaptation is a topic of considerable policy relevance and concern, but to date, has not been effectively assessed (Adger *et al*., 2009). Some authors, for example Smithers and Smit (1997) and Agrawal (2010) suggest that linking adaptation and development should focus on the concepts of social capital and adaptive governance. Social capital is immediately relevant for the nexus, because it concerns the cost and capacity of adaptation in local contexts, especially with respect to the poor, those people who have only limited capacities to adapt (Thomalla *et al*., 2006). Such communities reside in rural areas in developing countries (Berkes, 2008).

Social capital is usually defined as an essential part of the assets that people command in their livelihoods, or as "features of social organisation, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions" (Owens *et al*., 2003, Santha *et al*., 2012). The importance of social capital for adaptation comes from its essential role for risk management, especially among poor and vulnerable groups. Moreover, it is a prerequisite for any form of coordinated action and an essential element of adaptive capacity. The reason is that successful adaptation depends largely on the capacity of a society or a community to coordinate decision making, to act collectively, and to give collective action some stability by means of an institutional framework (Agrawal, 1995; Baumwoll, 2008a; Mercer *et al*., 2012). Adger (2003) points out that it is particularly important that institutional settings give collective action some sort of continuity and direction beyond spontaneous and often unstructured reactions to environmental variability or changes. Climate impact studies have tended to focus on direct physical, chemical or biological effects (Mercer *et al*., 2009). This despite the fact that a full assessment of consequences for human well-being clearly requires evaluation of the manner in which society is likely to respond through the deployment of IK coping strategies and measures that promote recovery in the longer-term (O'Brien & Wolf, 2010; Djalante & Thomalla, 2012). Thus, the above calls for attention as to finding ways in which communities can adapt to inevitable climate change.

Birkmann and Von Techman (2010) posited that the future climate change may bring about further extension of many new trends. Adger *et al*. (2004) suggest that some projections and the observed historical trends are known with more confidence than others are. The data from around the world demonstrate very evident patterns in reduced diurnal temperature ranges and higher minimum temperatures and frost-free days (Birkmann, 2006:9). However, there is little or no consensus on whether weather phenomena have become more damaging. Some question whether the past was worse or whether the regimes of weather will alter significantly in the future (Adger *et al*., 2004; Corbera *et al*., 2006; Heltberg *et al*., 2009).

The physical risk posed by present day and future drought and flood impacts in Zimbabwe (Madamombe, 2004; Gwimbi, 2009) are that the present distribution of risk associated with drought and flood landing presents a serious threat to human welfare. Reducing vulnerability to these impacts is a major priority for the Zimbabwean government (Madamombe, 2004, Mushongah *et al.,* 2012). The study of present-day (and historic) responses to the threat of

disaster risk should reveal abundant information of relevance to the related issues of vulnerability, coping and adaptation (Prowse & Scott, 2008; Mushonga *et al.*, 2012). This is so given the uncertainty of the climate forecasts for a global warming future. It would be unwise to base assessment of vulnerability and response strategies on modern science estimates directly (Adger *et al.*, 2009). In an environment with other significant stressors, like constrained land access, political instability and HIV/AIDS, climate change threatens to paralyse development efforts and to make interventions to improve food security and livelihood systems more challenging. The irony is that although technological advances and knowledge on predicting the likelihood of adverse weather have improved, the same cannot be said for our ability to identify and eliminate the barriers that prevent local communities from coping and adapting to these changes (Agrawal, 1995; Baumwoll, 2008a; Mercer *et al*., 2012).

Wisner (2011) highlights that research in the past had concomitantly focused on what climate change can do, and until recently, what we can do. Unfortunately, gaps still exist in research and policy. The fundamental question on the future of more disaster risk in light of potential climate change remains unanswered. Climate change is expected to result in more frequent and severe hazards. It is also likely to increase people's vulnerability, resulting in increased damage and even more disasters (Venton & La Trobe, 2008). The various regions of Africa have displayed differing climatic trends since the early 1960s. Zimbabwe is one of the countries in the region potentially vulnerable to climate change. Gwimbi (2007) and Gandure (2011) note that the country has in the past experienced both droughts and floods, but climate change threatens to exacerbate the country's disaster burden still further. It brings the prospect of shifts in average climatic conditions that may heighten the vulnerability of many communities (Ford & Pearce, 2010).

Conventions such as the Brundtland Commission (WCED, 1987), the Biodiversity Convention, Agenda 21, the Rio Declaration and the World Summit on Sustainable Development (WSSD) have acknowledged internationally the existence of IK in development and DRR. Recommendations have been made to integrate modern scientific and natural environmental and development fields. The United Nations Environment Programme (UNEP, 2009) recognises the role of IK in the conservation of natural resources and management of natural disasters. There is recognition that people of in developing countries are not passive

victims (Aikenhead & Ogawa, 2007). In the past rural communities had the greatest resilience to droughts, floods, climate change and other hazards/disasters (Altieri, 2004; Archer, 2010; Alexander, 2011). Adaptation to rainfall decreases of 25-33% has been observed in the 20th century among pastoralists in West African Sahel (Domfeh, 2007). Resilience to changing climate has been documented for smallholding farmers in Bangladesh and Vietnam, and indigenous hunting communities in Canada (Gaillard, 2007; Gaillard, 2010; Mercer *et al*., 2010). Given this apparent paradox, the research on inclusion of IK into DRR policy is clearly required. The following section presents the problem statement that springs from this dilemma

1.3 PROBLEM STATEMENT

Mawere (2013) affirms that research has shown that the root causes of disaster vulnerability, including the blockage of ordinary people's capacities for self-protection are much deeper than those listed in Hyogo Framework of Action's (HFA's) Priority Area 4. People's own knowledge (IK) is often so specific to a locality that it is not always universally applicable and it is therefore a challenge to integrate IK into mainstream DRR policy and practice. The keys to the success for DRR have been the absence of renewal and the use of indigenous peoples' wealth of scientific and technological knowledge. Currently most DRR programmes are shaped by advanced modern technology (Altieri, 2004; Oluwatoyin, 2009). The full mobilisation of IK is not fully acknowledged, with little or no engagement with civil society and government. Under the HFA, there is only lip service given to 'community participation'. IK is not part of the formal DRR policy.

The balance is still toward agency trust that is an 'outside', 'top down' diffusion of innovation. Many vulnerable communities experience climate change, disaster risk and failed human development on the local scale. All these factors act as one interconnected set of processes, challenges and opportunities. The Items 1-3 of HFA require transparent and accountable governance. If IK is synonymous with a community's capacity for DRR, in other words recovering from a disaster with little or no assistance, development and humanitarian programmes have been less successful in enhancing that ability. Current DRR approaches tend to adopt an approach where the 'helpless' disaster affected communities are 'supplied' with what they need. This is contrary to the thinking of building the strengths (capacities) of

affected communities (Berkes, 2008). Research on how communities use IK in DRR has become paramount to promote community participation, social learning and livelihood security through the inclusion of useful lessons in DRR policy (Agrawal, 1995; Baumwoll, 2008a; Mercer *et al*., 2012).

IK has been the basis for community coping practices to survive calamities over centuries (Gonese, 1999). Gonese (1999), Mapara (2009) and Mawere (2013) observe that Zimbabwe is a country particularly rich in IK bodies of knowledge. The practices that use IK are based on sound principles of interaction between humans and nature. However, the policy context for DRR in Zimbabwe has evolved from the governance domain. The country is addressing disasters by working with relief codes and approaches that are prepared for delivering emergency relief from elsewhere. The emergency response systems framework adopted from the west have overlooked DRR aspect of disaster management and more importantly, IK within DRR (Baumwoll, 2008a; Mercer *et al*., 2012).

Initiatives on local disaster management plans in many countries have recognised the gap that is evident between practice and policy (Wisner, 2010). The need to bridge this gap through the inclusion of IK is very urgent. Thus, the overall aim of this study was to establish an in-depth understanding of IK and how it can be included in DRR policy to assist communities in disaster prone areas. To achieve this, the aim was broken down into the research questions outlined in section 1.4 below.

1.4 RESEARCH QUESTIONS

The following broad question is considered pertinent to the research:
How can IK be included in DRR policy for Zimbabwe?
In order to answer the above question, the following sub-questions have to be addressed:

- What is IK?
- What does IK in Zimbabwe entail?
- Which specific categories of IK can be identified as valuable to DRR and applied to a community, regardless of its unique characteristics?
- How sustainable are IK systems in relation to policy formulation in the DRR field in Zimbabwe?

- What are the main theories, models and practices explaining IK?
- How can, and has, IK affected DRR policy formulation in Africa and other parts of the globe?
- How does IK currently feature in various policies in Zimbabwe?
- What informs and guides the current draft disaster policies /policy statements, lessons and recommendations for future inclusion of IK into DRR and policy in Zimbabwe?
- What could be the most effective means of inclusion of IK into DRR policies in Zimbabwe society?

1.5 RESEARCH OBJECTIVES

The aims and objectives of this study are informed by the research questions. The attainment of the research aim is facilitated by the following objectives:

- to identify IK systems (IK);
- to examine the main theories, models and practices explaining IK;
- to discover how IK can and has impacted on DRR policy formulation in Africa and other parts of the globe;
- to explain the meaning of IK in Zimbabwe;
- to explore specific categories of IK that can be identified as valuable to DRR and that can be applied to a community, regardless of its unique characteristics;
- to describe the ways IK currently features in various policies in Zimbabwe;
- to identify elements that inform and guide the current DRR policies / policy statements, lessons and recommendations for future inclusion of IK into DRR and policy in Zimbabwe;
- to examine the sustainability of IK systems in relation to policy formulation in the DRR field in Zimbabwe;
- to determine the most effective means of inclusion of IK into DRR policies in Zimbabwe society.

1.6 METHOD OF INVESTIGATION

The research objectives were achieved by means of qualitative approaches (Creswell, 2008; Creswell, 2012). The research was underpinned by the interpretive/constructivist framework,

which views reality as existing within the human mind dependent on human experiences and interpretation (Lotz-Sisitka *et al.*, 2013). The same framework sees reality as not independent, but socially constructed and with varied meanings. Since the aim was the identification and analysis of individual and group constructions or interpretations of reality, this framework was the most appropriate. Thus qualitative methodology, specifically the ethnographic design, was employed. Ethnography involves the study of social interactions, behaviours, and perceptions that occur within groups, teams, organisations, as well as communities (Reeves *et al.*, 2008:512). The method provides rich, holistic insights into people's views on actions, including the nature of the location they inhabit. Reeves *et al*., (2008:337) point out that the major features of ethnographic research include a strong emphasis on exploring the nature of a particular social phenomenon, rather than setting out to test hypotheses about it. It works primarily with 'unstructured data', investigates a small number of cases and the analysis of data involves the explicit interpretation of the meanings and functions of human actions. The product of ethnographic studies takes the form of verbal descriptions and explanations. As Denzin & Lincoln (2002) and Creswell *et al*., (2007) note, qualitative methodology is essential because it goes beyond mere fact and surface appearances.

The inclusion of IK into DRR must be examined within a real world context. The research required exploring multiple facets of local knowledge, vulnerability and how they are created and linked. The qualitative data collection methods (interviews, focus group discussions, observations) were of particular value because local knowledge and the vulnerability perspective rely heavily on context (Risiro, 2012). It was essential to use qualitative methods in understanding how communities make sense of community localised risk and respond to it. An interpretive approach that employed systematic analysis was used to understand and interpret how communities construct meaning in their experiences of everyday life (Risiro, 2012). The study focused on exploring what local knowledge, social perceptions, values and assumptions govern community level beliefs about decision making.

A number of sources, including the DRR policy, the Drought Policy Disaster Management Act of 1986, the environmental policy, the National Disaster Management Preparedness Plan and Provincial Disaster Preparedness Plans for Zimbabwe were consulted to collect primary data. The research included four districts prone to disasters. The selected districts were

chosen because they represent various cultural, ethnic and geopolitical contexts prevailing in the country. Traditional leaders, including key government participants from the Department Of Civil Protection And Social Welfare were asked a wide range of questions related to IK used for DRR, beliefs about community vulnerability to disasters prevalence, the nature of local organisations and networks, local leadership, and community participation in decisions related to mitigation of disaster risk.

Community research involved two (2) focus groups per district with 9 to 14 participants each. The total number of participants in the four districts was one hundred and thirty eight (138). In-depth interviews were held with four chiefs and their aids. The other interviews were held with six government official per district, who comprised of DRR practitioners or extension employees from the Department of Agriculture and veterinary services. The participants dialogued with the researcher to elicit more insights into community perspectives, values, and concerns about vulnerability and thoughts about mitigating disaster risk. The participants in the study areas were asked to identify 'items' objects/places/people to represent:

- what they perceive as important community values and beliefs;
- their attachment to the environment they lived;
- their concerns about vulnerability; and
- sources of reassurance of security in the face of disaster risk such as IK for risk reduction.

After the identification process, interviews were held with each participant and the meanings were recorded. Collected data were analysed by employing qualitative methods using patterns and ideas related to community vulnerability and IK used by the community. Findings were presented by the researcher to allow for commentary from interviews/participants to discuss. A poster with identified local knowledge and commentary was given to each community about the community and disaster risk at the conclusion of the assignment. This was done to check the validity of findings and to fulfil the first objective of this research, related to the main livelihoods and adaptation options to DRR activities in the community. It also helped to review the way mitigation issues have been addressed and mitigation decisions made to date. The figure below depicts the flow of the research methodology.

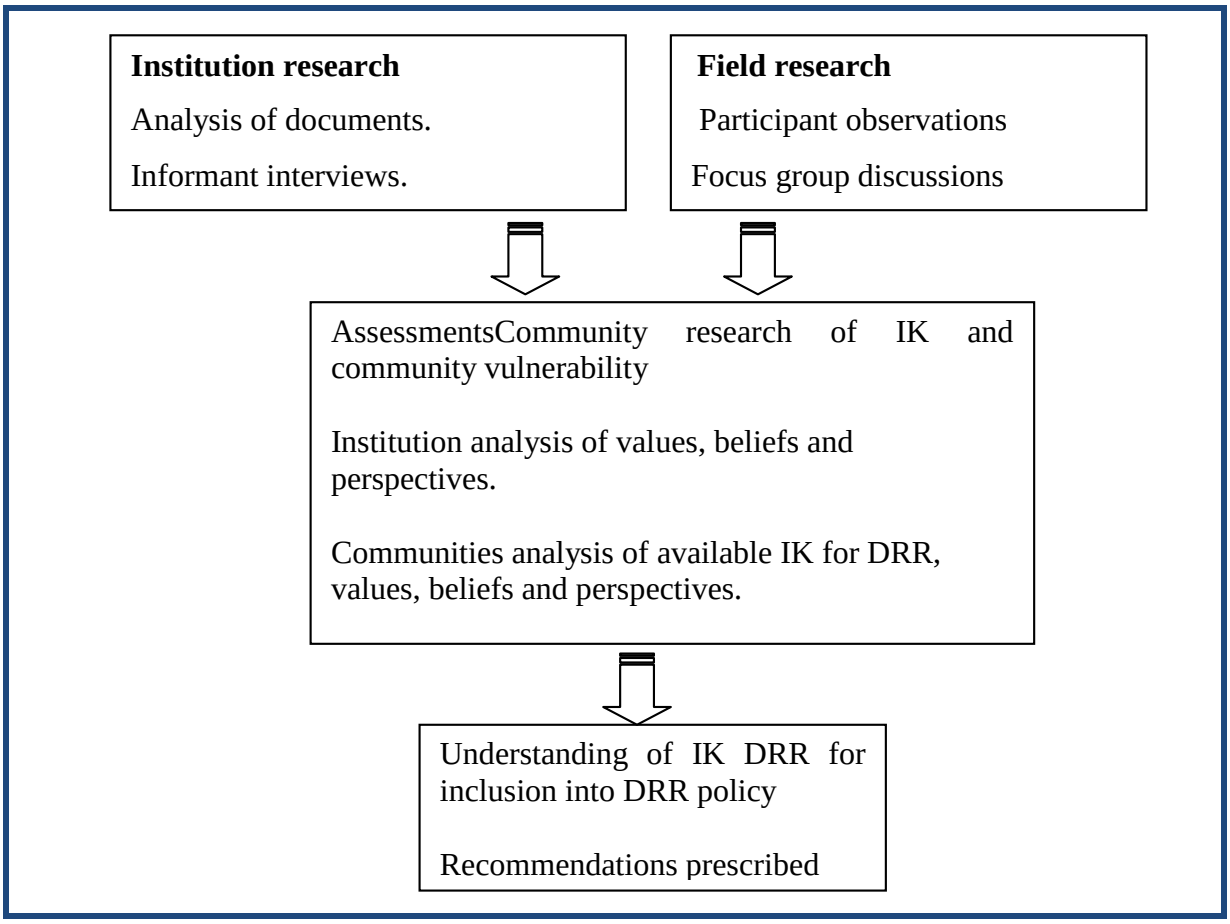

Figure 1.1 Flow of the research methodology

1.6.1 Document analysis

This study intends to identify processes, enablers and challenges regarding inclusion of IK into DRR policy. Documentary analysis, more specifically qualitative content analysis, was selected as a method because it reveals aspects of the social context in which documents are created and then used as communication mechanisms. Studying what is said and how it is said allows researchers to make inferences about what is important to the creators of the documents (Creswell *et al.*, 2007). Content analysis as a technique allows researchers to discover and describe the focus of individual, group, institutional or social attention (Weber, 1990, cited in Stemler, 2001). In this particular study it was also used to help identify whether IK is pronounced in policies. The attitudes, values used by dominant institutions, including decision makers in Zimbabwe with regard to IK, disaster reduction and vulnerability reduction can be discerned in content analysis.

1.6.2 Interviews

In addition to documentary analysis of archival material, interviews were conducted with knowledgeable individuals (the traditional leaders, village elders), grassroots local leadership, who are crucial respondents in this research, for they are the custodians of IK. Government personnel, members of non-governmental agencies (NGOs) operating in the study areas, were also interviewed to investigate their perspectives on disaster risk management and IK. These personnel, who represent the perspectives of their institutions or organisations, may be referred to as 'institutional gatekeepers' (Rokeach, 1979). They were identified through direct contact with key institutions within the study areas. A list of the types of participants is presented in Chapter 5. Examples of information sought from key informants include their perspectives on decision-making, consultations within the communities, existing IK and the barriers that might exist to realising sustainable disaster risk management. The interview schedule appears in Appendix A.

Once the above data had been collected, the achievement of objectives 2, 3, 4 and 5 required that findings be examined in the context of current thinking about the integration of IK into DRR. Frameworks seek to explain the variables that contribute to, or are critical to, the analysis of vulnerability. While numerous frameworks are reviewed in chapter 4, one model offered particular guidance and insight into this analysis. The model is that of Wisner *et al*., (2004) a more recent version of Blaikie *et al.*,'s (1994) Pressure and Release (PAR) model which focuses on the pressures and processes that result in disasters through a 'progression of vulnerability' essentially social vulnerability coinciding in space and time with hazard events. This framework in particular emphasises the interplay between root causes of social vulnerability (such as values, economic forces, governance, etc.), dynamic processes (such as decision-making, livelihood or other stresses, etc.), and resultant vulnerable conditions that are created by the aforementioned root causes and processes. This framework was applied in part, and in the concluding chapter it is adapted to show the progression of social vulnerability in the study areas using the findings of this research. The vulnerability analysis component of the study considered the results of the documentary analysis of archival material, analysis of key participant interviews, and observation data from the community, interviews and focus group discussions. This was done to explore use of IK in disasters.

The final objective (6) of this study is to have a deeper understanding of the inclusion of IK into DRR policy for Zimbabwe. One assumption made in conducting this research, was that the inclusion of IK into DRR policy should address issues related to DRR by reducing vulnerability and improving mitigation. An understanding of some of the root causes of social vulnerability was required, specifically through exploring the perspectives and values of communities affected by localised hazards and institutions involved in disaster risk management. The reason is that decision-making processes are dependent upon such social variables, and values in particular (Mangun & Henning, 1999). The findings of this research may very well have implications for improving responses to hazards of all types, particularly when shared with the appropriate authorities, communities, interest groups, and individuals.

1.7 LIMITATIONS AND OBSTACLES TO THE STUDY

A major limitation and obstacle to the study is that the issue of IK systems in Zimbabwe has facets that are under researched. IK is oppressed in a number of ways. This oppression results in marginalisation, exploitation, powerlessness, cultural imperialism, violence and denial of existing knowledge placed upon its bearers (Laws, 1994; Young, 1988, 1990). The forms of oppression may occur simultaneously or independently of each other. However, all these acts contribute to the suppression of IK in a society where the scientific culture is dominant (Rist & Dahdouh-Guebas, 2006a).

Too often IK is hidden and dismissed by the tendency of scientific knowledge to deny the importance of other bodies of knowledge (Agrawal, 1995; Davies, 1999; Laws, 1994; Rist & Dahdouh-Guebas, 2006). African IK is increasingly being interpreted by minds that have been profoundly exposed to Western or other ways of thinking (Berkes, 2007). There are limited numbers of scientific sources in this field, especially primary sources. The researcher made use of research skills already acquired, prior knowledge, promoter guidance and networks to overcome the problem.

The research called for the formulation of logically aligned and contextually synchronised chapters. To this end, the chapters of the research are outlined in the section below.

1.8 STRUCTURE OF THE THESIS

The following procedure was implemented:

Chapter 1: This chapter discusses the orientation, motivation, problem statement, goals and objectives. In addition, the concepts underlying the study are discussed. The methodological method of investigation is discussed, and the contribution of the research to the DRR body of knowledge, as well as the central theoretical arguments of the study is presented here. The first chapter provides an overview of the field of disaster management and reviews the recent shifts in the approach to DRR, emphasising the importance of human action in reducing disaster threats. Statistics and recent trends illustrate that the risk posed by natural disasters is escalating and that there is an urgent need for new strategies that consider incorporating IK in protecting vulnerable populations.

Chapter 2: The theoretical framework and IK conceptualisation are presented. The complexities of IK are examined and discussed in detail. Characteristics of IK are highlighted and addressed to help clarify the definition: who is indigenous, and how does one differentiate between common terms? It also addresses the false assumption that all indigenous people act sustainably based on a harmonious relationship with the environment. The overview of the existing discourse on IK and its value for DRR is explained. The potential value of IK for DRR has only been recognised in the past twenty years. The arguments on the importance of IK in reducing disaster risk are subsequently discussed. The arguments are classified into two groups: narrow values, highlighting specific indigenous practices that can be transferred to other communities, and general values.

Chapter 3: The chapter discusses DRR, Vulnerability and IK linkages.

Chapter 4: This chapter offers an in-depth evaluation of international disaster models with more emphasis on IK, and Sustainability Livelihoods adapted by DFID, IK for DRR model, the adaptation model, Ecosystems and ecological models and integrating indigenous and scientific knowledge bases for DRR.

Chapter 5: The chapter is entitled DRR Policy in Zimbabwe. It presents the findings from a review of a sample of documents relevant to Institutional Values and Perspectives. The review examined the thematic content of draft policy documents that are currently in operation in Zimbabwe. The final discussion in the chapter highlights institutional perspectives and vulnerability, as well as a specific discussion of the values of government institutions.

Chapter 6 The chapter outlines the research methodology and analytical framework. The research instruments are discussed in detail.

The chapter 7 The chapter presents the findings and data analysis. The results are organised according to themes that emerged from the data to address the research questions. This is followed by a discussion of what the findings reveal about traditional leaders and community perspectives, priorities and values, their link to hazards management issues and mitigation decisions that are made locally, and begins to explore their link to vulnerability.

Chapter 8: The inclusion of IK into Disaster Risk Reduction Policy is discussed, using adapted models, especially the Pressure and Release (PAR) model and the Sustainable Livelihoods (SL) model.

Chapter 9: Conclusion and recommendations are presented related to IKS in DRR. Conclusions relate to how hazard mitigation decisions are made and what (and how) community and institutional values and perspectives influence hazard vulnerability is addressed in this context. A brief discussion of the contributions of this research completes the final chapter. The research contributes towards future disaster management policy in Zimbabwe that includes IKS for Disaster Risk Assessment and DRR.

1.9 CONCLUSION

This chapter provided an orientation and understanding of the process that was followed to reach a conclusion on the problem statement. The phenomenon to be studied was introduced and the dynamic factors under investigation were discussed. The chapter also attempted to explain the process that was followed to reach the envisaged objectives of the study. The contribution of the study to the DRR body of knowledge was also mentioned. IK incorporation into DRR policy is discussed within the international arena. In order to determine the underlying elements to this term, it is imperative that a thorough theoretical investigation of the concept is undertaken. Such an analysis of the term would provide the foundation of a better understanding of the concept and the aspects that it comprises.

The next chapter aims to provide the reader with an in-depth investigation of IK and vulnerability, considering the importance of DRR and theoretical framework for the thesis. It also addresses two research objectives, namely conceptualising and identifying IK categories valuable to DRR and how it is applied to a community, regardless of its unique characteristics.

CHAPTER 2

THEORETICAL FRAMEWORK AND INDIGENOUS KNOWLEDGE

2.1 INTRODUCTION

The preceding chapter introduced the research problem. This chapter provides a theoretical framework for the thesis and IK conceptualisation to address research objective one (1) by explaining the meaning of IK. The selection of the theoretical framework has been on its ability to provide explanations of linkages between DRR and IK as capacity that is available within vulnerable communities to advocate for IK inclusion into policies. The concept of IK is valued based on the potential to reduce disaster risk for the technology is cheap and readily available within communities. The consistent use of modern technology among vulnerable communities may continue to increases vulnerability and contributes to the conditions that increase disaster risk. The main aim of the study is not focusing on the implications of DRR but the inclusion of IK into DRR polices for Zimbabwe.

2.2 THEORETICAL FRAMEWORK

IK paradigm is engaging DRR and development theories due to its importance including practices in relation to environmental hazards and disasters (Jigyasu, 2002; Howell, 2003; Cronin *et al*., 2004; Hayness, 2005; Mitchell, 2006; Dekens, 2007). According to Dekens (2007) theory has shown the importance of IK and recognition in the international arena. The application of IK has not been put into practice on a larger scale, despite some of its successes in developing countries. Vettori and Stuart (2004) in addition Kelman (2005) provide examples of indigenous communities who survived cyclones on small islands. The indigenous communities had traditional houses with technologies that could withstand the phenomenon and some too shelter under overhanging rocks on high terrain (Donovan, 2010). While assistance to the affected came later, indigenous people had already survived through application of IK practices (Donovan, 2010; Wisner, 2010; Gandure, 2011).

The thinking on IK for DRR in academia builds on Karl Marx's 'radical' theory and Max Weber's cultural and institutional 'conservative' theories. These theories have been further

developed by other scholars, like Kenneth Hewitt and Dennis Mileti respectively. McEntire (2004:193-198) studied the disaster model from the ancient Greek philosophers' interest in development to its present connections to DRR. Thinkers like Aristotle believed that reality and realisation of potential are dependents on the laws of birth, growth, maturity and decay. The negative supposition of reject and death were challenged during the industrial revolution. The industrial revolution brought about technological, economic, social and political changes (McEntire, 2004:193-198). McEntire (2004) explains that societies were viewed either as contemporary urban, civilised and traditional. The traditional societies were seen as rural, agricultural, primitive, static and sacred (McEntire, 2004:193-198).

Max and Weber, according to McEntire (2004) did not believe that industrial revolution would bring about social, political and economic changes resulting in socialist forms of government. Societal forms were thought to be dependent on organisations, the legitimacy of authority informed by ideas and values of their citizens. Thus, there are disaster scholars, who believed that disaster prevention is dependent on restructuring the economic, social and political systems to reduce community vulnerability to disasters (Hewitt, 1993; O'Keefe, 1998). Disasters according to O'Keefe (1998) result from the complex domination of developed nations over developing nations. The domination of developed nations is propagated using transnational corporations supported by Non-governmental Organisations (NGOs) and subjected to donors' policies. Interests of principals are promoted at the expense of the 'vulnerable communities who are either victims or beneficiaries' (Middleton and O'Keefe, 1998).

Scholars inclined to the Weberian perspective, disaster causation is viewed as a product of human inadequacies in adjusting to natural hazards. Scholars like Dennis Mileti blame culture for the creation of disasters due to the influence of works by Ian Burton, Robert W. Kates and Gilbert F. White (McEntire, 2004). A shift in thinking and behaviour, including institutional improvements to mitigate hazards, is viewed as essential elements of DRR (McEntire, 2004). Mileti has indicated that sustainable hazard mitigation has to include gaining more knowledge about hazards through education and training, land-use planning, early warning systems, engineering, building codes, insurance and use of technology. Lowe *et al*. (2007) posits that there are two main theoretical approaches with regard to studying

disasters and risks, the technocratic approach and the vulnerability approach depicted on table 2.1.

Table 2.1 Theoretical approaches with regard to studying disasters

Technocratic	Vulnerability
• Style is hierarchical, managerial problem solving • Applies technology, Engineering, Money • Tends to be top-down approach • Goal is to reduce damage • General philosophical orientation is utilitarian and the conquest of nature • Philosophy of science emphasises the linear and bounded systems (Newtonian physics analogy)	• Style is decentralised, community based problem solving • Applies local knowledge, pressure, imagination, creativity • Tends to be bottom-up approach • Goal is to reduce people's vulnerability • General philosophical orientation is egalitarian and co-existence with nature • Philosophy of science emphasises the non-linear, open systems, and complexity (Quantum physics analogy)

(Source: Wisner, 2002; UN/ISDR, 2004; Cardona, 2004:37; Thywissen, 2006)

According to Lowe *et al*. (2007), the vulnerability approach is people-centred and it concentrates on the social, political, and cultural factors of people that make them more vulnerable to loss from a disaster risk. Alexander (2000) asserts that in vulnerability people, not physical forces are the principal cause of risks and disasters. Thus in disaster reduction, causes of disasters can be attributed to human factors. The main goal of this approach is thus on reducing community vulnerability (Alexander, 2000). The vulnerability approach draws its arguments and methods from social sciences. As Lowe *et al.* (2007) note, vulnerability emerged in the 1970s from social scientists, particularly those working in developing countries. A closer analysis of the Vulnerability shows that the theory provides a comprehensive of human responses to disasters.

Technocratic approach is hazard-focused and aims to reduce disaster through control of natural environment (Lowe *et al.*, 2007). Thus, the focus is on physical processes of hazard. According to Lowe *et al.* (2007) this theory seeks to manage risk through:

- Anticipating and hence contain the extremes of nature through environmental engineering works e.g. flood embankments.
- Monitoring and modelling extreme geophysical events
- Creating disaster plans and emergency

Lowe *et al*., (2007) asserts that there are beliefs that the only way of dealing with disasters is through public policy application of geophysical and engineering knowledge. Unlike the vulnerability approach that is founded on social science discipline, the technocratic approach is founded on science and technology disciplines. According to Hewitt (1985), science and technology are seen as the primary means available to deal with natural hazards. Gopalakrishnan and Okada (2007) argue that on designing new institutions for implementing integrated DRR, the inclusion of culture, customs and traditions is paramount. This is against the backdrop of the 2004 earthquake and tsunami in Asian countries (Arunotai, 2008). The locals, who had acquired IK knowledge over many generations survived, while migrant workers and tourists perished (Donovan, 2010). IK has components that are critical for DRR. These are symbols, language, values and norms. Arunotai (2008) highlights that with symbols it is possible to give meaning to abstract concepts with objects that are seen with the naked eye. Symbols help to share love, hate and loyalty, among other things (Arunotai, 2008). The local language expresses ideas, while values determine the right or wrong ideas that are appreciated in the community. The norms are those rules and standards to determine the appropriate behaviours the community accepts (Arunotai, 2008). IK is also linked to livelihoods for communities (Chambers & Cornway, 1992; Daskon & Binns, 2010). There are communities that survive on livelihoods that are intangible, like beliefs, practices, customs and knowledge, sacred sites, skills, social institutions, identity (Adato & Meinzen-Dik, 2002; Baumwoll, 2008; Daskon & Binns, 2010).

The importance of pointing out IK is that it asserts that sometimes unsustainable and unproductive livelihood patterns continue because of tradition and habits of communities (Wisner, 2012). It is often claimed that cultural elements are neglected when planning and implementing DRR strategies (Hoffman, 1999; Wisner *et al*., 2004). Oliver-Smith and

Hoffman (1999) and Nunn *et al*. (2007) assert that not acknowledging IK aspects vulnerabilities of communities' increases leading to development of unsuccessful DRR strategies. Huntington (2000) further states that many governments have ignored the roles of IK for DRR activities. A model has been provided by theses scholars. The model has awareness and access to information, autonomy to make decisions, affordability of technology, accountability, adaptability to local conditions and sustainability aspects (Berkes, 2008; Huntington, 2011). The implication of the framework is that a powerful institutional infrastructure that is supported by science and technology has the potential to improve DRR implementation.

Hewitt (1997) argues that humanity can avoid disaster risk for man is able to live with nature since communities have coping mechanisms. A disaster, according to Hewitt, is when a community fails to cope because the event surpassed community ability. The choices of man when dealing with nature are the triggers calamities. The technocratic approach is hazard-focused and aims to reduce disaster through control of natural environment (Lowe *et al*., 2007). Thus, the focus is on physical processes of hazard. According to Lowe *et al*. (2007), this theory seeks to manage risk through:

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autonomy to make decisions, affordability of technology, accountability, adaptability to local conditions and sustainability.

The implication of the framework is that a powerful institutional infrastructure that is supported by science and technology has the potential to improve DRR implementation. Dekens (2007), Mercer *et al*., (2007) and Sudmeier-Rieux *et al*., (2009), point out that no single technology can provide knowledge in totality. Knowledge belongs to groups of people, not a single group. A particular knowledge has its weak and strong points (Wisner, 2004; Mercer, 2012). These researchers have advocated for the use of technologies and knowledge that are combined with IK. Cannon (2008) adds that vulnerability is contextual; hence, it depends on a particular situation. It is not easy to explain issues of vulnerability and inhabitants therefore feel the term could only be western with little meaning (Cannon, 2008).

Technocratic and vulnerability theoretical perspectives and principles have been used in practice in many situations. Etkin (1999) explains the reliance on structural flood system as risk transfer but vulnerability increased in the long-term. Such technologies only help when the disaster event is not massive. These systems also give false sense of safe conditions for they fail when disaster that is massive strikes a community (Eitkin, 1999). In such scenario smaller disaster risk vulnerability had reduced vulnerability, but when a massive event occurs vulnerability is increased. The positions above highlight that systems should not rely on numbers only, but inclusive numbers of all vulnerable object to deal with subjectivity issues. In any community, involvement becomes paramount to understand views and perspectives. Such actions would need participatory tools to obtain data that can be factored into the work for DRR.

Actions in many communities according to Canon (2008) have taken place based on strictly techno-centric and top down model. The top down models have failed in most instances in reducing DRR in vulnerable communities (Canon, 2008). Disaster risk and vulnerability are on the increase despite modern technology being used. The linkages between practice of DRR and IK as a capacity are very weak.

Davies (1978) posits that the above can be a result of the following:

- Inappropriate technologies are preferred over IK for DRR; and

- Communities receive incentive related to technologies with inputs from foreign experts for DRR, imported in addressing local vulnerabilities.

Thus, the position adopted in this study is that the radical and 'conservative' theories complement each other in balancing the shortcomings of one approach. Each approach has its weak and strong points. McEntire (2004) asserts that the emphasis on vulnerability does not only serves as the focus to enable an understanding of the radical approach's emphasis on poverty as key a causal variable, it runs the risk of ignoring behaviour, attitudes and personal responsibility as the cause of disasters. He contends that the emphasis on culture may ignore the constraints of the social structure (McEntire, 2004, Wisner, 2010). However, the complicated relationship permits explanations from both the radical and conservative theoretical camps. This is an acceptable view for the model of vulnerable, which tends to adopt supply-driven approaches where disaster victims are seen as 'helpless' rather than demand-driven approaches where victims are viewed as having the capacity to withstand disasters (Wisner, 2010) . If vulnerable communities are able to withstand disaster risk, the question that arises as to what gives these communities the capacity to do so? It is the contention of this study that the inclusion of IK (knowledge embedded within the community) into DRR policies is more appropriate as it emphasises building on existing local capacities.

From the above exposition, the focus of the study has a conceptual framework within which to conceptualise the inclusion of IK into DRR policies. In the theoretical framework, IK is seen as capacity within vulnerable communities that can be harnessed to reduce disaster risk vulnerability. Hence, the framework as depicted on figure 2.1 will guide the study through its contribution to the DRR equation.

Disaster risk vulnerability is a process that continues in a cycle (Berkes, 2008; Huntington, 2011). This becomes critical when investigating how IK as capacity can be used for risk reduction to support its inclusion in DRR policies. The research used the context of Zimbabwe to investigate means for the inclusion of IK in DRR policies.

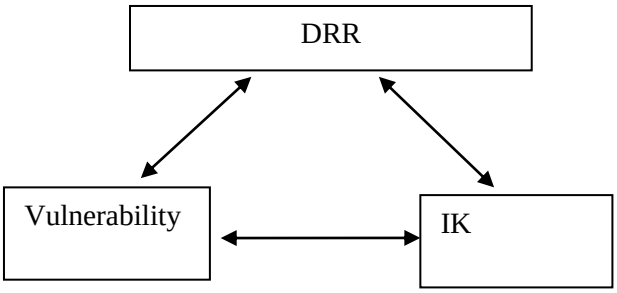


Figure 2.1 Theoretical inter-relationships between DRR, IK and vulnerability

The study applied IK as one way that can help reduce vulnerability and exposure to disaster risk in Zimbabwe. Models that are used in DRR and IK studies are analysed in chapter 4. These models, namely the Ecosystem model, IK integration model, Pressure and Release, and the Access and Sustainable Livelihoods Models, have been accepted within the DRR community (Blaikie *et al*., 1994; DFID 1999; Twigg 2001; Cannon *et al*., 2003; DFID 2005). The models are implemented as the basis of understanding and contextualising hazard impact and disasters through vulnerability, sustainable livelihoods and IK analysis. The inclusion of the models in studying the inclusion of IK is justified in the following sections and other chapters.

2.3 INDIGENOUS KNOWLEDGE

The increasing discussion of IK in DRR and development studies has added an impetus to research on the possibility of its inclusion into DRR policies (Berkes, 2008). It has become regular to find documents on DRR that use or mention the term IK and research on IK remains vigorous (Nyong *et al*., 2007; Aikenhead & Ogawa 2007; Berkes 2009; Berkes & Berkes 2009). The research on IK has been centred more on "project of integration" of IK and science (Bohensky & Maru, 2011).

The interest in integrating IK into DRR is growing steadily (Rist & Dahdouh-Guebas, 2006b). Rist and Dahdouh-Guebas (2006) argues that integration of IK maintains global diversity, contributes to valuable information for DRR and has societal merit (Bohensky &

Maru, 2011). They further assert that modern problems cannot be solved with singular, mechanistic, science-centred solutions.

Thus, the chapter discusses IK in more depth, as well as how capacity and vulnerability concepts contribute to developing more meaningful inclusion of IK in DRR policy. The first section focuses on the IK construct with respect to its evolution and definition. The second section focuses on IK relationship with vulnerability. It will be noted that multiple definitions of IK are not problematic as long as they do not cloud conceptualisation. Achieving a consensus on the conceptualisation of IK is not an end itself but has an implication of justifying its inclusion into DRR policies.

2.4 IK BACKGROUND

Hwang (2005:80) assert that IK is not a new concept. It has been in existence since humankind. Chirimuuta and Mapolisa (2011:53) support this indicating that IK has origins in the remote past. There is an indication that since the end of World War II there have been three large-scale academic movements attempting to incorporate non-Western cultural factors into psychological research: modernisation theory, research on individualism/collectivism, and the indigenisation movement (Hwang, 2005:80).

The interaction between conventional science and IK is not new as well. History of science demonstrates that the two knowledge systems have often been intertwined (Agrawal, 1995). Trade routes; military and scientific expeditions; including political conquests in the Himalayas for instance have contributed to the exchange of knowledge (Linkenbach-Fuchs, 2002). IK has never been isolated. It has always been connected to other places and other types of knowledge. The work by Allan, (1965) on The African Husbandman is a text distinguishing that indigenous agricultural systems exhibit a substantial knowledge of, and sympathy with, the environment. The work is fundamental on the benchmark development account of population and land pressure. The understanding of IK appeared later as outlined in contributions by (Howes, 1979; Bell, 1979; Howes and Chambers, 1979). The work by Brokensha & Warren (1980) is prominent and later influenced the integration of IK in development (Scoones, 1992; Scoones, 1996). IK became pivotal to later debates concerning sustainable development. IK allowed people to live in agreement with nature for generations.

The privileging of IK in development was welcomed, for influencing "a shift from the preoccupation with the centralised, supposedly oriented solutions of the past decades that failed change of life for the majority small farmers in the world (Agrawal, 1995:414). These developments helped the institutionalisation of IK through conferences and development (Warren *et al*., 1995; Warren and Cashman, 1988).

Baumwoll (2008) posited that the delay of taking on board IK in DRR has been due to the vast differences in the subject material and characteristics of indigenous and Western knowledge; methodological and epistemological grounds. Methodologies employed are different when investigating reality; contextual grounds that see traditional/IK being rooted in its environment (McNeely *et al*., 1995; Baumwoll, 2008). Chambers (1994) assert that ignoring people's knowledge ensures failure in development. With regard to DRR, the delay was more an issue of prevention on technological solutions as already discussed on the conceptual framework in this chapter section 2.2. Issues like better surveillance techniques, high technology warning systems, and stronger infrastructure, dominated DRR (Howes & Chambers, 1979; Baumwoll, 2008). DRR aimed to implement initiatives such as use of policies, strategies and practices that ultimately reduce or eliminate conditions of disaster risk and vulnerability at the local level (Van Niekerk, 2008).

Baumwoll (2008:66) explains that the social science perspectives, such as local knowledge, were not considered to be in conflict with the belief that geophysical knowledge and technical systems were the most effective disaster prevention and response method. The growing interest in IK for DRR was also a result of the relationship between DRR, natural resources management and development, specifically the sustainable development discourse (Baumwoll, 2008:66). Lastly, environmental disasters brought the issue to the attention of academics, practitioners and the public (Bohensky & Maru, 2011). Experts agree that the links between DRR and IK have seldom been made in either literature or practice (Gaillard & Mercer, 2012). In the1980s, the development experts in the field started shifting their thinking and have started to consider IK. DRR is slowly mirroring (Gaillard, 2007; Mercer *et al*., 2012) this shift towards more social science perspectives in recent years, illustrated by the vulnerability approach as discussed earlier in section 2.2 and will also be dealt with sections below and chapters 3 and 4. While historically, emphasis in DRR has been placed on response and recovery plans, focusing a majority of the effort on improving international aid

programs and public support systems, this is beginning to change. As discussed in this chapter and chapter one, the 1970s and 1980s brought a new thinking to DRR.

The failure of externally driven, transfer-of-technology focused top-down development ushered in an era of consideration of local knowledge (Pottier, Bicker &Sillitoe, 2003:1). The custodians of this knowledge under the adopted new development paradigm are expected to contribute their knowledge through participatory approaches (Bolin, 2007). Vulnerable communities make this knowledge work for the success of interventions, albeit those that seek to promote adaptation to climate change impacts. The question that arises is: can a marriage, at least of convenience, between climate science and IK last at least through the honeymoon and strengthen livelihoods for better adaptation? Pottier *et al*. (2003:273), argues that the spaces under which rural communities can express their IK, is difficult to create due to a host of factors that jeopardise successful communication between development agents and local people. The issue of participation is also questionable hence becomes a challenge to negotiate for IK (Bolin, 2007; Bohensky & Maru, 2011).

Garlake (1992:6) asserts that ancient knowledge and technology incorporates the wisdom distilled through millennia of experimentation including trial and error. Bhebe *et al*., (2000:7-8) posits that this knowledge is non-sentential. IK is often not well-documented in the modern sense, but is that tacit knowledge transmitted to generations orally, through practice and gradually perfected by tradition (Ocholla & Onyancha, 2005). There are now international documents that have shown interest in IK. Such documents include the Draft United Nations Declaration on the Rights of Indigenous Peoples, the International Labour Organisation Convention No. 168, Universal Declaration of Human Rights, and the Convention on Biological Diversity and the International Covenant on Economic, Social and Cultural Rights (Simeone, 2004:3). The United Nations conference on Environment and Development in 1982, the Rio Declaration and Agenda 21 has referred to IK (Baumwoll, 2008:21). There is emphasis on governments to help preserve and maintain the knowledge practices of indigenous communities to encourage them to share benefits arising from the utilisation of IK innovations and practices (Baumwoll, 2008:21). The world bank has also come on board with the launch of IK for Development programme in 1998 and the creation of a database of IK dedicated to sharing and promoting IK (McPherson, 2007:25).

United Nations Environmental Programme (UNEP) started a project in Kenya, Tanzania, South Africa and Swaziland to harness and promote the use of IK in environmental conservation and natural disaster management. The strategy was through training, access to, and exchange of information, including the involvement of all constituents such as the local communities (Republic of South African, 2005). This should be seen as part of new interest in traditional African knowledge systems. Despite the numerous interruptions by development interventionists that fail to recognise IK utilisation by rural communities, initiatives for integration are being developed. In support of the above, Garlake (1992:6) acknowledges that IK contains important characteristics that make it different from other knowledge types. Some of the characteristics identified originate within the community, maintaining a non-formal means of spreading information, owned by community. IK has been developed over many generations and is imbedded in a community's way of life in providing livelihood options (UNESCO, 2010).

Cuny (1983) and Matowanyika (1995) assert that the existence of IK and the time-tested food security strategies mimic the natural cycle in the natural ecosystems. The survival means practiced included mixed or intercropping, agro-forestry, shifting cultivation and other indigenous agricultural approaches (Matowanyika, 1995). Hunter (2002) explains that indigenous communities have waged battles to achieve empowerment and self-determination through the preservation, protection, and revitalisation of their cultures eroded by colonisation, Western culture and more recently by globalisation. There is now a renaissance as indigenous communities have recognised the importance of documenting and sharing their cultural heritage (Boon & Hens, 2007; Berkes, 2008; Huntington, 2011). Thus, the understanding of the process of knowledge creation and transformation is more important in this study than focusing on the knowledge outcomes. Das Gupta (2008) asserts that what people know is influenced by (and influences) their beliefs, lifestyle, and behaviour. The inclusion of IK in to DRR policy intend to understand vulnerable people's ways of knowing looking at different knowledge types that include practices and beliefs, perceptions, and values. The understanding these factors become crucial for it assist in explaining why people do things the way they do.

Gandure (2011) argues that the adoption of foreign structures of consumerism has resulted in the weakening of survival strategies of the African communities. Birkman and von Teichman,

(2010) have also indicated that everyday knowledge is being lost and gained hence it is not static. Tanyanyiwa *et al*., (2011) affirms that IK is in danger of extinction. IK is meaningful within its own spatial and temporal contexts. The disappearance may result in the loss of people's capability to keep and pass on the artistic and natural heritage, an extraordinary source of knowledge and cultural diversity with appropriate innovative solutions the current era and the future in management of the natural resources and disaster risks.

The United Nation's declaration of The International Decade of the World's Indigenous People (1995-2004) indicates that IK systems are gaining significant global prominence. The objective of the declaration was to strengthen search for solutions to problems faced by indigenous people many facets of human life that included human rights issues, the environment, development, education and health (UNISDR, 2013). The 1992 Earth Summit in Rio de Janeiro, Brazil, recognised the importance of indigenous ecological knowledge systems in environmental protection and care. There are now many world-wide research centres like the African Resource Centre for IK, Nigeria; Bangladesh Resource Centre for IK; Brazilian Resource Centre for IK; Centre for IK for Agriculture and Rural Development, United States) citation needed that have been established to document this rich store of knowledge. In Africa, the focus on IK and education is growing, as attested by the formation of the Enhancing Indigenous Agricultural Knowledge in Africa (ENIAKA) initiative in 1999 (Gonese, 1999; Millar, 2014), which was fully dedicated to IK research.

There is clarity that there are initiatives that have been started by several international bodies, in an attempt to recognise and promote IK. The next section focuses on explaining knowledge and behaviour in a context of change with respect to the relationship between explanation and practice.

2.4.1 Knowledge

Webster *et al*., (2005) and Mercer *et al*., (2007) assert that knowledge implies cognition. Knowledge is the condition of having information or of being learned through experience or association. IK is a concepts developed and advanced by anthropologists over the past century (Silitoe, 2004). Weick and Roberts (1993) describe knowledge as either explicit or tacit. The explicit elements of knowledge include being open, clear, unambiguous, and precise and being unequivocal. Such knowledge, according to Weick and Roberts (1993), can easily be

transmitted. Tacit knowledge and can be inferred (Badaracco, 1991; Weick & Roberts, 1993). Tacit knowledge is quite difficult to track, for it is a result of social interactions within institutions or organisations (Badaracco, 1991). The above discussion shows that human knowledge is a result of life experiences and as humans; we refuse to be bound by a verbal matrix. Emotions of humans at times are communicated with words, but other cues can also be used, such as frowning or throwing hands, kicking the air, among others.

Weick and Roberts (1993) go on to state that since tacit knowledge is in social interactions; there are varied social context that can facilitate model of integrating knowledge. Interpersonal ties, linkages in communities all provide varied social contexts for knowledge integration. Ties among social groups and relationships that show cooperation and trust involve repeated interactions over some time horizon (Granovetter, 1985). Epstein (1961) and Kadushin (1966) assert that frequent interactions strongly influence other people. This view is supported by the social information processing theory that opinion, information and behaviour of salient others, influence individual preceptors (Salancik & Pfeffer, 1978; Hardin & Higgins, 1996). Those that are proximate in behaviour and attitude patterns tend to influence others, including the social context (Chatman *et al.*, 1998). It is through interaction as well that policy should be informed, so that it becomes relevant to the issues it is meant to address. Interaction among communities, people may pick up or share insights about their environment or social context (Uzzi, 1997). The transfer of Knowledge according to Uzzi (1997) results in joint problem solving among communities. Local knowledge is usually effective, as it consists of understood words due to repeated complex transactions (Romo & Schwartz, 1995). The knowledge that grows out of such repeated interactions is enabling (Ellen, 1986).

Ellen (1986) posits that IK is enabling because it is necessary to operate in an adjacent world even though it was not originally a subset of the knowledge being applied. Ellen (1986, 1993) suggests IK as enabling knowledge that permits us to describe 'tacit, intuitive, experiential, informal, uncodified knowledge' more formally. Codification of IK may lead to the loss of some of its properties. IK is experiential, not theoretical knowledge: for is has been tested in the rigorous laboratory of survival of local communities through trial and error. Local vulnerable communities constantly reinforce IK.

'IK' emerged to describe the knowledge of a local group of people to a given situation (Mercer *et al*., 2007). IK has been used interchangeably with 'local' knowledge in some instances (Ellen & Harris 2000:12). Practitioners are interested in knowledge that, regardless of source, is enforceable with respect to their own practice. Anthropologists are more interested in the knowledge itself and its interconnections with other knowledge. Ellen and Harris (2000: 45) present a checklist of characteristics that anthropologists and others have associated with 'IK. The attributions of IK put more emphasis on the empirical, practical, applied, and contextual nature of IK. The other aspects are issues related to oral transmission, informality distribution. Mercer *et al*. (2007) conclude that IK, in the sense of tacit, intuitive, experiential, informal, uncodified knowledge, will always be necessary and continue to be generated. There is repetition in learning IK and this defines the characteristic of tradition even when new knowledge is added. The aspect of repetition aids in the retention and reinforcement of IK (Ellen, 1986, 1993; Gandure, 2011). The deduction that can be made in this instance is that IK becomes people's science for it is constantly changing. It is produced as well as reproduced, shared among the community, discovered as well as lost regardless that those from outside perceive it as static knowledge (Ellen & Harris, 2000). It is important to note that, relying on literature that has authority, to have IK validated by technical experts, the interface between this kind of expert knowledge and real world situations will always be there. IK should be translated and adapted to local situations, for it depends on what individuals know and reconfigure culturally, regardless of formal and book knowledge (Ellen & Harris, 2000:28). Ellen and Harris (2000:18) suggest that there is need simply to accept that each application of IK is improvisational performances not leave the study of IK to succumb to our own 'tacit, intuitive, experiential, informal IK tradition'.

IK is about the interaction about what can and cannot be done in different circumstances (deontic or enabling knowledge). Thus, enabling or deontic is referred to as 'contextual' knowledge (Ellen & Harris, 2000:18). Contextual knowledge form of knowledge is necessary to produce results hence must be kept dynamically in 'tune' with contemporary circumstances. Knowledge bases are often entrapped within and dependent upon power relationships (Dekens, 2007b; Wisner, 2009b). The dominant knowledge base is frequently science, which overpowers and dismisses IK's importance (Birkman & von Teichman, 2010). This partly explains the neglect in using IK for DRR (Dekens, 2007). Wisner (2009) posits that conflicting interests within and between different groups of actors and the lack of political will to solve the disaster risk have contributed to the failure to use or highlight the value of IK

for DRR. It is however increasingly being recognised that for reduction in disaster risk and address increased vulnerability to hazards, there is need that new and sustainable relationships are built upon strengths of both knowledge bases (Berkes, 2008; Huntington, 2011).

Some knowledge, like western scientific knowledge, is seen as powerful since it is considered true (Ellen, 1993:229-234). The confusion with truth is a result of associating philosophical truth with knowledge. Knowledge of spirits fails to be considered true, for it is not based on empirical knowledge of the world. Ellen (1993:229-234) asserts that knowledge of spirits can be powerful and operative when there is provision of access to powerful social institutions or powerful people.

The thesis value more knowledge that is enabling. Enabling knowledge of this sort can include knowledge that others hold and relate to how this exterior knowledge can be enacted or how its consequences can be avoided. IK relates to accessing powerful processes ('natural' and human influenced), structures and people, including the exploitation of environmental resources (Ellen 1993:229). Dove (2000) explains that there are possibilities to face challenges when enabling knowledge is exported and it is inappropriate to the new contingencies within which application is desired. In such scenario there is need to be able to identify enabling knowledge, both to understand how IK works in its original context, and how it might be modified in its new context.

Knowledge is scattered and it is dispersed institutionally (Langhill, 1999:14). It is located at the individual, household level as well as collectively through community stewards and other key social actors that include healers, political leaders, elders and local religious (Langhill, 1999). The above assist to distinguish between common knowledge held by the wider community and specialist knowledge that is retained by few local experts. The local experts can be healers with specific medical expertise and knowledge of local curative plants; knowledge of local plants known only by women; or knowledge of crops known only by men (Antweiler 1998; Langill 1999; Berkes 1999).

Blaikie *et al*. (1994:62) discuss specialist knowledge and its relationship to different resources. Langhill (1999:14) distinguishes common and specialist knowledge from shared knowledge, that is knowledge held by many but not all. Examples include knowledge of

herders, hunters and farmers. This kind of IK is a result of local control, developed locally and uses low technology. The modes of IK for spreading information include folk media such as traditional performing arts, deliberate instruction apprenticeship memorised records, traditional schooling, child rearing among others and direct observation (Gonese, 1999, Gandure, 2011). IK thus reveals that it encompass in a holistic manner the complete cultural context. Sillitoe (1998:147) describes IK as interdisciplinary because rural communities think of and manage their natural environment as a whole system.

Wisner and Luce (1993) found useful information on some contested domains of IK. These are shown in table 2.1 below:

Table 2.2 Domains of IK

Description	Category
Private individual knowledge inherited from forefathers	K1
Acquired the skill to practice it faithfully without modification	K1-wm
Acquired the skill to practice it faithfully with modification	K1-m
Individual rights to use the modified and unmodified knowledge according to same rules	K1-sr
Individual rights to use the modified and unmodified knowledge according to different rules	K1-dr
Knowledge known to the community	K-2
Knowledge practiced by individuals if known to individuals	KI-1
Knowledge practiced by individuals if known to community	K2-I
Knowledge practiced by community if known to community	K2-c
Knowledge practiced by community even if details known to individual/s	K1-c
Known to community but not practised by individuals or community	K2-n
Knowledge known to community and accessible to outsiders	K2-ao
Knowledge known to community and not accessible to outsiders	K2-na
Knowledge known to wider public through documentation or otherwise	K3
Knowledge known to wider public and practised by only few individual	K3-I
Knowledge known to wider public and practised by wider public	K3-P
Knowledge known to wider public and not practised by any one	K3-n
Experiential and transmitted knowledge	K

(Source: Wisner & Luce, 1993)

The different types of knowledge outlined above assist in data analysis chapter 7. It will assist in knowing why some people in a community are unable to avail themselves of a particular knowledge and practice such as traditional building construction, use of health knowledge focusing on the vulnerability of people and other livelihoods. Section 2.4.1 in this chapter above it can be deduced that IK brings indigenous peoples experiences closer to their home lives. It gives them the opportunity to develop their talents and abilities to full potential, gain confidence and self-esteem, use their initiative and creativity, gain life skills and make

informed decisions, and to understand and experience pluralism and democratic coexistence (UNICEF, 2004).

Local knowledge and practices are mediated by local institutions and associated power relations (Silltoe, 1995). Local practices may be different from one level to another. Certain disaster preparedness practices may be found only at the household level while others may be found only at the community or village level as propounded by Wisner and Luce (1993) (see table 2.1 above on domains of IK). Wisner and Luce (1993) go on to explain that policies and decisions made over long term resulted in failure to deal with disaster risk. The policies for DRR neglect community understanding and perceptions of their own environment that they know better (Wisner & Luce, 1993).

This section highlighted the fact that enabling knowledge emanates from the interaction of people and communities and that knowledge is transmitted through local language and makes people solve their own challenges. An in-depth understanding of such knowledge entails understanding the concept of such knowledge. Hence, the section below is on concept of IK and its position in the thesis.

2.4.2 IK concept revisited and its categories

In exploring the inclusion of IK into DRR policies, there was need to interrogate, what is IK? This is the first step forward on the road to have clarity of understanding IK definition, substance, and most importantly its applicability in disaster risk practice. It also help answer the research questions especially question 1 and 2 in section 1.4 of chapter 1.

Briggs (2005) posited that IK is not a new concept in practice; it is linked to community uplifting of the 1970s. Indigenous people define it as an ancient, communal, holistic and spiritual knowledge that encompasses every aspect of human existence (Sillitoe, 2000; Sillitoe, 2004; Hammersmith, 2009). Arabena, (2008) and Baumwoll, (2008b) affirms, IK is often referred to in different ways including but not limited to local knowledge, traditional knowledge, indigenous technical knowledge, peasants' knowledge, traditional environmental knowledge and folk knowledge. IK thus is understood to be knowledge with origins inside of indigenous communities. It consists of tried and tested tools, methods or materials developed 'inside', but which are immediately accessible to an indigenous community. IK tends to be

considered local, not considered global (Birkmann & von Teichman, 2010; Bohensky *et al*., 2011). Agrawal (1995) consider the recognition of IK as necessary to foster social justice, sovereignty and autonomy of vulnerable rural communities. Promoting IK and its integration with other knowledge available for DRR is paramount for vulnerability reduction (Agrawal, 1995).

The concept of IK is further clarified in table 2.3 below in summary format

Table 2.3 IK conceptualisation

Author	Definition
Non African perspective	
Warren *et al*. (1995)	IK is unique to a given culture or society and is founded on the relationship between humans and their unique natural environment
Battiste and Henderson (2000a)	IK is the expression of the vibrant relationships between people, their ecosystems, and other living beings and spirits that share their lands.
World Bank (2004)	IK refers to the large body of knowledge and skills developed outside the formal educational system.
Michell (2005)	IK is manifested in different forms, some of which is practical and learned through day-to-day activities that revolve around survival. It is empirical knowledge that is learned from careful observations of the natural world over extended periods. The "revelatory' knowledge is accessed through elders' guidance, consultation, and preparation; using proper protocols, including dreaming and visioning.
Mercer *et al*. (2007)	IK is unique knowledge to a given culture or society. It is seen to contrast with the knowledge generated within the international system of universities, research institutes and private firms. IK is used at the local level by communities in developing countries as the basis for decision-making pertaining to food security, human and animal health, education, natural resource management, and other vital activities.
Baumwoll (2008)	IK refers to approaches and practices of a culture that develop from an advanced understanding of its specific environment that has formed over numerous generations of habitation.
African perspective	
Matikiti and Gunda (2007)	IK encompasses spiritual relationships, relationships with the natural environment and the use of natural resources. Religion is the dominant preservative factor.
Mapara (2009)	Bodies of knowledge of the indigenous people of particular geographical areas that they have survived on for a very long time". Knowledge developed through the processes of acculturation and kinship relationships that societal groups form, and are handed down to the posterity through oral tradition and cultural practices such as rituals and rites.
Blessing Ossai (2011)	IK is tacit knowledge that is not easily codifiable. It provides the basis for problem solving strategies for local communities, especially the poor. IK refers to traditional and local knowledge existing within and developed around specific conditions of women and men indigenous to a particular geographical area.

IK is a kind of learning by doing, or adaptive management (Berkes *et al*., 2000). IK evolves all the time and involves constant learning-by-doing, experimenting and knowledge building

(Berkes, 2008). IK encompasses spiritual relationships, relationships with the natural environment, use of natural resources, and is reflected in relationships among members of a society and their language. In short, IK is multi-dimensional and hence several indicators can be used to understand it (Wisner, 2004, 2008, 2010; Mercer, 2012). Since it is practical knowledge obtained as society members interact with their environment, then it implies that smallholder farmers 'traditional farming practices are a form of IK since it is based on lived experiences (Phuthego & Chanda, 2004). Thus, presumably, it is available and present within the local communities. However, some scholars define IK in terms of its association with culture, people's values and their ways of life but as noted by Briggs *et al*. (2007) such a definition excludes the fact that it is sometimes produced by incorporating external influences. The exclusion of external forces in its production process implies that IK is primarily place-specific in nature (Baumwoll, 2008). The production of IK is then just based on a given environment, culture or society and other social factors, such as beliefs (Briggs, 2005; Kolawolei, 2009; Mapara, 2009; Ruheza & Kilugwe, 2012).

The salient issues in the definition that are non-African and African perspectives are as follows:

IK is a generic term that consists of the actual knowledge, skills and practices or methods of doing things (Mapara, 2010). IK is based on local materials developed through various types of experimentation and practical experience overtime by the people of the place and adapted to the local situation. It is the local knowledge that is unique to a given culture or society, but continually influenced by internal creativity and contact with external systems (Ruheza & Kilugwe, 2012:160-174). According to Nakashima (2000:433) indigenous or local knowledge refers to a complete body of knowledge, know-how and practices maintained and developed by peoples, generally in rural areas, who have extended histories of interaction with the natural environment.

These sets of understandings, interpretations and meanings are part of a cultural complex that encompasses language, naming and classification systems, practices for using resources, rituals, spirituality and worldview (Berkes, 2008; Huntington, 2011). Mushonga and Scoones (2012) assert that IK provides the basis for decision-making at community level about many fundamental aspects of everyday life. Examples that can be cited include hunting, fishing,

gathering, agriculture and husbandry including food production (Baumwoll, 2008; Mercer, 2012).

The definitions reveals that IK is locally bound and indigenous to a specific area; situational, tacit, culture- and context specific; intangible and non formal knowledge; orally transmitted from generation to generation, and generally not documented; dynamic and adaptive; holistic in nature; and closely related to survival and subsistence for indigenous people around the world. Cajete (1999) adds that IK science is internally consistent and self-validating. The concept of IK is based on its own merits, conceptual framework, practice and orientation (Baumwoll, 2008). It is a disciplined process of coming to understanding and knowing. It has its own supporting metaphysics about the nature of reality. It deals with systems of relationship (Baumwoll, 2008; Wisner, 2010). It is concerned with the energies and processes within the universe. It provides its own basic schema and basis for action. It is fully integrated into the whole of life and being, which means that it cannot be separated into discrete disciplinary departments (Cajete, 1999; Berkes, 2008; Huntington, 2011).

IK exists in many forms (Gandure, 2011). The forms of IK include literary knowledge; performing and artistic works (including music, dance, song, ceremonies, symbols, and designs); spirituality (cosmos, indigenous sites of significance, sacred sites, and burials); languages; scientific, agricultural, technical, and ecological knowledge (including medicines and sustainable use of flora and fauna); cultural property, including burial artefacts; and cultural environmental resources (UNESCO World Intellectual Property Organisation, 2001, Hammersmith, 2007; Mawere, 2013). These forms of IK are vital for DRR from a multidisciplinary approach and thus make it valuable for its inclusion in policies.

Mawere (2013) go on to say IK is the adhesives that bind society as they constitute communicative processes through which knowledge is transmitted, preserved, and acquired by humans in their different societies. A society's uniqueness stems in part from the uniqueness of the local environment and the conditions it presents (Baumwoll, 2008; Mercer, 2012; Mawere, 2013). Certain knowledge is given to people when they are ready to receive it. IK is embedded in community practices, institutions, relationships and rituals. The characteristics highlighted state the propagation of knowledge through non-formal, internal origin, possession that is collective and practical knowledge. Gonese (1999) asserts that

community beliefs and ways of survival are taken into account in decision-making. Most of the IK relate to the whole community ways of survival with more emphasis of collectivism (Gadgil *et al*., 1993; Berkes *et al*., 1995; Hammersmith, 2007). The common thing coming out is that over time, every community generates and transmits knowledge to cope with its particular circumstances.

Adding on the above salient issues from the table, literature on anthropology, ethno science and IK focused organisations such as Association of Zimbabwe Traditional Environmental Conservationists (AZTREC), International Development Research Centre (IDRC) reveals IK ways of knowing structures (Wisner, 2010; Millar & Gonese, 2014:640). The structures include the following:

- knowledge of and belief in unseen powers in the ecosystem;
- knowledge that all things in the ecosystem are dependent on each other;
- knowledge that reality is structured according to most of the linguistic concepts by which Indigenous people describe it;
- knowledge that personal relationships reinforce the bond between persons, communities, and ecosystems;
- knowledge that sacred traditions and persons who know these traditions are responsible for teaching "morals" and "ethics" to practitioners who are then given responsibility for this specialised knowledge and its dissemination; and
- knowledge that an extended kinship passes on teachings and social practices from generation to generation.

There is a connection between specific environment context, locality and the natural world with IK (Matikiti & Gunda, 2007). IK encompasses integral relationships with the way of living and the environment (Battiste & Henderson, 2000a). There is historic continuity in a specific location that can be derived from the term indigenous. Mercer *et al*. (2007a); Agrawal, (2009b) and Wisner *et al*. (2014) assert that IK is from experience and understanding of life processes. IK evolves over time, adapting to the conditions on the current environment. There is some influence of experimentation and internal creativity and contact with the external systems (Mapara, 2009).

IK forms the base for survival strategies and decision-making. It is also spiritual, holistic, ethically based and intuitive, hence it has a large social context (Berkes *et al*., 1995). The individual is treated the same as his surrounding, no separation from relations between human and non-human entities (Mercer, 2012). Integration of beliefs and practices form is very strong. Observation is another strength offered through IK in that it relies on long-term series. Berkes, (2009); Alexander *et al*., (2011b) an Ajani *et al*., (2013) indicated the use of IK areas of education, agriculture, medicine, natural resources management, botany, zoology and craft skills. The knowledge has been in use for centuries and resulted from experience developed in specific environments that relied on direct evidence not arranged data (Berkes, 2008; Huntington, 2011).

Literature has various definitions of IK and those consulted point to the fact that IK has value for DRR (Mercer *et al*., 2007a; Agrawal, 2009b; Wisner *et al*., 2014). Indigenous communities understand their specific environment due to experience and understanding of life processes. The relationship between the local community and its specific natural environment is crucial when discussing disasters. Wisner *et al*. (2014) posit that when people understand their environment, they perform certain practices and what people know is influenced by (and influences) what people do, that is their practices. IK in addition to being 'in people's heads', it is embedded in the individual and group action (Ellis & West 2000:14). It has to be pointed out that local practices are not static traditions; they are rather complex adaptive responses to external and internal changes that have evolved throughout the generations from trial and error (Berkes, 1999; Berkes, 2008; Huntington, 2011).

People's coping practices can protect them from the impacts of disasters using preventative measures (Berkes, 1999). The use of IK practices can also assist communities to reduce their negative effects using 'protective measures', 'risk reduction mechanisms', 'impact-minimising strategies', 'risk-spreading strategies', or help them to escape certain peak values or their consequences that is 'avoidance strategies' (Mercer *et al*., 2007a; Agrawal, 2009b; Ajani *et al*., 2013). There are instances where IK management systems have been applied like conservation of biodiversity through a number of practices that embrace the use of a variety of species in agronomy (domestication of crops), agro forestry (combining food crops and domesticated trees), and agriculture (seed selection and preservation) (Warren, 1991; Agarwal, 1999; Emeagwali, 2003; Blessing Ossai, 2011).

The element of local environment and that of time are common to many definitions (Mapara, 2009). The time a community has lived in an environment, helps expand the knowledge that comes from experience and practice. Time presents some attributes of societies with historical continuity in resource use practices for their own livelihoods (Madamombe, 2004; Millar, 2014). Over time as communities observe (historical observation) they gain experience that they may internalise and apply it. Over time, the knowledge can be derived from memory, senses and intuition than from the intellect (Mushonga, 2004). Such knowledge does not present challenges for it is legitimate and has been culturally internalised. IK knowledge that can bring about challenges over time is transmitted knowledge. This kind of knowledge is gained from one generation to another (Berkes, 1999).

Transmitted IK has no legitimacy and is multigenerational in nature (Wisner *et al*., 2014). Knowing emanates from observation, complex kinship systems of relationships among people, animals, the earth and the cosmos among others. Wisner *et al*., (2014) noted that all knowledge is dynamic, continually changing, developing and adapting as communities respond to societal and environmental changes (Baumwoll, 2008; Millar, 2014). For centuries, indigenous communities have responded to their environment and have adapted to change, using mixture of knowledge that has been transmitted from one generation to another (Nakashima, 2000: 433). The research asserts that IK has value, not only for the culture in which it evolves, but also for those who are striving to improve conditions in rural environments (Baumwoll, 2008). The discussion and views expressed above show attempts by researchers of IK to describe the scope and extent of IK. The packaging and marketing of IK is as if it is something complete in itself (Berkes, 1995; Donovan, 2010). The author views are that scientific and local knowledge do not exclude each other. They are coupled knowledge, but the only distinguishing features are that IK is experience laden; practice oriented and culturally embedded, thus more holistically oriented (Elwert, 1999:4).

The thesis uses the combined term indigenous/local knowledge and "IK defined as that knowledge that is unique to a given culture or society "for it is internalised knowledge derived from memory as the result of the quotidian interactions in indigenous people's territories acquired by local peoples through daily experience. IK is capacity on itself, a local resource and communities can use its practices as reduction mechanisms' for vulnerabilities.

It has been discussed in detail that IK has 'risk-spreading strategies', or help people to escape certain disaster risk situations. A number of examples extending to various parts of Africa are presented in the following section 2.5.

2.5 IK IN OTHER DEVELOPING COUNTRIES

Hart (2010) has highlighted the importance of IK in sustainable Natural Resource Management and food security including its potential and value. They assert that the strengths of IKS in natural resources management are based on the existence of strong traditions, culture, beliefs and values of the local people including their tremendous respect, appreciation and understanding of the natural resources and the environment. In indigenous communities, the existence of practical and strong traditional institutions for resource management helps enforcement of rules and regulations through different means (Shiva, 1993). There is acknowledgement of gender and age as distinctive issues that should be taken notice of, for in many areas activities including food gathering, production, soil conservation, irrigation, land use planning and other environmental tasks are defined as either those done by males or females (Mishra, 1994; Simpson, 1994; Emery, 1997; Flintan, 2003).

Food Security according to Agrawal (1995) and Ariga (1997) is an issue women addressed for they possess specialised knowledge of traditional plants, livestock production and other available resources for nutrition and health. Women role in food security is much broader (Rodda, 1991; Bryceson, 1995; Gladwin and Thomson, 1998; Saad, 1999). Other components worthy of note include the use of integrated pest management based upon IK. Altieri (1996:7) has observed that despite the increasing industrialisation of agriculture, the great majority of the farmers in the Andes are peasants, or small-scale producers. They farm the valleys and slopes with old traditional ways (IK) and subsistence methods up to today (Altieri, 1996:7). After centuries of cultural and biological evolution, traditional farmers developed and inherited complex farming systems (Altieri, 1996; Mercer *et al*., 2007; Borkhuu, 2008; Gaillard & Mercer, 2012). The systems are, adapted to the local conditions of the locality and assisted them manage disaster risk in meeting their subsistence needs, without depending on mechanisation, chemical fertilisers, pesticides or other technologies of modern agricultural science (Mercer *et al*., 2007; Borkhuu, 2008; Gaillard & Mercer, 2012).

In Africa, like elsewhere, IK was and is still used to bring peace, harmony and order among people and their physical environment (Mawere, 2010). Blessing Ossai (2011) state that Chiefs have the responsibility to govern through a traditional council. In times of disasters such as diseases outbreaks, droughts and famine the chief distributed food and cattle to the people who have been most affected (Jacobs, 2003; Chigora *et al*., 2007; Mawere, 2010). The livelihoods of communities include IK as an essential element in their DRR practices especially agriculture. IK is very useful especially in summer and immediately after harvesting when crops like finger millet, rapoko and sorghum would be in need of thrashing and winnowing (Chigora *et al*., 2007). Traditional practices based on local knowledge (for example, use of IK for pest management, harvesting and grain storage), have a significant value and are applied in crop production and distribution, as well as in cattle production (reproduction, calving, disease control and grazing of livestock) (Emeagwali, 2003; Chogora *et al*, 2007; Mawere, 2010).

Practices of loaning of cattle or livestock (Jacobs, 2003; Munyaka, 2003; Chigora *et al*., 2007) to a poorer member of the community are some of the examples used to deal with disaster risk. A person who is loaned cattle looks after it and uses milk to feed his/her family. This strategy is used to fight calamity in the community. From time immemorial, natural disaster reduction in Africa has been deeply rooted in local communities that apply and use IK (Chogora *et al.*, 2007; Risiro, 2012).

In Mali the Jatropha Curcas plant is being grown as an alternative renewable energy (Easton, 2004), thus contributing to environmental conservation. In Kenya for instance, the use of IK in environmental conservation and natural disaster management is still prevalent and harnessed (Domfeh, 2007). This knowledge had, and still has, a high degree of acceptability amongst the majority of populations in which it has been preserved. Baumwoll (2008) posited that many communities have easily identified themselves with IK easily in Latin America, Asia and Africa. It facilitates their understanding of certain modern concepts for environmental management including disaster prevention, preparedness, response and mitigation. Baumwoll (2008) assert that IK is a precious national resource that can facilitate the process of disaster prevention, preparedness and response in cost-effective, participatory and sustainable ways.

Millar (1994) has observed that indigenous communities in Northern Ghana believe there is close interrelationship among gods, spirits, shrines, rituals, crops and animals, food items and cash crops. The relationships among these elements help them to monitor climate and other natural systems. Millar (1994) further explains that their mastery of the interrelationship generated early warning indicators for their own benefit and future generations. The African worldview according to (Millar, 1994; Gonese, 1999; Mapara, 2009) is grounded in environmental ethic (land, water, animals and plants). These have their place within the sanctity of nature (Gonese, 1999; Mapara, 2009). Certain places have a special spiritual significance and are used as locations for rituals and sacrifices (Gonese, 1999; Mawere, 2013). Such places include mountains, shrines, sacred grooves and rivers. High biodiversity is found in these places, which also save during times of disasters as sources of food and shelter (Gonese, 1999). Gonese (1999) affirms that these locations are quite often patches of high biodiversity, which are well conserved and protected by the community, as they are believed to be home to gods and spirits.

The application and use of IK for disaster reduction is prevalent in Swaziland (Manyatsi, 2011). Floods can be predicted from the height of birds' nests near rivers. Moth numbers can predict drought (Manyatsi, 2011). The position of the sun and the cry of a specific bird on trees near rivers may predict onset of the rainy season for farming. Manyatsi (2011) and Mawere (2013) affirm that the presence of certain plant species like the *Ascolepis capensis* indicates a low water table. These examples underscore the importance of harnessing IK not only as a precious national resource but also as a vital element in environmental conservation and DRR. However, despite the prevalent application and use of IK by local communities, it has not been harnessed to fit into the current scientific framework for environmental conservation and natural DRR (Wisner, 2004; Mercer *et al*., 2007; Gaillard & Mercer, 2012).

IK strengths in natural resources management are based in the existence of strong traditions, culture, beliefs and values of the local people (Wisner, 2004). Communities have tremendous respect, appreciation and understanding of the natural resources and the environment (Shiva, 1993). Communities are still relying on IKS for soil fertility as it has been proven that use of chemicals affect the harvest and the quality of soil (Agarwal, 1995; Ariga, 1997). Pidatala and Khan (2003) found that in India women appear to play a major part in the use of IK in

animal husbandry, as they are responsible for collecting fodder for cattle, milk them as well as well as gather, dry and use cow dung for energy purposes. They also play a vital role in post-harvest operations and storage of grains (Pidatala & Khan, 2003).

The World Bank (2001) findings from other African countries also confirm IK vital role played by women in assuring food security. In Lesotho and other parts of rural South Africa, the production of sorghum plays an important role in the social, cultural political and economic arenas is very rich in IK for the preservation of seeds and soil preparation. This has an implication in minimising the impact of climatic hazards, pest control, storage and harvesting among others (World Bank, 2001; South Africa Department of Agriculture, 2002).

In Southern Africa (Zambia, Malawi), conservation and sustainable use of trees and medicinal plants (*mishonga*) has been implemented by preventing logging (Ramphele, 2004). At the centre of many African countries social economic activities, the land is regarded not only as a productive resource, but also as a link between the dead and the living, the present and the past. The land binds the people together (Gonese, 1999; Millar, 2014). Gelfand (1972:54), one of the early colonial settlers in Zimbabwe, noted with some admiration the attitude of the Shona people toward their environment and noted:

"*Not only must man avoid change, but he must not alter nature more than is necessary for his basic needs. Not a tree may be chopped unless required for firewood. Nor land cleared unless required for cultivation. No one should hunt an animal except for his own family requirements*".

This feeling among the Shona is very strong that one entering a strange area in a forest, a mountain or a beautiful spot is not allowed to comment on at least he upset the ancestral spirits (*vadzimu*) (Gelfand, 1972:54). The killing of animals was traditionally restricted to male and older animals. It is an offence to kill female and young ones. The practice ensures sustainable resource use (Mapara, 2009). In Namibia the use of cattle manure, kraal, and homestead rotation and selection of indigenous crops (finger millet) have been used to maintain soil fertility) (Verlinden, Seely & Hillyer, 2006).

However, despite the prevalent application and use of IK by local communities, it has not been harnessed to fit into the current scientific framework for DRR (Wisner, 2004, 2014; Donovan, 2010; Mercer, 2012). As a result, there is a general lack of information and understanding of the need to integrate or mainstream IK into DRR. To achieve this integration would require a blend of approaches and methods from science and technology and from IK (Baumwoll, 2008).

Literature and research work has evidence indicating that communities are aware of IK technologies and have implemented successfully in a number of communities in Africa and beyond. IK adds to the success of intervention and to some extent to long-term sustainability of interventions (Mercer *et al*., 2007; Gaillard & Mercer, 2012; Wisner, 2014). When local communities participate and integrated in all disaster-related processes in pursuit of the Hyogo Framework for Action, this may highlight the importance of IK in mainstreaming DRR practices and policies (Borkhuu, 2008). To paraphrase the discussion above, IK for DRR can be thus seen as an approach that has the potential to address local needs and contradictions, use local potentials, build local capacity to organise to take initiatives.

2.6 CONCLUSION

This section discussed the theoretical framework that guides the study, and explained the concepts of knowledge and IK. Knowledge can be tacit or explicit. Knowledge is generated when communities or people interact. The most affluent influence other people. The discussion of IK is that knowledge possessed by people as they interact with nature. The knowledge has the potential to reduce vulnerabilities of rural communities in developing countries. The argument has been advanced looking at evidence that its strategies were successful in Africa. IK has been used in natural resources management and promotion of sustainable exploitation of resources. IK remains abundant in many rural communities and is applied for vulnerability reduction. Thus, the following chapter explain in detail DRR and vulnerability to address objective two (2) on the models and practices explaining IK. This is done as a way of understanding vulnerability and DRR as concepts and verifying the validity of the claim that IK, as a form of knowledge, has indeed been used as capacity for DRR in various regions for disaster risk and vulnerability reduction.

CHAPTER 3

DISASTER RISK REDUCTION AND VULNERABILITY

3.1 INTRODUCTION

The chapter sets out the most important aspects of vulnerability and DRR approaches. The theoretical framework for the thesis presented in chapter 2 section 2.2 views vulnerability as based neither purely on natural processes, nor only on social processes. Vulnerability is viewed and believed that social processes and political processes influence more vulnerability. Foucault (2006) affirms that in the past and even today vulnerable communities can not voice. They did not have representatives to say out their concerns (Faucault, 2006). Cognitive patterns, needs, and their worldviews were not well articulated and no one listened to them. Those that were vocal had their influence felt including their property while the vulnerable were, and are silenced (Faucault, 2006). This happened at various levels using various practices and means some of these are discussed in sections of this chapter. The dimension of vulnerability that is more important is the "participative capacity", which should be included into an integrative framework for DRR (Bankoff *et al*., 2004). The integrative framework includes factors like economic, social and ecological. The section is structured to discuss DRR converging in the vulnerability approach.

3.2 DRR origins

DRR originated from the inadequacies in initiatives of responding to disaster situations (United Nations International Strategy for Disaster Reduction (UNISDR), 2004). The acknowledgement to reduce vulnerabilities to disaster risk and prevention provided a better alternative to response to emergencies, recovery and rehabilitation costs (UNDP, 1992; UNISDR 2004; Warner, 2007). A strategy to promote culture of safety, prevention and preparedness in 2000 was adopted by the United Nations Department of Economic and Social Affairs in 2002 (UNISDR, 2004).

DRR origins are also within the Hyogo Framework for Action (HFA) (UN-ISDR, 2005; UN-ISDR, 2007). HFA documents outlines all the priorities and guidelines necessary for

many levels and application of DRR (UNISDR, 2005). Warner (2007) stresses that the emphasis in the HFA documents is in the institutionalisation of DRR. The figure 3.1 below provides the framework for DRR institutionalisation.

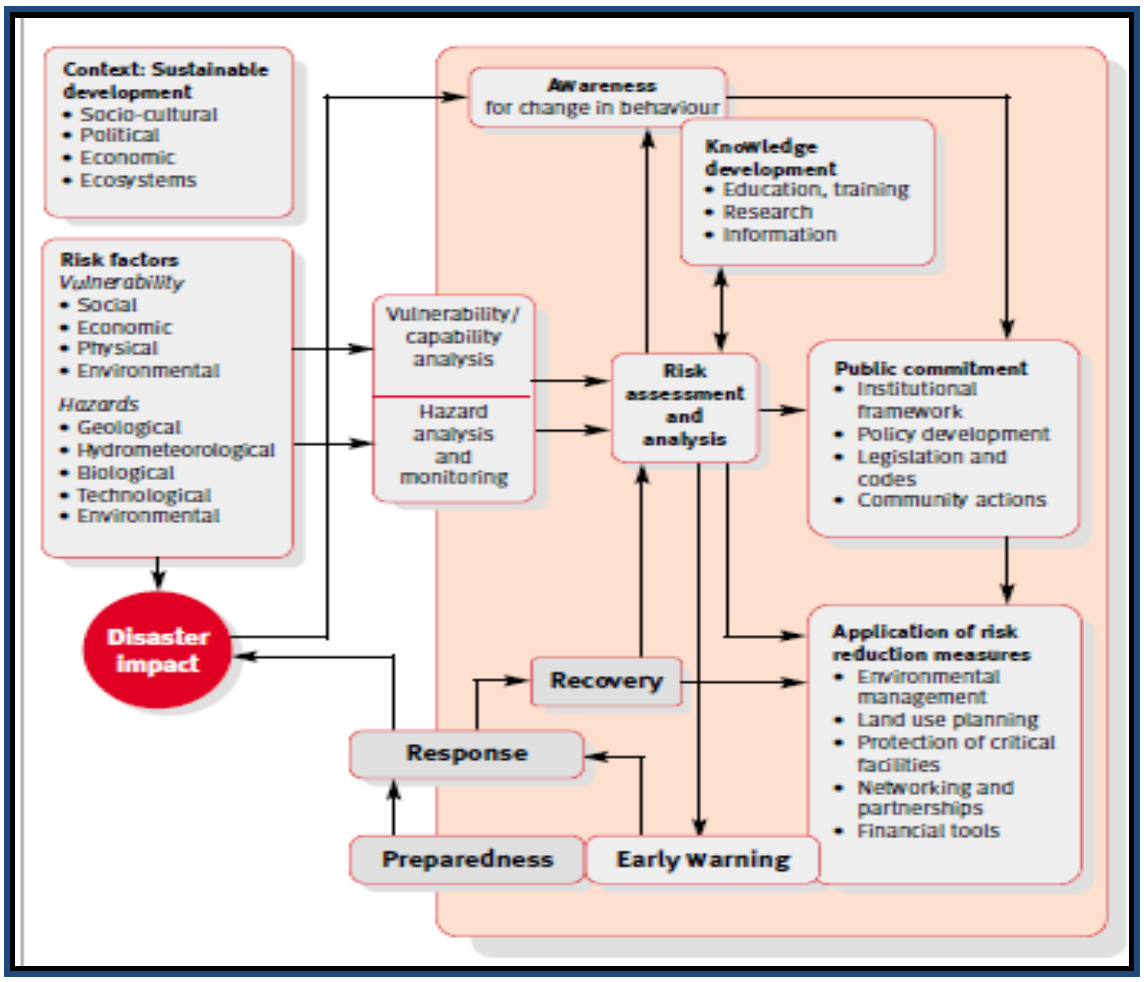


Figure 3.1 Frameworks for DRR

(Source: UNISDR, 2002:23)

The above figure clearly shows that vulnerability is not natural. It is the human dimension of disasters, the result of a whole range of factors like economic, social, cultural, institutional, political and even psychological factors that shape people's lives, and create the environment that they live in (Twigg, 2001). Warner (2007) explains that understanding human dimension of disaster risk, allows local and national level implementation of DRR. Nations also end up appreciating the need for DRR in project planning and implementation (Warner, 2007). Alexander (2001, 2006) further explains that there is considerable evolution in theories and techniques of DRR and an increase in academic interest focused on DRR, especially at the

international level. Thus, the following section discusses the concept of DRR using the above framework that has provision for inclusion of IK.

3.3 DRR CONCEPTUALISATION

DRR is increasingly getting a lot of attention in the wake of the increase in disasters, both anthropogenic and natural (Donovan, 2010). A number of areas in Africa are facing complex humanitarian emergencies due to famine, natural disasters or war (Wisner, 2008, 2010). McEntire (2004); DFID (2006); Warner (2007) and Twigg (2007) posit that development gains and productive assets are lost within communities due to disaster impacts. Disaster risk compromises communities' livelihoods and increases their vulnerability (see context and risk factors on figure 3.1) (McEntire 2004; DFID 2006). There are however innovations like reinforcing partnerships, improved data and indicators on disaster risk are coming in to help with issues on DRR (Wisner, 2010). Rural communities have experiences that are related to DRR that can inform policies (Mawere, 2013).

Wisner (2003) explains that the terms "disaster reduction" and "DRR" have brought out a lot of discussion and confusion among the scholars and this mainly due to a lack uniform definitions. Van Niekerk (2005:5) believe that the concept of DRR is more widely used than disaster reduction as it indicates an emphasis on what is being reduced, as opposed to "disaster reduction" which might increase the perception that the main focus of disaster (risk) reduction is disasters, rather than hazards and conditions of vulnerability. The Department of Civil Protection (DCP) policy (2011) defines DRR as "the conceptual framework of elements considered with possibilities to minimise vulnerabilities and disaster risk throughout a society. DRR avoids or to limits the adverse impacts of hazards, within the broad context of sustainability. Baumwoll (2008:13) points out that DRR are steps taken before a disaster occurs. The aim is to reduce the impacts the disasters may have. She argues that the term is more specific than the term disaster risk management, since it only refers to mitigation and preparedness. It is a preventive approach to disaster risk that includes the technical, social or economic actions or measures used to reduce direct and indirect disaster losses (Mitchell and van Aalst, 2008). It is widely accepted that in order for DRR to be successful it should be applied at the local or community level (Baumwoll, 2008:13).

DRR practices for rural communities are mainly stated in policies (Manyena, 2013). Many policies outline the approaches to follow and are well articulated in various international and national policy documents (Wisner, 2008). The interesting thing about policies is the ways in which they are translated into practice. This is especially important, considering the fact that social, economic and human impact of disaster on rural communities is steadily rising and their capacities not utilised (Baumwoll, 2008:13). DRR is the desired outcome that the study is trying to facilitate through inclusion of IK into policies. The UN-ISDR (2004:17) affirms that, "Disasters are a result of the risk process." Risk is the chance of a calamity to cause potential loss associated with disaster risk within the context of vulnerability (UNDP, 2004). The complex relationships that bring about disaster risk link the likelihood of a trigger event (in the form of a disaster risk) with the susceptibility of a given community to disaster risk impact" (UNDP, 2002:15).

The above conceptualisation of DRR strengthens the belief that reduction of risk should reduce or prevent the severity of the disaster through changing the conditions of vulnerability in any community (DFID, 2006:9). The significance of DRR is its endeavour to minimise vulnerability and disaster risk, safe guarding livelihoods within the context of sustainability (Baumwoll, 2008:13). DRR acknowledges that in communities there are differences among populations, groups, individuals or communities (Shanker *et al*., 2010). These groups are capable of undermining their inherent ability to rebound from the implications of a calamity. When a group of people in community are lacking or have limited access to social power, resources, and fail to rebound from disaster risk impact they are considered more 'vulnerable' (Cutter, Boruff & Shirley 2003; Cannon, Twigg & Rowell 2003; Wisner, 2014). Vulnerability as a result of disaster risk varies among groups (Fothergill, 1996). In any community there are vulnerable groups that include, children, women, elderly, disabled are more likely to be affected than others (O'Keefe, Westgate &Wisner 1976; Burton, Kates & White 1993; McEntire 2004; DFID 2006; Warner 2007). There are efforts aiming to reduce vulnerabilities among the vulnerable focusing on capacity development and resilience (UNISDR, 2005). Priorities are placed more on knowledge acquisition, innovation and creation of safe cultures Warner, 2007; Wisner, 2008, Donovan, 2010). Donovan, (2010) affirms that DRR also encourages public awareness, decision-making, and advocacy.

The above discussion has demonstrated that DRR refers to a range of activities that seeks to engage to reduce the negative implications associated with disaster risk impact. There is provision for directing the potential focus disaster risk ‘minimisation of vulnerability and exposure’ efforts. The implementation of DRR requires situational analysis and interpretation for identifying vulnerabilities including disaster risk so as to implement appropriate activities for vulnerability reduction (see figure 4.1) above. DRR objectives are achieved when there is vulnerability reduction and improved community well being (UNDP, 2004; UNISDR, 2008).

The following section seeks to discuss vulnerability from the perspective that various conditions (context and risk factors) (see figure 4.1 in chapter 4) contribute to the vulnerability of communities due to the threat of disaster risk. Suda (2000:94) asserts that any changes in communities environment, there is some potential to positively or negatively influence the degree of disaster risk. Disaster risk is a result of many factors ranging from collective influence of a physical, political, social, and environmental (Lavell, 2003; UNISDR, 2008). Vulnerability reduction has to consider the above named factors (Lavell, 2003, 2004). To put vulnerability into context, it is important to understand the concept of vulnerability.

3.4 VULNERABILITY

The use of the term vulnerability has its origin in geography and research in disaster risk (O'Brien *et al*., 2004a; Gow, 2005).Vulnerability is now a multidisciplinary concept for in public health, ecology, DRR, climate change; science and many others use it. Timmermann (1981), some 20 years ago, posited that “vulnerability is quite a broad concept to an extent it has become useless for careful description at the present, except as a rhetorical indicator of areas of greatest concern". Kasperson (2005) provides a more recent view of vulnerability, and states that no single `correct' or `best' conceptualisation of vulnerability is able to come up with an assessment of all policy contexts. Vulnerability conceptualisation is varied due to it being used in many policy contexts addressing elements exposed in different disaster risk situations.

Policy communities and researchers from many disciplines, such as those in DRR and food security, among others, have emerged with various conceptualisations of DRR and

vulnerability (Bankoff *et al*., 2004). In the 70s and 80s, Bankoff (2004) posits that vulnerability was a result of fragile physical environments or structures on impact of disaster risk. In the current period, vulnerability concept has changed and incorporates more issues (Bankoff *et al*., 2004). The United Nations International Strategy for Disaster Reduction (UNISDR, 2004), state that vulnerability is susceptibility of a community to the impact of disaster risk caused by physical, economic, social, political and environmental factors. Vulnerability concept widened to become more encompassing to include factors like susceptibility, capacity, exposure, and adaptive capacity, and other themes that include environmental, social, physical, economic and institutional vulnerability (Birkmann, 2006). UNISDR, (2004) views disaster risk itself as primarily outside to the element or object at risk. Vulnerability is seen as describing the conditions of a society at risk that determines the potential disaster risk impact according to losses (UNISDR, 2004; Cardona, 2004:37; Wisner, 2002:7-12; Thywissen, 2006).

Hilhorst and Bankoff (2004) explain that disasters are caused by social and economic discrimination for vulnerable groups end up occupying hazardous environments. Canon (1994) explains that when there is social and economic discrimination of communities, then that is key cause of vulnerability. Vulnerability in this case is not a result of raw nature, (Canon, 1994). The term vulnerability is used in context of non-human systems like physical and infrastructures (Hilhorst & Bankoff, 2004). The underlying factors associated with vulnerability are more of social and economic nature. Faucault (2006) suggests that to reduce vulnerability, marginalised people should be integrated in DRR activities. This is in line with the framework discussed in chapter 2 section 2.2, which acknowledges that theory of vulnerability provides comprehensive of human response to disasters. Technology is still the most favoured approach focusing more on natural events to address vulnerability (Bankoff *et al*., 2004).

The integrative approaches assist in visualising the complex understanding of economic, cultural, social and ecological factors. Vulnerability has the internal and external side (Bankoff *et al*., 2004). The external side is of risk, stresses to which objects is subject. The inside or internal is lack of defence mechanisms (Chambers & Cornway, 1992). The definition suit this thesis for it permits an assessment of social groups' capacities in relation to the hazard cycle (Tierney, 2001). It allows identification of mitigation (the anticipatory

planning and measures to reduce exposure between events), preparedness (the actions taken before disaster impact), response to the hazard event, and recovery. Most importantly, effort is more biased to IK on actions taken for disaster risk reduction in Zimbabwe rural communities. The table below is summary of vulnerability definitions.

Table 3.1 The concept of vulnerability

Author	**Definition**
(Chambers & Conway, 1992)	Vulnerability is the exposure to contingencies and stress, and difficulty coping with them. Vulnerability has an external side of risk, shocks and stress to which an individual or household is subject. The internal side of vulnerability is the defencelessness, meaning a lack of means to cope without damaging loss".
(Blaikie & Cannon, 1994)	Vulnerability is 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 or disaster risk.
(Brooks, 2003)	"The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity."
(UNISDR, 2004)	Vulnerability is conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards.

(Adger, 2006)	Vulnerability is the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt. Antecedent traditions include theories of vulnerability as entitlement failure and theories of hazard. Each of these areas has contributed to present formulations of vulnerability to environmental change as a characteristic of social-ecological systems linked to resilience.
(Birkmann, 2006)	Vulnerability has a double structure consisting of an external side (exposure) and an internal side (coping). Vulnerability is understood as the predisposition of an element or system to be harmed by an external event – depending on the type of the event and its magnitude.
(Kelman, 2007)	Vulnerability and hazard combine in different ways to yield risk. The presence of risk leads to disasters. Without vulnerability, a disaster cannot happen, especially since vulnerable aspects of society, such as straightening a river to provide land for housing along the banks, often cause a normal environmental event such as water rising to become a hazard such as a dangerous flood.

The concept of vulnerability contains the idea of threat and that of adverse effect (Blaikie & Cannon, 1994; Brooks, 2003; Adger, 2006; Birkmann, 2006 and Kelman, 2007). The threat varies with respect to how communities respond. The concept stresses that there are differences in vulnerability (Bankoff *et al*., 2004). The difference is based on capacities to deal with the hazard, resilience and social characteristics (Hilhorst & Bankoff, 2004). The definition by Chambers and Conway (1992) is more enticing as it looks at various issues. Most outstanding issues are `the exposure to contingencies, stress, and difficulty coping with them (Brooks, 2003; Bankoff, 2004). The concept has an implied relationship between what happens on daily basis in the community and impact of disaster when it takes place (Blaikie & Cannon, 1994; Alexander, 2001).

Vulnerability can also be understood from the sustainable livelihood perspective, which draws on Amartya Sen's work (Scoones, 1998). The livelihoods approach to vulnerability contributes to the understanding of household vulnerability. Livelihoods from these perspectives mean the way rural communities survive or make a living (Hilhorst & Bankoff, 2004). It also assists us to understand whether livelihoods are secure or not secure (Ahmed & Lipton, 1999:6). Vulnerability conceptualisation extends from many angles depicted in figure 4.1 in chapter 4. It starts from the context, vulnerability factors and strengths at household level among others (Putnam, 1993; Moser, 1998). Other factors like capabilities, exclusion, and means of making a living all determine vulnerability (Moser a& Holland, 1998; Bebbington, 1999). Vulnerability according to Moser and Holland (1998:2) is "the insecurity of the well being of individuals, households, or communities in the face of a changing environment."

In this thesis, vulnerability analysis included community "capacity," the ability to exploit opportunities within their environment by using IK to resist and recover from disaster risk. It is also important to note that authors like Morrow, (1999) and Dilley, (2000) have described vulnerability as a combination of social factors. Their argument was that individual vulnerability is not separate from collective nature of vulnerability within a social context. People in a community have social ties, safety nets, institutional arrangements hence there is bound to be collective nature of vulnerability (Morrow, 1999; Dilley, 2000). The existing institutional arrangement have varying degrees of social ties, social capital therefore it becomes difficult to measure these. Birkmann (2004) points out power structures, diversity of ethnic groups, poverty, organisational capacities, gender, and age among others contribute to vulnerability. Communities that are vulnerable, lacking capacity, experience the worst impact of disasters (Gaillard, 2010). There is also subjectivity with the concept of vulnerability in that even the rich can be vulnerable. However the rich can quickly recover due to resources they have (Wisner, 2001; Birkmann, 2006). Yodmani (2001) added that vulnerability includes ethnicity, community structure and political issues. All these issues discussed above should be understood to assist in the inclusion of IK for DRR for Zimbabwe. The recognition that technocratic approaches are unable to address complex disaster issues, susceptibility of communities to disasters has allowed acceptance of the vulnerability approach (Bankoff, 2006). The inadequacy of technocratic solution to social variable seen as contributing to disasters risk, made it possible for vulnerability to make inroads to disaster research (Gaillard, 2010).

The technocratic approaches were the logical solutions to the hazard problems defined as external events to be controlled, but were obviously inadequate when social variables were seen as contributors to vulnerability (Hilhorst & Bankoff, 2004). There are instances, (McEntire *et al*., 2002) where a lack of resources disturbs the ability of communities to save lives and protect their livelihoods. This could be due to unclear roles and responsibilities of those that should provide services (Hilhorst & Bankoff, 2004). Decision made during disaster situation can due to weak planning lead to inefficiency and deceitful response decisions (McEntire *et al*., 2002). During the recovery phase (i.e. returning to a normal situation), vulnerability may continue if lessons learnt are not taken into consideration (Hilhorst & Bankoff, 2004). Wisner (2001:6) believe that while vulnerability is often present in checklists, taxonomies, and to a greater degree, externally produced situational analyses. Local communities have the logic of their situation for they understand their situation better due to their living with risks over time (Wisner, 2001:6). The experience of living with risk forces communities to be aware of their strengths, capabilities, weaknesses and their needs (Birkmann, 2006; Gaillard, 2010). Vulnerability has expanded and includes many issues, ranging from economic, political and social variables, which explain disaster risk. DRR is seen to lie in understanding of human values governing their judgements and motivation actions as solutions to vulnerability (Gaillard, 2010). Kelman (2007) and Gaillard (2010) assert that as human values govern their motivation actions to solutions to vulnerability; IK can also be applied to DRR and vulnerability. IK is also evolving because of the transformation processes in rural communities (Kelman, 2007; Gaillard, 2010). Understanding of the transformation processes in communities is very helpful in identifying the changing scope of IK and capacity including the underlying reasons for disaster vulnerability (Altieri, 2004; Alexander, 2011). It is important to point out that lack of capacity also results in vulnerability for capacity is the ability and analysis of ideas including to cope with challenges like disaster risk (Schmuck, 2001). Schmuck (2001) believes that capacity includes potential of a community in doing the following:

- Establish those that are capable to use coercive power, and its capacity to restrict such use.
- Share resources efficiently and allocate resources equally.
- Conflict resolution and resolving disputes between individual members, as well as among groups.

- Identify challenges and issues, amplify solutions to those problems, and implement the solutions.
- Facilitate and enable processes in which individuals and groups with diverse and competing interests excel because of engaging in competition as well as build common interests of collaboration to reach a common goal.

Acquiring skills, competencies and tools, processes and resources that are needed to improve the ability of a society to achieve success is what capacity is all about (Schmuck, 2001). Capacity development is an explicit intervention intended to improve a community's potential to achieve its objectives in relation to its environment (Altieri, 2004; Alexander, 2011). Capacities may also be the potential strengths that a community may or may not be conscious of (Alexander, 2011). IK can be a coping capacity in disaster situations. Blaikie *et al*. (1994) and Webster *et al.* (2005) posit that coping refers to the current resources and the range of expectations of a situation to achieve various ends. Thus coping skills and capacities can be physical, social, economic and institutional (Brooks, 2003; Webster *et al.,* 2005).

Societies throughout the world have variety of internal social structures for helping other members of society or safety nets (Altieri, 2004; Alexander, 2011). Such structures are capacities for coping and these become collective instruments for organising action for disaster-affected communities (Brooks, 2003). There are many coping mechanisms in societies like clans, religious groups, extended family and so on (Cuny, 1983; Altieri, 2004; Alexander, 2011). In disaster situations, IK can be a knowledge base and critical for coping capacity of rural communities (Anderson & Woodrow, 1989; Mercer, 2007). The structures in rural communities can make external mechanism efficient (Mercer, 2007; Alexander, 2011). Internal coping mechanism effectiveness may only be destroyed by strong external influence.

Wisner (2001) has suggested approaches for analysing disaster risk and vulnerability. The categories as outlined by Wisner (2001) include techno-centric, target group, situational or community based. These categories are linked to disaster models that are constantly changing. The models will be discussed in chapter 4 in addressing objectives two (2) and eight (8) of the thesis. However to further clarify conceptualisation and issues related to disaster risk and vulnerability; various types of analysis are presented below.

3.5 TECHNO CENTRIC ANALYSIS

Wisner (2001) posits the techno centric approach, views vulnerability and risk as the extent of loss to elements at risk due to a disaster of a given magnitude. The definition provides categories of elements at risk with degrees of freedom to a given hazard with characteristics of its own. Vulnerability can be of structure, people, and the environment and so on (Wisner, 2001). Definitions for many NGOs and United Nations Organisations agencies are mainly inspired by the techno centric approach for they see the potential for loss when disasters strike (Gaillard, 2010; Alexander, 2011). Vulnerability of infrastructure, people is assessed through the same approach. Models are also applied to calculate economic losses including human loss estimation (Wisner, 2001). The weakness of the approach is that they do not have reference to people, networks, their community a processes that support life in society (Gaillard, 2010). Vulnerable groups' lists are usually restricting and limited, for the aim is to address dimension of vulnerability (UNISDR, 2008, Alexander, 2011). People can be identified as living near a vulnerable location (floodplain) or on place with recurring disaster risk. Buckle, (2000) posits that usually the emphasis is placed on groups of people in these lists. Reasons as to why these groups are at risk, are not identified (Buckle, 2000). The concepts do not look at a particular worldview of what matters or their IK but concentrate more on disaster risk (Buckle, 2001). The consequences placed on the interactions between the disaster risk agent, community, property and the environment are neglected. Such actions are more likely to affect planning in practice (Buckle, 2000).

3.6 TARGET GROUP ANALYSIS

Enarson and Morrow (1997) state that the approach looks on the vulnerability of social (target) groups, including the factors associated with the causes of this social vulnerability. Maskrey, (1989), Blaikie *et al*., (1994), Lavell, (1994), Hewitt, (1996), Enarson and Morrow (1997) explain that the approaches start from the empirical observation that different groups of human beings often suffer different degrees of injury, loss, disruption in the same event. These also experience different degrees of difficulty, success or failure, in the process of recovery. Vulnerability is broken down into social, economic, environmental, informational vulnerability (taxonomies). Taxonomies are used instead of the term vulnerable, which is a convectional term (Wisner, 2001). Wisner (2001) affirms that taxonomy terminology fails to distinguish people and systems.

Aysan (1993: 12) identified certain aspects that undermine self-protection as capacity, thus blocking social protection, making it difficult to recover and expose vulnerable groups. The aspects identified include the following:

- Lack of access to resources (material/ economic vulnerability)
- Disintegration of social patterns (social vulnerability)
- Degradation of the environment and inability to protect it (ecological vulnerability)
- Lack of access to information and knowledge (educational vulnerability)
- Lack of public awareness (attitudinal and motivational vulnerability)
- Limited access to political power and representation (political vulnerability)
- Certain beliefs and customs (cultural vulnerability)
- Weak buildings or weak individuals (physical vulnerability)

Anderson and Woodrow (1989) categories of vulnerabilities as well as capacities as matrix can also be considered. The matrix has the following:

- Physical / Material; what productive resources, skills and hazards are there?
- Social/Organisational; what are the relations and organisation among people?
- Motivational /Attitudinal; how does the community view its ability to create change?

The analysis in this case refers to factors at the community level (Anderson and Woodrow, 1989). It does not look at individual level. These approaches have practical benefit in assessing vulnerability. The weaknesses of the approaches according to Wisner (2001) and Alexander (2011) are that, analytically these taxonomies and lists are still blunt tools. They fail to explain the characteristics of a specific disaster risk, specific circumstances and specific persons, all of which are capable of change including their IK that can be capacity or skills (Alexander, 2011).

The vulnerability approaches discussed above can however contribute information useful to inform policy interventions, in relation to particular characteristics of the disaster risk domains that may be under consideration (Wisner, 2001:5). Vulnerability information with spatial data can be used to help locate and come up with characteristics of communities that

may be affected by specific activities such as crop or livestock based, and to help quantify specific disaster risk impacts.

3.7 COMMUNITY BASED ANALYSIS

Anderson and Woodrow (1998), Chiappe and Fernandez (2001), and Wilches-Chaux and Wilches-Chaux (2001) explains that in community based analysis for vulnerability, communities and groups appropriate the concept of vulnerability to inquire into their own exposure to damage and loss. In this instance, vulnerability concept becomes a tool in the struggle for resources that are allocated politically. The employment of the concept of social vulnerability as a tool in and by the community also involves capacities or capabilities.

In Zimbabwe such community based vulnerability assessment are quite elaborate (DCP, 2011). There is utilisation of all sorts of techniques to map and make inventories, seasonal calendars, and disaster risk chronologies. The utilisation of various techniques in vulnerability assessments has also been highlighted by Geilfus (1997), Soto (1998), von Kotze and Holloway (1998), Anderson and Woodrow (1998), Chiappe and Fernandez, (2001) and Wilches Chaux (2001). Vulnerability assessments have enabled those SADC countries that use them to establish a forum for all relevant stakeholders to come together and learn more to better understand vulnerability issues. The assessments looked at the provision of key information source for the humanitarian assistance community to respond to complex emergencies; and to create the opportunity to influence policies related to emergency and poverty responses. The aspect of inclusion of IK or local capacities has been overlooked. Hence, the need to investigate the inclusion of IK into DRR policy became imperative, for this is the first research of its kind in Zimbabwe.

Marsland (2004), Maunder and Wiggins (2005), and Maunder (2005) affirms that most of the Vulnerability Assessments Committees (VACs) were initially focused on collecting information and data to provide a deeper understanding of food insecurity, prompted by the apparent food crisis and emergency of 2002 within the Southern Africa Development Community (SADC). At later stages, it was realised, that the humanitarian crisis was, and is, embedded in a socioeconomic context (Marsland, 2004; Wiggins, 2005; Maunder, 2005). The issues that came out included the role of macro-economic failures in the region dating back to

the 1970s, the liberalisation of domestic markets, and the role that HIV/AIDS plays as it intersects and interacts with food crises (Marsland, 2004; Wiggins, 2005; Maunder, 2005). The focus of vulnerability assessments is on a more nuanced view of vulnerability and the requirements for efforts to build sustainable resilience. Vulnerability has a time dimension. Downing and Bakker (2000) and Wilhite (2000b) noted vulnerability changes over time, incorporating social responses as well as new rounds of disaster risk events. Disaster risk cause harm to livelihood and not just life and property, hence more vulnerable groups are those that also find it hardest to reconstruct their livelihoods after a disaster.

Blaikie *et al.* (1994) asserted that vulnerability constantly changes because of changes in technology, population behaviour, practices, and policies. Downing and Bakker (2000) indicate that even from season to season, vulnerability can vary from extreme crisis to complete safety. Vulnerability, DRR and IK are discussed in more detail in chapter 4. These concepts are key and prominent in DRR and vulnerability models, especially the Pressure and Release model, which has a long history but which is most known through Wisner *et al*. (2004). The Pressure and Release model describes how disasters result from the interaction between disaster risk and vulnerability. Vulnerability in the model emerges from conditions, constraints, and pressures that are imposed and created by some parts of society on other parts society, often those who are least able to help themselves (Enarson & Morrow, 1998, Boyce, 2000). When vulnerability interacts with a disaster risk, a disaster is the result. Policies and decisions over the long term have created conditions that often neglect communities 'perceptions and understandings of their own context'. Chester (2005) and Donovan (2010) posit that IK is embedded more in specific contexts, and has to be taken as crucial for DRR. This view is supported by Weichselgartner and Obersteiner (2002) who warned that IK should be considered within a given local context for any DRR approach. This is done to deal with potential failure that may arise. IK for DRR has been highlighted after the earthquake and tsunami of 26 December 2004 (Wisner, 2010). Differences on effects of disaster risk (tsunami) were observed between the immigrant workers, tourists and locals who possessed IK of the specific hazard (Wisner, 2008; Donovan, 2010). Those that did not have IK failed to recognise the warning signs of the approaching tsunami hence they were unprepared for its impact (Sieh, 2006). Thus the section below discusses DRR, Vulnerability and IK linkages.

3.8 DRR, VULNERABILITY AND IK LINKAGES

Wisner (2008) and Donovan (2010) posited that there are quite various reasons for the convergence or linkages in DRR, IK and vulnerability. The focus in analysing the linkages using the community is because IK is acquired in a social context or community (see chapter 2 section 2.4.2). The logic follows that a community vulnerable to disaster risk suffering an undesirable outcome, and this vulnerability comes from exposure to risk (Wisner, 2008). Donovan (2010) noted that vulnerability start with the idea of disaster risk. Disaster risk has characteristics of a known or unknown chance of events occurring (Wisner, 2008; Donovan, 2010). Communities through social actions (using IK) are capable of reducing disaster risk or exposure to disaster risk (Alexander, 2011). Programs for commodities price stabilisation are examples for reducing price risk. In communities, individuals using IK can respond or go on to manage in a number of ways disaster risk. Accessibility to formal or informal tools can assist DRR and vulnerability reduction (Wisner, 2008; Donovan, 2010).

Wisner (2008) explains that DRR has activities that happen before and after a disaster event. DRR activities are able to lower risk exposure or vulnerability reduction. DRR activities after a disaster event are coping activities responding to a disaster event reducing vulnerability of losses incurred (Alexander, 2011). Some communities have IK practices, safety nets and ceremonies for psychosocial support that help cope with disaster risk (Kelmann, 2007). Individuals in a community may have difficulties related to adoption of DRR practices exclusion from social networks or inability to use IK abundant in the community or does not have access to IK (Holzmann & Jorgensen, 1999; 2000). Siegel and Alwang (1999) go on to state that policy can reduce all or some of these constraints, but others alternative course of due to costs involved. Vulnerability is the continuous state of expected outcomes (Wisner, 2008). The above discussion in shows that DRR, vulnerability and IK when they converge, there is provision for learning opportunities. The three concepts have however suffered from a lack of political influence and human capacity to raise the profile of DRR (Cannon, 2008; Chester, 2005; Donovan, 2010). Evidence provided in literature so far does not show issues related to inclusion of IK for DRR into policies but show more issues related to integration of IK with scientific knowledge. There is need to investigate the means for the inclusion of IK into DRR policies and remove negative from culture towards DRR activities. This then calls for proper engagement with IK in order to use IK effectively in DRR activities. Mercer

(2009) has stated that community based DRR activities are considered as a better means of integrating IK aspects for effective vulnerability and DRR activities. Within the community, DRR activities bring about participant empowerment and a mechanism that enables diffusion of ideas from community to decisions makers in governance system (Mercer, 2009). Communities can also gain opportunities of contributing towards their own well-being through development of DRR strategies. Community commitment and belongingness for the DRR activities is strengthened (Mercer, 2009). Lavigne *et al*., (2008) concluded saying, community based DRR activities can be used as a mechanism to provide awareness to the community about the disaster risks that they could encounter.

3.9 CONCLUSION

The chapter discussed DRR, and vulnerability conceptualisation and their strong linkage with IK. The importance of integration with IK that reduces risk, and vulnerability of communities from disasters was presented. Anderson and Woodrow (1998) clarified the concept of capacity as a means of reducing vulnerability. The importance of making DRR strategies compatible with IK aspects of the community in further strengthening community's coping capacity towards disasters was highlighted. The thesis should bring out an understanding of why IK is not included in DRR policy, or rendered archaic, old-fashioned when rural communities, as reflected in literature, finds it useful and appreciates it.

A balanced view is needed for IK since there are many changes that are taking place due to inreasing disasters and coupled with migration, among other things (Mercer, 2009). Wisner (1994a, 1994b, 1995a, 1995b, 2004, 2010, 2014) is of the view that ways has to be found to motivate vulnerable communities to be encouraged or influenced to revive their knowledge in their own cultural environment where society tell them they are uninformed. Models that provide the starting point for DRR, IK and vulnerability reduction are available. These models include the sustainable livelihoods framework, the progression of vulnerability: pressure and release model (PAR), ecosystem and ecological model for DRR and the IK model for integration actions and knowledge into DRR. These are discussed in chapter 4.

CHAPTER 4

DRR, VULNERABILITY AND IK MODELS

4.1 INTRODUCTION

The concepts associated with vulnerability were presented in chapter 3 using the vulnerability framework. Wisner's (2001:5) situational analysis that recognises social vulnerability was explained. DRR, vulnerability and IK linkages were discussed for these are terms necessary for contextualising essential components within the framework of DRR. Chapter 2 outlined the underlying theoretical framework based premised and informed with techno centric views in addressing disaster risk. Lowe *et al*. (2007) argued that vulnerability approach is people-centred and it concentrates on the social, political, and cultural factors of people that make them more vulnerable to loss from a disaster risk. Thus in disaster reduction, causes of disaster can be attributed to human factors and draws its arguments and methods from social sciences. Technocratic approaches are disaster risk focused and aims to reduce disaster through control of natural environment (Lowe *et al*., 2007). This is in contrast to Gopalakrishnan and Okada (2007) who argues that on designing new institutions for implementing integrated DRR, the inclusion of culture (IK), customs and traditions shape is paramount. In culture and local language, there is expression of ideas while values determine the right or wrong ideas that are appreciated in the community (Arunotai, 2008). Huntington (2000) further states that many governments have ignored the roles of IK for DRR activities can be minimised through addressing the factors that ultimately contribute to the risk equation itself.

The application of models widely recognised within disaster discourse serves as the basis for data collection and analysis for the thesis in line with the theoretical foundation presented in chapter two sections 2.1. These models, namely the Pressure and Release, and the Access and Sustainable Livelihoods Models, have been accepted within the DRR community (Blaikie *et al*., 1994; DFID 1999; Twigg 2001; Cannon *et al*., 2003; DFID 2005) and utilised as the basis of understanding and contextualising hazard impact and disasters through vulnerability and sustainable livelihoods analysis. The inclusion of the models is justified and critical to the thesis is the presentation of DRR, Vulnerability and IK models that provide clarity regarding

the inclusion of IK in to DRR policy. Section 4.2 presents a discussion of theoretical frameworks regarding the response of traditional societies in facing disaster risk followed by the progression of vulnerability: pressure and release model (PAR).

4.2 THE PROGRESSION OF VULNERABILITY: PRESSURE AND RELEASE (PAR) MODEL

Researchers (Kates, 1971; Burton, 1972; Kates *et al*., 1973; Mileti *et al*., 1975; Dynes, 1976; Burton *et al*., 1993) presented the framework that regards natural environment dependent societies as fragile and failing to cope on their own with disaster risk. The challenges presented because of extreme natural phenomena deprived societies of their main resources, which is pushing them to rely on external resources for recovery and rehabilitation. Disaster risk has been viewed according to Kates (1971), Burton (1972), Kates *et al*. (1973), Mileti *et al*. (1975), Dynes (1976) and Burton *et al*. (1993) as controlling social cultural change. These arguments emanates from the "top-down "technocratic and western logic dominant paradigms in disaster studies (Wisner, 2008, 2010). The proponents of this approach find justification for promoting a transfer of experience, knowledge and technology from industrialised countries to developing nations in the poor capacity of traditional societies to respond to natural hazards (Gaillard, 2007:524). The figure 4.1 shows a theoretical framework regarding the response of traditional societies in facing natural hazards.

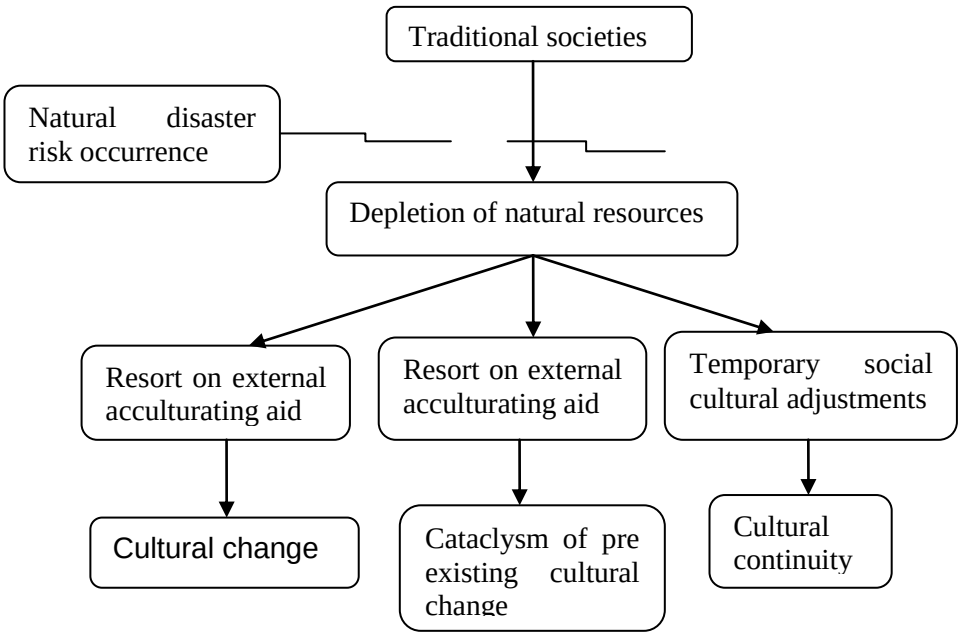


Figure 4.1 Theoretical frameworks regarding the response of traditional societies in facing natural hazards

(Source: Gaillard, 2010)

According to Torry (1979) and Oliver-Smith (1996) the framework on figure 4.1 emerged from the growing anthropological literature on hazards and disasters during the 1960s and 1970s. The arguments of this approach have greatly contributed to challenging the aforementioned dominant and technocratic paradigm on DRR. It pointed out the perverse effects of emergency measures and other technological adjustments set up by western governments. The approach, according to Waddell (1974), Torry (1978b), Cijffers (1987) and Newton (1995) if there is a temporary incapacity of traditional societies to overcome the consequences of disaster risk occurrence, it is due to the foreign relief aid that disrupts indigenous resilience systems rather than to the intrinsic incapability of affected societies. This gave way to new models for DRR like the PAR model presented by Blaikie *et al.*, (1994).

The PAR Model ideology is based on a dynamic model, explaining vulnerability to disaster risk. Disaster risk according to the model is a result of the interaction between physical exposure and social economic pressure (Blaikie *et al.*, 1994). The factors contributing to

vulnerability and disaster risk exposure intensifies the risk exposure for severe impact or disaster occurrence (Blaikie *et al.,* 1994). Wisner and Blaikie *et al.* (2004) discussed the notion of differential vulnerability in a political ecology framework. The social aspects of disaster that put more emphasis on the union of social vulnerability and exposure are the focus of the 'progression of vulnerability' framework (Burton *et al*., 2006). Capacities of rural communities to cope with disaster risk are addressed including the need for planning to reduce vulnerability. The model also put more emphasis on involving grassroots vulnerability reduction and DRR actions (Tobin, 1999; Tobin & Whiteford, 2002; Burton *et al*., 2006).

The authors mentioned above advocate a differential approach to vulnerability. Vulnerability is looked at from the household and community level, through a dynamic framework called the 'access model'. The access framework addresses vulnerability as defined in chapter 3 sections 3.5 where vulnerability is viewed as targeting elements at risk (Wisner, 2001). The access framework is also in line with the theoretical framework discussed in chapter 2. Most focus of the access model is on assets. The framing of the access model is based in the context of the ways in which social systems create conditions so that disaster risk has a differential impact on various societies and different groups within society (Blaikie *et al*., 1994:46). Focussing on resources shows that nature itself is part of the resources that are allocated by social processes. Access to resources is observed by Blaikie *et al*. (1994, 2004), as the capacity or ability of individuals, groups, families, classes and communities to utilise resources that directly secures livelihoods.

Blaikie *et al*. (1994:48, 2004) further explains that social relations within communities of gender, status, production, ethnicity including age determine access as well as social and economic relations. The latter variables always affect access to resources in any given community. It is not always the case that rights and obligations to resources are equally distributed among people (Blaikie *et al*., 1994:48, 2004). Access to resources is differential for some have less access and others have more access. Such a scenario allows vulnerability to set in. The same can also be inferred for IK domains discussed in chapter two Table 2.1, where in certain communities people access some domains of IK or possess certain IK.

An important aspect in differential vulnerability analysis is determining access to resources. There are many challenges among communities and individuals, on the range of making

choices. These challenges on choices of access are related to livelihood and social arrangements among various cultures on earth (Blaikie, 1998). The PAR model, ecosystem and ecological perspective as shall be discussed later in this chapter 4; political perspectives depict the nature of disaster risk, and the vulnerability of communities that are exposed. The disaster results at the intersection of two forces, where Risk = Hazard x Vulnerability as depicted on figure 4.1 below (Wisner *et al*., 2004).

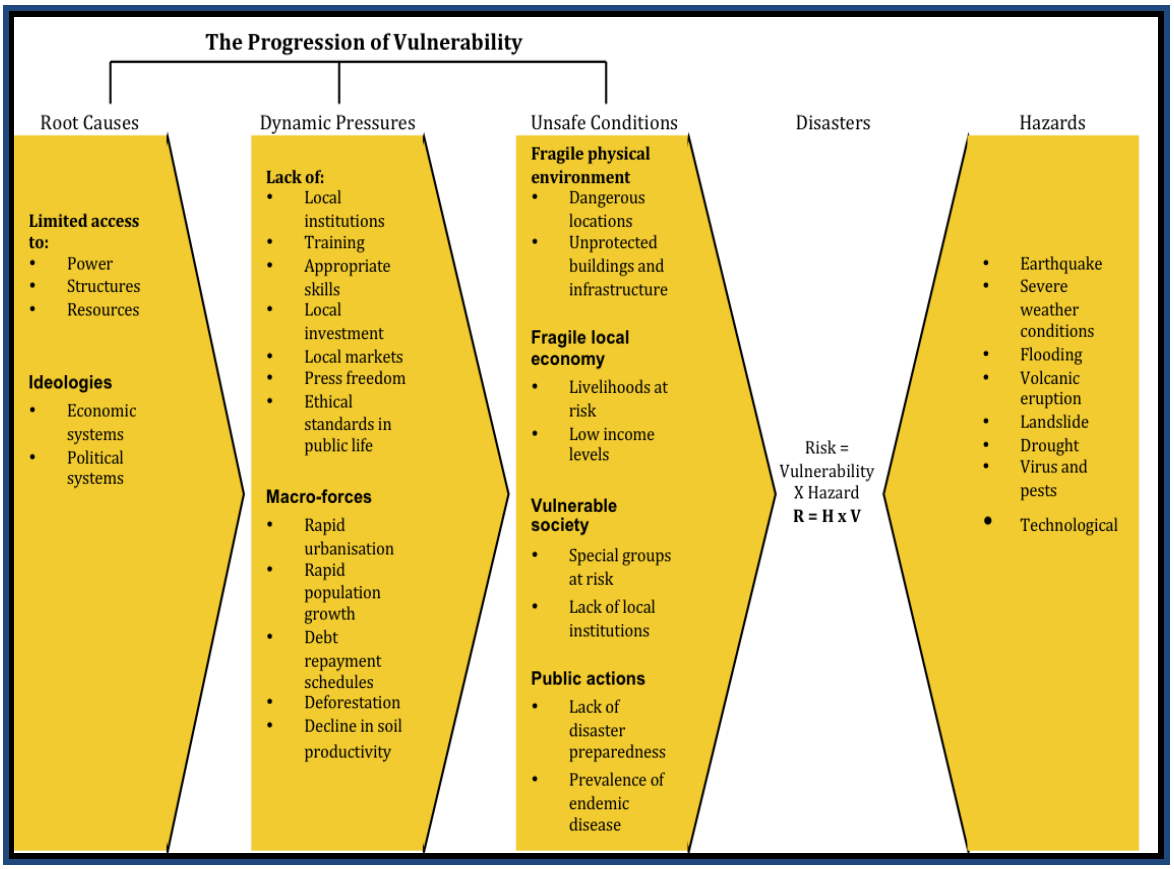


Figure 4.2 Progression of vulnerability: Pressure Model

(Source: Blaikie *et al*., 2004)

The pressure (disaster) is at the intersection of unsafe conditions (context and risk factors figure 3.5 chapter 3) and disaster risk, as the two opposing forces. When the colliding two opposing forces in time and space, disaster unfold or set in. The forces are the physical exposure to the disaster risk itself and the many processes generating vulnerability. The main root causes depicted in the PAR model are power relations in communities resulting from limited access and ideologies (Blaikie *et al*., 1994). Rural usually vulnerable communities though endowed with own IK, they have less access and less secure livelihoods (Kelmann, 2007; Baumwoll, 2008). Government interventions, especially in developing nations, fail to

acknowledge IK and prioritise vulnerable communities in vulnerability and DRR (Wisner, 2008, 2010, 2014). This observation is discussed in chapter 5 that reviewed DRR policy of 2011, environmental, drought and land policies for Zimbabwe. The effects of root causes are a result of dynamic pressures as shown in figure 4.1 above. The dynamic pressures include activities (local institutions, training, acquiring appropriate skills) and processes (deforestation, urbanisation, migration etc.) that bring about vulnerability and cause communities to settle in unsuitable dangerous conditions. The dynamic pressures results in vulnerability that should be addressed (Blaikie *et al.*, 1994).

Blaikie and Cannon (1994) and Wisner (2003) posited that geophysical process and social, economic and political processes are different from one disaster to the other disaster. The context in which disaster occurs among developing nations is well articulated in the PAR model. In developing countries like Zimbabwe, the capacity to respond (use of IK) to disaster risk is linked to due to issues of access to resources, poverty levels, political and economic instability, and globalisation effects among others (Gandure, 2011; Manyena, 2013). Etkin and Stefanovic (2005) affirm that this is in contrast to developed countries in that the rich people live in potentially hazardous environments for aesthetic reasons among many other factors. It also has to be pointed out that the PAR model, considers demographic and political processes as very important root causes of vulnerability. These factors focus on processes' influencing resources allocation and distribution in communities and developing countries (Blaikie *et al.*, 2004). The thesis applied this model in Zimbabwe a developing country looking at rural vulnerable communities. It examined what Blaikie *et al*. (2004) thought on the term 'ideological order' of root causes that include beliefs, practices, activities and worldviews promoting certain sets of responses to disaster risk. Chapter 6 described in great depth the methodology, research design and data collection tools that assisted to gain insights into IK, values and beliefs about disaster risk of communities, and how those IK, beliefs and values result in decisions for DRR. There are instances when IK possessed by communities, social values and beliefs result in certain expectations of both government institutions and other citizens (Kelmann, 2007). These also at times determine responses to any disaster risk. Values, attitudes and beliefs may act as inhibitors to coping and adaptation as well (Baumwoll, 2008).

Twigg (2001:5) asserts that unsafe conditions are evident in specific scenarios of time and space that exist in union with a disaster risk that expresses a community's vulnerability. The underlying connection behind the framework also means that pressure from the accumulation of outputs or root causes, unsafe conditions and dynamic pressures including exposure to disaster risk has potential to increase from either direction. That also means there is an increase in the potential for disasters. In the same way, the implication is that reverse of the process could decrease the progression of vulnerability, thus reducing the accumulated outputs (Twigg, 2001) as shown in figure 4.3 below.

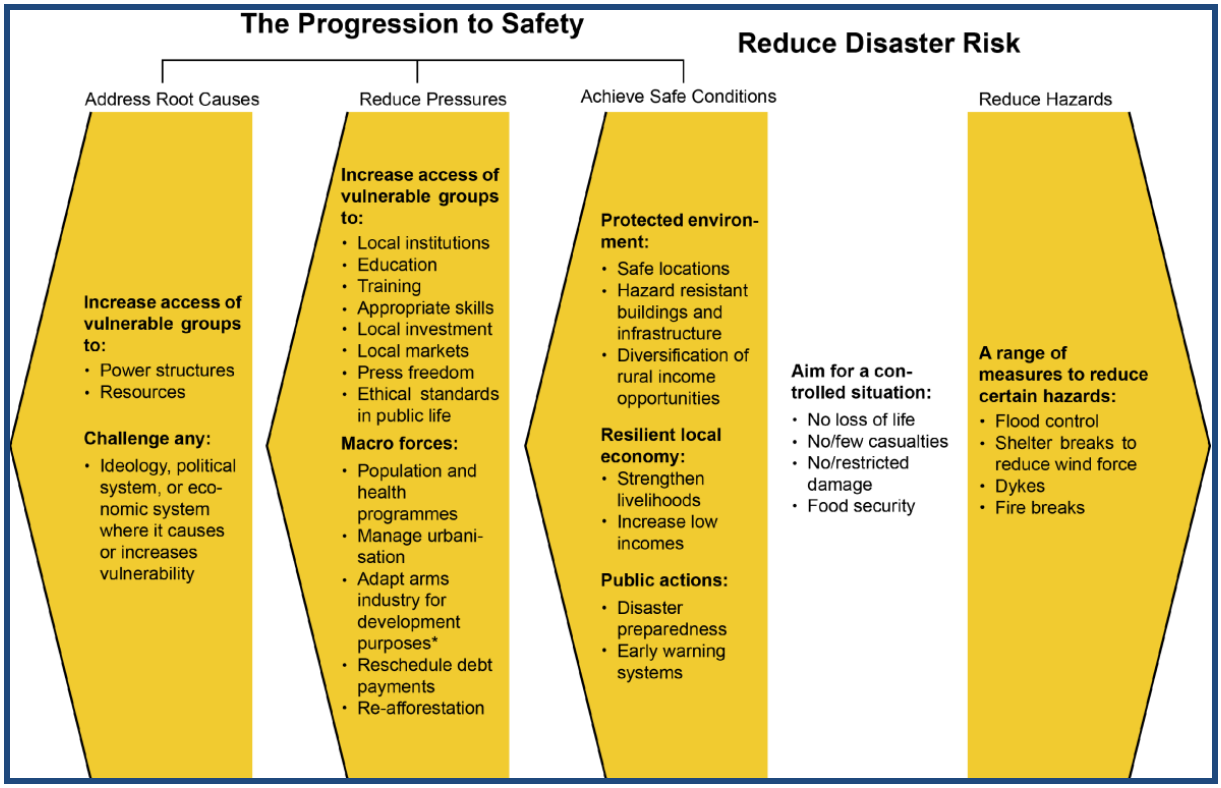


Figure 4.3 Progression of safety: Pressure Release Model

(Source: Blaikie *et al*., 2004)

The reversed ideology details opportunities to alter the flow of factors associated with causes of disaster scenarios. The opposite functioning version of the PAR model reflects the potential implications of reducing aspects such as exposure to disaster risk threats, root causes, unsafe conditions including dynamic pressures that may decrease disaster risk. Critiques of the model like Twigg (2001) indicate that the model fails to predict finite means to measure vulnerability. Kasperson *et al*. (2003) also stated the model failed to consider

addressing human-environmental systems regarding biophysical system. There is acknowledgement though that the model has helped to explain the complexities and interrelationships within society (Twigg, 2001). The importance of the model lies in its holistic or total view of vulnerability, its integration of livelihood strategies and its ability to explain the concept of vulnerability.

The PAR framework was applied in part of chapter 7, and in the Conclusion chapter 8 it was adapted to show the progression of social vulnerability in the study areas using the findings of this research. The vulnerability analysis component of the study considered the results of the documentary analysis of archival material, analysis of key participant interviews, and observation data from the community, interviews and focus group discussions. This was done to explore practices of IK in disasters reduction and later suggest possible framework and informed recommendations for the inclusion of IK into DRR policy for Zimbabwe.

Besides the insights presented above on the application of the model in the methodology section, it has to be pointed out the Access Model utilises strategies pertaining to livelihoods and understanding of communities coping mechanisms with disaster risk and other external stressors (Twigg, 2001). In communities effective resource forms the basis for securing livelihoods. Access to resources (livelihoods) helps in explaining the individual or collective ability to recover from or reduce disaster risk impact (Twigg, 2001:6). Clarification of livelihoods is best explained using the sustainable livelihoods model. The section below discusses the model.

4.3 SUSTAINABLE LIVELIHOODS FRAMEWORK (SLF)

The premise of the Access Model discussed above also applies to the Sustainable Livelihoods Framework (SLF) in that they both recognise the role of livelihood, including access to resources. Access to resources help to support and sustain livelihoods, which is crucial when addressing severe disaster risk impact (Carter & May, 1999; Twigg, 2001). The SLF even though it was developed not focused on disasters, it has relevance in describing the potential application of disaster risk impacts on vulnerable livelihood systems of communities (Chambers & Conway, 1992; Twigg, 2001). The model shown in Figure 4.3 clearly highlights the contributions of natural capital, social, human, financial,

and the physical capital to the dynamic system shaping the livelihoods of communities (Twigg, 2001).

The components of the SLF identified are presented in the following sections.

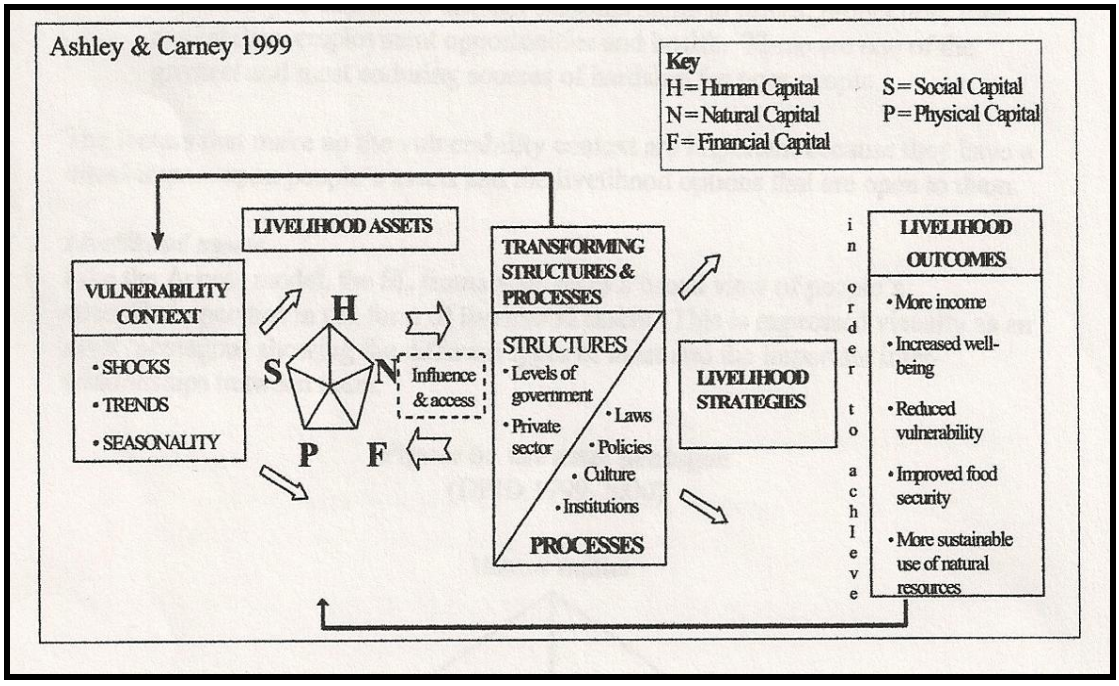


Figure 4. 4 Sustainable Livelihoods Framework (SLF)
(Source: Twigg 2001)

Twigg (2001:9) defines livelihoods as those things comprising of capacities, assets (including both material and social resources) and activities required for earning a means of living. Vulnerability in the SLF is the starting point for creating a dynamic system using concept of livelihoods. The natural, social, physical, human and social components in the SLF can be modified to change the potential outcomes (Carter & May; 1999; Twigg, 2001). The whole system within the SLF has livelihood assets, transforming structures and processes, livelihood strategies and vulnerability within Sustainable Livelihoods as shown in figure 4.4.

4.3.1 Livelihood Assets

Twigg (2001) asserts that the SLF helps in understanding the situations communities that depend on the relationships between household assets, the vulnerability context and

institutional processes shaping their lives. The framework's focus on the institutional context facilitates description of how effective indigenous communities and institutions can help mitigate the effects of disasters on vulnerable people through resources mobilisation (Carter & May, 1999). The assets value of livelihoods lies in determining the strengths in the broad scale of the system. Twigg (2001) posited that of the five categories, the significance of capacity is gauged in human, social, natural, physical and financial terms. The framework provides an insightful analytical approach to help identify which types of households are likely to be particularly vulnerable (Manyena, 2006). It will also be interesting to use the SLF in identifying networks formed using IK as well as connection and membership of groups, relationships of trust, reciprocity and exchanges.

When focusing at a community, the model will be used to show the strengths and weaknesses of different types of assets, their relative importance in reducing disaster risks and the linkages between them. The focus on assets shall assist the identification of assets that are vulnerable to disaster risk and reasons for vulnerability, which are the characteristics that make them more vulnerable. The focus has to be on assets that are more resilient to disaster risk and what makes them resilient.

This will assist in analysing the interrelationships in shocks, vulnerabilities and households assets and coping strategies. This can happen within the context of ongoing policy and institutional development processes. The SLF puts households and their livelihoods at the centre of analysis, assuming that they are continuously influenced by potential threats of shocks and/or disasters (Carter & May, 1999). Carter & May (1999) and Twigg (2001) posited that in the SLF, vulnerabilities of all kinds and institutions form core parts of the overall context within which development progresses. The different assets of different households, social groups, communities and the institutional contexts will finally determine the capacities to cope with disasters risk. Institutions play a major role of changing things including issues of access. The section that follows is on institutions as transforming structures and processes.

4.3.2 Transforming Structures and Processes

Within the SLF there are institutions, organisations, policies and legislation that shape livelihoods. These operate at all levels, from micro, meso to macro levels (Chambers & Conway, 1992; Twigg, 2001). These determine access to the five different types of capital, livelihood strategies and decision makers, terms of exchange between the different types of capital, economic and other returns from livelihood strategies. They can reduce or worsen the impact of disaster risk on vulnerable communities (Carter & May, 1999). It is important to identify those that promote disaster risk and the ones that increase vulnerability to disaster risk. It is in this context that an understanding of institutions is required to determine their strengths and weaknesses (Anderson *et al*., 1994). Institutions can fail to build livelihoods or can facilitate the building of livelihoods. In Zimbabwe, for instance (Manyena, 2006), Rural Districts Councils (RDCs) are facing a number of challenges, which include inadequate financial and human resources; unstable political system; problems related to decentralisation. Their role for building resilience has been incapacitated as result of these challenges (Manyena, 2006). However, communities always find ways to develop livelihood strategies. The following section briefly explains these.

4.3.3 Livelihood Strategies

In DRR livelihoods strategies are structured actions for achieving a tangible or intangible something in future or relatively long-term perspective (Anderson *et al.*, 1994:20). In a disaster situation there are strategies that are put in place to counter the hardships that may be experienced. The strategies can be those of coping with disaster risk in the short term or medium term (Anderson *et al*., 1994). Twigg (2001) asserts that livelihood strategies are the ways in which individuals or communities seek and are persuaded to utilise their assets to earn their livelihood. There are complexities in the process that depend on combination of many factors. Livelihoods are bound to a particular context or scenario and recognise external influences that may change decision-making (Carter & May, 1999; Twigg, 2001). Any interruption within the livelihood system on a broader scale may reinforce the cycle of vulnerability associated with having little access to livelihood assets (Schipper & Pelling, 2006).

4.3.4 Vulnerability within Sustainable Livelihoods

The SLF is quite significant in the thesis as it show relationships between concepts such as livelihoods, processes, vulnerability context, transforming structures, livelihood strategies and livelihood outcomes. The context of vulnerability in this thesis is the setting in which individuals live with their assets (Mangwe, Lupane, Hwedza and Guruve) see chapter 6 section 5.4. Assets, according to Twigg (2001) represent the capacities possessed by communities. Twigg (2001:9) posits that the vulnerability context frames the external environment in which people live. The vulnerability context has all the hardships experienced by vulnerable people (Chambers & Conway, 1992; Twigg, 2001). Chapter 3 and chapter 4 discussed at length on the principles related to vulnerability as a concept. Aspects that include vulnerability as forward looking, the probability of experiencing a loss, household can be said to be vulnerable to future loss of welfare and this vulnerability is caused by uncertain events, and many more were presented and discussed in depth.

The SLF explains that the categories of vulnerability are shocks, trends and seasonality. Shocks are interruptions forcing communities to utilise or lose some of their assets in the process of trying to cope with negative implications of disaster risk (Twigg, 2001). Twigg (2001) explains that trends reflect larger scale factors that impair livelihoods that are based on resource use, governance, and technological perspectives (Carter &May, 1999; Twigg 2001). There are also shifts in any environment on price regulation; employment opportunities, production, and health and food availability are associated with the seasonality category (Twigg, 2001). The integrity of a community requires that it bounce back after disasters.

The SLF is a method of organising complex issues and can be applied to DRR research for it can be used to illustrate the complex nature of livelihoods and potential interventions (Twigg, 2001). The thesis aims to investigate the inclusion of IK into DRR policy; hence, the model assists in identifying livelihoods that use IK for DRR for disaster risk in various parts of the country. Having presented a selection of models that contextualises relevant information within DRR, vulnerability concept including references to DRR and Sustainable livelihoods, the point of the review has been reached where the role of the ecosystems and ecological approach to DRR needs to be discussed. Section 4.4 presents the ecosystems and ecological approach to DRR.

4.4 ECOSYSTEMS AND ECOLOGICAL APPROACH TO DRR

Understanding the ecosystems and functions is an important component of appreciating the orientation of disasters reduction. The discipline of DRR and environmental management share many of the same concepts, issues, processes, and concerns. They come into contact only rarely, and then usually it is only a glancing blow (Labadie, 2005). Parts of environmental management include disaster risk identification, risk assessment and emergency/contingency planning all activities that are central to the practice of disaster risk management. Labadie (2005) provides an explanation that other parts of the ecosystems address issues of water quality, protection of flora and fauna including general health of the ecosystem.

The Ecosystem Approach can help to manage resource use more effectively and contribute to DRR and impact of disasters (UNEP, 2009). Ecosystems concept looks at relationships between living organisms and their environment (Labadie, 2005). It also comprises those disciplines, or parts of them, considering the physical, chemical and biological aspects of the environment. Allaby (1999) and Allaby and Saunders (2000) explain that ecosystems refer to the natural cycles, systems and their components. The strategy looks into the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way (Allaby, 1999, Allaby & Saunders, 2000). The Ecosystem Approach puts people and their natural resource use practices squarely at the centre of decision-making.

The environment is seen as the agent/reason of a disaster or as the carrier (Aptekar, 1994). When disaster strikes for example an earthquake or a flood, the environment behaves in ways that bring harm to the communities. Communities may suddenly find the environment sitting in one's living room (Aptekar, 1994). Communities and individuals make choices, agriculture practices, selection of building materials and sites that significantly influence their susceptibility to environmental disasters (Aptekar, 1994; May & Cousins, 2000). This outlook mirrors the thought that disaster risk is a social make formed by the interface of human practices with natural processes. An earthquake or flood is a disaster when it impacts the human infrastructure (Cutter, 1993; Burton *et al.*, 1993; Cutter, 1996; Mileti, 1999; May & Cousins, 2000).

The Ecosystem Approach can be used to seek an appropriate balance between the conservation and use of biological diversity in areas where there are both multiple resource users and important natural values (Sudmeier-Rieux *et al*., 2006). This observation make the model relevance to this thesis as the areas of study has very active farming communities, forestry, fisheries, protected areas and cultural practices among many other fields. Ecosystems matter to DRR. Gaillard (2010) asserts that ecosystems can be managed to lessen disaster risk more effectively. Ecosystems supply valuable protective services, including buffers like forests, wetlands and wildlife (Sudmeier-Rieux *et al*., 2006; Wisner, 2010, 2014). Enhanced management of ecosystems can assist disaster-ridden societies in reducing poverty (UNEP/ UNISDR, 2008). Ecosystems contribute to reducing disaster risk in two important ways. First, ecosystems, such as wetlands, forests and coastal systems, can reduce physical exposure to natural hazards by serving as natural protective barriers or buffers. Well-managed ecosystems are used as natural protection against common disaster risk, such as landslides, flooding, wildfires and drought (UNEP / UNISDR, 2008). Ecosystem management can be valuable in disaster preparedness and post-disaster situations. There are number of reasons to integrate ecosystem-based management in DRR that are shown in the table:

Table 4.1 Reasons to integrate ecosystem based management in DRR

Authors	**Reasons to integrate ecosystem based management in DRR**
(Baumwoll, 2008)	• It can decrease vulnerability to natural disasters, for literature has shown that IK on ecosystems management exist in many communities throughout the world.
(Wisner, 2008) and Donovan, 2010).	• Costs are high due to natural disasters and ecosystems have saved many vulnerable communities in Indonesia. • Prevention of disasters results in costs than fixing the damage caused. • Populations that are at risk depend on ecosystems for their livelihoods
(Donovan, 2010).	• Responses to natural disasters have a negative impact on biodiversity • Ensuring the rapid recovery of ecosystems on which local livelihoods depend.
(Tompkins & Neil Adger, 2005)	• avoids disaster responses that have a negative impact on ecosystem recovery and enhances communities' capacity to recover their livelihoods
(Masundire Hillary, 2010)	• brings the greatest improvements to present-day livelihoods while minimising the impact of future disasters

The tools used for the ecosystem approach application are still evolving for it is relatively an innovation but the ecosystems approach is being recognised in disaster reduction (Watson *et al*., 1997; Watson *et al*., 2000; Watson, 2002). The ecological approach is entrenched in the concept of resilience. The term resilience is often used with the notion of "bouncing back" reflecting its Latin root "*resiliere*" meaning "to jump back" (Klein and Nicholls, 1999, Manyena, 2006; Paton *et al*., 2010). The concept of resilience originated from the field of ecology three decades ago. Holling (1973) is frequently cited as the first to use and define the concept of resilience in the field of ecology after publishing his article entitled "Resilience and Stability of the Ecological Systems".

Holling (1973) coined the term resilience for an ecosystem as the ability of an ecosystem to absorb changes and persist. A comparison of the resilience concept with stability notion was defined as the ability of a system to return to its equilibrium after a temporary disturbance (Manyena, 2006). The implication is that, the more rapidly the system returns to its equilibrium, the more stable it becomes. The conclusion was that resilience and stability are two important properties of an ecological system (Klein & Nicholls, 1999). Therefore, a system in this context can be very resilient but still fluctuate greatly; that is small stability. Two decades later, Holling revisited his definition, and redefined the concept of resilience as a buffer capacity or the ability of a system to absorb perturbation, or the magnitude of the disturbance that can be absorbed before a system changes its structure by changing the variables (Holling, 1996). Since the work of (Holling, 1973; Folke *et al*., 2002), numerous ecological definitions of the resilience concept have emerged. The figure 4.4 below depicts long-term sustainability through the ecosystems approach. The model focuses on human livelihood needs.

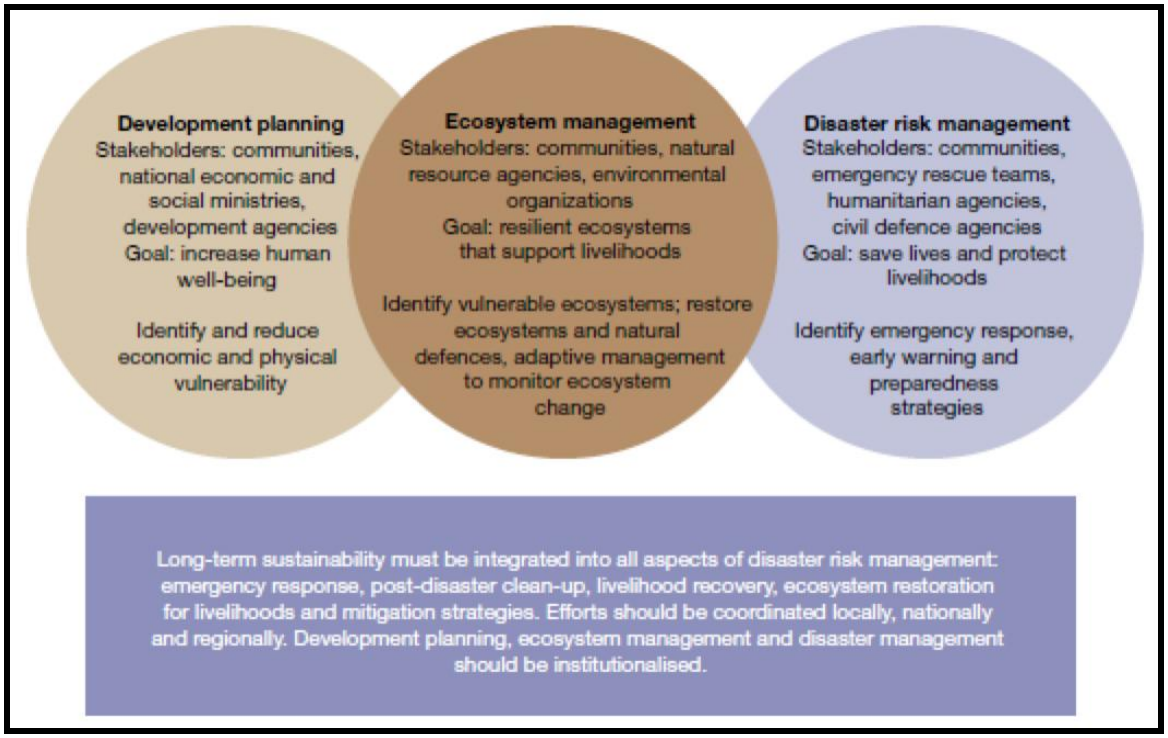


Figure 4.5 The Ecosystem Approach for long-term sustainability

(Sources: Sudmeier-Rieux *et al*., 2006)

In the ecosystem approach, communities become accustomed to their livelihoods including dangerous conditions in spite of the risk. Most of them have no alternatives. Disaster risk forces vulnerable communities adjust to new and potential bigger risks affecting them and their livelihoods. Natural barriers, particularly based on IK are sometimes an important part of protection and mitigation during disasters events (Danielsen *et al*., 2005). In Sri Lanka, for instance with current rates of erosion, assuming one km of reef protects five km of shoreline; one square km of coral reef is able to prevent 2,000 sq. metres of erosion in a year (Heltberg *et al*., 2009; Berg *et al*., 1998).

Ecosystems present an environment where organism and human interact (Heltberg *et al*., 2009). Natural environments can offer many benefits to humans and communities, including other livings organisms (Tompkins & Adger, 2005). Physical environments may be endowed with fuel, fodder, food, medicine and so on and also can self-regulate through disaster risk like illness or floods. The ecosystem can also support itself through crop pollination, seed dispersal mechanisms recreational and spiritual benefits (Tompkins & Adger, 2004, 2005). The ecosystem model is also linked to the sustainable livelihoods model, for it open up many options with regard to livelihoods. Communities can be able to use their IK to tap into the

available livelihoods in the ecosystem, such as hunting, farming, recreation and so on (Baumwoll, 2008; Heltberg *et al*., 2009). Heltberg *et al*. (2009) affirms that the use of IK among communities within an ecosystem improves the social well being thus resulting reduced vulnerability to disaster risks.

The regulating aspects that occur within an ecosystem can play a direct role in disaster risk and vulnerability reduction (Tompkins & Adger, 2005; Heltberg *et al*., 2009). In wetland areas for instance (Heltberg *et al*., 2009), flood risk can be reduced and communities that rely of water sources experience reduced vulnerability but also benefit from fisheries. Thick vegetation in communities can also act as windbreaker or a source of food (Donovan, 2010). Such processes can benefit communities that realise the need to live in harmony with ecosystems they reside in (Tompkins & Adger, 2005; Heltberg *et al*., 2009).The areas chosen for the thesis are forms of ecosystems that presents forests, river systems among others hence this models will be used as reference for the research.

In chapter 2, IK has been identified as being locally bound and indigenous to a specific area; situational, tacit, culture and context specific and closely related to survival and subsistence for indigenous people around the world (Cajete, 1999). Rural communities have acquired IK over generations on both on DRR and ecosystem management and they in particular, maintain specific cultural systems and values relating resources available including disaster risk (Mawere, 2013). They have use IK to predict disaster risk through studying IK categories (environmental ethic, ecological ethic etc.) plant growth, flowering patterns, behaviour of animals, nesting height of birds and so on. These signs were used to usher in early warnings to the community (Mapara, 2009; Mawere, 2013). Communities within ecosystems have intimate relationships with nature. Communities who possess IK in the context of DRR according to (Marsh & Buckle, 2001; Delica Willison & Gaillard, 2012) are not helpless in facing disaster risk. Rural communities use their valuable IK for risk reduction practices, thus the following section discuss IK model for DRR.

4.5 IK FOR DRR MODEL

Disaster related issues have been published in social sciences, geography emerging with two main paradigms that follow different paths (Kates, 1971; Burton *et al*., 1978). These paradigms include the hazard paradigm, which is from the behavioural geography movement.

Kates (1971) and Burton *et al*. (1978) asset that the hazard paradigm look at disasters as resulting from extreme and rare disaster risk, and that affected people fail to 'adjust' because their perception of risk associated to these natural events is insufficient. The other is the vulnerability paradigm that is more and is in line with the political ecology tradition of geography (Hewitt, 1983; Wisner *et al*., 2004). Hewitt (1983) and Wisner (2004) assert that disasters primarily affect those who are marginalised. These do not have access to power hence they lack access to resources and means of protection.

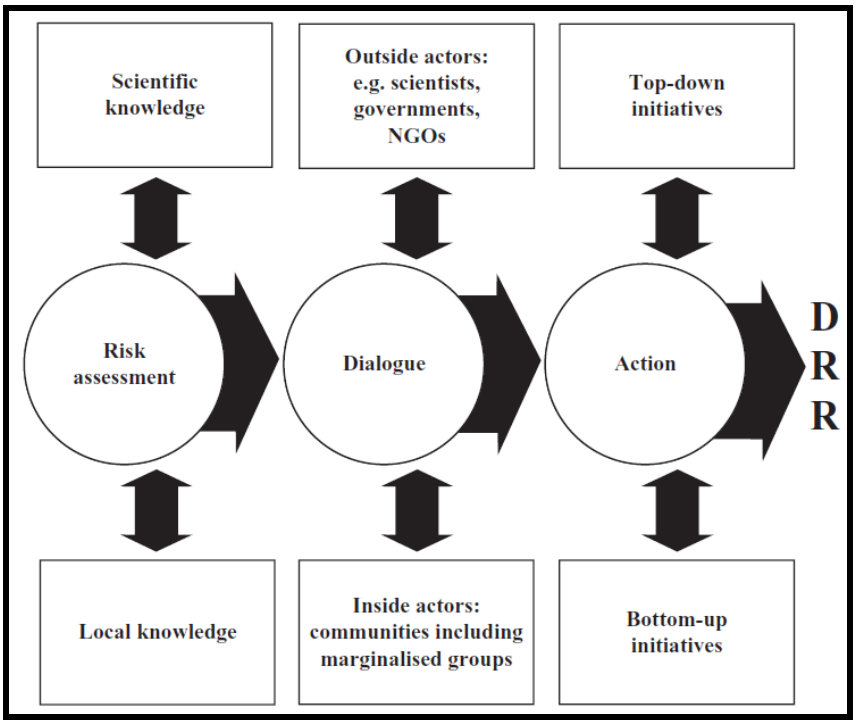


Figure 4.6 Model for integrating knowledge, actions and stakeholders for DRR
(Source: Gaillard & Mercer, 2012)

Gaillard (2010) explains that policy-makers have given primary attention to the outcomes and suggestions of the hazard paradigm. Policies in many parts of the world (Gaillard, 2010) still rely on command and control and top down frameworks, which emphasise scientific knowledge. The current policy in Zimbabwe for DRR also subscribes to this paradigm hence the need to influence the inclusion of IK. It is only in international arena where policy makers have considered ideas from the vulnerability paradigm (GNDR, 2011; IFRC, 2011). The Hyogo Framework for Action (HFA) is a result of these developments of international policy

documents, which are not binding treaty. They do not have concrete targets and thus remains vague to entail concrete outcomes at the national level (UNISDR, 2005).

Civil society, DRR practitioners and NGOs have reacted to these dominant technocratic policies advocating for increased involvement of those affected by disasters in policy and actions towards DRR (Marsh & Buckle, 2001; Delica Willison & Gaillard, 2012). Voices have called for recognising local people and communities (for definitions of communities in the context of DRR (Delica Willison & Gaillard, 2012). Local communities are being seen as not helpless in facing natural hazards and that local knowledge is a valuable resource (Maskrey, 1984, 1989; Anderson &Woodrow, 1989). These movements have thus pushed for community-based DRR (CBDRR). The CBDRR is now a practice that has gained momentum worldwide (Pelling, 2007; Heijmans, 2009).

Long and Long (1992) affirmed that the field of DRR is a battlefield of knowledge and action. It always results in poor outcomes in terms of actual reduction of disaster risk for those most vulnerable (Long &Long, 1992). Gaillard and Mercer (2012) have come up with a model for integrating knowledge, actions and stakeholders for DRR. They argue that DRR is an integrative process that needs a road map for it is inclusive and not exclusive. DRR (Gaillard & Mercer, 2012) recognises that there are different forms of knowledge valuable in addressing disaster risk. Tibby *et al*. (2008) further asserts that actions at different scales, from the top down and from the bottom up, are necessary to reduce the risk of disaster. DRR requires a large array of stakeholders operating across different scales to collaborate as depicted on Figure 4.5. The road map put more emphasis on horizontal process (Gaillard & Mercer, 2012). They also advocate the integration of IK with scientific knowledge since scientist and geographers dismiss IK (inside knowledge) as inferior to (outside knowledge) scientific (Wisner, 1995; Mercer, 2012).

Agrawal (1995) disputes this notion on the basis that the label ‘expert’ given to scientists symbolises authority and prestige, as opposed to local generated knowledge, often embedded within a community and given no particular label. Livingstone (2003) says even though scientific knowledge is validated and verified with the global community, IK is validated and verified with those that use it. It is also continually evolving through internal creativity, experimentation and contact with external systems and knowledge (Flavier *et al*., 1995).

Mercer (2012) goes on to advise that IK should be carefully assessed to ensure its applicability and effectiveness in addressing disaster risk. This has been said based on increased focus upon use of IK for DRR (Shaw *et al*., 2008, 2009). This represents a movement away from top-down technological focused solutions to the more context specific 'local' solution (Agrawal, 1995). While it is clearly accepted that 'science' saves lives, IK has demonstrated this capacity. The high profile cases include the 2004 Indian Ocean tsunami (Arunotai, 2008; Baumwoll, 2008; Gaillard *et al*., 2008b). Local communities in disaster risk prone areas often initiate own distinct ways of addressing disaster risk (Tibby *et al*., 2008). These initiatives are when further analysed may or may not be beneficial for DRR (Shaw *et al*., 2008, 2009). However, IK is a precious resource that can facilitate the process of DRR in cost effective, participatory and sustainable ways (Howell, 2003).

Tibby *et al.* (2008) affirms that reducing vulnerability seems to be a task of prime. It is not sole responsibility for those with power for the local communities are not helpless and always display capacities in some form (Tibby *et al*., 2008). Disasters are local events that primarily affect local communities. Willison and Willison (2004) assert that no one is more interested in reducing disaster risk than those whose survival and wellbeing is at stake. Furthermore, local people are those immediately affected when disasters occur, they become the first responders to the event (Quarantelli & Dynes, 1972; Delica Willison & Willison, 2004). In times of disaster, outside assistance arrives at best hours or at least days after the event. Quarantelli (1986,1987) and Alexander (2002a) further state that even though it is well-known that the initial few hours are crucial to save lives and livelihoods, evidence from the field suggests that 85% of post-disaster survivors are rescued by their friends, kin or neighbours who are on the spot at the time of an event. It therefore makes sense that local communities should be the prime stakeholders of DRR. Quarantelli (1986, 1987) posited that if people and communities are able to handle many tasks in responding to disasters, thanks to their IK capacities. In that context, people and local communities should collaborate with local institutions, which know better their needs and resources.

The main objective of this study was to have a deeper understanding and meaning for the inclusion of IK into DRR policy for Zimbabwe. In conducting this research, the inclusion of IK into DRR policy should address issues related to DRR through reducing vulnerability and improving mitigation. An understanding of some of the root causes of social vulnerability

was required, specifically through exploring the perspectives and values of communities affected by localised hazards and institutions involved in disaster risk management. The reason being that decision-making processes are dependent upon such social variables and values in particular community (Mangun & Henning, 1999). Wisner *et al*. (2004) posited that ways to reduce community vulnerability to disaster risk should recognise the interaction between indigenous and scientific knowledge bases. The section 4.9 discusses the model on indigenous and scientific knowledge bases for DRR.

4.6 INTEGRATING INDIGENOUS AND SCIENTIFIC KNOWLEDGE BASES FOR DRR

Lewis (1999); Wisner *et al*. (2004) and Hewitt (2007) have stated vulnerability to disaster risk increase has been due to the changes in people's social, economic, cultural, political and environmental contexts. The loss of IK among rural communities has made indigenous communities to be severely disadvantaged in their ability to deal with disaster risk (Campbell, 2006). Campbel (2006) affirms that for centuries, rural communities could cope and adapt, yet they are now being more vulnerable due to isolation.

There is now a shift in DRR according to Jigyasu (2002); Howell (2003); Cronin *et al*. (2004a), (2004b); Haynes (2005); Mitchell (2006); Dekens (2007a), (2007b); Mercer *et al*. (2007) that have caused the recognition of IK for vulnerability reduction. Brokensha *et al*. (1980) presented that Scientific and IK can be used as bases for vulnerability reduction regardless that they are often entrapped upon power relationships. Wisner (1995); White *et al*. (2001) posits that the recognition to reduce disaster risk and address increased vulnerability to disaster, the strengths of IK and scientific bases are essential. Agrawal (1995), Wisner (1995), Larsen (2006), Mercer *et al*. (2008) agrees that any kind of knowledge is dynamic, changes continually and adapting as communities respond to changes in society including their environment. Scientific and IK have been used for many years to deal with disaster risk (Mercer *et al*., 2008).

Wisner *et al*. (2004) and Louis (2007) asserts there has been a movement from top down towards bottom up approach in international DRR. The bottom up approach has been successful due to use of participatory techniques that allows community engagement (Wisner *et al*. 2004; Louis 2007). Comfort *et al*. (1999) affirms that community engagement has

resulted in rural people being involved in decision. The framework in figure 4.6 has applied theoretical foundations of disaster related studies in geography (White *et al*., 2001; Wisner *et al*., 2004). O'Keefe *et al*. (1976), Hewitt (1983, 1997) and Campbell (1984) indicates that the IK and scientific framework followed the participatory paradigm through guided discovery that allows interaction and collaboration. The figure 4.6 shows the integrating indigenous and scientific knowledge bases for DRR model.

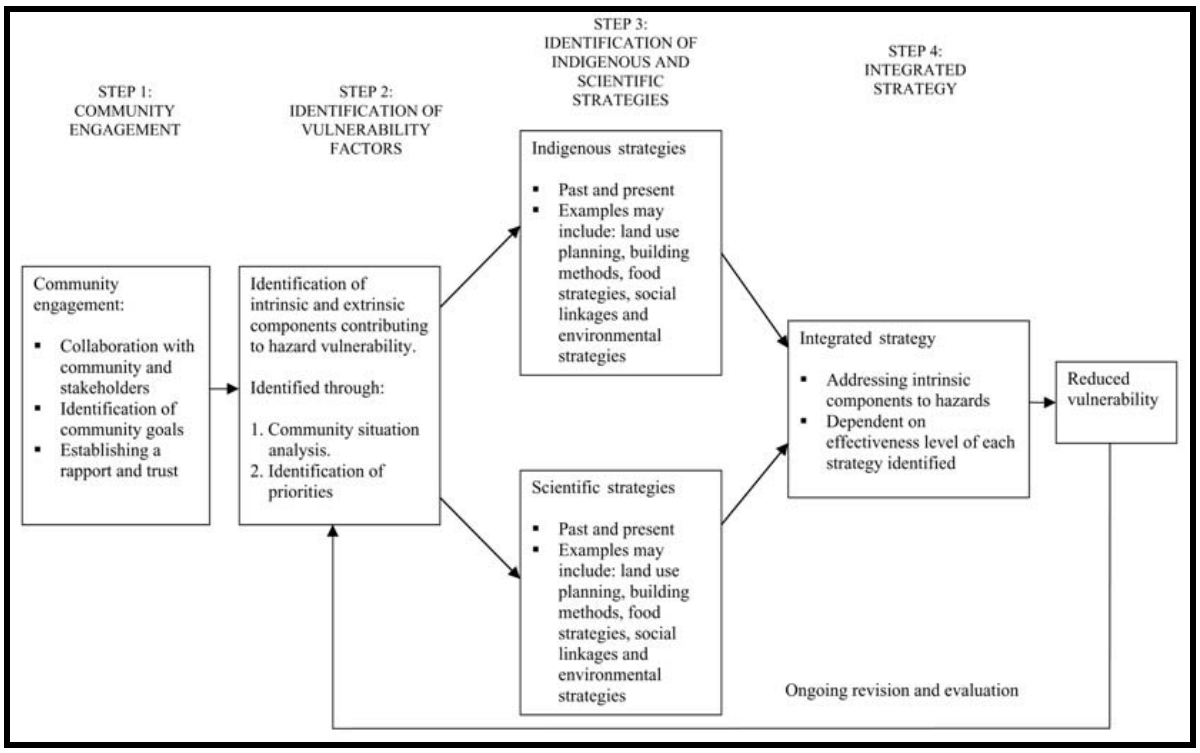


Figure 4.7 Integrating indigenous and scientific knowledge bases for DRR model
(Source: Mercer *et al.*, 2009)

The model on figure 4.6 shows that communities can identify their existing knowledge that is scientific and indigenous (Méheux *et al*., 2006; Kelman *et al*., 2006). Following the steps outlined in the model, vulnerable communities can then discover means to integrate the knowledge (IK and scientific) in a more cultural and compatible way for vulnerability reduction to disaster risk (Dolman 1985; Lewis 1999; Pelling and Uitto 2001; Kelman *et al*., 2006; Méheux *et al*., 2006; Mercer *et al*., 2007; Kelman, 2007, 2008).

The model has benefits for the thesis identification of IK used by communities to deal with disaster risk in Zimbabwe, with an ultimate aim of establishing how this knowledge could be included into DRR policy to further reduce vulnerability. The findings of this research may very well have implications for improving responses to disaster risk of all types, particularly when shared with the appropriate authorities, communities, interest groups, and individuals.

4.7 CONCLUSION

The continued rhetoric surrounding the need for bottom up and top down actions and an integration of local and scientific expertise is no longer adequate. The paradigm in support of "one technology or one knowledge system fits all" has been debunked (Shankar, 1996). IK suggest a different approach to problem solving. This is so for discussion of the DRR, vulnerability reduction, PAR, SLF, ecosystems and IK integration models in the chapter, there is an important need to address power relations within and across scales. Reduction of the manifestation of hierarchies of scale and the focus upon national and local is needed (Marston *et al.*, 2005; Neumann, 2009). IK debate within discipline should be translated into policy and action at all levels to reduce disaster risk within society. Other points discussed touched on the reassessment of DRR among 'at risk' communities, ensuring a truly participatory process during which communities themselves are active decision makers. Networks of stakeholders should provide a basis for progressive action and change that builds on IK and scientific knowledge.

This is as opposed to waiting for top-down DRR policy and action to trickle down to those at the local level (Robbins, 2004). It is therefore time to step back and reflect upon the research ensure concrete outcomes are achieved and applied policy and action. The study of models provided fodder for a fuller examination of problems facing humans, helping to define problems more cogently and from different angles. The chapter also added significantly to the understanding of what motivates people, including government institutions, to take the actions that they do when faced by a challenge.

IK theory and practice, has been discerned as explaining and underpinning what has been happening with IK during its production and use. IK being knowledge of the local people has created a potential for being effective in disaster reduction. It is assumed to be out there with

local people as social resources. It can thus be used for DRR or vulnerability reduction with policies that crowd out inefficient disaster risk. Welfare losses are most likely dealt with when policies improve inefficient DRR mechanisms. The next chapter discusses DRR policies in Zimbabwe to address the objectives on gaps for inclusion of IK into DRR policy cited in chapter 1.

CHAPTER 5

DISASTER RISK REDUCTION POLICY IN ZIMBABWE

5.1 INTRODUCTION

This chapter discusses Zimbabwe's legal framework and national institutional structures for managing disasters, the civil protection plan, constraints on DRR and the civil protection policy review. The focus is on the factors contributing to the nation's vulnerability to disasters and hazards. In tracing past disasters impacts, the chapter also discusses some of the opportunities and challenges confronting the country's emergency management system. This is important in order to understand the means for the inclusion of IK into DRR policy framework. Wisner *et al*. (1999) posited that disasters have become a policy problem for humans, both in the normal course of their lives and in response to disasters, magnifies the vulnerability of communities. Failure is recognised in land use, settlement policies and the accompanying degradation of habitats increasing increased levels of disaster risk exposure and vulnerability (Madamombe, 2004). These observations require evaluation of DRR policies (Wisner *et al.* 1999). Wisner *et al.* (1999) echoes that policies must change today than to rely heavily on sending assistance only after tragedy have occurred.

The development of DRR, policy and legislative imperatives in the Zimbabwean context will be discussed.

5.2 DRR

Zimbabwe has a legal framework for managing disasters. The Civil Protection Act, Chapter 10:06 Acts 5/1989, 3/1992, 22/2001 complemented by sections of other laws, provides a legal framework for the management of disasters. In essence, the Act provides for a coordinated disaster risk management policy that is meant to focus on disaster prevention and reducing the risk of disasters (GoZ, 2011). The act calls for all stakeholders and various government departments to be part of disaster risk management planning as is shown in the structure on figure 5.2 of this chapter. Besides, it also calls for the establishment of national,

provincial and districts disaster preparedness plans. There are a number institutions prescribed in the act and these are discussed in section 6.2.1.

5.2.1 The legal framework and national institutional structures

A tenet of the national policy on disaster management is that every inhabitant of the country should help, where possible, to prevent or reduce the effects of disasters (Madamombe, 2004). Drought, flooding, disease epidemics, public transportation accidents, industrial accidents, forest fires and environmental degradation are some of the major hazards that affect Zimbabwe (MLGPW&UD, 2006,2011). The Civil Protection Act (Chapter 10:06) of 1989 is the principal act that regulates disaster risk management (UNISDR, 2004; GoZ, 2011; MLGPW&UD, 2006, 2011). Sections of certain laws complement the Civil Protection Act in the management of disasters (MLGPW&UD 2006). The Environmental Management Act (Chapter 20:27) of 2002, the Public Health Act (Chapter 15:09), the Rural District Councils Act (Chapter 29:13), the Urban Councils Act (Chapter 29:15), the Defence Act (Chapter 11:02), the Regional Town and Country Planning Act (Chapter 29:12) and the Police Act (Chapter 11:10) have portions that are used in disaster management in Zimbabwe. The sections are highlighted in the table below.

Table 5.1 Sections of laws complementing the Civil Protection Act in the management of disasters in Zimbabwe

LEGISLATION	RELEVANCE
Environmental Management Act (Chapter 20:27)	Part IX on environmental quality standards; Projects subject to environmental impact assessments
Public Health Act (Chapter 15:09)	Section 22 to 35 on prevention and suppression of infectious diseases; Part V –International sanitary regulations; Part VI –Water and food supply issues; Part IX –Sanitation and housing
Rural District Councils Act (Chapter 29:13)	Rural district councils empowered to control bush fires, regulate farming and pollution through by-laws Rural district councils empowered to control bush fires, regulate farming and pollution through by-laws
The Regional, Town and Country planning Act (Chapter 29:12)	Control of development in environmentally sensitive areas through by-laws
The Defence Act (Chapter 11:02)	Provides guidelines on how defence forces can be mobilised in peace times to deal with disasters
The Police Act (Chapter 11:10)	Guides the Zimbabwe Republic Police on how to deal with disasters to reduce loss of life

DRR programmes are initiated by Central Government through relevant sector ministries. The local administration takes the responsibility for implementing and maintaining its

effectiveness (GoZ, 2011b). The Local Governance Framework at District Level in Zimbabwe, Valk and Wekwete (1990) posited that some civil society institutions have found the village and ward development structures useful for representing local grassroots institutions. However, local government itself has many challenges for the rural areas the structures have slowly died. The figure 5.1 below shows the government structures.

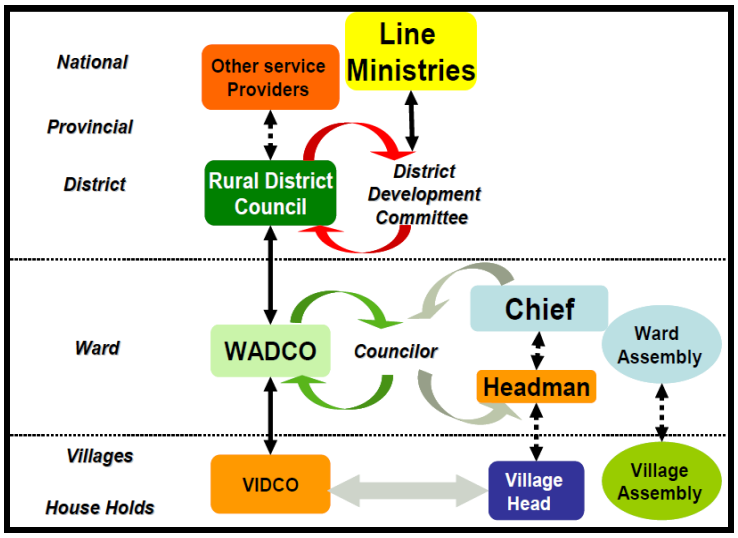


Figure 5.1 Government structures for Zimbabwe

(Source: Adapted from Government of Zimbabwe, 1999)

The structures within local government are in conversations alone, hence government or civil society cannot be engaged (De Valk & Wekwete, 1990). Administration is another great challenge at a local level (Dube, 2008). According to Dube (2008) the mandates of the executive and legislature are not clearly demarcated in practice, policy and law. Government agencies remain powerful due to bulk human and financial resources but below government administrator at district level, there are no structures. Traditional leaders, who are informed of cultural/traditional roles, see themselves in competition with councillors locally based politicians. Traditional leaders, despite being in charge of development, they are not provided with resources by the central or local authority hence they are not capacitated in terms of leading the DRR agenda. The District Administrator (DA), who is the highest-ranking civil servant, has powers to recommend or unseat a traditional leader, and yet the DA position is actually there to coordinate government efforts at the local level.

The Chief Executive of the Rural District holds another equally powerful position overseeing all district level development. Thus, the DA and the Chief Executive Officer at district level exhibit confusing and roles that conflict at local jostling for power. These challenges make the local administration very inefficient in its responsibility for implementing and maintaining its effectiveness with regard to inclusion of IK and DRR activities. More so, as the DA and the Chief Executive Officer are at par with no one reporting to the other and always competing for resources and power (Matabeleland district report, 2008). Makumbe (1998) observes other parallel structures at district level. The Rural District Development Committee (RDDC) operates at the district level and has superiority, for it is composed of civil servants who have to implement plans that allow representation from technocrats with no locally based inputs (Makumbe, 1998). These plans are sent to the parent ministries for authorisation and funding and hence become the plans that are implemented at local level (Dube, 2006). These observations are consistent with Cronin *et al*. (2004a, 2004b), Daly *et al*. (2010) and Fazey *et al*. (2010) who posited that there little experience in literature of truly multi stakeholder projects where collaboration between local communities, scientists, local and national governments and NGOs considered the most important actors of DRR. There is little done in levelling power relationships between local people, government officials, scientists and NGO workers (Cronin *et al*., 2004a, 2004b; Daly *et al*., 2010; Fazey *et al*., 2010)

The challenges outlined above occur within the current system that uses the existing government, private sector and NGOs, whose regular activities contain elements of disaster risk reduction and community development (UNISDR, 2004; GoZ, 2011). "The organizations are adopted structurally, materially and technically so that they can be shifted rapidly from their regular activities to undertaking protective, relief and rehabilitation measures in times of disaster" (Madamombe, 2004: 9). The Civil Protection Act empowers the Minister of Local Government, Public Works and Urban development to have a coordination role (MLGPW&UD, 2006). The model of the civil protection system is illustrated by Figure below. The coordination function is carried out by the Department of Civil Protection run by the Civil Protection Directorate in the Ministry of Local Government, Public Works and Urban Development. The Civil Protection Act (Chapter 10:06) of 1989 stipulates that a Civil Protection Directorate should be formed. The Directorate is assigned a number of responsibilities by the Act.

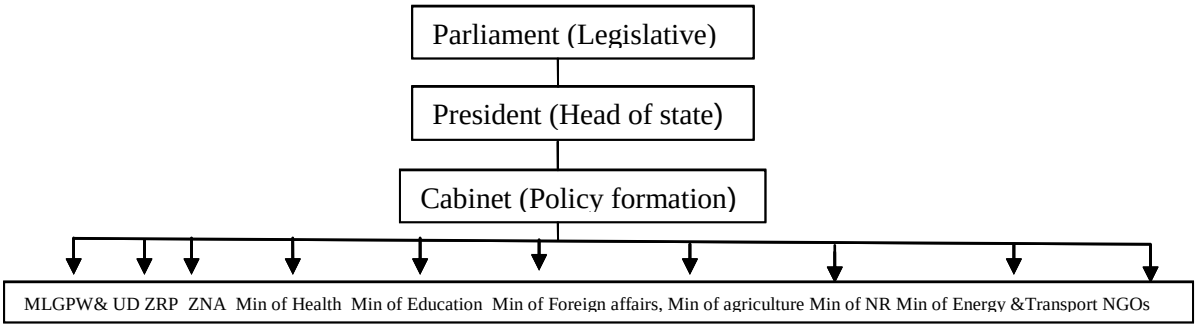


Figure 5.2 Structure of Zimbabwe Civil Protection System

(Source: GoZ, 2011a)

The planning committees have drafted civil protection measures to be submitted to the Director, then the Minister, for approval. Institutions, ministries, departments, private and non-governmental organisations have to be assisted by the Directorate to come up with plans for emergency preparedness and disaster prevention (MLGPW&UD, 2006). The Directorate has to forward a request through the Minister to the President to declare and gazette a disaster in cases where the magnitude of the disaster is high. Other responsibilities are: to ensure that the data gathered by different persons from various disciplines are not contradictory; to maintain regular contact with international disaster management and disaster relief organisations; to arrange to get first-hand information on major incidents; to develop public awareness programmes on emergency preparedness and response; and to promote research and training on matters relating to disaster management (GoZ, 2011a).

The National Civil Protection Coordination Committee (NCPCC) is empowered by section (41) (2) of the Civil Protection Act (Chapter 10:06) of 1989 to execute civil protection functions. The Committee consists of senior officers selected from government ministries/departments, parastatals and NGOs (MLGPW&UD 2006). The Provincial Civil Protection and Planning Committee (PCPPC), chaired by the Provincial Administrator, operates at provincial level whereas the District Civil Protection and Planning Committee (DCPPC) operates at district level and is chaired by the District Administrator as shown in figure 5.3 below.

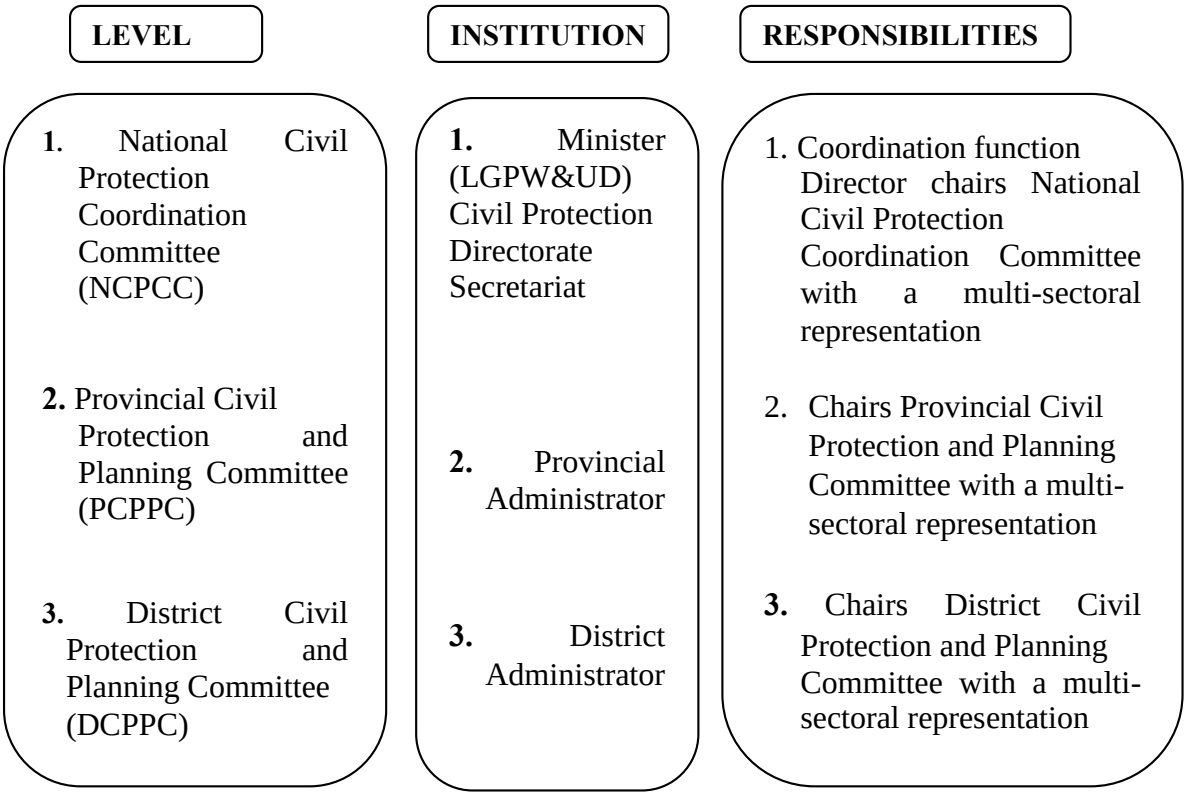


Figure 5.3 Structure for operation of the DRR policy

(Source: GoZ, 2011a)

At each level there are subcommittees whose responsibilities are determined by their area of specialisation. The members of the NCPCC, PCPPC and DCPPC are grouped into the following sub-committees: food supplies and security, chaired by the Ministry of Public Service, Labour and Social Welfare; health, nutrition and welfare, chaired by the Ministry of Health and Child Welfare (MOHCW); search, rescue and security, chaired by Zimbabwe Republic Police; international cooperation and assistance, chaired by the Ministry of Finance (MLGPW&UD, 2006).

National food security is the responsibility of national government, which operates through the GMB, a parastatal. The responsibility of this institution is to maintain strategic grain reserves both in grain and cash (UNISDR, 2004). The Civil Protection Act requires that emergency preparedness and response plans should be formulated so that they are activated during emergencies. The planning for emergencies as stipulated by the Act, is done at various levels: sectoral, local authority, district, provincial and national level

(MLGPW&UP, 2006).

The provincial and district committees retain a multi-sectoral composition as well. At each level there are subcommittees whose responsibilities are determined by their area of specialisation . The members of the NCPCC, PCPPC and DCPPC are grouped into the following sub-committees: food supplies and security, chaired by the Ministry of Public Service, Labour and Social Welfare; health, nutrition and welfare, chaired by the Ministry of Health and Child Welfare; search, rescue and security, chaired by Zimbabwe Republic Police; international cooperation and assistance, chaired by the Ministry of Finance (GoZ, 2011b).

National food security is the responsibility of the Grain Marketing Board a parastatal of the national government. The responsibility of this institution is to maintain strategic grain reserves both in grain and cash (UNISDR, 2004).

The Civil Protection Act requires that emergency preparedness and response plans should be formulated so that they are activated during emergencies. The planning for emergencies as stipulated by the Act, is done at various levels: sectoral, local authority, district, provincial and national level. The National Civil Protection develops a plan that should be informed by other plans from provincial and district plans. The following section describes the national civil protection plan.

5.2.2 The National Civil Protection Plan

The National Civil Protection Plan forms the overall framework for the promotion, coordination and execution of emergency and disaster management in Zimbabwe. First, it allocates responsibilities and duties to appropriate authorities at different levels so that the organisations can prepare their own plans and make them operational when required. Second, it provides guidelines for the planning, execution and preservation of the civil protection system and its functions. The ward, district and provincial plans should fit into the national plan (UNISDR, 2004).

The civil protection system faces a number of constraints. These relate to the fragmentation

of the legislation caused by the fact that the principal act has organisational gaps (MLGPW &UD, 2006). Another problem is lack of finance at provincial and district level to carry out civil protection activities. The next section deals with the constraints on DRR.

5.2.3 Constraints on DRR

The annual disaster management budget of the Zimbabwe government is inadequate (Madamombe, 2004; MLGPW&UD, 2006). As a result, the local structures at provincial and district level are not provided with a budget to finance their activities related to disaster management (MLGPW&UD, 2006). There are certain parts of the country, for example the remote parts of Matabeleland South, where there is no radio or telephone communication. It is therefore difficult to give early warning for imminent disasters in such places . The legislation for managing disasters is fragmented and the principal act, the Civil Protection Act, is weak causing a civil protection organisational structure that is weak (Sibanda, 2005). The current policy is under review to improve the DRR practices. In Zimbabwe, it is historical that the policy arena has separate communities working on DRR issues. The communities are policy makers who are experts, practitioners for DRR and researcher so the other side. These have limited overlap in methods, tools, networks and meetings (Manyena, 2013; Chigora *et al*., 2012). Chigora *et al*. (2012) belives that scepticism is present among DRR specialists in the country with regard to sudden popular interest in adaptation and community adaptation's perceived focus on long-term agenda of many other hazards, excluding earthquakes. Mawere (2013) asserts that experts in DRR circles, focus more on longer term issues like changing averages that are easy to obtain using modelling other than acknowledging social issues behind vulnerability. The other challenge in policy formulation is that of language used by the communities outlined above (Mawere, 2013). The integration of IK into policy fails to tap this knowledge for it is not documented experience. The review of policy, thus would require to look into these challenges taking advantage of the current era that offer increased sessions at major DRR events, knowledge portals and guidance documents.

5.2.4 Disaster management policy review

The Civil Protection Act is being reviewed in order to deal with gaps in the legislation

with regards to fire and ambulance services and to put into effect sectors preparedness planning (UNISDR 2004; Sibanda 2005). The new policy will address the problem of funding of the disaster management system and enable disaster risk reduction to be strengthened. The Emergency Preparedness and Disaster Management Bill were presented for consideration to parliament in 2011 (Manyena, 2013:1791). The Bill will change the disaster management policy in a number of ways. The current Civil Protection Act will be repealed and replaced with the Emergency Preparedness and Disaster Management Act. It will facilitate the establishment of an Emergency Preparedness and Disaster Management Authority (MLGPW&UD 2006). One of the major functions of the Authority is to develop a risk reduction strategy in order to minimise the population's vulnerability to both natural and human made or technological hazards. Mawere (2012) and Manyena (2013) provides that other changes in the policy include: establishment of an integrated early warning system for emergencies and disasters; promotion of training and research in matters relating to disasters; integration of disaster risk reduction into all developmental initiatives; standardised training for emergency services; establishment of a funding mechanism for DRR at both the local and national levels; and capacitating the local authorities to manage emergencies and disasters at the local level but does not mention IK. The new Act will move the country towards the establishment of a proactive disaster management policy framework (Manyena, 2013).

The country currently has no database on DRR. The information is managed at institutional level through sharing reports, minutes, newsletters and email facilities. The new bill proposes the establishment of a Disaster Management Centre for housing and linking relevant stakeholders (UNISDR, 2004; MLGPW&UD, 2006). It is not clear how the new Act will be used to manage disasters that are prevalent in the country, even though the country should definitely develop better strategies for dealing with them. The new bill also has not made efforts to identify and document IK based DRR practices in the country (Mawere, 2013). There are IK practices that rural communities have acted on to respond to disasters (Gonese, 1999). Mawere (2012, 2013) suggest that policies should acknowledge and recognise knowledge assets in abundance among rural communities in Zimbabwe. This is in the basis that Zimbabwe has not considered possibilities of integrating IK with modern technologies. Zimbabwe DRR policies that include the environment, drought, land and DRR policies are

avoiding cultural practices (Mawere, 2013). Most of these policies capture technology that is advanced for various sectors at the disadvantage of IK.

The importance of local knowledge and coping strategies is entering national policies (Gandure, 2011; Mawere, 2012). For example, South Africa has made significant progress by explicitly stating the importance of IK for DRR in its policy (Republic of South Africa, 2005). Another example is the Nepal Disaster Reduction Policy, which mentions the need to strengthen communities' coping strategies. This policy was drafted by the Nepal Centre for Disaster Management (NCDM) and Oxfam-Nepal and is currently being reviewed by the Government of Nepal, Ministry of Home Affairs, and the National Planning Commission (NCDM & Oxfam-Nepal, 2007). However, most policies, plans, building codes, or land use standards are not implemented and enforced effectively in developed countries (as illustrated recently in 2005 by the effects of floods in New Orleans, USA, following Hurricane Katrina) and this is more so the case in developing countries as is discussed below with reference to Zimbabwe.

DRR in Zimbabwe is through a representation of many sectors hence a multi-sectoral approach has been adopted (Manyena, 2013). Civil society groups, private sector, sector ministries like the Zimbabwe Republic Police (ZRP), the Zimbabwe National Army (ZNA) form part of the DRR and Management Council, (Goz, 2011, Manyena 2013:1791). Traditional leaders who work with vulnerable groups and who respond to disaster first are not mentioned. The replacement of the Civil Protection Act of 1989 will result in establishments of organisational structures at national, provincial, district and local authority levels (GoZ, 2011). Cabinet Ministers will form the apex to foresee integration of Disaster Risk Management measures into development initiatives as well as to review the Disaster Risk Management Strategy, promote DRR policy and ensure preparedness for emergencies. Principal Directors and ministries secretaries form the working group that support to the Cabinet Committee on Disaster Risk Management. Review of annual reports, DRR strategies and coming up with recommendation is done by the working group. The National Disaster Risk Management Platform work together with the working group as outlined on the structure presented in figure 4.1 above (GoZ, 2011). Challenges are more likely to happen in operationalising the legislation. The structure has not changed much as it still has the top-down bureaucratic structure, technical bias and without clarity of responsibility from national

to local levels. There are structures that will remain redundant, as there is duplication of roles, the Cabinet Committee and the Working Party (Manyena, 2013). For instance the role of ensuring disaster risk management measures are integrated into development, reviewing of DRR strategies, promotion of DRR policy, ensuring preparedness planning, cooperation with other regional and outside bodies falls under the cabinet (GoZ, 2011). Working part body that support the Cabinet Committee on Disaster Risk Management comprised of Secretaries of Ministries and the Principal Directors has the role of reviewing DRR strategies, annual reports and to come up with recommendations to the cabinet (Government of Zimbabwe, 2011). Line ministries that include the Zimbabwe National Army (ZNA), Zimbabwe Republic Police (ZRP), fire officers, local authorities, statutory bodies including United Nations agencies and Non Governmental Organisations (NGOs) forming the National Disaster Risk Management Platform (NDRMP) support the working party on DRR (Government of Zimbabwe, 2011). NDRMP role is the provision of advice and coordination of national DRR efforts. They also come up with recommendations to the Working Party on DRR on the National Disaster Risk Management Strategy (GoZ, 2011; Mawere, 2012). These structures increase bureaucracy and inefficiencies. An in-depth analysis of the proposed changes show there is no DRR focus, but rather a disaster risk management focus. Another notable change in the act as reflected in the Zimbabwe's Disaster Risk Management Bill of 2011 is the introduction of community-based disaster risk management and volunteers to ensure community participation. The roles and responsibilities of the ward and village disaster risk management committees, including the role of the traditional leadership are not outlined in the proposed legislation. The roles of The Cabinet Committee and the Working Party for instance are the same, like reviewing disaster risk strategies. This is an indication of duplication of roles hence one of the two structures is likely to be redundant in future

When compared to other structures in the region, Zimbabwe is different for instance South Africa has a less bureaucratic structure. South Africa structure has an Intergovernmental Committee on Disaster Management at the apex supported by the National Disaster Management Advisory Forum (Republic of South Africa, 2005). The roles and duties of district municipalities, provinces, cities and their disaster management centres are well spelt out in South Africa. It is only municipalities' duties that the Disaster Management Act of South Africa has not clarified. The framework for national disaster management of South Africa is very detailed, showing key performance areas and enablers. It is directed more at

central government roles and responsibilities to ensure community participation (Republic of South Africa, 2005). To draw a comparison with the Zimbabwean situation, the Civil Protection Act of 1989 was less bureaucratic than the new one. Communities who possess IK and use it and taking measures for DRR as well as building new skills, capacities are nowhere within the structures (Manyena, 2013).

However, the new bill of 2011, there is some bias towards rural communities since the Ward Disaster Risk Management Committees are rural areas based. Decentralisation of authority to local institutions that are rural based has can exert great impact in that it is a pre-conditions towards building DRR rooted in IK (Lewis, 1999). Wards committees are in a better position to deliver the DRR agenda for they are deeply rooted in the communities, or rather, close to community pressures. Stewart (1986) and Smoke (2003) posited that governments depart working with communities are better placed in increasing local access to public and the empowerment of local actors. The ward Disaster Risk Management committees are able to mobilise rural communities and execute their activities using shared resources (MLGPW&UD, 2006). This is because traditional management is informed by the locals' traditional knowledge forms. Mawere (2010) points out that the people of Zimbabwe experience since the colonial period has made them look down upon their own traditional practices and the value including rights they put to the natural environment for instance. The current situation has not changed either, so the status quo still remains in the policy arena despite the challenges disaster cause among communities. While Zimbabwe legislation is quite clear in community-based DRR, representation when it comes to national platforms is not enough. However, there some changes taking place in the current proposed bill to change from civil defence to civil protection to enforce regulations to prevent loss of lives and livelihoods resulting from disasters.

Mapara (2009) affirms that local ideas and knowledge of community-based representatives that are critical will not be voiced and be heard. Usually rural communities who posses IK do not have power and measures to effect change (Arnstein, 1969; Michener, 1998; Draper *et al*., 2010). The typologies of participation purport that there is movement of control from authorities to communities "the ordinary citizens'. Cornwall (2008) reminds us that participation is concerned about power and control. Different stakeholders do have interests that are not in tandem with other stakeholders (Cornwall, 2008). Participation is vital in

management of disaster risks that threaten community well being. The challenges though of participation are that community generated ideas cannot change international rules dominated by large organisations. Communities in small-scale schemes tend to be looked down upon. Making community-based DRR operational in the country may also face challenges of decentralisation (Manyena, 2013). Manyena (2006) posits that rural district councils and urban councils created through the Rural District Councils Act (1988) and Urban Councils Act (1973), to take charge of resources and development issues in their respective areas fail to exercise their powers due to political interference. Politicians can intervene in the day-to-day running of rural district councils (Manyena, 2013:1793). The central government still wields power in decision-making in the proposed legislation (MLGPW&UD 2006). The state controls all DRR activities using civil servants. The District Coordinator of Disaster Risk Management is the District Administrator, a public servant instead of the Chief Executive Officer of the rural district council or an independent agency (MLGPW&UD 2006; Manyena, 2013). The DRR operation is still the command-and-control structures at all levels that is provincial, district and at ward level in the country. However, there is recognition of the role of the traditional leaders, custodians of IK who most rural communities rely on. When one look at some organisational structures at provincial level for instance the Provincial Administrator (PA) represents the coordinating Minister of Local Government Public Works and Urban Development. The Provincial Civil Protection and Planning Committee (PCPPC) is then under the Provincial Administrator. The PA is the one who informs other lines ministries like health, agriculture, security forces (ZRP, ZNA) and NGOs to act when disaster strike (MLGPW&UD, 2006). The whole structure fails to acknowledge traditional leaders including structures at ward level. The drafting of disaster plans at district levels are also not informed by rural communities, as these do not attend such platforms.

The planning platforms for DRR are the preserve of experts (Mawere, 2012, 2013). MLGPW&UD (2006) clearly outlines the roles of PCPPC, the Provincial Disaster Management Team (PDMT) and technical task forces, the Provincial Administrator as stated in the Civil Protection Act (Chapter 10:06) of 1989. The act stipulates that DRR committees should be headed by technocrats depending on the type of disaster. Other activities the PA carries out include collating gathered information from experts and participating in visiting disaster sites including mobilising external assistance. These activities show that locals have no part to play other than being assisted. When an imminent

disaster is reported , information id first reported to govern minister responsible and then other institution and communities get to know through the media (electronic and print) regardless that such media is not available in rural communities in Zimbabwe (Mawere, 2010). When disaster strike, evacuation are done relocating those affected to safe location put in place by government. This means that preparedness planning is done without input from rural communities, since it is the duty of disaster experts, NGOs and government (Southern Africa Development Community workshop notes, 2013). The MLGPW & UD (2006) also state that activities for monitoring the situation in communities under known disaster risk like insect manifestation, drought, crop failures and climate change is the preserve of experts. Manyena (2013) and Mawere (2013:6) posits that there are many local practices based on sound principles of interaction between humans and nature but the policy context for DRR in most developing countries in the Southern Africa Development Community (SADC) region has evolved from the governance domain. Most countries have tended to work with relief codes and with an approach of being prepared for delivering calamity relief (Manyena, 2013). The emergency response systems based disaster management models adopted from the west have generally overshadowed the DRR aspect of disaster management, and particularly IK within DRR. The recent initiatives for development of national and local disaster management plans in many countries in the region have recognised this limitation, but have so far only been able to address it in very limited ways (Manyena, 2013). In spite of increased investments in the area of DRR in recent decades, the losses continue to mount (Wisner, 2008). There is an evident gap between practice and policy. The need to bridge this gap with adequate recognition of the domain of IK and local coping capacities is very urgent. There is a strong need to recognise the potential of community knowledge and actions, and of switching to a bottom-up approach that uses appropriate community practice as the base for policy formulation. The analysis in this section clearly show that IK is not considered in DRR policy or in other policies as well like the environment and the drought policies. The omissions with regard to IK are quite evident as is shown in the following paragraph.

Mawere (2013) posited that the policy that incorporated IK in Zimbabwe was the Tribal Land Act of 1979 that was repealed in 1982. This was done to put in place the Communal Land Act of 1982. The aim of the Communal Land Act of 1982 was in way to review common property rights. Later there was the formation of the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) initiated within the Zimbabwe's

Department of National Parks and Wildlife Management (DNPWM) (Mawere, 2013). The custody to manage resources responsibly was now with rural communities who had total knowledge of their environment (Mawere, 2013). The CAMPFIRE Annual Report of 1999-2000 stated that there were challenges and the project had failed its mandate. This resulted in the setting up of the Rukuni Commission of inquiry of 1993 to 1995 that found fault with government for having failed to hand over power to traditional leadership. Without power, traditional leaders were not effective in executing their mandate to manage natural resources effectively (Rukuni, 1994). The Campfire policy would have caused the conservation of all species including threatened species. The government reasons for failure of the CAMPFIRE were in adoption of modern science as the only way in management of the environment. The thinking in Zimbabwe government was that the rational and motivation for conservation lies in science (Mawere, 2013). This meant that science was the only way to policing environment issues not IK. The connection of rural communities with ecologies became useless. In addition, species like insects (*mopane worms, harugwa*) that had value for rural communities did not feature the conservation projects pronounced by the government. The current Zimbabwe's National Environmental Policy and Strategies (ZNEPS) of 2009 are not acknowledging the moral value and rights of other fauna and flora abundant in the natural environment (Mawere, 2013:16). The policy discriminates other natural environment species for it is ill informed by scientific views. This is clear in ZNEPS (2009:7) that states the following:

> *"….at species level, the country supports an estimated 4,440 vascular plant species, 196 mammal species, 672 bird species, 156 reptile species, 57 species of amphibians, 132 fish species and uncounted numbers of species in other groups. The diversity of microorganisms in particular is extremely poorly known…"*

The above quote does not account for insects, despite the contribution they make to the livelihoods of rural communities. The recent Zimbabwe, environment policy does not have sections on protection of some species as is clearly seen in the quote (Mawere, 2013). There are many uncounted species populations in the policy. The author can only infer that the unaccounted species that are small are the ones stated as unaccounted for (ZNEPS, 2009:7). Some kinds of fauna and flora are more equal than others. Rural communities practices do not discriminate species, they put equality in their conservation practices for the acknowledge

rights for all species in the environment with the right to life (Acosta, 2010). Mawere (2013) present that another policy showing a deficiency in inclusion of IK is the 1998 national policy on drought management. The policy was launched in 1999 to aid government planning capacities and provides comprehensive drought preparedness and mitigation (MLGPW & UD, 2006). Its objectives include the development of more appropriate water use policies to develop water-harvesting techniques suitable for communal areas and drought contingency plans for the national budget (National Economic Planning Commission 1999). The orientation of the policy was towards sustainable livelihoods for populations who are most at risk of drought-induced shocks. The policy also intended to come up with more efficient and equitable use of water through research promotion (MLGPW &UD, 2006). This was a development process of a national nature designed for the sustainable management of resources and rural industrialisation. The policy envisaged the provision of water and irrigation development, nutrition and food security (National Economic Planning Commission, 1999, FAO, 2004). The achievement of the policy would have been through encouraging proper biological precautions and mechanically very good land use practices (FAO, 2004). FAO (2004) further affirms that areas with suitable climate and topography were to be assigned such projects though educational campaigns and research in advocating for drought tolerant crops. The conditions set in the policy were correct livestock stocking rates, grazing schemes, protection of water catchment areas among others (FAO, 2004). The policy does also not show the relevance of IK and it was not known at provincial level (PA) including the head of Environmental Management Agency (EMA) (Mawere, 2013). The fast track land reform, saw the policy being abandoned has there was reduced capacity with shortages of fuel, capital and skilled labour. However, it has to point out that IK skills and capacity remained in the country, but since traditional leaders were not consulted, the policy failed. The policy arena based on this analysis shows that it needs much consultation between many sectors and institutions. Zimbabwe has continued to look down on IK in the policies discussed above in development of its policies as exemplified with the environmental and drought policies. This is despite that these policies are national policies that should be aiming to revive traditional practices that help to solve challenges experienced by rural vulnerable communities. The development of policies that have strategies or at least inclusion and or recognising the interrelations between humans and non-humans is required for Zimbabwe.

5.4 CONCLUSION

The Civil Protection Act, complemented by sections of other laws, provides a legal framework for the management of disasters in general including those induced by droughts. The Act empowers the Minister of Local Government Public Works and Urban Development to coordinate civil protection activities through the Department of Civil Protection. The Act also creates a Directorate in the same ministry to guide civil protection activities. Among other responsibilities, the Directorate provides guidelines for the development of Planning Committees with a multi-sectoral composition at national, provincial and local level. The committees are responsible for the formulation of disaster response plans to be activated during a disaster. The passing of the Emergency Preparedness and Disaster Management Act will address the shortcomings of the civil protection system, such as the weak institutional structure, crisis management of disasters, inadequate funding and lack of capacity to manage disasters at local level. The government manages droughts through crisis management by providing drought relief to avert famine and starvation. There are gaps in the DRR policy and the bill of 2011 in that the local leaders' structures, culture and knowledge of rural people provide useful frameworks, ideas, guiding principles, procedures and practices that can serve as a foundation for effective DRR, but this is not recognised in the policy framework. It is therefore essential that traditional knowledge systems in the continent should not be subsumed by the domination of cultures that notoriously foster inequality and materialism. The interest of carrying this study has been to clearly show that rural communities still use their knowledge in DRR activities. The HFA for DRR 2005-2015, the 10 year plan adopted by UN states members, encourages countries to incorporate knowledge to make all types of messages related with DRR "easily understandable and people cantered", making special emphasis for early warning systems. This disaster awareness culture is created through the dissemination of understandable information on DRR. Gaps have been outlined in the review of various policies in this chapter showing clear need to incorporate IK into DRR strategies. The chapter did not discuss clearly defined methodologies to identify the means to identify IK for its inclusion into policy. Access to and inclusion of IK for DRR into policies is a very sensitive approach.

The next chapter looks at the methodology that was used to collect data to address the research problem presented in chapter 1.

CHAPTER 6

METHODOLOGY

6.1 INTRODUCTION

This research examined the IK for DRR in four districts if Zimbabwe namely Mangwe, Guruve, Hwedza and Lupane. An interpretivist research paradigm that was predominantly qualitative focused on IK in DRR and understanding of a how communities used it to deal with disaster risk. It involved studying the real world context of how people make decisions for vulnerability reduction, particularly at the community level.

The study included several methods of collecting empirical data from both mainly traditional leaders, elders, extension workers and government officials. The Emphasis in this study was on how communities deal with various disaster risks affecting their communities. The primary data collection techniques used to achieve the objectives is listed in Table 6.3. The chapter discusses methods that were used in the study. The author provides the explanations of how and when he selected each of the study areas. The location of the study and sampling techniques used for investigation, as well as, the tools used for analysis of data are explained.

6.2 RESEARCH METHODOLOGY

The research paradigm and data gathering methods used selection of the study areas, research process, and data analysis including limitations of the methodology are presented in the following sections.

6.2.1 Qualitative Research

The research followed a qualitative design. It was underpinned by the interpretive/constructivist framework that views reality as existing within the human mind and reliant on human experiences and interpretation (Lotz-Sisitka *et al.*, 2013). The same framework sees reality as not independent, but socially constructed and with varied meanings. Since the aim was to seek the inclusion of IK into DRR policy, identification and

analysis of individual and group constructions or interpretations of reality, this framework was the most appropriate. Thus qualitative methodology, specifically the ethnographic design was employed.

Ethnography involves the study of social interactions, behaviours, and perceptions that occur within groups, teams, organisations as well as communities (Reeves, Kuper and Hodges, 2008:512). The method provided rich, holistic insights into people's views on actions including the nature of the location they inhabit. As pointed out by Reeves *et al*. (2008: 337), the major features of ethnographic research include a strong emphasis on exploring the nature of a particular social phenomenon, rather than setting out to test hypothesis about it. It works primarily with 'unstructured data from a small number of cases and hence the analysis of data involves an explicit interpretation of meaning and functions of human actions. Ethnographic analysis takes the form of verbal narratives and explanations. As Denzin and Lincoln (2002), Creswell et al. (2007) noted, qualitative methodology is essential because it goes beyond mere facts and surface appearances. This is true of this study as it focused on the importance of the experiences that participants in this study have gone through and how these experiences have sharpened their senses to respond and learn from the disasters they experienced.

It is worth noting that qualitative research is also effective in the collection of specific data that depict the culture of a community (Lotz-Sisitka *et al.,* 2013). Such cultural data include social contents, behaviours, norms, opinions and values of a population in an area. Neuman (1991:145:146) explains that qualitative researchers are open to unexpected research findings and thus can easily go with the flow and refocus the research, or even abandon the original research questions. Qualitative research uses tools that enable the researcher to understand participants' judgements and terms/concepts in discovering individuals' experiences, perceptions and complexities. Such tools include interviews, narratives, and focus group discussions (FGDs) among others (Lotz-Sisitka *et al.,* 2013). As a researcher, one enters the field with no predetermined categories or phrases that restrict participants' answers. The tools (in-depth interviews, focus group discussions, stories of change) therefore capture other people/participants mind and obtain things.

Neuman (1991) goes on to explain the relationship between theory and data collection in qualitative research paradigm. He states that words are important in qualitative approach during interpretation. This study employed grounded theory. Grounded theory is theories and hypotheses grounded in the data collected during fieldwork (Schram, 2006). Grounded theory methodology recommends that the number of interviews conducted should be determined by the emergence of themes in the field, rather than interviewing a pre-determined number of respondents (Glaser & Strauss, 1967; Schram, 2006). Grounded theory is developed through discussions in a social context with emphasis on tracing sequences and processes associated with specific settings (Glaser & Strauss 1967; Schwandt, 2007:132). Participants explain how they attach meaning to events and learn to see events from multiple perspectives. Rarely does one hear a qualitative researcher discuss variables or hypotheses (Neuman, 1991:144). A qualitative researcher begins with a research question and theory develops during the data collection process when employing grounded theory research (Walker, 1995). This inductive method means that theory is built from data or grounded in the data. Moreover, conceptualisation and operationalisation occur simultaneously with data collection and preliminary data analysis. According to Walker (1995:7) qualitative research methods share characteristics of flexibility in execution, deliberate interaction between the researcher and the researched and richness of data that stems from their largely textual nature and from their grounding in the language and experiences of the participants (Walker, 1985:7).

The temporal dimension is explicit in qualitative research. According to Neuman (1991:148). The passage of time is an integral part of qualitative research. Qualitative researchers look at the sequence of events and pay attention to what happens first, second, third, and so on. Qualitative researchers are able to examine the same characteristics over time and observe issues evolving, a conflict emerging, or a social relationship developing. Qualitative research is very relevant for examining IK for DRR and transformation processes that emerge over time; from DRR to emergency relief to long-term post-disaster rehabilitation.

Qualitative research is relevant in disaster research. It is preferable over quantitative research that have inadequacy in identifying needs of affected communities as claimed by The United Nations Disaster Relief Co-operation (UNDRO, 1982b) and Taylor (1981), among many others, prominent in quantitative approaches. Quantitative approaches lack means to collect

data on familiarity with the local conditions; processes, habits and lifestyles, people's needs and resources among others (Taylor, 1981). Quantitative approaches have inappropriate techniques when quantifying needs of affected populations and affected people are not differentiated according to needs and their aspirations. There is much exaggeration, lack of a proper definition of the objectives of assessment, lack of coordination between different interveners, assessment based on interveners, self-interest and available resources (Taylor, 1981, UNDRO, 1982b).

This study fieldwork is not about quantifying but defining priorities, perceptions, attitudes, opportunities, problems and alternatives. There is need to project the dynamism in rural communities in all aspects of life including assessment of the viability of alternative course of action. Taylor (1981:139) affirms that quantitative methodologies is useful but over enthusiasm for the questionnaire as a tool often obscures details than inform situations prevailing in a community. Communities have different cultures, norms and values hence characteristics for each determined their selection into this study. The following section discusses selection of study areas.

6.3 SELECTION OF STUDY AREAS

The selected rural areas in the four provinces are similar in respect of social and cultural aspects. Moreover, the study areas are rich in language form, which provided the researcher with an opportunity to observe closely the positive aspects of the knowledge embodied in them, and the existing weaknesses that contribute to social and physical vulnerability. The study areas chosen has a fairly long history (>80 years) of using IK in DRR and the communities are prone to hazards of various kinds throughout the year (Risiro *et al*., 2012).

The criterion for selection of these sites was they experience of natural hazards and disasters, although the intensity and impacts differed between the sites. These sites are mostly subject to flooding, insects' infestation, animal diseases and drought. Drought is one of the most common disasters in Zimbabwe (Madamombe, 2004; Gandre, 2011; Mushonga, 2012), and the documented horrors associated with it date back to the pre-colonial times (Iliffe, 1990). The table 6.1 below show some of the hazards and vulnerabilities for Zimbabwe. Some of the factors in the table were considered in the final selection of the study areas.

Table 6.1 Hazards and vulnerabilities, Zimbabwe

Hazard	Vulnerability	Capacity
Lightning	Of all the districts, Gutu, Lupane leads with approximately 10 fatalities per annum Binga, Guruve and Hwedza follow a long way behind with 3 to 4 per annum. The rest have 1 to 2 casualties or fatalities per annum	Very difficult to forecast the exact areas that are going to be struck, Can only give areas which are prone to lightning strikes, Can advise on objects favoured by lightning Strikes, Mitigation, Zimbabwe Electricity Supply Authority (ZESA), Civil Protection Organisation (CPO) can educate the communities on importance of installing lightning conductors Assessment: Zimbabwe Republic Police (ZRP)
Storms and Hailstorms	Homes, tobacco, maize and other crops are destroyed every year	Early warning - Environmental Management Agency (EMA Assessments -Environment Mitigation EMA/AGRITEX/ Social Welfare/ UN agencies, NGOs
Earthquakes	Lake Kariba Both natural and reservoir induced earthquakes occur. Many events are felt by the locals especially Binga. Zambezi Valley and eastern border Mainly natural events associated with the east Africa rift system. Recently, rock bursts have been reported in the Penhalonga area indicative of mine induced events Nyamandlovu Aquifer Since 1999 four events recorded (magitude 4.0 25/6/04)	Monitoring of seismic activities in the country- Goetz Observatory, Assessments, CPO Mitigation, Infrastructure development CPO, Regional collaboration, Data exchange with Neighbours, International collaboration Training of scientist.
Environmental Degradation	Communal areas, and areas with sandy and alluvial soils such as Lupane Tsholotsho, Guruve, Hwedza, Gokwe, Muzarabani. Gold or former gold rich areas.	Early warning -Environmental Management Agency (EMA Assessments -Environment Mitigation EMA/AGRITEX/ Social Welfare/ UN agencies, NGOs
Fires	Forest Areas in the Eastern Highlands, road sides, along pathways, National Parks, Newly resettled areas, Domestic and Industry, Lupane Guruve	Early Warning -MET, general public Environmental Management Agency (EMA) Assessments Emergency services Mitigation CPO
Biological Malaria Cholera Typhoid HIV/AIDS Animal Epidemics Crop Pests	In the past it used to be common in areas with poor water & sanitation, temporary settlements and Overcrowded slums. Binga, Chipinge, Lapne, Mangwe, Hwedza • However, with the current economic hardships leading to shortage of water and sanitation facilities almost every area in Zimbabwe is now at risk of the disease.	Cholera control guidelines are in place – strategic plan for cholera control has been developed – operational procedures for cholera control are available – Ministry of Health and Child Welfare (MOHCW) adopted and adapted WHO-Integrated Disease Surveillance and Response (IDSR) principles – Training in cholera control and management has been conducted at national level and cascaded to Provincial, District, sub district structures

(Source: SADC training workshop notes 2013; Department for Civil Protection (DCP), 2013)

Communities' in Lupane, Guruve, Hwedza, Binga, Muzarabani shown in the table above,

their encounters with disaster risks (wild animals, droughts and famines), they equipped themselves with the necessary experiential knowledge to deal with the disasters. During disaster events, affected areas (indicated above) witness arrival of hundreds relief workers from national and international organisations, both governmental and non-governmental. Many challenges emerge from the lack of coordination between these organisations (GoZ and UNDP/GEF, 2009). The role of local institutions (government departments, NGOs, CBOs) in disaster risk management has become a significant issue of debate for they seem to be failing in addressing disaster related challenges (Wisner, 1995; Gaillard & Mercer, 2012).

The identified areas (communities of Mangwe, Lupane, Hwedza and Guruve) are not uniformly covered by early warning information, rescue operations, assistance measures (sanitation, medical assistance and shelter) and resettlement and reconstruction programmes when disaster strikes (Government of Zimbabwe and UNDP, 2011). Their geographical position also shows that there are inequalities with regard to infrastructure and accessibility compared to other areas in Zimbabwe (UNDP, 2011). In addition, the regions present an historical picture of the influence of traditional authorities (Risiro, 2012). After independence, power was removed from traditional authorities who were seen as the product of colonial rule (De Visser *et al*., 2010). People unfortunately did not recognise the important role of existing local authorities in allocating resources to sustain their means of livelihood. De Visser (2010) posits that traditional leaders have been found to play important role in reducing people's dependence on natural resources, as they complement state institutions in reviving old practices. Some organisations that had already worked in these areas provided with basic information to the researcher about the areas, including the presence of local institutions, conditions of accessibility and working conditions. The table is a summary of criterion for choosing the study areas.

Table 6.2 Areas of study

District	Number of wards	Criteria for selection
Mangwe	17	• Support of local and traditional leadership for human values research • Use of IK • Nature of collective action / community initiative related to disaster issues • Outcomes from previous disaster events in 2006 to 2013
Guruve	24	• Nature of collective action / community initiative related to disaster issues • Engaged in recent mitigation actions • Support of local and traditional leadership for human values research
Hwedza	15	• Cultural heritage • 2. Use of IK for DRR
Tsholotsho	22	• Outcomes from previous disaster events in 2006 to 2013 • Economic activities and use of IK • Engaged in recent mitigation actions • Nature of collective action / community initiative related to disaster issues
Totals	68	

(Source: FAO General wards statistics for Zimbabwe, 2013)

The four districts are at risk of various kinds of disasters and have engaged in recent mitigation actions. There is a population size of less than two thousand people per ward (Risiro, 2012). The decision to focus the research on communities with populations of this size was based on two considerations. Firstly, there was a need to limit the size of the communities to facilitate IK used for DRR analysis and IK analysis. Larger communities are typically characterised by more diversity in values, IK and more transient populations making identification of common values and social relationships more difficult (Risiro, 2012). Secondly, the vast majority of communities are close proximity to river basins in Zimbabwe also have more populations due to benefits associated with water like fishing and vegetable growing (Goz, 2011; UNDP, 2011). Once the basic criteria for identifying potential communities were determined and a short list of communities was created, a number of secondary elements became known that were also considered. These include: cultural heritage, type of community initiatives related to DRR, level and type of economic activity

including IK experiences and outcomes from the previous disaster events. While applying these criteria to the selected communities provided more diversity in community characteristics, the primary purpose of the study was to identify IK technologies for DRR, values / perspectives in the communities and find ways or means to include IK into DRR policy.

The target population included District traditional leaders (Chiefs), Village heads, Department of Civil Protection (DCP) staff and District Administrators. The names and places of the respondents having knowledge and skill in IK and those practicing IK in DRR were obtained through snowballing. Initially the chiefs of the four districts were targeted as respondents, and these later led the researcher to other respondents and hence a total sample size of 138. Since the study aims to include indigenous technologies in DRR, the respondents who had knowledge and were practicing IK as part of DRR were selected. Further, such households were also asked for the names and addresses of the other IK practitioners in the same or surrounding villages. In this way, a snowball sampling approach was followed for identification of respondents.

6.4 RESEARCH PROCESS

The study objectives required field observations, major inputs from traditional leaders about their disaster risk activities and IK throughout their lives in the community. Third parties supporting traditional leaders and their communities such as the government and its agents, NGOs and communities in general (elders) were also required for triangulation purposes.

The involvement of traditional leaders gave them the chance to be heard. Traditional leaders' participation was necessary to establish the rationale and the scientific basis of their knowledge gained over generations. It was also important to determine the production of IK and its transformation and dissemination for DRR. The research study considered the impact of disasters as very important, making it necessary for the study to be conducted over a period of one year, three months from September 2012 to December 2013. This was done so that there was adequate time to observe risk reduction measures over a long period at different times. The period of the study ensured that most IK practices for risk reduction were included in the observations.

A preliminary exploration of the four communities namely Guruve, (Mashonaland Central), Hwedza (Mashonaland East), Lupane (Matabeleland North) and Mangwe (Matabeleland South) was undertaken to determine the methods that would be appropriate for data collection to answer the research questions. A mixture of methods (these are discussed in much detail in section 5.6) was used to achieve the objectives of the study (Johnston, 2005; Beckford *et al.*, 2007). Primary methods of data collection included a structured questionnaire, in-depth interviews, participatory observation, and focus group discussions. The interview guide questions were discussed with the study leader, pre-tested and necessary changes made so that the research questions could be adequately addressed.

Preliminary fieldwork was done to become familiar with the areas of study and meet people working in the field of disaster management. Interaction with government and other stakeholders was constantly undertaken to obtain their views on IK application in the areas of study. To obtain views of participants, data had to be collected using various qualitative tools. The following section discusses these tools.

6.5 DATA COLLECTION TECHNIQUES

The researcher used multiple methods to collect data from primary and secondary sources. Official records, previously conducted studies, book publications, journal articles, reports, policy documents and other relevant documents were used to collect secondary data. Fieldwork was the main activity in the study used to collected primary data. The main tools used included: field observation; documentation and recording; semi-structured key participants' interviews; and stories of change. These methods are elaborated on in the table below:

Table 6.3 Research tools

Research question	Data collection tools	Description of methods
What is IK?	Observations Recording and documentation Focus group discussions Interviews (in-depth) Stories of change	Observing daily activities that use IK, Transformation processes in various villages before disaster and after disaster Recording physical changes in communities, IK technologies used
What does IK in Zimbabwe entail?	Observations Recording and documentation Focus group discussions Stories of change Interviews (in-depth) Checklists	Interviews with traditional leaders, elders, government disaster management officials, identified key participants through snowball sampling Life histories or stories of change of some people using IK for DRR and other practices (anecdotes) related to IK technologies
Which specific categories of IK can be identified as valuable to DRR and applied to a community, regardless of its unique characteristics?	Participant Observations Focus group discussions In-depth Interviews	
How sustainable are IK systems in relation to policy formulation in the DRR field in Zimbabwe?	Focus group discussions In-depth interviews Stories of change	
What are the main theories, models and practices explaining IK?	Document analysis	
How can, and has, IK affected DRR policy formulation in Africa and other parts of the globe?	Documents content analysis	
How does IK currently feature in various policies in Zimbabwe?	Focus group discussions Interviews (in-depth) Stories of change	
What informs and guides the current draft disaster policies /policy statements, lessons and recommendations for future inclusion of IK into DRR and policy in Zimbabwe?	Focus group discussions Interviews (in-depth) Stories of change	

What could be the most effective means of inclusion of IK into DRR policies in Zimbabwe society?	Focus group discussions Interviews (in-depth) Stories of change, Documnet analysis	

6.5.1 Documents analysis

Document analysis was done to determine what IK in the field of disasters in general entails. This enabled the creation of a theoretical understanding of disasters and existing practises in DRR. Groundwork in the four study areas through secondary sources was also carried out to understand social, political, cultural and economic data of the areas.

6.5.2 Indirect participation through field observation

The researcher wanted to obtain insights of local dynamics and other processes hence field observations were undertaken. Visits were arranged through the district administrator of each district and were later carried out during fieldwork. Observations were made and data collected was either recorded using a camera (wherever possible) and notes were written in field notebooks. The entry into local communities was also facilitated by then district office, and this made it easy to collect data without many challenges, as most of them were known in the districts.

Thorough inductive research was done to deduce inter-relationships of various findings to address the research questions. Partial participant observations were made by the researcher taking part in DRR activities such construction livestock enclosures, weeding and land preparation for conservation agriculture with some traditional leaders in the study area. The researcher made ridges, weeded and harvested crops with farmers. Data were gathered on how farmers handled and managed crops. Important details like grading during harvesting were discovered. Participatory observations were conducted throughout the research, particularly when various local activities and practices were being carried out. Participatory observation is useful where there is potential for respondents to conceal or even forget to mention traditional knowledge (Phuthego & Chanda, 2004). It has been shown in some studies that respondents give researchers what they think they want to hear, and not

necessarily what they do (Peters, 2002; Tembo, 2003), therefore participatory observation was used to circumvent such problems of intentional and unintentional hiding of respondents' practices.

Furthermore, the method generated "messy" data about farming, animal health and natural resources conservation practices that respondents were unable to elaborate on verbally. The approach also enabled the researcher to uncover practices, such as the grading of crops in the process of harvesting. Apart from giving the researcher the chance to see communities practising their major occupational activities, it proved to be useful, as it allowed the researcher to learn and discover important issues. It transpired that participants' responses to questions were based, in some instances, on what they believed to be important to the researcher.

6.5.3 Recording and documentation

Recording was done for various IK practices in the form of photographs. These photographs were to be used to illustrate the use of IK and data interpretation. Recording also captured physical changes around the village (its immediate setting) and the daily activities in the villages. Elders were provide with cameras and requested to take photographs of IK innovations they regarded valuable for DRR within their community.

6.5.4 Semi-structured key informant interviews

Data were collected by means of semi-structured interviews with key informants. This allowed the researcher to capture data from verbal and non-verbal cues and obtain views of participants through unbounded dialogue. The semi-structured questionnaire had questions that could easily adapt to the conditions of dialogue that would present itself. Notes were made during the dialogue, or later, depending on the situation at hand.

The use of interviews were to gain insights into IK, institutional perspectives and values on vulnerability reduction, community participation in decision making, and issues that addressed the research questions. The interviews were conducted in homes, popular leisure spots and at workshops arranged by district officers. In all, informal interviews, structured

interviews and observations were used for triangulation to verify what facts that had been obtained using another method. Since traditions are well known, verifying them was not a problem. Consistent with a qualitative approach, interviews were not a once off event, but follow-up interviews were conducted repeatedly until no new data transpired. This was intended to achieve saturation. This process also ensured trustworthiness of the data. Lastly, ethical issues were also addressed. Participants were initially briefed about the purpose of the research and were assured that the information was for research purposes only and that anonymity of respondents were assured. Participants were also given the right to opt out of the interviews should they feel uncomfortable with the issues being discussed.

The key participant interviews consisted of semi-structured interviews with traditional leaders who are key individuals who represented decision-making institutions in communities, those who were themselves local decision-makers, or those who were influential within non-government organisations or community groups. Participants were determined through contacting key government agencies and organisations, or asking them to identify the person they considered best suited to represent IK, values / perspectives of their agency in relation to disaster related matters. These agencies can be described as institutional 'gatekeepers'. The term 'gatekeepers' is applied to such personnel who are capable of reflecting the IK, values and priorities of the agency of which they are a part (Rokeach, 1979:53).

The focus of interviews with key participants was on the following:

- Livelihoods;
- Disasters;
- Frequency and intensity of disasters;
- Impact on people's livelihoods, environment and community;
- The IK technologies, role of IK and local institutions in DRR; and
- Institutional coordination within the community and local government.

The following were considered: resources available locally, access to and control over main livelihood strategies, and the challenges faced by the community in improving their livelihoods within the cycle of the agriculture calendar. With a central focus on previous disaster events, the aim of the interviews with the community was to recreate their experiences of the event. There was also a need to understand what really happens before a

disaster strike and after a disaster occurs, how people survived, who had intervened and, if they had, how long after the disaster. Other information was to identify, whether organisations that intervened were still working within the community, role of IK and administrative authorities in DRR among other issues that addressed the research questions. In each local community 24 households were interviewed to understand in-depth the livelihood aspects of activities, assets, strategies, opportunities and the impact of hazards in the context of household coping mechanisms. In the Guruve and Mangwe communities, households are very dispersed around the forest and accessibility was very difficult and dangerous, due to wild animals. Some areas were only accessible by bicycle. In all, the sites interviews were also conducted with members working locally such as teachers, church members, and rural agrarian extension officers, to assess their role in emergency response and risk reduction. Furthermore, the challenges that they faced and the level of collaboration with, and acceptance by, the local communities were also assessed. Transect walks and participant observations were used as complementary research methods to understand physical aspects that could not be expressed by the interviewers.

To ensure participants' anonymity and permit them to offer critical insights into their own communities, their specific villages and households are not named. Interviews were in-person and lasted approximately one-and-a-half hours. Respondents were asked to answer the questions from their own perspective. The Interview Schedule of questions asked of them is found in Appendix B. The focus was on eliciting a range of rationales, assumptions, IK for DRR and potential values stances held by participants' respective communities. Hence, questions were deliberately exploratory and open-ended. Several questions or sub-questions were eliminated in analysis when many of the gatekeepers could not address those questions primarily due to their role as leaders in the community.

All interview data were transcribed following the interviews. Data was read and reread and impressions noted. A data set was developed using responses to each question and sub-questions, and categorising information according to responses (coding) was undertaken. These detailed categories were organised into broader themes that emerged from the data (see section 6.8 in this chapter.

In some cases, responses also were accompanied by experiences and behaviours that were

highlighted in interpreting the data. Recurring issues were noted as novel / contradictory perspectives. Following this, responses and categories were cross-referenced. Patterns and relationships that were particularly relevant for addressing the research objectives were highlighted for further discussion and integration with other data sets. It was particularly helpful that the community FDGs had been completed in advance of the key informant interviews as it allowed for exploring (with institutional representatives) some issues that had arisen at a community level earlier in the research. Quotes were occasionally used in presenting the findings from the key informant interviews when they most effectively captured the real-world experiences and beliefs of the interviewees, or subtle nuances indicative of the relations between communities and institutions. Similarly, anecdotes shared by key participants were used when they were particularly powerful in illustrating IK perspective.

6.5.5 Community data collection overview

Community values, IK and perspectives related to hazard vulnerability were examined at an individual level and community level in this research, with the emphasis on the latter. This was deemed most appropriate for two reasons. A 'community' by definition can be conceptualised as a collective with shared values and norms, sharing a common history and identity, and in which there are affect-laden and reinforcing relationships (Arthur, 1998) such as exists in smaller communities. This made community level analysis suitable for the researcher's purposes. Equally important, the level of community is where many mitigation decisions and hazard vulnerability analyses are made (Yodmani, 2001). It was also necessary to gather some of the data at the individual level so that community residents might have time to reflect upon community values, IK and meet privately with the researcher to openly share their thoughts and feelings about their community.

6.5.6 Stories of change

Stories of change provide information about the experiences a person uses to make decisions. A person can also explain the course of his life to himself (Schütz & Luckmann 1967; Babbie & Rubin 2010). Life stories of some participants are recorded among these are the old people, who narrated to their experiences from past floods, drought, insects infestations among

others. Other participants narrated eloquently about the transformations that have occurred in their village during their lifetime.

6.5.7 Focus group discussions

Two focus group discussions were arranged with in each district with groups ranging from 8 to 13 members in each district. It was therefore not based on random sampling, which would have been the researcher's preference. The participants were asked by the researcher to choose the day and place where the focus groups were to be conducted. The prior arrangement of focus group discussions alerted the participants about the topics that the researcher wanted them to discuss, such as the IK DRR activities, knowledge transfer from parents to their children and the reasons why they did so, what they did and when (Appendix A). The researcher acted as a facilitator and kept records of the conversation by taking detailed notes. The focus group was conducted in the local language, which is Shona in Mashonaland Province and Ndebele in Matabeleland province, to improve the level of participation by the members.

Recording discussions would have been ideal, but the participants felt uncomfortable with this and it would likely have reduced their levels of participation. The fact that participants arranged their own time, made the discussions very lively and open. The frank and candid debate was considered more useful than what might have been gained by recording the conversations. This trade-off was a necessary cost considered acceptable by the researcher.

6.6 POPULATION OF THE STUDY

The population in a study refers to a set of objects that the research focuses on. Bless and Higson-Smith (2000:84) posits that the population has certain characteristics the researcher intend to determine. The study area chose four (4) districts with a combined total of 68 Wards. A district has one chief and depending on the size can have up to 30 headmen. The districts were selected for being vulnerable to various hazards including practising indigenous technologies for DRR. The target population of this study comprised male and female participants who are Chiefs, Headman, village elders, traditional healers, extension workers, local leaders and department of Civil protection staff.

6.7 SELECTION OF RESPONDENTS

Sampling takes into consideration decisions about settings, people, events, social processes and behaviours that are observable (De Vos *et al.*, 2002; Rubin & Babbie, 2012). The selection of research sites and participants from an entire population was done through purposive and snowball sampling procedure. The sampling techniques were adopted for the research targeted a particular type of participants according to what they already know about the field of DRR to include a range of perspectives (Terre Blanche *et al*., 2006:304 and De Vos *et al*., 2005:329). This technique is also referred to as judgemental sampling because it is carried out based on a defined scope and an expected outcome (Rubin & Babbie, 2010 and De Vos *et al*., 2011:233). Purposive sampling was employed to identify participants. In all, thirty four (34) participants per district were identified thus bringing the total number to one hundred and thirty eight (138). The sample size of 138 is informed by technical recommendations on sampling in research put forward by De Vos, (2002). There were two (2) focus group discussions (FDGs) per districts with thirteen to fifteen participants. In all the districts there were six (6) to eight (8) women participates.

Taking into account the amount of time needed to interview, have a discussion in a focus groups, code data, transcribe, and come up with emerging issues, it was felt that 138 participants were an appropriate sample.

6.8 DATA ANALYSIS

After the data has been collected, the data was analysed and documented/transcribed. The data was analysed according to the eight steps of data analysis as outlined by Tesch (1990:142-145). These include:

- Thorough reading and making notes of all transcribed material.
- Consider the substance of interviews conducted looking for the underlying meaning.
- Compile a list of all topics that came to the fore in the research.
- Cluster these topics.
- By using clustered list, once again consider the data. Code the topics and correlate coding with data.

- Elaborate on the topics with the aim to turn them into certain categories and determine interrelationship.
- Make a final decision on the coding of the categories and alphabetise the list.
- If necessary, recode existing data.

The transcribed data from the focus group discussions and in-depth interviews were subjected to qualitative analysis. Qualitative analysis was appropriate to determine relations between the data from traditional leaders, village elders considered in decision making concerning their disaster reduction practices (Tembo, 2003; Johnston, 2005; Bringer *et al*, 2006; Briggs *et al*., 2007; Babbie & Rubin, 2012). As a point of final convergence of theories, themes, relationships, perceptions and preferences, the ways for the inclusion of IK in DRR policy is presented in narrative form with supporting qualitative explanations.

The analysis of data was carried out in steps. Firstly, mind mapping was employed to reduce data collected through focus group discussions and in-depth interviews. The technique allowed for organising the data into ideas, trends and patterns as a way to come up with relationships that are easier to understand. Secondly, data interpretation extracted meaning and integrated views of other authors into the data. The themes that were expected to yield data for answering the research problem is shown in table below. The coding used information in chapter 2 section 2.4.1 table 2.1.

Table 6.4 Data coding applied

Description	Code
Private individual knowledge inherited from forefathers	**K1**
Acquired the skill to practice it faithfully without modification	**K1-wm**
Acquired the skill to practice it faithfully with modification	**K1-m**
Individual rights to use the modified and unmodified knowledge according to same rules	**K1-sr**
Individual rights to use the modified and unmodified knowledge according to different rules	**K1-dr**
Knowledge known to the community	**K-2**
Knowledge practiced by individuals if known to individuals	**KI-1**
Knowledge practiced by individuals if known to community	**K2-I**
Knowledge practiced by community if known to community	**K2-c**
Knowledge practiced by community even if details known to individual/s	**K1-c**
Known to community but not practised by individuals or community	**K2-n**
Knowledge known to community and accessible to outsiders	**K2-ao**
Knowledge known to community and not accessible to outsiders	**K2-na**
Knowledge known to wider public through documentation or otherwise	**K3**
Knowledge known to wider public and practised by only few individual	**K3-I**
Knowledge known to wider public and practised by wider public	**K3-P**
Knowledge known to wider public and not practised by any one	**K3-n**
Experiential and transmitted knowledge	**K**

(Source: Wisner & Lucey, 1993)

Brief explanations on the IK coding are given therein. The tacit knowledge that is acquired largely through personal experience through learning by doing or by observing is inherited knowledge **(K1)**. **K1-wm** refers to tacit knowledge that is acquired largely through personal experience through learning by doing or by observing but should not be changed. It has to be used as it is or as given. Traditional healers use such knowledge.

Tacit knowledge that is acquired largely through personal experience through learning by doing or by observing but the acquired skill has to be practiced faithfully with modification in another context **(K1-m)**. This type of knowledge that can be modified is mostly in infrastructure were others can modify the structure depending on resources available in other contexts.

The tacit knowledge that is acquired largely through personal experience through learning by doing or by observing **is** knowledge known to the community **(K2).** This kind of knowledge is the obvious things for everyone in the community like sacred days (*chisi*) where no one go to work in the field, trees that should not be used as firewood among others.

Knowledge practiced by individuals if known to community (**K2-1)** is the IK the individual practice work in individual's favour. Other community members would seek help from the individual practising it.

Knowledge practiced by individuals if known to individuals (**KI-1**) is that IK knowledge people possess when they leave their families to start new homes, they walk out with tacit knowledge. Intimate knowledge about IK technologies can transfer across communities from an incumbent parent and remain connected to the parent's knowledge.

Knowledge practiced by community if known to community (**K2-c)** is inherited tacit knowledge that is common practice in the community and include taboos mostly.

Knowledge practiced by community even if a detail known to individual/s (**K1-c**) is that knowledge the community learn and acquire from the individual who is an expert.

Known to community but not practised by individuals or community (**K2-n)** it is tacit IK knowledge that does not value in the community.

Knowledge known to community and accessible to outsiders is the knowledge acquired through imitation thus individuals adopt the skills, techniques and methods of those whom they perceive as 'successful' and apply them to address problems in their own situations or other contexts **(K2-ao).**

Knowledge known to the community and not accessible to outsiders *(***K2-na)** is that knowledge which is distinct of a tribe and community. The community gains prestige by being the only ones with expertise to use it. Examples include knowledge of casting out demons or specialising in treatment of childhood diseases, among other things.

Knowledge known to wider public through documentation or otherwise (**K3)** include documented knowledge that could be IK farming methods, harvesting methods or any other IK practice that has been documented.

Knowledge known to wider public and practised by only few individual (**K3-I)** is the inherited tacit IK of those that have started new homes. The new families possess IK inherited from their parents but differ from parent's survival means. The value of IK is for few individual as some view the IK as of no value.

Knowledge known to wider public and practised by wider public (**K3-P)** is the inherited tacit IK of those that have started new homes from their parents is the same knowledge and survival means as well. The IK still has backing of the parents and community they settle in.

Knowledge known to wider public and not practised by any one (**K3-n)** is inherited knowledge that has lost its value in the community over time such as killing of twins.

The objective of carrying out these processes was to ensure that a final product was not merely the rewriting of existing knowledge, but generation of new knowledge that came from the findings. There were some limitations encountered in the data collection process and some of these limitations are explained in section 6.10.

6.9 LIMITATIONS

In conducting the fieldwork, a range of local factors limited research. The main constraints were:

- Bureaucracy and Political atmosphere: As the study was carried out in the year of national elections, in some cases the researcher carrying out fieldwork was misinterpreted as being members of a political party in the pre-electoral campaign. This was resolved through working with government staff especially extension workers who were known in the areas of study.
- 'Disasters' and false expectations: Two of the study areas were affected by army worms while fieldwork was being carried out. The arrival of the researcher gave villagers and some elders false expectations; they assumed that they were going to be registered to be able to get aid assistance as is the case when a calamity strike any community in Zimbabwe.
- Physical inaccessibility: Mangwe and Guruve study sites were situated in areas where, owing to poor road accessibility and the danger of wild animals, it became difficult to conduct interviews with the dispersed households. The researcher later had to organise meetings with participants in leisure spots and schools in these areas as a mitigation measure. This also affected some elders who failed to attend due to distance from their homes.
- Health Conditions: The fieldwork especially in Lupane and Mangwe was carried out during the peak of a malaria epidemic, which had caused several deaths in the communities visited. In Mangwe, for example, several interviews had to be cancelled because the potential interviewees had to attend funerals of relatives, neighbours or friends. In certain cases, the researcher was involved directly in these events.

The challenges that were experienced did not impede the achievement of the research objectives because cancelled meetings were rescheduled for alternative days. The following section looks at validity and reliability issues.

6.10 VALIDITY AND RELIABILITY OF THE RESEARCH METHODOLOGY

The research ensured credibility from a methodology and outcomes point of view through testing of focus group reports against the theoretical chapter of the research. The focus group reports generated through focus group sessions and those completed independently by the sampled population were tested against the theoretical chapters of the research. Informal interviews, structured interviews and observations were used as form of triangulation to verify what facts that had been obtained using another method. Since traditions are well known, verifying them was not a problem. Consistent with a qualitative approach, interviews were not a once off event, but follow-up interviews were conducted. This was intended to achieve data saturation. This would also ensure trustworthiness in the process. The key chapters used as references were chapter 1, which sets the scene for the study, as well as chapter 2, which introduces IK concepts. Reference was further made to chapters 3 and 4, which introduce the DRR models. The review of the DRR and related policies for Zimbabwe in chapter 4 also served as a frame of reference to test the focus group reports. The data gathering process was also subjected to a peer review process. It was first discussed with participants and latter an in-depth analysis by the researcher was done. This process helped to clarify issues that emerged during dialogue with key participants and focus on the content that was gathered to address the research problem.

Prior approval for the focus group facilitation directive was sought from the study leader. The need to ensure that the directive was approved by the study leader became necessary. This is so to ensure that the directive is of the required standard in terms of quality and consistency with the research objectives. To this end, the directive was presented to and approved by the study leader before distribution to the participants of the study (see appendix A). Generally, the research was successfully carried out. The section follows briefly presents ethical consideration for the study.

6.11 ETHICAL CONSIDERATIONS

Ethical issues were addressed before going into the field to gather data for addressing the problem at hand. The research involved human participants in exploring IK for DRR hence it brought about ethical issues that include right to privacy, confidentiality, personal autonomy,

respect and dignity. Anderson and Woodrow (1989) posited that in research, no harm must be done to participants. Peach (1995), Sapsford and Abbott (1996) and Patton (2002) explains that no pain should be inflicted to those that take part in any form whether physically and mentally. The ethics literature on research for working with rural communities and DRR as grown and examples include works by (Collogan *et al*., 2004; Lott, 2005; Rhodes, 2005; Mackenzie *et al*., 2007; Jesus & Michael, 2009; McManus, 2009). In research there are many issues that arise and these cannot be resolved by one method during the course of the research (Peach, 1995: 14). More so, most of the research ethics theories are based on the Global north ideals; they fail to capture aspects that do not apply in other regions of the world (Peach, 1995). The researcher in this thesis did what was right in the context of Zimbabwe by simply following, the laws, prohibitions, prescriptions and norms.

Participants were initially briefed about the purpose of the research and were assured that the information was for educational purposes only and that no names were to be mentioned in the write up. Participants were also given the right to opt out of the study should they feel that the issues being discussed were against their conscience. The research obtained ethical approval for data collection where human participants are the target group. Similarly, in Zimbabwe, permission was sought from the Head of Department of Civil Protection (DCP) to conduct research in the four locations stated above (see Annexure A). A meeting with the head of DCP was arranged with the purpose of making a formal application to conduct research in the study area, and permission was granted. All government officials, involved in disaster management activities such as the police, district administrators, and provincial administrators in the study area were notified of the presence of the researcher and the purpose of the study.

Following the notification from the head of DCP, the district administrators in the study areas notified traditional leaders of the presence of the researcher in the area. This was followed by visits to village headmen to seek permission to work with their villagers. A checklist or a consent form or both were considered to ensure ethical issues were observed. This was done to address issues of illiteracy in the study locations. Those that were able to read and write were given the consent form to read the contents before appending their signatures to the form. The checklist in table 6.5 below was part of the toolkit referred to during fieldwork. Before going into the field to collect data, the research assistants were given some orientation

on data collection, including ethical issues. Traditional leaders were also asked for permission for the researcher to conduct transects walks on their land, to collect artefacts, take photographs and participate in their DRR practices. Some 138 respondents that included village heads, traditional leaders, district administrators, field officers and extension workers agreed to participate in the study (see section for detailed description of sample). These procedures had to be done for the research intruded into people's lives during data collection in the form of interviews and observations, involving personal and interpersonal interactions.

Table 6.5 Checklist for ethical issues

Ethics aspect	**Guidance notes**
Purpose of the study	Explaining the purpose and importance of, and reasons for, the studies in simple understandable language, the expected value or benefit of the study to the participants
Risk assessment	Conscious of the psychological stress the interviews or observations might cause elderly people, women and IK experts
Confidentiality	Emphasis was made that participants' identities would remain confidential and anonymous in the study documents, unless they chose otherwise. This was particularly important in socially and politically polarised Zimbabwean environment at the time of the study.
Promises	Explaining what the study would be able or unable to deliver or attend to some issues raised by participants, which were beyond the scope of the scope of the study.
Informed consent	Before data collection and during participation, consent was sought. Participants were informed and could withdraw their consent at any point.
Data access and ownership	Data sets were accessed through permission from respective DCP and DA offices.

(Source: Patton, 2002)

Another very important issue of ethics was positionality of the researcher, which was also a limitation of this study. The aim of the study was to contribute new knowledge to DRR through empirical evidence. The researcher originates in one of the study areas, which had similar circumstances to other three study areas; some biases could have influenced the

research process. Cont and O'Neil (2007), Sultana (2007); Huisman (2008) who have written a lot on reflexivity and positionality emphasises the importance of researchers to acknowledge their partiality, biographies and subjectivities through reflexivity. They claim that, reflexivity helps researchers to fully understand their research process, the researched and the research context (Cont & O'Neil, 2007; Sultana, 2007; Huisman, 2008). An aspect like knowledge production due to the level of education of the researcher could have affected access to participants. This is an aspect related to the researcher's positionality.

To deal with issues of positionality, the study adopted a dialogue process between the researcher and research participants in the four study areas to influence and transform each other through the research input (England, 1994). The researcher was visible and integral part of the research setting. Furthermore, the study observed four notable strategies. Flexibility as 'methodological appropriateness' and a range of multiple methods where employed (Patton, 2002). Group or individual interview methods were employed, sometimes using participatory tools, meetings, workshops and focus and open discussions depending on the situation in the various study areas. In-depth interviews were open, self-disclosing and consciously accommodated participants' work schedules and time constraints. There was also mutual sharing of information. In some cases, personality attributes including sharing jokes, and learning some key words in local language were done to address the issue of positionality. Ethical considerations and positionality are revisited in Chapter 8.

6.12 CONCLUSION

This next chapter, the multidimensional and diverse data from Mangwe, Lupane, Guruve and Hwedza districts including from literature review discussed in preceding chapters on conceptualisation of IK, vulnerability discussions on DRR models are synthesised for presentation and analysis in chapter 7. Data screening was based on the researcher's interpretive application of IK, and links with the IK models discussed in chapter 4. The convergence of empirical findings with the thesis's review of literature made, it is clear that the synthesis and analysis of data in chapter 7 answers objectives of the thesis posed in chapter 1. Actually, it has become clear that the inclusion of IK into DRR policy for the country could be facilitated by considering empirical data based on IK understanding of disasters, IK domains, categories, IK practices in agriculture, IK practices in crop and animal

health, IK practices in weather prediction, IK livelihoods, themes yielded by the data these answered the thesis main issue of the inclusion of IK into DRR policy in Zimbabwe.

CHAPTER 7

EMPIRICAL RESEARCH FINDINGS AND ANALYSIS

7.1 INTRODUCTION

Chapter 7 presents a review and analysis of how chapters 2, 3, 4 and 5 partially addressed some of the thesis questions posed in chapter 1. These questions are, explaining IK, assessment and analysis of the main theories, models and practices explaining IK in DRR, determining the extent and depth of how IK has impacted on DRR policy formulation in Africa and other parts of the globe, assessing the extent to which IK currently feature in various policies in Zimbabwe. The responses to these are found in section 7.3.

As outlined in chapter 6.5.4 traditional leaders, elders and other key informants from government departments, extension workers were extensively interviewed separately in all the four districts. Focus groups discussions (FGDs) were carried out, photographing of practices, artefacts, observations and transect walk were undertaken in all the districts. Consistent with the signed agreement between the researcher and the participants, they are not named in the text. Detailed summaries of each interview are included without naming respondents. The section of profile of the participants is presented first in section 7.2.1.

7.2 EMPIRICAL RESEARCH FINDINGS

Table 6.4 presented in chapter 6 provided the coding of data that was used to explain the various knowledge domains adapted from Wisner and Lucey (1993). The findings show that not all IK is used in the four districts studied. The Table 7.1 below presents the number of times IK is used and the component of DRR it address. This is done to clarify reasons for non-use of other IK presented in the table in section 6.4 of chapter 6.

Table 7.1 IK DRR component and IK domain

Component of DRR using IK identified	IK type
Prediction of Disaster Risk	K1,K2
Community awareness	K1,K2,K3
Structural measures	K1,K2,K3-p
Non structural measures	K1.K2,K1-m
Knowledge transfer	K1,K2
Education (informal)	K1,K2,K3
Livelihoods	K1,K3,K2,K-ao
Preparedness	K1,K2,K1-m
IK capacity	K1
IK sustainability	K1
Governance issues	K1
DRR planning	K1,K2
IK by laws	K1, K1-wm
Mitigation aspects	K1,K2
Community participation	K1,K2,K3-p
IK institutions	K1,K2,K3
Training	K1,K2,K3,K1-wm
Risk reduction strategies	K1,K1-dr
Information sharing	K1,K2
Culture of DRR	K1
Prevention	K1,K2

The mostly used IK domains for components of DRR identified are **K1** (25 counts) and **K2** (15 counts). Other IK domains used are **K1-1; K1-wm; K1-sr** and **K1-m**. These domains are more dominant in Hwedza, Mangwe and Lupane reveal that IK through inheritance is still

prevalent and applied for DRR. Communities that have inherited IK, have abilities to observe their surroundings using plants (environmental ethic) and animals (ecological ethic) to develop indicators that can be used to predict disaster risk. This is similar to technological methods of predicting disaster risk, such as weather forecasting of cloud cover, and wind direction among others discussed in literature review and the theoretical framework presented in chapter 2. Rural communities also use the environmental indicators such as flowering of plants and bearing fruits of plants to help them to develop adaptive and coping strategies. IK use of signs/symbols **(K1, K2)** is used to foretell an impending disaster that alert the community. In flood prone areas of Guruve and Lupane for instance, when traditional leaders alert communities about floods, they start to place barriers around homestead and put in place platforms to keep food, water, fuel and valuables **(K1, K2).**

The IK domains of **K2** and **K2-ao** also dominate in all the districts and many of the rural communities are aware of IK components of DRR identified. Some of the strategies that use IK are accessible to outsiders and can be used with or without modifications. IK strategies identified as accessible to outsiders without modifications involve wild fruits and honey harvesting. The strategies for searching for alternative sources of livelihoods in the surrounding environment can be modified depending on the context or connection to a place. Connection to a place allows people to understand their environment and come up with infrastructure that withstands the disaster risk peculiar in that community.

K3; K3-1 and **K3-p** IK domains shows that within the communities studied there are DRR strategies using IK found in documents of government and Non-Governmental Agencies that operate in these communities. This also may imply that IK may be undergoing transformations because of relationship with the internal and external entities of the community.

The non-usage of some of the other domains of IK can be the realisation that there is more to IK than the repetition, or intergenerational transfer, of a relatively fixed body of knowledge. Individuals as the findings shows, learn through copying, emulation, observing, and comparing with what they learn from school. Individuals, especially the young adults, conduct their own small experiments to verify the knowledge that they have accumulated over time and have shares among their peers. IK is also changing with regard to cultures,

tradition, oral literature, and religion. All these are being continually revisited at the individual and community levels due to mixing of people, modern education and Christianity. Most of the issues highlighted in this section are further discussed in detail in the next sections providing narrative and recorded examples from the districts.

After a detailed analysis following the procedures explained in chapter 6 section 6.8, the empirical data yielded themes used to justify the inclusion of IK into DRR policy in Zimbabwe. IK is closely related to the following major themes derived from the data:

- Religion and IK (Traditional and Christianity)
- IK health (human and animal health)
- IK transfer and informal education (households meetings, *dare*)
- Survival and subsistence through sustainable livelihoods (Beekeeping, gathering, hunting, selling wild fruits, craftsmanship)
- Food security (*Zunde*, IK agriculture techniques)
- Natural resource management (through other practices and existing IK)
- IK construction for DRR (granaries, livestock enclosures)
- Disaster Risk awareness (IK use of signs and symbols from nature i.e. plants & animals)
- IK Institutions (kinships, ceremonies, emotions, marriage, trust, reciprocal attitudes, solidarity, sharing, mutual support, socialising, social ties, taboos)
- IK changes and consequences
- Sustainable IK technology transfer
- IK repository
- IK homogeneity
- Sustainability of IK for DRR
- Challenges for IK use
- IK actors and knowledge usage in the four districts
- Institutional arrangements and interplay in the districts
- IK technologies for vulnerability reduction

The first part presents participants' profiles based on their type, tribe, gender and age categories and then perception of IK, disaster, DRR and the main themes addressed thereafter. Interviews were undertaken in Mangwe, Lupane, Hwedza and Guruve districts. These interviews were conducted in vernacular that is Shona for the elderly in Guruve and Hwedza, and Ndebele for Mangwe and Lupane. English was used for government staff and extension workers. Where concepts are expressed in vernacular Shona is written first, followed by Ndebele

7.2.1 Participants' profile

The profile of participants relate to age, gender, ethnicity and religious beliefs. The information was intended to provide a clear picture of the profile of each of the respondents. In total one hundred and thirty eight (138) participants took part in the study. The breakdown of the participants is shown on Table 7.2.

Table 7.2 Description of participants and response rate

District	Type of participant	Gender		Tribes represented	Age group
		Male	Female		
Mangwe	Traditional leaders Elders DCP staff Traditional health experts	7 11 2 3	0 6 0 1	Ndebele, Shona	18-35 years (2) 36-50years (4) >51 years (25)
TOTALS		23	7		
Guruve	Traditional leaders Elders Extension workers Herbalist	11 12 2 1	2 7 3 0	Shona	18-35 years (3) 36-50years (11) >51 years (22)
TOTALS		26	12		
Lupane	Traditional leaders Elders Extension workers DCP staff	5 14 3 1	1 8 2 0	Ndebele, Shona	18-35 years (5) 36-50years (8) >51 years (22)
TOTALS		23	11		
Hwedza	Traditional leaders Elders Extension workers Herbalist DCP staff	7 12 4 2 1	1 5 2 1 0	Shona	18-35 years (2) 36-50years (5) >51 years (29)
TOTALS		26	9		
OVERALL TOTALS		99	39		138

The participants' average age range was 64 years. There were 12 participants in the 18-35 years age group, but these were extension workers. The participants' older age was very significant for the study as they were mature and provided rich, well-informed input into the

study. This is consistent with Tanyanyiwa *et al*. (2011) findings that people aged above 40 years were more interested in the IK system as compared to those aged below 40 years. Those aged above 40 were raised in a system with less influence of the modern scientific education system. The elderly people had accumulated knowledge and experience over time in their respective communities. This also made them to be identified as the custodians of IK among their peers who identified them through snowball sampling.

7.2.2 Gender composition of participants and IK

With regard to gender, the participants especially the chiefs and headman were mainly male in all the districts' but Hwedza, Guruve and Lupane had female kraal heads. There were 36 female participants and these provided information on IK used by women in their communities. The larger number of men among the participants shows that patriarchal systems are well embedded in these communities. This also shows that IK is still in practice in Zimbabwe and men are still dominating in leadership roles. Gender representation among the participants made it possible to gather IK data that is possessed by women and useful for DRR. When disaster strike, it is not selective but affect people across the gender divide. The fact that women were contacted through referrals implies that IK was also transferred to them. Quite a great deal of IK knowledge was obtained from women and these results are presented later in this chapter.

These findings reflect that gender and IK are linked in many ways, for it is part of the social fabric. Bodies of IK are accessible members of a social group charged with specific roles and production responsibilities. The differences in gender come about because of the specific experiences, knowledge and skills that women and men develop during the productive and reproductive responsibilities assigned to them. IK is not universally gendered as was observed in the field. Men have specific knowledge that was privy to them and women as well had IK privy to them.

Dialogues with research participants revealed that women had more IK of wild plants, food, fodder and medicine for children small livestock among others. The women IK was multidimensional for they tend to fend for the family in rural communities. The dialogue also

touched on conceptualisation of disaster and IK understanding in the study areas. The views of the participants are presented in sections 7.2.3 and 7.2.4 respectively.

7.2.3 Participants' perception of disaster and disaster risk

The participants viewed a disaster as a great calamity, damage (*ngozi, nhamo, urombo, rufu*) that destroys the lives of people, animals, property, and livelihood. Respondents believe that a disaster is something that disrupts normal life, and an accident that affects many people. Respondents identified disasters that happened in their communities similar to those in section 6.3 Table 6.1 of chapters 6. The Table 7.3 shows disasters that had occurred in the past 5 years from 2009 to 2014.

Table 7.3 Disasters that have occurred in the past two (2) years (2009-2012)

Disaster	Name of District			
	Mangwe	Hwedza	Guruve	Lupane
Fires	X	☒	☒	X
Wild animals	X	☒	X	X
Drought	X	X	X	X
Storms	X	X	☒	X
Lightning	X	X	☒	X
Livestock diseases (black water, foot and mouth, new castle, anthrax)	X	X	X	X
Human diseases (HIV/AIDS, Malaria, Cholera)	X	X	X	X
Insect infestations (quelea birds, armyworms, locusts)	X	☒	X	X
Mass hysteria	☒	X	X	☒

Two districts Mangwe and Lupane had experienced many disasters. These districts are near national parks and have Kalahari sandy soils as well as low rainfall. They are dominated by Kalahari sands. The responses confirmed some understanding of disasters. In discussions with the respondents, it was determined that the respondents' had an understanding of disaster concept. The respondents 'understanding also reflects the essence of the definition of

the Zimbabwe Civil Protection Act of 1986 and policy of 2011 discussed in chapter 5. The definition of the Act stated that a disaster is determined by the number of lives lost, injuries sustained damage to property, infrastructure and environment.

The participants in Focus Group Discussions (FGDs) and in-depth interviews indicated that they have been directly affected by some kind of a disaster in the past. Transect walks in Mangwe showed the irrigation had canals affected during cyclone Eline in 2000 had not been repaired. The respondents related/described the causes/source of disasters as being uncontrolled, since they were caused by people through witchcraft, nature, wildlife, change of seasons. In Lupane one ward called Sothini (literally meaning "what we can do") had few households that were asked to leave their original homes for they were accused of witchcraft. The participants' views show that the occurrence of disasters is not only related to natural causes, but also to unnatural causes. Disasters are also caused by the actions of people, for example, by angry ancestors or a god, snakes, fighting and witchcraft. The people knew instinctively that they needed to understand their environment (**K1**) well to be able to foretell and cope with disaster risks as shown in Table 7.4 below. Memories of the challenges experienced related to the devastating 1992 drought, and 2000 floods were expressed. The second most frequently experienced disaster was insect infestations of armyworm and human diseases (HIV and AIDS and Malaria), which was experienced by more than half of the respondents. Storms and fire were also mentioned in Lupane and Guruve districts.

In dealing with hazards, different strategies were given by traditional leaders and elders. Most of them are experts in livestock diseases, agriculture, human diseases and environment. They undertake the responsibility to predict disasters and guide the people on actions to take to prevent or mitigate the disaster. In the four districts studied rural people can observe weather conditions (**K1**) and plan accordingly for disaster risk aversion. This is so for rain-fed cultivation practiced by many rural communities is highly dependent on rainfall patterns, the people have to make crucial decisions about sowing time, location of cultivation plots, and the varieties of crops used.

Table 7.4 Weather related signs/Indicators for predicting disaster risk

Sign/Indicator	Explanation	Activity
Dew on leaves, objects etc in the morning (K1, K2)	Less likely to rain that day	Schedule weeding, application of fertilizer
Breeze changing direction occasionally from South East and North West (K1, K3)	Prolonged Rainfall most likely	Planting and avoiding activities affected by rain
Full Moon (K1)	Chances of rain slim	Weeding, harvesting, social activities
Exceptionally well developed wild fruit such as Mazhanje Mazhanje (Wild Loquat) and Matamba/ Umtamba (Sweet Monkey oranges), Tsubvu (Chocolate berry) etc (K1, K2, K1-1)	Below normal to a poor rain season	Grow drought resistant crops, Harvest and store fruits for future use Develop additional sources of drinking water
Frequent cries from a bird called Haya/Inkanku (Jacobin Cukoo) (K1, K2)	Rain season about to begin	Field preparation for the season

Solutions such as scheduling weeding, planting develop additional sources of water as ways of preventing disaster could be prescribed by the traditional leaders and followed without challenging the decisions. The IK of these indicators in Table 7.4 varies from place to place. Some people, especially in Mangwe, Lupane and Guruve still use it; many in Hwedza see it as 'old-fashioned' knowledge that has been superseded by scientific methods of weather prediction. However, some of the observation show there is some evidence that IK on disasters and methods of prediction is still being passed on to the young, who may not yet have experienced a serious disaster. One young extension employee in Guruve from the government had this to say;

"I have seen and heard the elderly saying that incessant howling of dog and turning of leaves of Mopane trees upside down brings floods in a place. Traditional leaders say the movement of ants to higher ground or climbing trees predicts flood. As an extension officer, I give more importance to the modern scientific methods of predicting disasters".

Fowls and other birds help communities to predict whether conditions, that is whether the rains are going to stop or continue. When poultry come out to feed during rainfall, it signifies the onset of drizzle. When poultry fail to come out for feeding then it meant that the rains

would not last the whole day. The research established that IK did not only manifest themselves in matters relating to agricultural production and weather forecasting.

Indigenous long term and short-term weather forecasting methods are probably the classic example of how traditional communities used to manage disaster risk. These weather forecasting methods have largely assisted the communities to plan both daily and seasonal activities and hence ensure agricultural and livestock sustainability. The community during focus group discussions revealed possessing knowledge that prolonged drought start with thunderstorms on arrival of the first few rains. Such knowledge helped them to put in place DRR measures for impending disasters. Changes in birds' cries and onset of mating reveal changes in seasons. The study also noted that when forecasting of weather is the aggregate of reading many natural signs, then it follows the same signs have come to alert communities of any weather related hazards that they may experience. An interesting aspect of these signs is that scientific or Geographic explanations are available though the communities themselves lack the skill. It is true that dew on leaves or other objects during the morning signify condensation-taking place at ground level over night. This implies that by next morning it would be dry hence chances of rainfall are slim unless a moist air mass moves in. In other words, this observation is true and scientific and hence such knowledge is used to plan for the day's activities.

A frequent change of wind direction in summer signifies convergence of air masses that bring rain to many parts of Zimbabwe. All the districts studied except Mangwe like within the path of the Inter Tropical Convergence Zone (ITCZ). Zimbabwe benefits from the convergence of the warm moist Congo air with the South East Trade winds from the Indian Ocean. Thus, communities have learnt to predict the onset of rains accurately though they may not be aware of the scientific mechanisms involved. Prolonged absence of convergence could signal a short growing season or the likelihood of a drought. It means these communities would not be caught completely unawares by a climatic disaster like lightning strikes, flooding or drought among others. Similarly, a sudden surge of the small brown cricket called Ndororo (Curtilla Africana) into highland areas signifies saturated ground and an impending danger from flooding. It may also signify reduced harvests due to leaching of nutrients, rotting and disease.

Consistent with grounded theory discussed in chapter 6, interviews should be conducted until no new themes emerge in subsequent interviews and achieve saturation point. Dialogue with traditional healers revealed that IK for predicting disaster risk use both plants (environmental ethic) and animals (ecological ethic) (**K1, K2**) and these are apparent to everyone children, women and men. The community instinctively responds and prepare for events without consulting the elders for interpretation of indicators derived from plants (environmental ethic) and animals (ecological ethic). At other times, the prediction of disaster risk signs could be complicated and required interpretations of experts (elders). Elders in Guruve, Lupane and Hingwe were tasked to monitor the progression of hazards and give advice governing the behaviour of the communities. At times, the interpretations would cause major conflicts of opinion depending on decision. The elders and traditional leaders who would predict accurately the occurrence diseases, natural disasters and climatic conditions were respected. Whenever there is mass hysteria in communities, traditional leaders and traditional healers including prophets are consulted from time to time to solve the problem. The traditional healers use their IK for medical practices and establish many plans to solve disaster risk as well as restoration of situations.

7. 2.4 Participants' perception of IK

The common definitions that emerged from the respondents were that; IK is knowledge that is used in community to run away from wildlife like elephant, practice in farming, and treatment of child killer diseases (*Nhova, Gwirikiti*), building houses, treating snakebites, and protecting fields. IK is knowledge of culture and tradition that involve dance, music, keeping livestock, appeasing spirits (*kupira mudzimu/ukudhlala amadlozi*), and respecting nature. IK is part of everyday life, what we do in our community, food we eat, rules we follow as prescribed by our elders. IK is knowledge acquired from the ancestors *(tateguru/utategulu),* traditional chiefs and elders.

Thus, basing on the participants' perceptions IK has categories as explained in table 6.4 of chapter 6 and has knowledge domains such as (**K1**) inherited knowledge or (**K2**) knowledge known by every individual in the community as discussed in chapter 2. IK is also defined in terms of healthy foods that the community consumes, or recommends, the type of diseases they are able to cure, and traditional practices and expertise.

A large majority of the participants, ninety eight (98) had an excellent understanding of the term IK. The fact that the majority of the respondents had their own way of understanding the term IK, there is an indication that this knowledge actually exists within the study areas as also demonstrated above.

The concept of IK stated was very consistent with literature review findings. For instance, IK has been referred to in the literature review as the ancient, communal, holistic, and spiritual knowledge that encompasses every aspect of human existence (Baumwoll, 2008; Mapara, 2009; Mawere, 2013). It is important to note that one of the major lessons learnt from the respondents' definition and interpretation is that IK is not limited only to the academic literature. According to the interviews, IK encompasses traditional values, norms, habits and other principles, which comprise the history and experiences of the respondents.

Some respondents said that IK is knowledge used in their everyday life that is passed on to their children, who perpetuate it from one generation to the next. Both communities perceive IK differently, but they both provide an understanding of it as ancestral knowledge that is passed down along the generation lines. Participants' definitions also provided close relationships with natural components and embedded in cultural practices.

Today many local knowledge systems are at risk of becoming extinct because of rapidly changing natural environments and fast pacing economic, political and cultural changes on the global scale (Baumwoll, 2008; Donovan, 2010; Wisner, 2010, 2014). Many practices and ways of life are disappearing, as they do not match with foreign technologies. The definition provided by participants' shows that the rural communities depend almost entirely on specific skills and knowledge essential for their survival. Local knowledge is being turned to and accepted as of great utility in sectors of agriculture, animal husbandry and ethnic veterinary medicine, use and management of natural resources and poverty alleviation (World Bank, 1997; Kolawole, 2001; Baumwoll, 2008). IK is the basis for information for communities and is facilitating learning and decision-making. Rural communities' activities, their internal innovations and experiments are informed by the dynamism in information systems. In order to address the main research problem, data analysis had to follow the procedures stated in chapter six. The next section is a presentation of themes grounded in empirical findings.

7.3 THEMES

The empirical findings presented herein have been derived through the application of data analysis and interpretive process justified in chapter 6 section 6.8 and used coding in the same section Table 6.4. Hence, the development of research themes given above in section 7.2 guides and structure the arguments presented within the respective context.

7.3.1 Informal education (IK transfer)

IK is existing and contributing in sustaining communities in Mangwe, Lupane, Guruve and Hwedza through instructions such as apprenticeships (**K1, K2**), practices, observations, communication through folk media and other traditional information exchange mechanisms (**K1, K2**). Dialogues with elders revealed that knowledge was acquired or taught during the night at meetings within a homestead. The homestead meeting is called the (*dare)* (**K1&K2**) and skills for making fishing traps and the hunting arsenal are discussed. The impartations of skills have usable value for the young and in later years of living. Besides meeting, myths, songs, folktales, riddles (**K2**) were some of the medium of transferring livelihoods skills. An experience on what is to be done and avoided is taught to young adults with ages ranging from as low as 4 years. IK as observed by the researcher depended on personalised knowledge (**K1-1**), a mixture of experience (**K1**), subjective wisdom and intuitive feelings (**K1-m**). The implication here is that IK transfer is always achieved by direct transmission from father to son and from mother to daughter rather than formal training. One elder in Mangwe, said he acquired through copying what his grandfather was doing. This shows also that observation is another way IK is transferred. Emulation and observation has helped IK to survive aiding osmosis in the course of discussion within the family and community.

These results were consistent in the four districts and the only difference noted were the names given to places where informal meetings were held or the name of the informal method for IK transmission. For instance homestead meeting in Shona were called (*dare)* (**K1, K2**) in Ndebele (*idhale)* storytelling in Shona is *(Ngano)* (**K1, K2**) while in Ndebele is *(ingalikwani).* Key informant also corroborated the findings from traditional leaders and elders. They indicated that children learn a lot from their elders as they perform many activities at home. Their participation in the labour process begins at an early stage. Almost

as soon as children can walk, they are expected to help adults in their daily tasks. When physical capacities allow, play turns into work. In the course of general socialisation, children of both sexes acquire the basic skills of cultivation, food processing and all essentially female tasks. After the age of 8-10, boys begin to lose interest in female tasks and girls continue to help their mothers and female relatives.

IK games as narrated by elders in Hwedza and Guruve, (*mahumbwe)* (**K1, K2**) are a way to transfer knowledge to children. The *mahumbwe* game is about roles in the family and involves both sexes. The game is participatory and children from as young as 4 years take part. Children camp near a homestead to play house and assign roles of mother, father, and children and so on. Extended family members cousins, uncles, aunts are also included. The mother play all roles performed at home such as: feeding baby, prepare food and so on, while the father fend for the family. An analysis of games shows that children cognitive skills develop at a young age and they grow up knowing what to do when they start their own families.

Observation in Hwedza and Mangwe the researcher noted that children are exposed to different information sharing channels as they grow. The channels of sharing information are those maintained within the household (**K1**), through the extended family and kinship ties (**K1**), work groups (**K2**) and local social organisation (**K2, K1-1**) and lastly associated with religious affiliations (**K2-ao**) and contacts with village elders (**K1**). However, IK is changing due to a number of reasons. The time spent in schooling among the children may result in vulnerability of the methods of transferring IK such as oral tradition, folklore and storytelling. Children no longer have much time to listen to stories from grandparents, playing traditional games or sitting by the fireplace for family meetings, as they have new tasks from school that should be completed. The changes that are currently used for communication like use of the electronic and print media do not talk about IK. The occurrence of disasters as identified by the participants in section 7.2.3 Table 7.2 may displace or kill, those that are repositories of such knowledge (traditional leaders, elders) before it is acquired from ancestors and hence children may not inherit IK. However, the degree to which various communities depend on IK varies, depending on affluence, interaction with external systems, household characteristics and environments setting. As observed in the study areas, IK is still entrenched in the studied communities due to people's

various family histories, taboos, symbols, legends, myths, rituals, dances, festivals, proverbs, poetry, music and folklore.

7.3.2 Religion and IK

Data on religious beliefs of research participants was important for there are fatalistic beliefs (**K2**) that can impede use of IK for DRR and some can even exacerbate disasters or heighten vulnerability. Among the participants in all the four districts, about eighty seven (87) were practicing both Christianity (**K3**) and traditional religion (**K1, K2**). Fifty six (56) other participants purely practiced traditional religion. Most residents of Mangwe, Hwedza and Lupane communal area are Christians. Guruve had the largest number who practices traditional religion only. The most common denominations are Pentecostal churches and apostolic faith (**K3, K3-1**), which are African Independent churches that were founded by Zimbabweans mostly and are spreading in the Southern Africa Development Community (SADC) region. The other denominations are Roman Catholic, Protestants like Anglican and Methodist, Seventh Day Adventist (SDA), and various emerging charismatic churches. An observation made was that many Christians practised religious syncretism. The participants, as it was noted, that although a substantial portion of them belongs to a Christian congregation or church, retained many of the traditional customs and beliefs in traditional religion. They prayed to God through ancestral spirit medium as opposed to Christianity who prayed through Jesus Christ.

Christian would not visit a traditional healer, but a prophet who also used the spirit to predict disaster risk of the future. The common practice among the Christians' religion and traditional religion was their belief in the power of the spirit to help them prepare for disasters. This was also a common finding among those from Matabeleland (Ndebele speaking) and Mashonaland (Shona speaking). Salient issue is that spiritual forces of the universe are considered disaster risk and they must be fought.

Dialogue with Focus Group Discussion (FGDs) participants revealed that religion has a great impact on the survival of IK in that some practices of IK are believed to clash with Christianity. Christianity according to elders has led communities to believe that traditional religion was based on paganism and brutality. Few issues related to IK were said to contradict

Christianity though such as those related to taboos, ceremonies for rainmaking and use of traditional herbs (**K1).** Other Christians did not value IK because some churches have regulations that forbid members from eating some insects although there appears to be no known explanations for the other occurrences. However, some elders reported that many Christians visit them at night for traditional medicine or cast off bad spirits. Some churches do not allow their members to use medicinal plants to cure human disease, but are not strict with medicinal herbs for curing livestock diseases.

The Pentecostal and apostolic faith groups discourage the use of human medicinal plants but acknowledge a spiritual world that is believed to be the supreme authority before God (*Mwari*). Gonese (1999) states that the Zimbabwean society believed in the existence of a tripartite relationship of the human, the natural and the spiritual world (**K3-p**). They respected and believed that mortal beings held towards the natural world as the habitat of the spiritual world and provider of foods, minerals and other resources, was itself a manifestation of conservation consciousness. Traditional leaders were able to reminisce about the days when they had been fewer people in the area, thick forests, animals to hunt for meat, and food and fruits from the forests, which are now occurring in few numbers due to demarcation of land into communal areas, protected land and national parks. Traditional leaders in all the districts according to traditional religion believe that after someone dies, spirits return and resides in their own descendants (**K1**). The spirits take the form of wild animals (*mhondoro),* which are the most powerful. The *mhondoro* provides welfare of its own kind hence maintain good relations among people, land and sacred places.

The mhondoro are the guardians' spirits of places and these make rural communities connected to a place. Dialogue with elders also revealed that sacred places (**K2**) (*nzvimbo inoera/indawo izilayo)* means they are life sustaining and provides food, water, shelter and wild fruits in times of disasters. Sacred places are mechanisms of DRR, thus they are closely linked with rain, and the fertility of the land for spirits are present and accessed through rules of access such as taboos. In Ndebele and Shona religion, a place is sacred if spirit medium or traditional leaders say so. Traditional leaders have knowledge of what is sacred and what is not. Traditional healers and traditional leaders told the researcher that all thickets and thick forests in parts of Guruve are sacred. The animals (*vakaranga)* are kept in thickets. Elders corroborated this in FDGs explaining the importance of conserving the forests of the area by

saying Lions (*mhondoro*) want shade. The participants were referring to (*mhondoro*), the powerful ancestor spirits that takes the form of lions. The participants and other traditional leaders in Guruve explained that forests are considered sacred and are protected mainly because they provide habitat for ancestral spirit that assist for disaster risk aversion or provides livelihood during disasters.

In the old days according to the one elder in Lupane, disrespect of the sacred places or use of vulgar language would result in a person disappearing. IK has now been substituted by Christian ones whereby rain would be asked for through prayers and water that had been prayed for and the laying on of hands is used to cure the sick by church leaders or prophets (**K3**). The majority of the participants are more comfortable with the Roman Catholic Church, since the church acknowledges the existence of ancestral spirits and allows its followers to consult their ancestral spirits sometimes. In all the four districts some churches held prayers for rain and congregates are not prevented from flocking to traditional shrines in times of calamities (**K1-sr**). The implication of the two-tier system may lead to confusions among people as some may totally disregard IK practices. Traditional leaders also reported that some churches are too hard on IK but some are conservative as they promote IK teaching even though with some modifications.

7.3.3 IK for Animal health

Within the domain of animal health, it was observed that there were traditional health experts for livestock who inherited the practice from their ancestors or grandparents **(K1)**. Several plants were used to treat livestock like cattle, goats and poultry when attacked by diseases (**K1, K1-1**). The most commonly used plant is the Aloe plant (*chikowa or gavakava*) (**K2**). The aloe plant according to participants is used to treat *coccidiosis* in chicken. The interesting thing was that this veterinary medicine (aloe plant) was known to all participants' men and women including young adults below 40 years old (**K2**).

There are, however, other plants that were privy to experts, like the (*batanai*) (Bulbophyllum), which one herbalist indicated is used to join broken bones of chicken (**K1-1**). Soot from the rural kitchen that forms and dangle on the roof (*chinyai*) (**K1**) is used as veterinary medicine for cattle and goats. However, detailed information was not forth coming

as key informants used their expertise as a livelihood. In Lupane and Mangwe soot forming of the kitchen roof (*chinyai*) is used mixed with washing powder as a dip tank residual to dip their livestock. This was some kind of innovation in these communities to deal with shortage of chemicals. There is a combination of IK (*chinyai*) and modern substances (washing powder) (**K1-m**).

Livestock medicine uses a wide array of plants, mineral-based ethno medicines. The medicines work as antiseptics. Sick chickens with a disease called coccidiosis can be cured by cutting infected parts and wounds in cattle can be smeared with ash or honey to cover the wounds (**K1**). The herbalists indicated that this was a very effective way and procedure to reduce vulnerability to infections. This made sense to the researcher for there was a barrier of bacteria reinterring the livestock (**K1-1**).

The discussions in focus groups revealed that the community had experts in areas of livestock breeding, IK fodder, forage species that would prevent diseases and animal production. Those that were good in medicinal species for livestock were also able to classify diseases of animals, depending on the season. This would help them to reduce vulnerability among their livestock to an identified disease that occurred during specific seasons (**K1-1**).

7.3.4 IK for Human health

IK was identified that it can be applied in cattle production (reproduction, calving, disease control and grazing of livestock). IK based on ethno biology is used to understand traditional medicines and methods of health care, family planning as explained by elderly women during interviews. In Mangwe, Lupane and Hwedza the wild custard apple tree (*muroro*), is given to expectant mothers as medicine. Diarrhoea, wounds, influenza ailments IK knowledge is known by men, women and young adults in all the districts (**K2**).

Children's diseases, according elderly women interviewed, were dealt with by women traditional healers. Snakebites, closing children's fontanel and child colic were treated by specialists, especially women elders. Many people had IK to treat diseases like influenza, stomach ache, wounds and diarrhoea (**K1, K2**). It was knowledge in the public domain in all the four districts. Honey is used for treatment of asthmatic conditions when mixed with

certain herbs, heart and chest pains, dehydration related weaknesses in children and controlling bed wetting in children (**K1, 1-wm**).

With the exception of Lupane, the other three districts traditional leaders had experts in their communities, well known for their prowess in IK nutrition, human ailments, herbal remedies for a variety of diseases, and areas were these could be obtained. Lupane and Mangwe have many experts in livestock diseases (**K1**) since these are livestock areas in Zimbabwe. Elders reported that there are also IK ways of harvesting medicines to preserve nature (**K1, K1-1wm**). For instance, medicinal leaves from plants would be harvested using the mouth. It is a taboo to use hands to harvest leaves for the belief is that medicine would not cure the ailment (**K1-wm**).

7.3.5 Natural resources

Cultural beliefs (**K1, K1-1wm, K2 & K3**) based on IK shaped the people's perceptions and knowledge about disasters, natural resources, agriculture activities and many other aspects of life. Communities especially in Mangwe, Lupane and Guruve they believed that big trees should be conserved because the cuckoo bird "*hwaya*" sings for rain. Ancestral spirits (*midzimu*) are also known to hibernate, take refuge or take rest in such trees. This was consistent with other rain making activities that are carried out under big trees that bear fruits like the *muchakata*. Rain making ceremonies are held under trees and thus the belief is a factor in reduced deforestation in these communities. The protection of forests from indiscriminate cutting of trees is induced by fear of retribution to some extent. The cultural belief instilled respect for all life forms and the land itself among the communities in all the districts under study. Indigenous trees used for water conservation, forecasting and soil fertility.

Gonese (1999) reported that some cultures in Zimbabwe, people protect wildlife for they believed that they bring rainfall by stopping clouds, as mountains do when causing rainfall. These empirical findings from the above sections show that most of the indicators are based on animal behaviour, plants, religious beliefs and weather patterns. The challenges that can be derived from an in-depth analysis are that such an analysis does not determine the extent of the severity of an impending disaster. There is, however, certainly possibilities that a

combination of two or three of these IK indicators can be used to give extra validation to signals of impending disaster risk that help communities to put in place measures to reduce disaster impact. There are also other IK technologies used for DRR as presented in section 7.3.6.

7.3.6 IK technologies for vulnerability reduction

The four districts studied have a considerable number of disaster risk as already identified in Table 7.3 sections 7.2.3. Traditional leaders, extension workers explained that rural communities use various structural and non-structural approaches for DRR. The IK strategies for DRR that are either structural or non-structural are used to reduce the impact of disaster risk. The table illustrate various knowledge types and IK technologies applied to address the disaster risk that would have affected rural communities. The technologies have been used in the past and still in use today in all the study areas. Most of the technologies are either inherited (**K1**), known to everyone in the community (**K2**) but are not being practiced, practised by individuals (**K1-l**), known through documentation (**K3**). Extension employees in all the areas stated knowledge acquired from training institutions while the elders acquired technologies through inheritance. Most knowledge was acquired during meeting at homestead, song, dance, games and so on. IK acquired during these methods of transmission is helping people to develop IK technologies that reduce disaster risk in rural communities as represented in Table 7.5 below.

Table 7.5 IK technologies for Vulnerability DRR

Typology of disaster	Type of knowledge used	Vulnerability and DRR technologies for identified disaster risk	Name of district			
			Mangwe	Hwedza	Guruve	Lupane
Floods/Increased moisture	K1,K1-m,K2	• Cereal crops stored in a granary (Hozi) build on a granite rock outcrop (Dwala/Ruware) or raised on rocks • Building temporary shelter in flood plain and permanent houses on higher ground • Use of indigenous repellents like Zumbani for mosquitoes, traditional medicines	A Non C	A Non C	A B C	A B C
Animal disease outbreaks	K2-n,K1-l, K2-na	• Raised goat pens built with poles and mud mixed with dung to keep the hooves dry • Three to four cattle kraals are built to rotate cattle and enhance natural disinfection process • Fodder mixed with traditional medicine to cure known cattle diseases	Non E E	D E E	D E E	Non E E
Crop diseases and pests	K3,K3-l K1-l	• Use chickens to control pests like locust, army worm, weeding, plant species that act as repellents • Early planting to help fight some species of migratory birds. By the time birds become active, they find the crop already matured hence they fail to eat since it will be hard. • Intercropping to avoid concentration of certain pests and fungus	G H I	G H H	G H H	H H I
Poultry diseases	K3, K1-l K1-dr,K1-m	• Use of traditional herbs with anti-biotic properties to immunise and control disease	J	J	J	J
House fires	K,K1,K3, K2	• The granary (*Hozi/Isiphala*) is completely plastered with mud on the floor, walls and roof to avoid impact in case of fire • Hut doors face west to protect them from strong winds that usually blow from the East, South East, North and North East	K Non	K L	K L	K L

In event of an ongoing disaster, if elders tell communities to move to designated places in case of floods, wild animals, drought or fires, they would obey without questioning. The results in the table also reveal that technologies for preservation of food crops are practised in all the four districts including the use of IK repellents (**K1, K2**). There is absence of building of temporary shelter in Mangwe and Hwedza since these communities do not experience flooding. In Lupane and Mangwe construction of raised livestock, enclosures are absent and this could be because there are many experts who can treat animal diseases (**K1**) and absence of excessive moisture compared to Guruve and Hwedza. IK technologies for crop and poultry diseases (**K1, K2**) are practised in all the four districts, as agriculture (crop and Livestock) is

the main livelihood in rural Zimbabwe. These results show that IK emanating from rural communities suggests that although many old values have intermingled with modern western values, there is still a communal memory of IK (**K1**) that understand and respect the inter-dependency relationship between humans and nature. In the table given above there are some clues as to how we can open ourselves to deep change and alter people's mindsets to address disaster risks.

7.3.7 Survival and subsistence through sustainable livelihoods

Prevalent livelihoods in the communities studied are presented using Sustainable Livelihoods Framework (SLF) discussed in chapter 4 section 4.3. Livelihoods were identified using the five capitals of the model. Rural livelihoods are the outcome of the combined employment of natural, physical, financial, human and social capital (Carney, 1988; Twigg, 2001). The rural livelihoods approach specifically focuses on options for sustainable livelihoods of disadvantaged groups in society such as small farmers and landless rural people and on the alleviation of their vulnerability. The five assets, as outlined in the model and related to IK are given below in narrative form.

The human capital livelihoods included inherited construction skills (**K1**), medicinal knowledge (**K1)**, and livestock knowledge including agriculture (**K1, K2**). IK in agriculture for instance assisted communities to select small grains that do well in their environment (**K1**). The small grains observed in Lupane and Guruve were millet and sorghum varieties such as the Mupositori sorghum variety (**K2**).

In addition, some notable agriculture knowledge includes subsistence farming of maize and vegetables especially in flood prone areas. Flood prone areas are small in few wards found in all the four districts but more prominent in Guruve and Lupane Districts. The communities in flood prone areas have acquired IK (**K1-1, K1-wm**) of using residual moisture from floods in the plains. These practices enable them to produce crops well after others have harvested. This give them some advantage for they the sell fresh crop in the dry season. This also ensures availability of food throughout the year. Flood plain and riverbank farming is still practised as a source of livelihood (**K3**). These livelihoods are important as expressed by the

participants for they have the ability to carry on with life in pursuing various livelihoods strategies.

The district of Mangwe and Lupane traditional leaders and elders are experts in livestock farming and have acquired knowledge from their ancestors (**K1**). The livestock breeds are also traditional but some have crossbreeds with foreign breeds (**K3**). Observed breeds of cattle are the Nguni and Tuli that are well adapted to the sweet grass and dry conditions as explained by one traditional chief. Foot and Mouth disease is the main challenge with regard to livestock keeping in Mangwe while Lupane it is Black water disease. Traditional animal health experts use their expertise (traditional medicine) (**K1, K1-wm**) as a livelihood for they offer their services to those that do not know the medicines for livestock.

There are many physical structures observed being used for DRR. The structures are used for storing food crops, raised housed in flood prone areas, and livestock enclosures. To reduce disaster risk (diseases) in livestock, communities have constructed raised goat enclosures as shown in figure 7.1 below.

Figure 7.1 Raised goat enclosures
(**Source**: Researcher's personal photo library)

An elder eloquently explained that the raised goat enclosure (**K2-n**) is used to prevent diseases during rainy season, the animal waste when mixes with mud, and goats can become affected especially on hooves. The raised enclose prevent diseases that come from the wet

conditions in the enclosure. One structure for DRR are the raised platforms for storing food to dry and later used when disasters strikes.

Figure 7.2 Raised platforms for food crop
(**Source**: Researcher's personal photo library)

Depending on the size of the platforms, (**K1, K2**, **K2-ao**) they can be used to store fodder, ploughs, grains and any other properties. Fodder production also involves a variety of landscape niches. In Lupane and Mangwe fodder production is through collection from cultivated fields or wild vegetation and free-range use of the communal lands covered by native vegetation. The collected fodder from fields is stored in the platforms for use in times of shortage such as winter or droughts (**K1, K3-1**). This is consistent with findings by (Scoones, 1993) who indicated that emergency grazing areas may be wetlands, grazing reserves some distance from the village and crop residues in fields. The raised platform is used to preserve crops that need cool temperatures, which is provided by the shade. Techniques to save property also varied between households of the four districts communities. In all the district communities ninety two (92) of the participants said they preferred to build platforms to protect their assets. Other key participants explained the use of soot (figures 7.3 and 7.4) as seed preservative, compared to use of chemicals sold on the market. Figure 7.3 shows a kitchen with an upper section used to preserve selected seed for future use in the next farming season.

Figure 7.3 Double storeys Kitchen with upper part for seed preservation
(**Source**: Researcher's personal photo library)

Women have acquired the skill passed on to them over time to identify good seed varieties (**K1, K3-1**). Women collect grain and maize cobs that they would tie and hang inside the granary above the kitchen. The smoke that wafts from the hearth would coat the grains. This is another risk reduction measure from grain borers and rats due to the bitter taste resulting from the soot. These DRR practices ensured use of the seed for longer periods from one agriculture season to another.

Figure 7.4 Seed preservation technology using soot (K1, K3-1)
(**Source**: Researcher's personal photo library)

Traditional leaders indicated that when comparing this method of seed preservation with soot to the current ones that are used by seed houses, an observation that can be made is that it is very difficult to keep today's seed for more than one season. One elderly woman interviewed indicated:

> *"The modern way does not always benefit communities who desire long term planning. Western science methods of treating seeds have small life span, hence they disturb long term planning".*

On social capital, most notable were kinship relationships (**K1**). Most villages would be comprised of people from the same family. However, there are also traditional women groups who would engage in some traditional activity like beekeeping, vegetable growing group and religious groups. There are elderly women who comprised a group as midwives in Guruve. These had inherited their skills from the past and assisted expecting mothers who could not afford the high fees charged in modern clinics or hospitals. In the other three areas this practice was not recorded. Extension workers from government also shared knowledge with locals and head quite some influence in pushing new technologies among rural communities. Kinship relations have seen those in Mangwe and Lupane receiving remittances from their relatives in neighbouring countries.

Observations did show that these communities also work with advice from extension workers from government and district administration at local level. However, the extension workers from veterinary service and agriculture departments promoted government and NGO projects in all the districts.

The financial capital available to people as their livelihood options are mainly income from women brewing and selling sweet beer and harvesting Mopane worms (*Mahlonza/Amancimbi* and *Ishwa/Izinhlwa* and *Mandere*). Some sell thatching grass to supplement family income. In Lupane and Hwedza IK beekeeping was doing well. Traditional beehives as shown on figure 7.5 below were prevalent.

Figure 7.5 Traditional beehives on homestead in Lupane district
(**Source**: Researcher's personal photo library)

Beekeepers in Lupane explained that the bees do not present any risk as they get used to the people and livestock within a homestead, and act as deterrent to intruders. Some women were learning traditional beekeeping (**K1-m, K2, &K2-ao**), which used to be the preserve of man. The research study also observed that beekeeping has been a major livelihood activity practised by many people of Hwedza and Lupane Districts. IK is used in most wards of the two districts. Apiaries are sited in forested areas and along the rivers in Hwedza (**K1**, **K2**) while in Lupane they are near homesteads and some in the gardens (**K1-m, K2, &K2-ao**) as shown in figure 7.5.

Figure 7.6 Traditional Top bar beehives in Lupane and Hwedza districts (K1-m, K2, K3 &K2-ao)

(**Source**: Researcher's personal photo library)

The use of IK top bar technology (**K2-ao**) in figure 7.6 is to protect hives from ants. Modern hives are not a common sight while traditional hives dominate. This is a technique for risk reduction for food security and forest conservation. Areas with many traditional beehives have witnessed a huge decrease in human induced forest fires and deforestation activities according to police records oral evidence from traditional leaders.

Figure 7.7 Supplementary bees feeding in dry season in Lupane district

(**Source**: Researcher's personal photo library)

Traditional leaders and experts in beekeeping use IK supplementary feeding of bees (mixture of water and sugar) (**K1-m, K3-1 &K2-ao**) in dry season when water sources and flowering plants are scarce. Honey according to traditional leaders and local villagers have many uses. In times of food shortages, honey is harvested for food. It is used for medicinal purposes and in traditional ceremonies. Honey, it is believed, can also be used to make charms for good luck (**K1, K2)** and finding good partners to marry, also after mixing it with sheep tail fat. The IK abound in the study area has resulted in more sustainable beekeeping in the area.

Observations made during the fieldwork in Hwedza and Lupane showed that beekeeping practice have contributed to forests conservation and indigenous tree planting for supply of bee forage. The practice is done by both men and women. The beekeeping activities in Lupane and Hwedza have resulted in reduction of veldt fires and this observation was triangulated with police reports that also indicated indeed, there was a huge reduction in fire outbreak reports compared to five years ago. Harvested honey is sold to retail shops and supermarket in Harare and Bulawayo. In Lupane women are also involved in souvenir crafts making and weaving using reeds and tree bark. Theses livelihoods activities brought income to most families. Hunting also took place in Lupane and Guruve, where hunting and game meat is sold.

Natural capital encompasses natural resources from which useful livelihoods can be generated, such as hunting and beekeeping. In fact, IK hunting practices are used in poaching, *per se*, as the communities do not have licences to hunt. Nature itself provides resources to communities. Examples include timber, water sources, animals and many more resources. Timber used to build the structures shown in the figures above came from natural resources in the communities.

Twigg (2001) posited that SLF model focusing at a community reveals the strengths and weaknesses of different types of assets, their relative importance in reducing disaster risks and the linkages between them. The participants indicated that most livelihoods are considered sustainable for they are resilient to external shocks and stresses. They do not depend on external support but maintain long-term productivity. Communities in the four districts are able to capitalise on their skills, knowledge for innovations to buffer against the forces, which threaten livelihoods and help in disaster aversion.

These empirical findings were consistent with Chambers and Conway (1992) who posited that capabilities, assets like stores, access, claims and many other activities that people use to make a living are livelihoods. They also explain that livelihoods that are sustainable are able to cope, recover from stress or may be able to maintain capabilities of assets. The research findings revealed that livelihoods varied among the four districts and emerged as the single most important issue for the participants. However, a critical analysis of the claims by participants makes one fail to draw a line between IK and skills imparted through the well-developed extension services provided by the Agricultural and Rural Extension Services (AGRITEX). The small grain crops do well in these dry prone areas with Kalahari sands. The growing of small grain also demonstrated understanding of context on part of the community. This has been the practice since time immemorial a knowledge that has been inherited from ancestors.

Other observations in Mangwe and Lupane were the larger population of old women and men including children of school going age. Many young people have migrated to urban areas and neighbouring countries (South Africa and Botswana). The prevalence of old people could be an explanation to continued use of IK in the area for these proved they have the knowledge and the young were learning from their grandparents. This can also mean that sustainability of IK is assured but may have modifications. Modification may results from new knowledge the young are acquiring from formal education. Guruve and Hwedza, the most domination livelihood is subsistence farming of maize, groundnuts, cotton and small grain. Conservation farming was well established compared to Lupane and Mangwe. Livestock farming is also a livelihood but not to levels in Mangwe and Lupane. The latter are known as cattle areas. Communities increase food security for the whole year by preparing deep holes filled with manure to help harvest water that will last and then plant seeds. These IK practices are worked to suit the specific environments. Observation made is that in areas were deforestation was high; crop waste is used to make manure (**K1, K3, and K3-1**) and in areas with forest, leak litter is used for manure as shown in figure 7.8 below.

Figure 7.8 Organic manure compost

(**Source**: Researcher's personal photo library)

The natural environment provides resources that the communities need. Communities would come up with a solution for a challenge identified within their environment. One elder made a comment in a focus group discussion that innovations in one community can be widely applied across the various environments in Zimbabwe for people are always mixing in many platforms and exchange information. Intermarriages are also contributing to diffusion of IK among rural communities.

These empirical findings on livelihoods shows that the characterisation of rural areas as being dominated by farming practices in the form of crop production and animal husbandry is changing (Shackleton *et al*., 2001). The livelihoods of rural people in the four districts studied not only include agricultural activities; they use IK of natural resource, animal and human diseases. Observations show that there is lot of attention focused on fauna and flora resources that have a high commercial value. Rural vulnerable communities collect wild plant material for various uses that includes vegetables, fruits, medicines, fuel wood, wooden utensils, and grass and twig hand brooms. In Lupane for instance many people makes use of wood for live fences or kraals and homesteads (**K2, K2-ao, K3**) as shown on figure 7.9 below. Some wild edible plants may be extensively inter-cropped in the crop fields or maintained within the home space, such as the most favoured edible fruit. Certain medicinal plants, weaving fibre, durable housing poles and the like, will only be found in certain parts of the broader landscape around the village or further afield.

Figure 7.9 Live fences/ bio fencing and agro forestry on homestead garden
(**Source**: Researcher's personal photo library)

In Lupane it is common to find wild plants used for agricultural production to address issues of food security and protection of homestead including fields (**K1, K3 and K3-1**). Individual traditional healers use hundreds of plant species while ordinary rural households are also knowledgeable of many plant species for self-medication of minor ailments or charms. Wild species are sometimes used on a regular basis, especially when disaster risk presents itself. The wild plants as also discussed in section above can be used for live fences/ bio fencing as shown in figure above to protect crops grows well without interruption from domestics and wild animals. Wild plant resources use range from being a natural or financial asset, to a socio cultural asset and expression of people's identity. Traditional leaders and other elders expressed that the natural vegetation contributes towards the identity of the landscape and gives a sense of place.

7.3.8 IK food security

The *ZunderaMambo/IsiphalaseNkosi* practice a social welfare practice (**K1, K2**) that was on the verge of dying, is a survival strategy in rural Zimbabwe and high expectations have been raised by its revival in Lupane, Mangwe, Guruve and Hwedza districts. The traditional leaders explained that it is a strategy they think will go a long way to reduce food insecurity in rural vulnerable communities. Although the concept maybe as old as the Shona and

Ndebele cultures, it had been abandoned as communities became urbanised, only to be rekindled by members of the Chief's Council of Zimbabwe, in collaboration with the Nutrition Unit of the Ministry of Health and Child Welfare. Traditional leaders in all the four districts highlighted that the *ZunderaMambo/IsiphalaseNkosi* concept (K1 &K2) a social welfare system is a sustainable DRR community project, in line with its original Shona traditional practice.

One traditional leader explained that the (*ZunderaMambo/IsiphalaseNkosi)* draws parallels with European feudal systems where a similar arrangement was used not for food security purposes but for farmers to pay feudal rent to knights or barons who were the land owners. From a Zimbabwean perspective, chieftainships (*huMambo/ubuKhosi*) have their roots in feudalism, although in Zimbabwe unlike in England feudal traditions and institutions have not been well blended to co-exist with capitalists institutions. However, in Zimbabwe, chiefs have managed to retain their traditional power and hence managed to convince their communities that feudal traditions are a part of culture, which defines who we are. This has led to the survival of the (*ZunderaMambo/IsiphalaseNkosi)* concept from one generation to another. The elders also added that to revive this (*Zunde/Isipkala)* IK practice, many factors should be assessed, including the nature of existing social and economic structures, leadership, gender roles and the availability of resources like land, inputs and IK implements.

It was established that *(Zunde)* agricultural practice makes households food secure in all the four districts. The research finding indicates that the practice has led to an increase in food production ranging from 0.4 to 4.2 tonnes per hectare across all the districts. The crop production was on 1.5 to 3 hectare plots. The relevance of the (*Zunde*) as food security IK practice is in that it provides pooled tillage assets, use of local resources, pooled labour and use of appropriate technology that is more affordable to vulnerable communities. Food security is regarded as a subset of livelihood security (Ziervogel *et al.*, 2006). The value and potential contribution of IK in food security is about revival of old IK practices. In the study locality with little external influence, IK is a key element in assuring food security to the local people. Traditional practices based on the local knowledge, have great value and are applied in crop production, pest management and grain storage.

The findings from FDGs and in-depth interviews also revealed other IK technologies used to preserve harvest from farming practices. It was observed and described through interviews and focus group discussions that rural communities have mechanisms for storage and maintenance of strategic grain reserve. This was done for household food security and nutrition security. The participants' practices in all the four districts reflect their ingenuity relating to food processing and preservation. The people preserved grain, in granaries. Observations made show that these granaries are erected in places free of moisture. In the communities of Guruve, Hwedza and Mangwe, granaries called *dura/tsapi* (**K1, K2**) in Shona, or *izipala* in Ndebele, are erected on rock outcrops called dwala *ruware/idwala*, an expanse of rock that provides a suitable site.

This is DRR measure from termites and moisture that may affect food security. The inside of the granaries is smeared with cow dung, another risk reduction measure for grain borers. The roof of the granary is plastered with mud to protect grain from fire and moisture as well from the surrounding air. These have various designs depending on the resources available in the community. They are cleaned, smeared with cow-dung before being filled with grain and then later completely sealed. The sealing itself is very critical for it is informed by a lot of IK on the life cycles of pests and pest management systems. Pests are not given any opportunity of entering the granary with crop due to it being completely sealed. The stored food would be used for any disaster event. The granary was not only meant to prevent loss of food from pests but also from hydro metrological hazards like fires and floods.

The granary position ensured that the grain inside is kept free from atmospheric moisture. Observations in the field showed that most granary structures are built on top of four large rocks that are above and further away from the moisture on the ground (**K1, K2-ao**). The rocks formed the four pillars on which the granary stood, allowing space underneath. The underneath space ensured the extending shelf life of water melons, cucumbers and pumpkins among other crops due to the cool temperatures provided by the shed. The section underneath is cool hence it is also a cold room that is user friendly as shown in figure 7.10 below.

Figure 7.10 Granary hoisted on pillars of logs sprinkled with ash
(**Source**: Researcher's personal photo library)

It can keep many crops for months intact well after their expected life duration. Some crop like tubers and round nuts would be available offseason because of this technique. Granary hoisted on pillars of logs is sprinkled (**K1, K3, K3-1**) with ash to prevent pests or termites attack the logs so that the granary to last for a number of years. Dug out pits are used to preserve sweet potatoes. Disasters are prevented when communities apply these technologies as they ensure food availability throughout the year.

Drying is another IK DRR technique for preservation of food as well. It is being used in all the four districts and is proving very reliable. Almost every food products is dried. The researcher dried watermelons in Mangwe and Lupane and this practise has been introduced in Shona speaking regions as was observed in Hwedza. Both Shona and Ndebele communities dry boiled maize, vegetables (*mufushwa*), and sweet reeds. Vegetables are dried to be consumed when water runs dry in river valleys or wells. An observation made during the data collection, rural communities in all the four districts have organised themselves in identifiable institutions as an attempt to combat disaster risk prevalent in their localities. IK of (*Nhimbe, Mukwerera, Bira and Zunde)* (**K1, K2**) already discussed in sections above has actively encouraged collective action of the community members in Mangwe, Lupane, Hwedza and Guruve as presented in section 7.3.8.

7.3.9 IK Institutions

Empirical findings revealed many institutions are operative in the study areas and some that emerged are presented in this section.

7.3.9.1 Kinships and social ties

Kinships and social ties (**K1, K2**, **K3**) are formed either by people who were in one village of depending on the distance between homestead. Participants explained that when one of their community members is faced with disaster risk like a house destroyed by fire, the family members or close associates would assist with whatever resources available in that particular community. Social ties and kinships were also formed through marriage institutions were in-laws would be united through act of marriage. One elder said that social ties were a result of specialisations and resources that one would possess like cattle, produce from the field or they practice the same trade (herbalist, insects' gatherer). Those with more resources formed their own social ties and so do those with few resources. Participants did put more emphasis on social ties formed through blood related were stronger than fictive kinship formed due to common ground, religion, gender and traditional practice. The kinship through blood related is said to be binding and they assist each other in events of hardship.

7.3.9.2 Marriage

Traditional leaders eloquently expressed concerns about marriage institutions (K1, K2, K3) in their communities especially in Lupane, Mangwe and Guruve. They indicated that marriages are no longer stable as they used to be and many children are left to grow with either one parent or stay with grandparents. The youth have left the rural communities leaving children to be looked after by relatives. Marriage is an institution that traditional leaders felt needed help to be restored to its former importance where the bride's price was a hoe. The most important livelihood in all the four studied districts is agriculture. The hoe is also an important tool in marriage. When a woman is married, she is expected to produce food using the hoe and also to foster unity in the family. This underscores why traditional leaders lament the marriage institution collapse. Polygamy (**K1**) is a result of paying lobola with a hoe, for more women in the home meant more food. The family is considered the nucleus of a

prosperous community, for it is the centre of production, the place where people live and make a livelihood. Viability, self-reliance and sustainability are elements that help maintain the family unit. Agriculture was successful for families would work together and produce enough food, thus assuring food security.

7.3.9.3 Mutual support and socialising

FDGs revealed the existence of quite a number of ways in which rural communities provide support and social interaction among themselves. The researcher noted there is a high component of reciprocity among the community members in Mangwe, Guruve and Hwedza but little in Lupane. Traditional rituals (*Bira, Mukwerera*) (**K1, K2**) ceremony for disaster risk are carried from time to time in the dry season to pray for rains. The kraal head (*Sabhuku*) assisted by elderly people who no longer mate are tasked to organise villages under the chief jurisdiction and to start preparations for the ritual. In Lupane rainmaking ceremonies are no longer practised as one elderly woman commented:

"Our chief a very young below thirty years and live a modern type of life, spending most of his time young friends and he does not believe in the practice in my village. We hear in Mashonaland they still practice biras and they prepare for such ceremonies every year. I think that is why they have plenty food, I do not know."

However, they know about rain making ceremonies and sacred sites still exist. Few elders did point out their awareness of sacred sites. Sacred sites are designated for rainmaking, beer brewing, song and dance to appease spirits. They believe that when the ancestors are satisfied, the rains are provided. The ceremonies have taboos to be observed. Some of the taboos are prohibiting communities to work on a designated resting day called *chisi*, incest, washing in pools near sacred forest and killing of sacred animals.

The rain making ceremonies (*Biras)* assist old people including other disadvantaged community members through food provision, drought power and agriculture inputs as they are in the forefront of preparations. They would receive more resources and keep remainder for themselves. The *Nhimbe* (**K1**) a collective activity also assisted vulnerable groups with land preparation, planting, weeding and harvesting periods. These IK activities the rain

making ceremonies (*Nhimbe)* and increase interactions of IK, kinship relationships and social ties among others. This *(Zunde)* (**K1, K2**) practice also acted as farmer field school where people interacted and gained IK. Social network is still maintained by village meetings called by the traditional leaders (Chiefs, Kraal heads), politicians and government administrators. The community cooperates in other activities, be they for joy like wedding parties or for sorrow, like funerals.

7.3.9.4 Taboos

The research established that taboos (**K1 &K2**) play a major role in IK DRR. It is one of the tools very prominent in all rural communities for they follow them religiously. Disasters were also averted using taboos within both the Shona and Ndebele societies. Taboos (*Ziyeriswa/Ukuzila*) are prohibitions to, or of, an action or behaviour that is believed to be either too sacred or cursed for community members to undertake. In most cases, for whatever reason, those who engage in such practices aim to preserve the status quo, a situation or the environment. One of the taboos common in the Mashonaland areas in particular was that weddings, parties, social gatherings, traditional religious ceremonies cannot be held in November. November is a sacred month and breeding time for goats. This taboo originated a long ago since the goat was used for multiple offerings in different traditional ceremonies (**K1**). The elders interviewed pointed out that the aim was to protect goats as any social function held in November would be disastrous to the survival of goats. Interestingly, this month was even named after the goat (*Mbudz*i).

Other taboos for DRR include that of not destroying fruits trees, as the punishments for the perpetrator would cause anger to ancestors. The results are that fruit trees fail to have fruits in other seasons (**K1**). The taboos on forbidding children (**K2**) to excrete in wells are meant to protect sources of water from contamination. Those that did not take heed of the taboo and went on to contaminate water sources, they suffered from Bilharzias.

Taboos have survived even today and they can be observed in all the four districts studied. In Mangwe and Lupane there are taboo used to protect medicinal herbs in communal forests. People have been made to believe that some herbs work only when you consume them at their site of location and you do not carry them home. The idea was to preserve the medicine

from commercialisation and to ensure that it is available at all times to the rest of the community members otherwise losing such herbs completely would be disastrous to the communities. Other common taboos include cutting down wild fruit trees and trading in wild fruit. Wild fruits act as a reserve granary for the community during times of distress particularly droughts, famines and flooding. Thus, taboos are in part of a preservation mechanism meant to either prevent or manage a disaster risk.

There are also taboos that are meant to protect water sources like wells and springs. One hundred and nineteen (119) participants in the four districts stated that a black container should not be used to fetch water, as the source would dry up hence community members are supposed to use IK clay pots or calabash (**K1, K2**). Other practices that were reported to cause the drying up of the source were washing clothes or dishes close to the water source. Drinking water directly from the source by mouth is believed to cause a snake to come out of the water. One elderly woman aged 45 stated that springs should not be tampered with, they could dry up. An example of a prototype well built by government using brick to cover it up dried within months since no rituals were practised to appease the spirits of the land. Communities thus believe that such modern infrastructure is not desirable in their communities.

Thefts are not common, as people believe in protecting their hives with traditional charms (*muti*) (**K1, K1-l**). Forests are also protected from deforestation and fire hazards by use of beekeeping taboos. The taboos include non-beehive owners who harvest a hive that does not belong to him/her. It is believed that the bees would be violent and would sting someone to death. The use of open fires during harvesting is not encouraged, as wild animals would attack one. Open fires were a threat to the bees and poses a risk of forest fires. In Hwedza hives are not supposed to be mounted close to homes as people are made to believe that chickens die after eating bees, yet this is done to protect the people from being stung by bees in case the bee colony is disturbed. However, in Mangwe and Lupane, beehives are near homesteads, as the people believe that bees are able to identify them when they get used to people.

Taboos importance for DRR is that they strengthen and maintains relationships among people. Food taboos were put in place long ago to reduce the chances of over exploitation of

the environment through over consumption. Beside taboos being used for DRR in Mangwe, Lupane, Guruve and Hwedza, there are also other IK technologies used in agriculture.

7.3.10 Agriculture IK

Traditional leaders know which IK indicators determine favourable times to prepare, plant, and harvest gardens; land-preparation practices (**K1, K3-1 &K2**). They also know the means to propagate plants, seed storage and processing (drying, threshing, cleaning, and grading) and seed practices. Through conservation farming, they can preserve moisture using crop waste as shown on figure 7.11 below.

Figure 7.11 Use of crop waster for water conservation in dry areas

(**Source**: Researcher's personal photo library)

The crop waste besides being a water conservation IK technology, it is also a waste management technique (**K1, K3**) for too much of it near the homestead resulted in many mice and rats that would eat harvested crops in the raised platform, and poses a fire risk. The mice however also provided protein and that is the reason it is then put in the fields away from homestead for young boys to learn hunting for mice in the field.

Through conservation farming they use IK methods of farming, sowing, seed spacing

and intercropping, seedling preparation, crop care and cropping systems. Lupane and Hwedza had similarities on complementary groupings and crop harvesting and storage methods. Women possess IK on food processing, pest management systems and plant protection methods. In pest management they shared information with the researcher that they use ashes or a mix of a small smelly plant ground together with onions and paraffin or used oil to repel termites and ants (**K1-wm, K2-ao**). This technique is common among women in Mangwe, Guruve and Lupane. Some of these IK technologies are sustainable and remain in use in the current era as presented in the next section.

7.3.11 Sustainability of IK

Some of the IK technologies that have been in practise in the past are still used today in Mangwe, Guruve, Lupane and Hwedza as evidenced by the photographs presented in precedent sections. This is due to the methods of IK transfer and resilience of IK including rural communities. Dialogue with participants in all the four districts revealed that storytelling is an important aspect of IK as it embodies life's lessons and shows how knowledge is transmitted to all. Stories (**K1**) are the cornerstone of vulnerable communities' culture and an essential part of learning to ensure survival into the future. Stories are told to convey several different lessons, depending when and where they are told and by whom (**K1**).

Storytellers are no longer old people but middle-aged elders who are now the living repositories for all current challenges. The stories provide lessons that apply in the present; but they also connect the past to a way of life. Stories have many layers of meaning, giving the listener the responsibility to listen, reflect and then interpret the message. Stories incorporate several possible explanations for phenomena, allowing listeners to creatively expand their thinking processes so that each problem they encounter in life can be viewed from a variety of angles before a solution is reached. All people, young and old, love stories. Community gatherings open with a prayer, song, or ceremony to symbolise cleansing the mind/body/spirit to get ready to listen in the manner described above. The (*Zunde, Nhimbe)* are IK concepts where communities work as partners with joint ownership. The concepts are also used as farmer field school for acquiring skills, sharing IK information and knowledge for DRR.

Traditional chiefs and village elders observed that the concept *Zunde* in Shona or *Isiphala* in Ndebele constitute an informal, in-built social, economic and political rallying mechanism. It allows the traditional chief to have control over people under his jurisdiction and share his views among the community. The *Zunde* is used by the chief as rallying mechanism over his area of jurisdiction thus securing their safety. It s revival in the four districts also guarantee sustainability of its practice in the country. The *Zunde* practice is consistent with many communities in Zimbabwe. *Zunde* agricultural practice has withstood the test of time and is not outdated regardless of the socio economic and cultural changes that Zimbabweans have gone through. The practice instils hard work among all members of society that include children and women. The *Zunde* practice does not hold that women and children should not work but take into consideration their knowledge during implementation phase. These IK practices are in a way ensuring the sustainability of IK for it is still being cascaded to wider community groups both men women and the young. As was observed rural communities had more old and young populations.

Indigenous communities have their own tools for DRR practices including transmission of information for prevention, preparedness and recovery. The participants identified the tools as religious ceremonies (*Bira, Mukwerera*), livelihoods practices (see sections on beekeeping, *Zunde* concept), oral storytelling and experiential instruction (**K1, K2, K3**). These forms for DRR are among some of the means that inform and guide DRR in the vulnerable communities in the study areas and still in use. Traditional leaders and participants drawn from all the study sites concurred that IK can only be understood through the traditional teaching methods like ceremonies, apprenticeship including experimental practice of the particular community where the knowledge comes from or originates. The threat to sustainability of some of the IKs is due to mixture of many tribes with different belief systems especially in many parts of the new adopted resettlement villages due to land invasion in most parts of the four districts. The most affected districts being Lupane and Hwedza. The people in these new areas do not get support from traditional leaders, government and NGOs. IK technology for making manure in the resettlement areas has found few takers as some have not accepted it due to their beliefs in use of modern fertiliser. IK skills for technologies that are abundant in all communities are not practised all for some participants felt they are no longer compatible with modern ways of crop farming. Organic

farming while other preferred it, some shunned it for they consider it labour intensive regardless that people are guaranteed of a decent harvest. Other participants indicated the distance where resources are obtained was far unlike in the past when it was abundant all over the community. People now travel long distance from the source for deforestation is high in some districts

They lamented that many young people who are now experts for DRR have not gone through traditional couching (**K2**). The challenge has been that these traditional methods of transmitting IK are not available to the young as a result of modern ways of upbringing children. Fluency in local languages is lacking hence the young are not connected to elders who possess IK. Socialisation of the young is now in educational institutions that depend on the written word. The participants in all the four districts concurred that IK was indeed not included in any model or policies hence also compromised its sustainability.

The review of policy documents in chapter 5 also supported the views of the participants for nowhere in the policy documents are IK recorded. The Zimbabwe DRR policies, the environmental policy, the drought policy among others are silent on IK practices regardless that they talk about it when workshops are held. All the chiefs in the districts agreed that there are many benefits if IK was well pronounced in DRR policies and other policies that affect rural life especially natural resources. Chiefs explained that they have a responsibility in DRR practices in their communities including the protection of their environment. The worldview of the participants is that the land, plants and animals have their place within the sanctity of nature. This was evident in observations and during transects walks that in every district visited there are special places with spiritual significance used for food provision. Such places were identified as shrines, rivers (*Lupane river Amanzi Amunyama*) and mountains.

These locations are quite often patches of high biodiversity which are well conserved and protected by the community. It is worth recognising that the indigenous livelihoods styles, embedded in the broader IK systems, appear evidently linked to the communal local beliefs and to some extent guarantees IK sustainability. The results also reveal that there is the perceived salient relationship between the communities and the land. The research noted the importance and significance of respecting nature was through activities that involve

beekeeping, slaughtering of beasts or goats, harvesting of water, fruits, mopane worms, and so forth. It is amazing how much wealth of scientific information is locked up in indigenous societies, with the main impediment against its dissemination being that it is not documented. A common feature across all the findings in all the four districts of the country, is that community members were able to explain what to do to avoid something specific, but could not only give the scientific explanation as to why this tradition is followed. IK solutions work is of a scientific nature though community members lack the knowledge to explain in scientific language. As already presented in sections above, the findings reflect that IK are in use when it comes to DRR related to agriculture and food security, climate change, environmental management and development. This is particularly visible should one look at it using the systems approach that is inputs, processes and outputs.

The researcher, just like the participants found questioning themselves: if the traditional society had all this vast knowledge of preserving food for use during periods of scarcity, if they could cater for all the dietary needs of their population, why has the present Zimbabwean society failed to tap from the wisdom that is displayed in the traditional food security policies and other many policies in the country? IK has passed through from one generation to the next through story-telling, experience, games, songs, tacit and direct teaching by community elders. In some of the communities, failure to do things the way the ancestors of those particular communities would have done them, including failure to follow the ancestral rituals to the letter, is perceived to be sources of misfortunes that bring about adverse events such as drought, floods, disease outbreaks, civil commotion and so on. For that reason, at least, it is essential that the DRR strategies employed in the communities recognise and show sensitivity to such local beliefs. The sustainability of IK is due to people that repository it hence the next section looks at IK repository.

7.3.12 IK repository

IK for DRR is everywhere in the rural communities, there is no place where one can say I am going to get it. Repository of IK is in abundance among people namely traditional leaders, elders and young adults (**K2).** However certain specific knowledge among adults is not present for they have to reach certain age to receive specialised IK. Repository of IK is not documented but embedded in people memories gained through practice and experience. The most applied IK is the inherited (**K1**) acquired from elders as this make people proud of their

origin. IK knowledge is gender specific and also occupations such as traditional healers, gatherers, infrastructure architectures (those that design granaries, animal enclosures) and prophets. Some local concepts are not easy to access as these are passed from one generation to another through symbols (**K1**), myths (**K1**) and also unfamiliar means that elders failed to divulge. This is because much of IK transfers are through practice and with little use of words. IK offers more than a set of social structures, the healing chemistry of plants and technologies. There are many who know IK who simply get on with the job for DRR, as is observed from the field. The Table 7.6 below shows IK main actors, IK type, IK domains and IK use in the districts studied.

Table 7.6 IK main actors, IK type, IK domains and IK use in Districts studied

Main actor	IK type	IK Domain	IK use	Mangwe		Guruve		Hwedza		Lupane	
				YES	NO	YES	NO	YES	NO	YES	NO
Grandparents, aunts, community elders	folk stories	K1, K2	Transfer knowledge, counselling,	x	☒	x	☒	x	☒	x	X
Women, young girls and boys	Gathering of forest foods and herbs	K2	Food security, health	x	☒	x	☒	x	☒	x	X
Traditional leaders, elderly women no longer sleeping with partners	rainmaking ceremony	K1, K3-1	Socialisation, addressing challenges such as drought, infestation of insects and pests	☒	x	x	☒	x	☒	x	X
Traditional leaders, experts, elderly	Soil fertility maintaining methods	K1, K3	Protection of resources, transfer of knowledge	x	☒	x	☒	x	x	x	X
All men and women, young adults	Erosion and gully control methods	K1,K2	Reclaim gullies using local resources (plant aloe, grass) Use many paths	x	☒	x	☒	x	☒	x	X
Herbalists, traditional healers, prophets	Human health	K2-na	Prescribe to ill people or use as prevention to diseases.	x	☒	x	☒	x	☒	x	X
Herbalists, Traditional healers,	Animal health	K2-na	Prescribe for sick animal or use as prevention to diseases.	x	☒	x	☒	x	☒	x	X

Traditional leaders, elders	Insect infestation (birds, army worms, locusts etc)	K1,K	Prescribe measures to implement	x	☒	x	☒	x	☒	x	X
Traditional leaders	Traditional institutions like, ceremonies, taboos	K1-wm	Psychosocial support, caring for vulnerable communities, elders, orphans, protection of resources, prevention for disaster risk	☒	x	x	☒	x	☒	x	X
Women and young girls	poisonous fruits	K1-wm	Prevention of death and illness	x	☒	x	☒	x	☒	x	X
Herders, men and women	livestock medicinal plants	K1-wm	Prevention of diseases and prescribe for sick animal	x	☒	x	☒	x	☒	x	X
Herders men and women	Livestock keeping	K1, K2	Identify illness, provide and make IK fodder, building healthy kraal	x	☒	x	☒	x	☒	x	X
Traditional healers, elderly men and women	Human medicinal plants	K1-wm	Prescribe to ill people or use as prevention to diseases.	x	☒	x	☒	x	☒	x	X
Women and young girls	indigenous vegetables and fruits	K1, K2	Livelihoods, food security	x	☒	x	☒	x	☒	x	X
Traditional leaders, elderly men and women	Social & cultural significance of trees	K3-1	Preservation, conservation practices	x	☒	x	☒	x	☒	x	X
Men and women of all age groups	trapping edible insects	K1, K2	Supplementary food, nutrition, livelihood	x	☒	x	☒	x	☒	x	X
Elderly men and women, parents	passing on IK	K1,K2	Gain knowledge, revive old practice, prestige	x	☒	x	☒	x	☒	x	X
Men and women	IK farming technologies	K1,K2	Conserving land, food security, polling labour and other resources for agriculture	x	☒	x	☒	x	☒	x	X
Traditional leaders and their wives, advisors,	IK laws and regulations	K1,K2	Enforce values and norms of community, sanction people to conform to social values of community	x	☒	x	☒	x	☒	x	X

The four districts have various actors who posses various types of IK or are IK repositories. The actors range from traditional leaders, elders, women and young adults, experts in the form of herbalists and craftsmen. The actors have roles they play in the communities that put to use their skills in disaster risk aversion. The various actors are present in the four districts and also possess IK domains that were dominating (**K1 and K2**) identified. All the districts have demonstrated that IK technologies are present but in some districts some practices are absent. In Mangwe and Lupane for instance, regardless that they know about rain making ceremonies to address issues of socialisation, drought, infestation of insects and pests, such practices are not being followed like in the other three districts. This might be attributed to out migration of young adults who participate in labour associated with activities of the ceremonies. Each of the actors possesses IK that is useful in one way of the other for DRR and vulnerability reduction. Interviewees indicate that DRR by government and development agencies have perceptions that DRR of the areas be based on scientific knowledge, to the detriment of their IK. The initiatives undertaken by traditional leaders in almost all the study areas are not supported by the government agencies or development entities. In Guruve participants with soil fertility maintaining methods knowledge indicated that the promotion of fertiliser usage promoted by extension workers and NGOs made it difficult to urge communities to use manure from leaf litter. Making leaf litter manure as shown in figure 7.8 above is labour intensive and hence people shunned it.

Overall the empirical data shows that IK is an inherent component of traditional DRR for communities have inherited many aspects that contribute to vulnerability reduction. The dominance of (**K1)** and (**K2)** is an indication of communities having adjusted livelihoods and their lives to adapt to changing contexts where they live. The data also contribute to empirical evidence that suggests some effectiveness of IK in dealing with disaster risk and improving resilience in the study areas. The actors identified in this section play a major role in the transfer and diffusion of IK. Thus the following section discusses IK diffusion and transfer.

7.3.13 IK diffusion and transfer

Observations made during the field work show that there was strong presence of NGOs and government extension workers in the rural communities. Knowledge in some of the rural

communities' activities (crop farming, beekeeping and small livestock keeping) had a mixture of advice from these groups. It was however difficult to establish whether that information was second hand or first hand as IK was highly valued by the participants. Other notable observation to buttress the idea that diffusion of knowledge is prevalent include the practices in Lupane , Guruve and Hwedza of mixed cultivation of "inferior" crops (millet, sorghum) that has been replaced with high yielding varieties and exotic fruits have replaced indigenous ones, chemical medication has replaced herbal medicines and western foods have replaced traditional diets. The diffusion of IK is a result of local institutions, government agencies and NGOs operating in most of these communities. These institutions play various roles that can promote or impede DRR initiatives and have implication in policy issues hence the following section present a discussion of institutional arrangement in the districts studied.

7.3.14 Institutional arrangements in the districts

Traditional leaders explained that the President of the Zimbabwe held communal areas in trust for the people. His powers were then given to the Rural District Council. Rural communities believe the land in communal areas belongs to the chief as he can allocate land in liaison with government approval. The policy on natural resources management, The Natural Resources Act of 1941 (amended in 1995 and 1981), is the tool that governs natural resources management. The authority lies with the Rural District Council. Other structures at community level are the village development committees (VIDCO) and ward development committees. These are elected by the community that works with communities in formulating and enforcing local by-laws for protection of the environment.

In all the districts, they have local committees (LCs) for forests, wildlife, water, health, and land, (*majengatavhu*) who carries out responsibility related to their committees. The committees are composed of men and women of varying age groups. In each committee it was observed that there were elders whose responsibilities were to enforce local values and norms of the communities but due to lack of support from traditional leaders hindered them to execute their bestowed mandate.

7.3.15 Institutional interplay and community involvement.

Institutional interplay was captured through relationship mapping with traditional leaders and elders in all the four districts during ward focus group discussions. The focus group discussions required them to state their perceptions and rate the level of community participation, institutional interplay and coordination using qualitative descriptions such as good, average or poor. Group discussion ratings suggested that the community trust horizontal structures as opposed to vertical structures in DRR for drought, fires, animal diseases and floods. Participants indicated that there was interaction at that particular level.

They also revealed their perceptions of institutions operating in disaster risk responses at district level as being poor in coordinating DRR activities. This assessment is consistent with what emerged from in-depth interviews with traditional chiefs that summarised institutional interplay into three categories namely: conflict between institutions, collaborative interplay between institutions and weak interplay between institutions and the rural community.

The nature of the interplay between the communities and external institutions varied with communal areas and resettlement areas within districts. Notably institutions with poor presence in the communities were mostly government departments. Rural communities' attitudes to policy and implementation in the technicist, prescriptive mode are a mixture of recognition that authority is necessary. They also have doubts as to its motivations and efficacy. Table 7.7 below illustrates the issues, perceptions involved and shows that institutions are characterised by competitiveness especially given the limited resources available to them.

Table 7.7 Participants perceptions of institutions

Comparisons of institutions based on perceptions of participants in Mangwe, Lupane, Guruve and Hwedza	
Traditional leaders (Chiefs)	"They have authority but have little power. Resources are controlled by the state'. 'They have IK for various disaster risks. They give orders that are followed by people under their jurisdiction, preside over matters".
Department of Civil Protection	"They carry out awareness campaigns but once in a year when they come. They do not understand our problems. Anyway the good thing is we don't see them much. They come to disrupt agricultural activities".
Local leaders (District Administrator (DA), Chief Executive Officer (CEO)	"Hardly visit the communities and fighting for power among themselves. Lack resources but demand that we pay tax. They just give orders and do not listen to community needs and concerns".
AGRITEX	"They are everywhere, they live with us. Work with certain farmers in groups and women mostly. The government sent them to work with everyone. We don't see them much compared to the past. They look down upon IK and prefer western science".
Kraal heads (*Sabhuku*)	"They are important to us and have de facto authority in the allocation of gardens. But they are now weak, few people respect them. *Masabhuku* are there but who have no power anymore. They can however organise the community in preparation for rain making ceremonies. They advise the chief among other roles".
***Svikiros* (Spirit mediums)**	"They are even weaker than the *Sabhukus.* Most of these are now just behaving like ordinary people. Their powers have gone. They have no resources to look after or conduct their rituals in. The land has been taken by the government. No one respects them".
Church	"Many people belong to the church. The good thing about the church is that it creates a market for produce. Mission school buys lots of vegetables from us. They don't allow anyone to observe traditional practices".
Councillors	'They get involved in everything, they are the new leaders, but few people have any respect for them. They spend their time at meetings and misrepresent us. Most are elitist and look down on the people that selected them. Our councillor is not visible; he would not even know who was doing what in his area'.
Traditional Healers	"Visited by many Christians and non Christians for assistance, they reside in the community and uses local resources (**K1**)".
IK experts in various fields (Human and animal health etc)	'Useful and offer assistance for the sick and accept payment in cash and kind. They possess (**K1, K2 and K1-1**)'.
District council	"It is another small government (*kamwewo kahurumende*) which is out of touch with the needs of its constituency. They claim to be for us, but we don't see what they do for us. Look at the problem of sand poachers who destroy our wetlands with no compensation. The district council must work to assist the community in this matter but they don't. They hardly visit rural villages have but good at putting new taxes on suffering people".

Village Development Committees (VIDCOS)	"This is another useless organisation. We are not sure what they do. Some VIDCOs are useful and work hard to promote development".
NGOs	"They started off giving us loans for growing vegetables. Now they come with new technology. They are useless and retrogressive; for they make people become lazy".

The table above captures some colourful depiction of those assuming that the designation of authority automatically equates to approval or compliance. Rural communities see themselves as being in competition with the state and the private sector over use of IK resources. They perceive policy as being designed to expropriate their entitlements. Competition among institutions destroys the spirit of cooperative and collaborative approaches to complex problems like disaster risk. The implication of such competition is that when rural communities are not engaged in collaborative decision making related to disaster risk, they are being disempowered. Rural communities then have a feeling that non engagement is failure by traditional leaders including local institutions since their IK is not being recognised for DRR and vulnerability reduction within their communities. The competition and also the scarce resources have caused rural communities to use their IK within their villages to collectively revive old practices in dealing with disaster risk.

The research participants raised concerns on the shortage of resources for most of the government departments to fulfil their DRR objectives. In resettlement areas, participants were worried about the limited number of institutions that service them especially NGOs, but they failed to understand that NGOs only operate where there is a need. Observation in resettlement areas showed weak traditional fabric, loss of IK skills and reluctance to use IK. Those were using IK were either supported by NGOs who were promoting their programmes.

Weak interplay between the local communities and government departments is a result of poor capacity to deliver services. Participants pointed out those government departments have poor outreach due to lack of resources although in some cases where extension workers were able to get to the communities, the training and knowledge dissemination was good but they did not promote IK. Extension workers from agriculture and veterinary departments applied knowledge they acquired from their education and despised IK as outdated technologies. Lack of drugs to control livestock diseases was also another major worry. Hence the

participants relied on IK to control animal diseases. Herbalists perfected this practice and established a livelihood (see section 7.3.6).

As for conflict between institutions, it was revealed that although donors and NGOs consult councillors (political representatives from political parties) upon entry into an area, also as part of protocol, they rarely respected councillors' inputs in local DRR issues after establishing themselves in such areas. Some NGOs were accused of lacking respect of traditional leaders, local people, IK practices, their priorities and activities, hence continued tension between with the village kraal heads. Participants also attributed limited development agencies interplay due to duplication of activities. Once one NGO introduces an intervention that is similar to another organisation already operating in the same area, conflicts arise in the timing and frequency of calling community meetings.

However, there are positive collaborative interplay between institutions at times especially government departments, traditional leaders, local government (districts rural council) and even between some government departments and NGOs. The Department of Veterinary services and Agricultural Extension (AGRITEX) collaborate well with some NGOs in capacity building of smallholder farmers through workshops on livestock and crop issues. At a local level, traditional institutions (village heads, headmen and chiefs) have a good working relationship. In terms of institutional fit, three mismatches were noted. Firstly there is a mismatch between external responses, IK response practice, local norms and values. Donor responses to disaster risks (drought, animal diseases) remain weak because external organisations do not fully integrate (local structures) local councillors, chiefs and village heads. Consequently identifying beneficiaries becomes a major source of conflict between locals themselves and between external agents and locals. Traditional leaders and elders interviewed expressed that local leaders understand the vulnerability context in an area and thus NGOs top-down programming does not address this.

Secondly, NGO policies/processes and perceptions of vulnerability do not fit into those of the local community. NGOs use broad categories for targeting humanitarian response, especially assets such as livestock. Traditional leaders prefer block inclusion of all people in to humanitarian interventions. Traditional leaders indicated that the government institutions used this approach in the past and it has always been effective. Selective targeting of

beneficiaries, such as is used by NGOs was criticised for being based on a criteria that emphasises asset ownership, yet ownership of particular assets does not mean one is not in need of help. Participants in all the districts concurred, local indicators for vulnerability do not match the NGO indicators of vulnerability in some cases.

Thirdly, there is still emphasis on maize production and yet it is less tolerant to the semi arid conditions of the districts. Farmers are into subsistence farming although a little surplus is sold to generate income. The promotion of maize as the staple grain in these dry areas thus leaves farmers more vulnerable in terms of food availability. However, there may be exceptions where short season and open pollinated maize varieties are promoted. Climate change has resulted in declining crop yields, water availability, increased crop and livestock diseases and increased dry spells yet, there is no evidence of policies that have a focus on water harvesting, or a bias towards drought tolerant crops. The focus of organisations involved in disaster risk response has not been informed by the apparent evidence IK option available in the communities' thus negatively feeding back into the effectiveness of interventions meant to reduce locals' vulnerability to disaster risks. It appears as if the threat and nature of disaster risk is evolving faster than changes in institutional mandates thus creating a misfit between problem and response.

7.3.16 Infuences on Indigenous Knowledge

The empirical findings have clearly shown that IK and practices held by the communities in Mangwe, Lupane, Hwedza and Guruve are neither taught in the classroom nor recorded. The largest part of IK for vulnerability and DRR continues to exist in the studied communities, for IK has a functional utility in these communities. The other reason is that IK has a very strong and dynamic nature of inter generation transmission (**K1**) through practice and oral tradition that makes it sustainable and resilient. Observations made during field work and the interaction with the local people in the four districts, it become apparent that not all communities hold an equivalent range of knowledge on DRR (see Table 7.6). Migration of people in the communities and diffusion of knowledge from government extension workers, educational institutions, Christianity and NGOs implementing their technologies has made some to ignore IK. The districts of Mangwe and Hwedza with little in migration did have much stronger sense of solidarity and harmony and possessed more IK on DRR. This may

mean that those communities that are more self-reliant and relatively undisturbed by modernity have better chances of possessing a rich stock of IK.

People in the communities have their IK influenced by what they do and what they do influences their practices. IK is in people's heads', embedded in individuals and group action (Ellis and West 2000:14). The empirical findings have clearly demonstrated that IK practices are not static but are complex adaptive responses to external and internal changes that have evolved throughout the generations from trial and error. Communities in Mangwe, Guruve, Hwedza and Lupane have adapted to their local environments applying adaptive and coping practices to protect them from the impacts of disaster risk. The practices are explained in most of the themes discussed above including recorded photographic images therein. IK preventive measures are helping rural communities to reduce the negative effects of disaster risk such as protective measures (granaries, raised livestock enclosures), risk reduction mechanisms', 'impact-minimising strategies, (use of taboos, use of live fences on fields, growing of short varieties) and risk-spreading strategies (diversification into beekeeping, insects gathering). All these IK practiced are meant to help rural communities escape certain disaster risk consequences using avoidance strategies. IK practices are mediated by local institutions and associated power relations as highlighted in sections 7.3.9; 7.3.14 and 7.3.15.

Local practices may be different from one level to another and DRR practices may be found only at the household level while others may be found only at the community or village level. IK practices of conservation farming, ethno medicine and household food security coupled with other very old practices are also applied according to local level experiences with disaster risk peculiar to them. These forms are inherited from one generation to another. Greater ethno medicinal knowledge for the smaller livestock like poultry and goats compared to that for cattle, may reflect the importance the community gives to various types of livestock. Other notable observations are that many rural communities are now rediscovering trees and wild plants as sources of food, fodder and medicine. There is a lot of revival of old IK practices and this many mean the resilience and importance of IK for the provision of safety net for vulnerable communities against disaster risk and also improving wellbeing of people.

7.3.17 Sustainability of IK in relation to policy formulation in the DRR field in Zimbabwe

In-depth analysis of the empirical findings clearly shows that IK is abundant and communities have ways of cascading it to new generations who in turn are modifying it. There various IK institutions ranging from control, enforce, make decisions among others as shown in Table 7.6 chapter 7. IK is sustainable for transfer of knowledge has many ways that are being used to transfer it. Young people learn during meetings, games and observing their elders. IK and skills are present in the community for they inherited but are not always evenly distributed within the community. Traditional ways of learning are that knowledge that is relevant is taught a particular community. Formal knowledge tends to generalise knowledge regardless whether it is relevant or not. This happens when children are mixed from different cultures. What is knowledge in one society may not in another society. The teaching of relevant knowledge makes IK sustainable and critical for DRR. The degree to which people rely on natural resources determines the degree of IK possessed and their skills. In the areas where the interaction with the environment is less important and other productive activities, such knowledge and skills are scarce and are of reduced quality. Communities in the areas that are more vulnerable to external influences are adopting new practices learnt through diffusion of information. As people pursue sustainable livelihoods, their coping strategies depend on traditional, local and innovative knowledge.

Rural communities use IK mechanisms and other survival techniques from calamities and working towards safeguarding their lives, infrastructures, livestock and nature. They come up with many strategies to predict, prepare for, withstand and finally withdraw from calamities that may cause danger to their well being. IK distribution across and among different social, economic, gender and religions make them sustainable even though they are influenced by several factors, which change peoples' behaviour, roles and responsibilities over time. This makes IK more relevant for DRR policy. IK is indeed changing. Rural communities are transforming in many respects. They determine their own support systems based on IK and contribute to vulnerability reduction. Structural changes are a result of politics, social, traditions and resource relationships. The resources that are used to predict impending disaster risk are diminishing. Coping mechanism response systems that can be put in place have been weakened. Migration to urban areas also means that the people leave their IK in

rural areas and other related skills regardless that they remain marginalised when they reach urban communities.

For example women's rights and responsibilities change with men's out migration resulting in them acquiring and maintaining a broader range of new knowledge. The new Knowledge may over time affect its transfer and survival. Most people hold the type of knowledge that is relatively simple and easily put into practice and such knowledge can be included into policy.

7.3.18 Challenges for IK use

Challenges with regard to IK are many as revealed during interviews and focus group discussions. Some the challenges that can be depicted include loss of IK as young people are detached from their land, influx of new migrants with different cultures and values among other reasons. The other factors associated with erosion of IK include the following:

- Marginalisation of IK systems due to the craze for Christian religion and issues of modernity (**K3**).
- The widening of ethnic inequalities in communities and people's lives, which demonstrates that conventional DRR policies fail to tackle the disasters that are perennial in the study areas.
- The capacity of vulnerable communities is not being harnessed or recognised in the management of contemporary threats in the country.
- The country is failing to build and mobilise appropriate and adequate IK capital.
- There is no support for IK as only modern approaches are the only that gets support.
- IK is evolving and incorporating new knowledge.
- The belief that conventional or scientific knowledge is 'superior' to local knowledge is still dominant especially among the young adults in the studied districts.
- Some people believe IK is difficult to identify, use, assess, validate, generalise and replicate to other localities.
- There is also the thinking that traditional leaders, elders tend to have monopoly of IK since they possess the knowledge.

- Other DRR practitioners believe that as a result of rapid changes, local knowledge and practices are becoming inappropriate, irrelevant or inaccessible over time.
- Within the context of Zimbabwe, it may appear that the focus on IK can be perceived as a threat to national interests and political structures
- The technocratic and top down approaches to DRR initiatives in Zimbabwe may prove to be difficult for the decentralisation efforts
- There is also the thinking that documentation and use of IK can be used by outsiders against rural communities themselves to maintain control over them and their resources.

More so, no matter the amount of data gathered and technology, these may not help in improving rural communities lives on their own without understanding of the local environments and needs. DRR initiatives that ignore IK means they do not understand and take into account the needs of locals communities and the local context. Such actions of ignoring the needs and IK may result in increased vulnerability of rural communities. DRR requires a much deeper analysis of the local vulnerability context to come up with a holistic picture of a community.

7.4 CONCLUSION

The scope and extent of IK and capacities of rural communities for DRR is complex and dynamic. In all the study areas many village cultures have their built own traditional types of animal enclosures and granaries appropriate to local environmental conditions. Agricultural IK technologies applied like crop diversification, intercropping, varying planting and harvesting dates, supplementing moisture availability, soil conservation techniques, and diversifying from crop farming to non crop farming activities are meant to address disaster risk prevalent in their communities. Communities are industrious and develop IK that is applied to the various environments with which they are faced in their everyday practices. The tools like storytelling and events (*mukwerera*, *biras*, *zunde*) are best practices, participatory in nature and encourage consultation procedures for IK. The tools and events constitute formal procedures in all activities affecting vulnerable communities in their lands and resources. Traditional leaders initiate DRR measures through these forums in their

communities. The actual practice of IK for DRR is being done and concrete results are visible in the community.

The qualitative approach enabled the research to uncover issues that are not originally planned for but became apparent and critical for the success of the inclusion of IK into DRR policy for the country. There are challenges identified for IK inclusion for decision making such as loss of IK due to lack of support for IK innovations, modern education that look down upon IK, non recognition ok IK in policies and mixing of cultures in communities. Chiefs lamented that the young no longer undergo experiential learning. There is inadequate understanding of IK systems due to the craze for modernity, westernisation and Christian religion. The traditional leaders and elders who possess IK are marginalised. While communities' practices use a lot of IK in DRR, the country has not been able to build, mobilise appropriate, adequate IK capital. Policies and legal frameworks are very ineffective for they fail to facilitate participatory processes for IK and local communities' capacities on DRR matters including biodiversities. IK is not being captured and stored and therefore endangered with extinction. IK bring along many positives that can be harnessed for DRR and vulnerability reduction. IK practices build cohesion in the rural communities for they work through collective help and shared labour. This IK practice of using collective and shared labour also helps in forging community solidarity. The rural communities coping capacity is also evident in the informal ways of using the existing opportunities to generate alternate sources of livelihood. The findings demonstrated the capacity of rural communities to innovatively use the available resources, considering the constraints and the opportunities available.

Empirical findings in the chapter reaffirmed the need for inclusion of IK into DRR policy and that this study is in the right direction for a "generative dialogue" of different knowledge forms and other policy makers for DRR in Zimbabwe. Therefore, the next chapter presents the conclusions and recommendations emanating from the study.

CHAPTER 8

THE INCLUSION OF IK INTO DRR POLICY OF ZIMBABWE

8.1 INTRODUCTION

The aim of this thesis was making a case for the inclusion of IK into DRR policy for Zimbabwe. The inclusion of IK is envisaged to harness IK technologies abundant in the communities and address disaster risk affecting vulnerable rural communities. The empirical findings in chapter 7 have revealed that rural communities possess a range of IK to mitigate disaster risk that affect human, natural resources, livestock and so on. In addition, rural people observe signs in the environment and animals behaviours that enable them to put in place DRR measures for impending hazards and disasters.

IK has many skilled actors identified in Table 7.6 of chapter 7 that it is adaptive, flexible and covers a wide spectrum of aspects of DRR as indicated in Table 7.1 in chapter 7. The thesis had nine key objectives to be addressed. Eight of the objectives are discussed in chapter 9. The last objective aimed to determine the most effective means of inclusion of IK into DRR policies in Zimbabwe society. This objective is also the focus of this chapter. The chapter provides a process that assists the inclusion of IK into DRR policy for Zimbabwe.

8.2 COMPLEXITIES IN DRR POLICY FORMATION PROCESS

There are differences in perspective, cognition, interest and social location among primary actors involved in policy formation. Policy formation usually is complex and difficult to influence and become ineffective as a result of capturing wider views of the many actors supposed to take part (Murphree, 2001; GNDR, 2011). The discussion that follows deal with some issues that show the difficulties involved, which ultimately serves as a road map for the inclusion of IK into DRR policy.

8.2.1 Power of State Policy

The discussion in chapter 5 on Zimbabwean policies on DRR, environmental issues, agricultural practice among others revealed that policies have been consistently used since their initial formulation of colonialism (Sithole, 1999). Policies basic profile in the country has been carried forward to the post-colonial era without reflecting any significant changes (Keeley & Scoones, 2000: 15). Keely and Scoones (2000) explain that to examine the continuity across the “great divide” of independence in 1980, has been a political concern of

the government to establish itself as the centre for legitimate source of problem identification, intervention and problem solving. The approach to governance in the country has been and still is the positivist science and technical knowledge. This is consistent with perceptions of research participants perceptions captured in Table 7.7 in chapter 7. The power of Knowledge and its scientific influence comes from the degree to which the enlisted actors are themselves powerful (Keeley & Scoones 2000: 15). The powerful alliance between bureaucracy and science is evident in DRR policy history as discussed in detail in chapter 5 and revealed through empirical findings. DRR policy of Zimbabwe has excluded insights from local experience and civil science through "processes of 'black-boxing,' which does not question the premises upon which the policy is based and simply ignores IK (Keeley & Scoones, 2000:8-9).

The policy stance of an overall state custodianship dominates due to scientific/bureaucratic establishment to exclusive knowledge generation and political imperatives of the government. Rural communities resources valuable for IK as presented by traditional leaders during data collection (see section 7.3.14 of chapter 7) remain under the formal proprietorship of the state. In the language of legislation, they are "vested in the President," The notion here being that the state acts as custodian of the land and resources. The management of these resources is directly through line ministries and indirectly through units of representative local governance (local authorities) for the benefit of their inhabitants. These inhabitants have, in effect, usufruct rights to use land and resources and to participate in planning for this usage. The research findings clearly demonstrated that rural communities rely on plants and animals for many practices useful for DRR and vulnerability reduction. The law state that they do not have the right to act individually or collectively as a legal persona at sub district levels in respect to the ownership of land and resources. This basic policy stance becomes an impediment in rural communities endeavour to deal with disaster risk. The policy actually results in increased vulnerability. There are many other related pieces of legislation that hinder IK inclusion into DRR policy. The Communal Land Forest Produce Act (1987) and the Parks and Wild Life Act restricts use of forest products in communal lands for "own use". It however provides for Rural Districts Councils (RDCs) to grant commercial timber harvesting concessions but prohibits use of forest products from protected forest areas and reserved tree species, prohibits clearing of vegetation within 100m of river banks. The Traditional Leaders Act (2000) empowers chiefs, headmen and kraal

heads (*Sabhukus).* The duties of these include ensuring that land and its natural resources are used and exploited in terms of the law. The traditional leaders and kraal heads are tasked with controlling over-cultivation, over-grazing, the indiscriminate destruction of flora and fauna, and generally preventing the degradation, abuse or misuse of natural resources in their areas. They also establish village assemblies and mandate the demarcation of their boundaries. The Rural District Councils Act, 1988 also provides for (RDCs) to enact by laws to regulate natural resource use, issue licenses for commercial extraction of wood products, declare Natural Resources Management Committees to enforce the Natural Resources. RDCs are actually empowered to make orders or control cutting of trees. Political institutions are created at ward and village levels.

A close examination of the policies of state custodianship shows that they are technicist and centrist in their approach, excluding IK inputs and rural communities' participation in planning and implementation. Rural communities are marginalised as indicated by traditional leaders during data collection. The DRR structure presented in chapter 5 section 5.2.1 figure 5.2 make the coordinating ministry (Ministry of Local Government National and Urban Development) to have nightmares when disaster strikes for there is no synergy in policies.

It can also be highlighted that the financial capacity of government to carry out necessary administrative, extension and enforcement functions assigned to it, is severely constrained (Sithole, 1999). As presented in table 7.7 of chapter 7, government extension workers, traditional Leaders, village and ward assemblies are required to meet quarterly, conduct and report on business, but perform such services "on a voluntary basis and shall be provided free of charge," (Traditional Leaders Act Section 21(3)). This is evidence enough that these groups of people do not participate in governance issues given that village assembly and wards have no formal powers to conduct entrepreneurial activities in their own right, nor have any tax base of their own. The implication of this observation is that decision making is dominated by the elite or intelligentsia.

8.2.2 Local perspectives and Structures

Rural communities are not homogenous as shown in chapter 7 sections 7.21 Table 7.2. They are divided by various socio-economic and cultural differentials. This notwithstanding, the

research generalised this category that all share with national policy general concerns about their well being and concerned with the natural resource base since it forms a key elements of their livelihoods (see sections 7.3.5 and 7.3.7 of chapter 7). Chapter 5 section 5.2.1 shows the structures for DRR governance in Zimbabwe while the Table 7.7 in chapter 7 captured some colourful depiction of those assuming that the designation of authority automatically equates to approval or compliance. Empirical findings in Chapter 7 shows that rural communities see themselves as being in competition with the state and the private sector over use of IK resources. They perceive policy as being designed to expropriate their entitlements. Table 7.7 in chapter 7 illustrated the issues and perceptions involved that institutions are characterised by competitiveness especially given the limited resources available to them. Competition among institutions destroys the spirit of cooperative and collaborative approaches to complex problems like disaster risk. In chapter 7 section 7.3.15 a detailed discussion also pointed out challenges of competition among institutions. The implication of such competition is that when rural communities are not engaged in collaborative decision making related to disaster risk, they are being disempowered. Rural communities then have a feeling that non engagement is failure by traditional leaders including local institutions since their IK is not being recognised for DRR and vulnerability reduction within their communities. The competition and also the scarce resources has caused rural communities to use their IK within their villages to collectively revive old practices in dealing with disaster risk as presented in chapter 7.

8.2.3 Disconnection and Stalemate

The position and content at the roots of policy for the government and rural communities are different. There are competitive and disconnected for rural communities would want their ideas given priority and the government also want legitimacy and recognition. The state however has more power due to financial resources, the power of legislation, the power of bureaucracy and the power of established ways of doing things," (Murphree, 2001). Murphree (2001) further asserts that the power of local actors lie in them being on the ground as implementers. This is a 'socially constructed stalemate" a situation in which the state is unwilling to surrender its technicist and prescriptive policy approaches while lacking the resources to make these effective (Lee, 1993:12). The rural communities also do not have the authority and incentives to create effective policies that are responsive to local imperatives.

This disconnection need to be addressed with policy to facilitate IK inclusion into DRR policy.

8.2.4 LINKING RURAL COMMUNITY VIABILITY WITH VULNERABILITY

This section discusses linking community viability with the need for vulnerability reduction for the use of IK witnessed in Mangwe, Lupane, Hwedza and Guruve. The research shows that they have high level of concern about the impacts of disaster risk and ageing of IK repositories. There is evidence of social and economic vulnerability through changes to livelihood patterns, such as changes to farming practices especially those supported by government and development agencies and an increase in commuting to larger centres for employment bas reflected in figure 8.1 below. These changes have challenged not only community viability but quality of life, and the nature of community identity, for residents.

The experience of living with disaster risk is still a reality among rural communities in Mangwe, Guruve, Hwedza and Lupane districts in Zimbabwe as demonstrated in table 7.4 of chapter 7. Disaster risk results in significant losses individually and brings community hardship, thus motivates innovations to use IK practices and activities to reduce vulnerability (Table 7.6). The approach of those looking to reduce disaster risks is shifting. Instead of relying solely on technology-based approaches, now IK suggests a different approach to DRR that concentrates on reducing community vulnerability. With the introduction of more social scientific perspectives, the international community has begun to recognise the importance of IK for DRR (DRR) policy (Agrawal, 2007; Baumwoll, 2008; Donovan, 2010; Wisner, 2014). Existing arguments for the value of IK consider either IK in a general sense or in a specific sense (Donovan, 2010; Wisner, 2014). There is, however, an intermediate value, neither general nor specific, which highlights different categories of IK that can be applied to many types of communities, regardless of their unique characteristics as evidence of the research empirical findings shown in Table 7.4. The thesis studied four districts and IK used is almost very similar in the districts with different tribes and cultures.

In particular, four categories of IK (environmental ethic, ecological ethic, connection to a place, and cultural traditions) are assisting in vulnerability reduction to various types of disaster risk for agriculture produce, livestock, natural resource, infrastructure and people.

This has been demonstrated in the gathered data that communities can be the creative and locally based solutions that are often developed and tested become useful for other locations. Knowledge and the individual possessing knowledge (knower) are intimately interconnected. This is so for IK is embedded in memory. IK is a journey for the process of generating or learning IK ways of living in nature is coming to know (Cajete 2000b), or coming to knowing. The ways of living in nature or the environment fits an indigenous rural community context.

The empirical findings from traditional leaders and elders presented in chapter 7 demonstrated ways of living in rural communities is action oriented, thus IK cannot be given, accumulated or banked. IK has to be experienced in the context of living in a particular place in nature, in the pursuit of wisdom, and in the context of multiple relationships. When disaster risk is predicted and one does not have the competency to prepare then it is either one survives or there is extinction. When an individual fails to build a granary for food storage or a put up a raised livestock enclosure then the family may perish when disaster strike. The real rural community determines whether an individual has or does not possess IK. The evidence provided in narrations and photographs in chapter 7 demonstrates that the four districts studied have abundant IK that can be used for DRR. However, the inclusion of IK into DRR policy should take into consideration issues of scale, equity, devolution, resources among others. The section below presents a discussion on these issues.

8.3 KEY ISSUES FOR INCLUSION OF IK INTO DRR POLICY IN ZIMBABWE

This section identifies key issues that DRR policy in Zimbabwe must address. The issue discussed therein does not constitute a comprehensive list, but they are central to any approach that seeks to inject a new dynamism into Zimbabwean DRR policy. The issues mirror aspects of what has already been discussed in this research as drivers of change and the complexities that inhibit or complicate policy responses to this change in chapter 5.

8.3.1 Scale and Devolution

Taking into consideration that IK practices for DRR uses natural resources, the issue of scale becomes very important. The core policy task must be able to match jurisdictional scale with social, functional and ecological scale requirements. This also has to take into consideration resources and capacities that may be involved. The government has reasons to prefer centrist jurisdiction of placing all resources especially the land under its control even when it does not have capacity to manage all resources.

Suggestions that can assist in the inclusion of IK into DRR policy are either through decentralisation or devolution. De Visser *et al.* (2010) points out that with decentralisation, responsibilities can be delegated with limited authority to dispersed units of hierarchical jurisdiction. The dispersed units will be accountable to superiors up the ladder. With devolution there is a creation of realms of authority that have autonomy (De Visser *et al.*, 2010). Accountability with regard to devolution is within one's own constituency. In chapter 5 section 5.2.4 the discussion presented showed that devolution is highly contested in Zimbabwe. The state, feels that with devolution it will fail to claim the benefits of resources. This thesis suggest that decentralisation with aspects of partnership can work well within the context of Zimbabwe. Partnership', the fourth conceptualisation of decentralisation (De Visser, 2010) asserts that it involves, as implied by the terminology, the transfer from government of some or all planning and management powers with respect to public functions to civil society organisations that include voluntary and private non-governmental organisations. The traditional leaders, local structures and many Community Based Organisations in the studied districts can assist in this regard.

8.3.2 Land Redistribution

Land distribution is a DRR issue that has seen many changes since 2000 (Mawere, 2012). Unplanned settlement of people currently taking place in the country are causing uncontrolled exploitation of natural resources with alarming consequences, and this increases vulnerability of rural communities who rely of natural resources for IK practices and measures for DRR (Mawere, 2010, 2012). Newly resettled people destroy forests to pave way form cultivation, construction and firewood purposes (GoZ, 2001:1). Policy should also address this issue to

control the situation of deforestation in order to protect these resources that safeguard IK practices.

8.3.3 Equity

The complexities of this issue have already been discussed in Section 7.3.15 in chapter 7. Rural communities have various institutions and groups of people with various skills that use resources communally owned for DRR as presented in chapter 7. Policy should address the issue of local and national equity. Section 8.2.1 has discussed that ownership of resources is in state hands meaning that rural communities have resources effectively expropriated from them and yet they use the same resources for DRR. This is particularly the case in respect to timber, which rural communities use in the construction of structures that help in DRR (see figures 7.2 and 7.3 in chapter 7) as well as making it difficult to access other wildlife resources useful for livelihoods (see sections 7.3.7 in chapter 7).

8.3.4 Organisational capacity

Section 7.3.15 discussed institution interplay that revealed challenges related to organisational capacity at local levels. The suggestions that policy can work through devolution has put forth strong arguments, especially against the devolution route. There is no capacity at a local level due to the lack of education and experience, coupled with institutionalised corruption. Local organisations especially government local structures fail to execute their mandate due to their failure to raise revenues and thus they remain more administrative and control systems (see also Table 7.7 in chapter 7). A suggestion to address organisational capacity is provided in section 8.6 below.

8.3.5 Process in policy formation, evolution and inclusion of IK

The policy creation and change process is itself a policy issue for when stakeholders at any point in the policy process are omitted the policy becomes misdirected. The thesis put more emphasis on the full and representative participation in policy processes so that IK find its way in. This assertion is supported by the IK model for DRR for integrating knowledge, actions and stakeholders for DR discussed in chapter 5 section 4.5. Chapter 5 discussed at length that the Zimbabwean DRR policy and its roots is premised in scientific bureaucratic

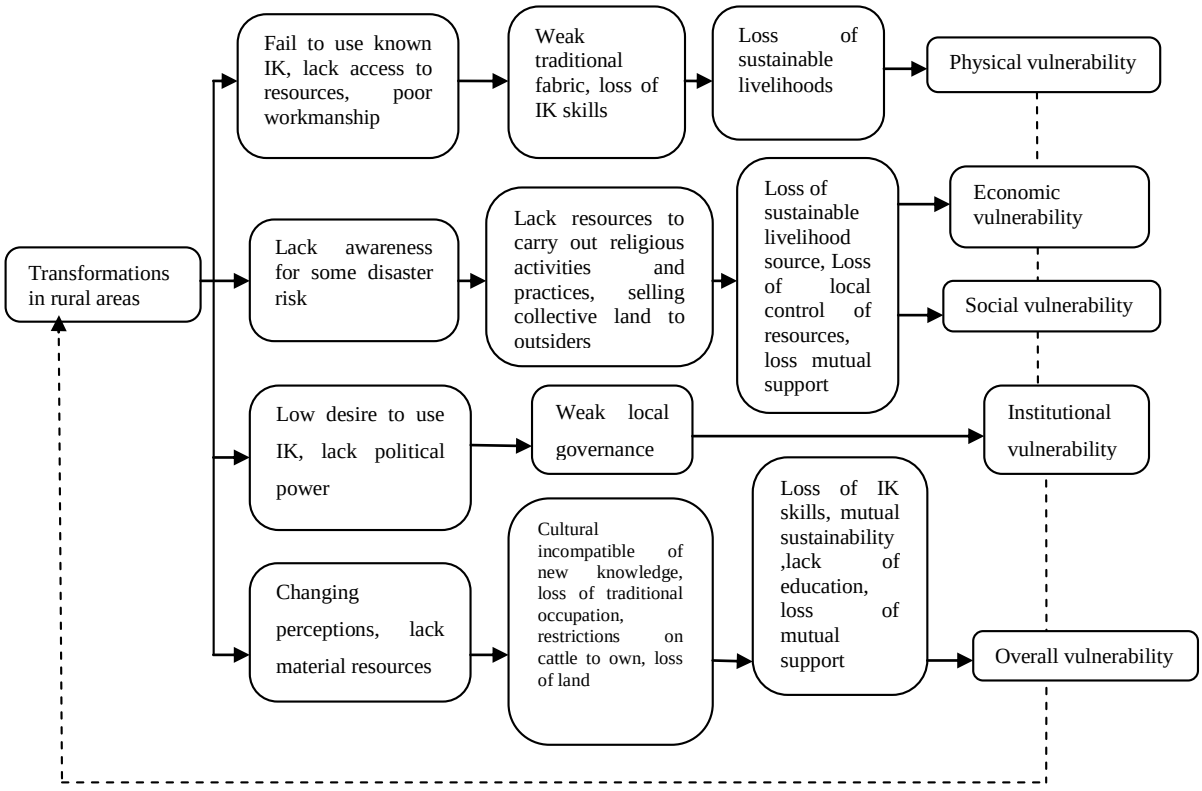
establishment and should include IK. DRR policy has been described as technicist, prescriptive and centrist in the basic profile. Thus suggestion for the inclusion of IK is provided in the next sections below.

8.4 INCLUSION OF IK IN POLICY AND PRACTICE

The paradigm in support of "one technology or one knowledge system fits all" has been debunked (Shankar, 1996). IK suggests a different approach to DRR. Whereas Western science attempts to isolate a problem to eliminate its inter linkage with various other factors and to reduce a problem to a small number of controllable parameters, IK approaches usually examine problems in their entirety, together with their inter linkages and complexities (Shankar, 1996). Berkes (1993) gave an example of people in the field of medicine who are realising the importance of including the physical, spiritual, social cultural and psychological well being of a person when considering matters of health. Although this is a fairly new concept for modern medicine, this holistic approach is the basis of many traditional systems (Berkes, 1993).

The model on ecosystems discussed in chapter 4 indicated that ecosystems sustain themselves in a dynamic balance based on cycles and fluctuations, which are non-linear processes. Ecological awareness, then, will arise only when there is a combination of rational knowledge with an intuition for the non linear nature of the environment (Berkes, 1993). IK can play an important role within the larger society where Indigenous people are located but have less influence as already discussed above in section 8.2.3. Within that sphere, misconceptions and misinformation exist about IK and rural communities. This is due to the fact that formal educational institutions do inadequate jobs of teaching about Indigenous history, culture, and the technologies they use every day. Indigenous vulnerable rural communities live very public lifestyles and are highly visible. The non-inclusion of IK may result in increased vulnerabilities as depicted by progression of vulnerability model produced using research findings in figure 8.1.

Figure 8.1 Progression of vulnerability of rural settlements in Mangwe, Lupane, Hwedza and Guruve



There are linkages of a dynamic nature between vulnerabilities and capacities. This is because vulnerability does never remain the same over time especially when disaster has struck. Actually before disaster strike, when it is still a disaster risk forming the context for the disaster to happen, IK can help prevent or reduce certain kinds of vulnerabilities as demonstrated in chapter 7 sections 7.3.7. Rural communities have locally organised preventive as well as responsive action to disasters risks that are very powerful to limit damage and losses as presented in chapter 7. Relief and rehabilitation as commonly known in emergencies can do the same, that is reduce certain kinds of vulnerabilities.

With time, vulnerabilities can also change on their own through some inherent coping mechanisms or practices of the community. Vulnerability to disaster risk in this research can be known as a product and process that exist before and after disaster. There are aspects of disaster vulnerability that precede a disaster and contribute to its severity and nature. These aspects can be strengthened and changed depending on responses decision taken by vulnerable people. In the research sites it was observed that many measures and practices are

activated once some prediction has been done. Other issues that change this scenario are response decisions based on social, economic, political and institutional context.

The research findings clearly demonstrated that IK and capacity have great potential for disaster reduction. Empirical findings also confirmed a good understanding about local experiences, IK and concrete guidance on how to strengthen the role of local government to improve their ways of communication and active interaction. IK and capacity are accumulative and continuously updating or changing. The changes respond to various situations taken as part of learning process through local innovations and initiatives. Rural communities' world views are the ones that dictate the learning process and communication practices. These develop over some considerable time as they lead to creation, reception and accumulation of new knowledge.

In considering of vulnerability, capacity and IK dynamic nature the author reflected that rural communities are in transition hence vulnerabilities and capacities increase or decrease accordingly. There can also be some hidden capacities and vulnerabilities characterising strengths and weaknesses of the rural communities that may not be linked to one specific disaster risk. It has to be pointed out those vulnerabilities and various disaster risks in many situations complement each other. Disasters vulnerabilities in Mangwe, Lupane, Hwedza and Lupane districts rural communities, when seen in a time continuum, can be described as a process being a product of disaster risk. Vulnerability increases as a result of the current economic, political and social environment. Vulnerability can also be increasing due to the inherent cultural transformation processes within rural communities. These factors affect vulnerability and IK capacity of the rural communities.

The existing policy approaches that support the technological paradigm for DRR as depicted in the conceptual framework in chapter 2 also increase vulnerability of rural communities. The main issues that are emerging of the empirical findings in the context of the four districts studied in reducing vulnerability for disasters through building IK as a capacity are weakened local governance, loss of traditional skills (IK and practitioners), loss of material and land resources to cascade IK to other generations and cultural incompatibility of external interventions.

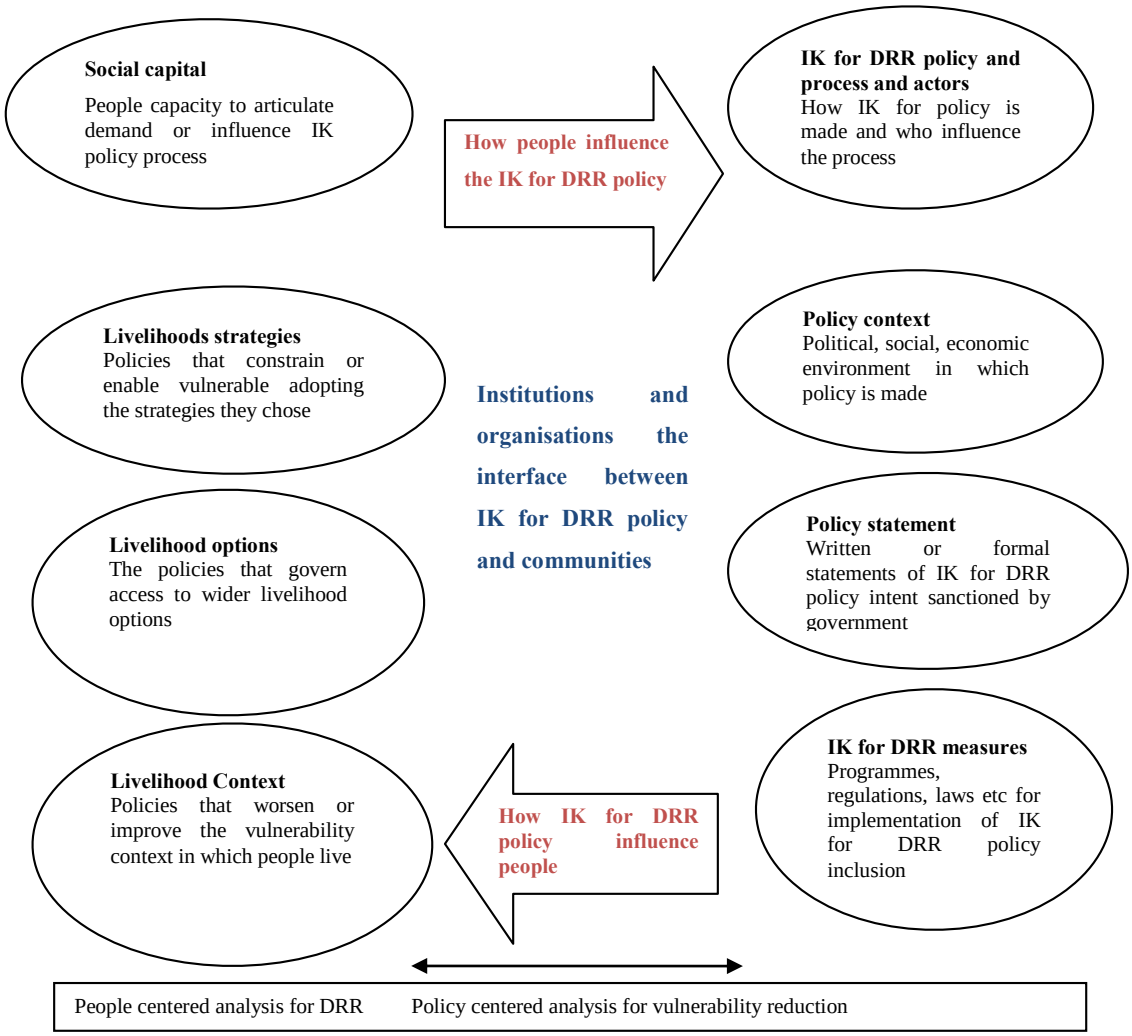
8.5 POLICY IMPLICATIONS AND SUGGESTIONS

IK is central in the DRR relating to threat or loss of natural resources. DRR are steps taken before a disaster occurs. Empirical findings have demonstrated that rural communities take these steps using IK. Baumwoll (2008) urges that for DRR to be successful, it should be applied at community or local level. The level of awareness among communities also enables them to openly use IK for DRR and integrate other technologies in the management of disaster related issues. Awareness has been observed to be very high in Guruve, Mangwe and Lupane for traditional leaders. They realise that the solution to the communal problems required involvement of all groups represented in their areas of jurisdiction. It was also noted that awareness needed the blessings of God and spirits. Prayers sessions and community gatherings are used to disseminate IK relating to various aspects affecting communities. Whatever communication, irrespective of whether it is about good or bad, is accompanied by the blessing of spirits (those that have departed from the community). The beliefs on the departed are paramount as when it did not happen, the knowledge will thin away into the air or fall into the deaf ears. The findings are quite valuable in that they may well explain the difficulties and resistance that government and development agencies and disaster risk managers face in the rural indigenous communities when introducing DRR measures not commensurate IK. Thus it is necessary to make local beliefs and customs central to the DRR measures employed in the respective rural indigenous communities in Zimbabwe.

Every locality might have some established or IK DRR practices, but the type of response adopted by community members and its effectiveness may vary over time depending on their level of awareness of disaster risk. Some of the DRR practices may fail not because people's ability to cope is overwhelmed by the scale of the disaster, but resources they are supposed to use are not freely available since they are controlled elsewhere. In effect, changes in the size of the population, the environment, and in the source of the livelihood of each household and in disaster characteristics can make coping mechanisms outdated. The study's findings suggest that IK DRR practices and level of awareness make a positive contribution to improving people's adaptability to disasters that affect them. However, it is a complex process, linked to other variables like physical and social factors. This also brings in issues related to sustainability of IK. In communities some members do not practice IK technologies and young people are moving from rural communities.

Zimbabwe DRR policy should include IK and should clearly show the roles that each institution or stakeholder play. The institutional roles should stand alone. The Central Government must acknowledge the role of local actors (Table 7.6 in chapter 7) and provide an enabling normative framework. The inclusion of IK can also be possible by recognising and enhancement through using it for risk identification and monitoring, risk mitigation strategies and early warning. Rural communities' are able to identify disaster risk and put in place mitigation, including early warning using various IK domains. There are also social safety nets that can be useful in the relief and rehabilitation phase. The policy is also not inclusive; hence the empirical data suggest that there should be an IK analysis component, as shown in the model figure 8.2, in order to include IK.

Figure 8.2 IK analysis components



This analysis helps to address key governance issue, namely the combination of modern democratic institutions with IK, livelihood and communication strategies and how to adapt traditional organisations to modern requirements. DRR policy that is effective requires the inclusion of the rural communities, acquisition of knowledge, innovation and creation of safe culture. Atanga (2010) and GNDR (2011) affirms that decision making that include local people does not fail for if it is participatory and there are views of men and women, youth, civil society groups and the private sector. Policy analysis in chapter 5 section 5.2.4 clearly reflected that the government does not fully integrate community and civil society organisations in decision making regarding DRR. Rural communities, civil society and NGOs are consulted after disaster events. The ways to speed up DRR process at local level in Zimbabwe requires that necessary policies be put in place, IK be incorporated and effective planning undertaken following the outlined ideas in the model on figure 8.2.

8.6 IMPROVING INSTITUTIONAL STRUCTURE FOR DRR

Improving institutional structures for the inclusion of IK into DRR policy requires delegating roles and responsibilities to local governance. Zimbabwe DRR planning is controlled mostly at the state and the national level, meaning that the whole DRR process is top-down with strongly centralised style of command and control. It is also reactive in its conception (see chapter 5 section 5.2.1). DRR planning is designed to face disaster situations through emergency relief. The proposition is that there should be a management structure where rural communities (local governing bodies like Village Development Committees, local government) have power and active role in DRR. If these structures are given active roles for DRR, they will create DRR planning that take into considerations IK, skills and capacities that is abundant in their communities. Effectiveness of the grassroots governance will of course have to be strengthened politically and economically. Autonomy is also quite critical for easy decision making and execution.

Grassroots structures link with the institutional structure at district should be improved, as current disaster management system is operationalised mainly at the district level. The process that is top down as to be replaced with a two way process. Equal representation for all community sections based on gender, social and economic status must be ensured by the government. On the point of stakeholder participation, the participation of all interested and affected parties in DRR must be promoted and all people must be given an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, IK education and DRR awareness. The sharing of knowledge and experience must be promoted to increase the capacity of communities to address disaster risk issues and engender values, attitudes, skills and behaviour consistent with IK and DRR.

Some strategies that can assist in the incusion of IK into DRR policy are as outlined below:

Strategy 1: Establishment of a Zimbabwe Knowledge Council, which consists of Zimbabwe knowledge specialists, who will decide on matters relating to the DRR activities with IK.

The research council of Zimbabwe can be incorporated in this council and assist as building block of decision making body for engaging individuals and groups with IK. IK inclusion into policy may fail if the process does not build upon a resource in which rural vulnerable people are rich - their knowledge. The conservation of IK is difficult when the world is fast changing. IK conservation on entirely cultural grounds can be just a farce. Institutional support systems are necessary to document, characterise and valorise IK since some of the IK valuable for DRR is not public domain.

Strategy 2: Establishment of institutions that will promote research on IK for DRR.

Empirical findings showed that rural communities do a lot of experimentation. In experimentation there is a chain of incremental learning which defines objectives, identifies options, selects and implements approaches, monitors results and adapts objective and action on the basis of these results in a continuous and iterative process. Rural peoples have, of course, been doing this for millennia and in doing so have provided the basis for much of what we now know about agricultural production and the uses of flora and fauna. However, in a contemporary world, where local use is constrained by superlocal regulation, there is little room for experiment and the role of local communities is confined to being the providers of "indigenous technical knowledge", as an informational adjunct to "professional science." Authority opens up experimental space for local jurisdictions and provides a new basis for collaboration between civil and professional science.

Strategy 3: Provide support for research, education and community knowledge workers equipped with IK DRR in the community.

At national levels the policy process should involve the same path of incremental learning as in strategy 2. Policies are experiments and people can learn from them (Lee, 1993:9). Policies change all the times for they are dynamic and present an iterative process of unfolding

knowledge informing negotiations between all significant stakeholders regarding their use and management of nature (Lee, 1993:9).

Strategy 4: Promotion of teaching and learning IK for DRR in the three systems of education: formal, non-formal, and informal.

The educational system has to make a significant contribution in teaching and learning of IK in schools, colleges and university level since some of the inherited knowledge people practice it without knowledge of why they do it. There are many subject areas that can actually incorporate IK in teaching and learning. In home economics, children can learn traditional dishes and their nutritional values. In agriculture, IK practices can be taught. In building studies the same can also be done and many more subjects.

Strategy 5: Honouring and rewarding community members that help transmit their IK to the young generation in the community.

Empirical findings revealed that traditional healers and herbalist for human and animal diseases are making livelihoods through their IK practices and hence they continue with their found professions. In the same vein, those that posses IK can be incentivised to halt the erosion of IK as depicted in figure 8.1. The erosion of knowledge takes place due to many reasons especially the unwillingness of young people to acquire the traditional knowledge as they are of the perception it is outdated knowledge. While the older generation had lesser choices and also a stronger communitarian spirit, the younger generation seems to prefer a more remunerative choice, which can compete with other available alternatives (Gupta, 2001)

Strategy 6: Formation of the Zimbabwe Knowledge Information Network System to collect and disseminate information on IK for DRR.

Local authorities also have a role in facilitating community organisation and can provide help in the inclusion of IK. The findings have shown that IK indeed originated within communities, based on local needs, and specific to culture and context, provides core knowledge with flexibility for local adaptation for implementation, uses local knowledge and

skills, and materials based on local environment, has been proven to be time tested and useful in disasters and is applied or applicable in other communities or generations.

8.7 CONCLUSION

The discussion in this chapter centred more on the complexities in DRR policy formation and the process that facilitate the inclusion of IK into policies. In Zimbabwe policies have a scientific and bureaucratic approach with no input from rural communities. Failure to consider rural communities inputs renders policies misdirected. The various policies that hinder the use of IK and participation of rural communities have been discussed in section 8.2.1. These policies actually results in rural communities disempowered for they do not allow engagement in collaborative decision making related to disaster risk. Suggestion of how IK can be included has been highlighted. It has also stated that when organising local people to enhance DRR activities, traditional skills and knowledge that is embedded across the gender divide in that particular community should be used effectively. This may end up improving prospects for community empowerment and self-reliance. The adoption of the bottom up participatory approach also encourages the highest level of local participation in DRR designed projects for the rural communities. Incorporating IK into DRR policies can lead to the development of effective strategies that are cost effective, participatory and sustainable. Chapter 9 presents the conclusions and recommendations emanating from the study. This is also done through the outline of the inclusion of IK into DRR policy resulting from the theoretical and empirical perspectives of the study.

CHAPTER 9

CONCLUSION AND RECOMMENDATIONS

9.1 INTRODUCTION

Living with the ongoing disaster risk is a reality for residents of Mangwe, Lupane, Hwedza and Guruve. Disasters that occur in these districts bring about significant economic loss, personal and community hardship, and many activities from government agencies and other development agencies to reduce vulnerability. The success of vulnerability reduction efforts that are technocratic and always given from those with political power have had limited success. The theoretical framework of the vulnerability approach to disaster risk emphasises a need to look at broader conceptualisations of how communities become unsafe, including looking beyond the threat of exposure to investigate social sources of vulnerability. These sources of vulnerability are found in how people actually live within their communities, and the social, economic and political processes that impact the choices they make to avert disasters. This study looked at IK processes through exploring how community and institutional perspectives and values are implicated in addressing vulnerability. To that end, the following objectives were completed:

The first objective, IK was identified and defined within the international and Zimbabwean context in chapter two through literature review (see Table 2.3 section 2.4.2 and section 9.2 of this chapter). Further to definition from literature review, participants in the research also provided their understanding of what IK entails to them in their respective districts. This was done to explain the meaning of IK in Zimbabwe. The clarification of the meaning of IK in Zimbabwe also helped to address issues of categorising IK to determine its applicability to DRR, regardless of its unique characteristics (see section 9.2.3). Chapter two and three had an in-depth and exhaustive examination of the main models that explained IK practices for vulnerability and DRR and a summary is given in section 9.2.2. Chapter 5 described the various ways IK currently feature in various policies in Zimbabwe and identification of the elements informing and guiding the current DRR policies /policy statements (see section 9.2.1). Empirical data in chapter 7 section 7.3.11 examined the sustainability of IK systems in relation to policy formulation in the DRR field in Zimbabwe. The Conclusions related to the objective of the inclusion of IK into DRR policy for Zimbabwe is presented in the whole of chapter 8.

9.2 OBJECTIVES REACHED

In conclusion major broad recommendations are made to aid in addressing inclusion of IK into DRR and vulnerability reduction and further areas of research are discussed including concluding remarks.

9.2.1 Objective 1: Explain the meaning of IK in Zimbabwe entail

The achievement of this objective was through dialogue with research participants on what they do when dealing with disaster risk. Rural communities showed that they use inherited IK, to observe their surroundings using plants (environmental ethic) and animals (ecological ethic) (K1, K2) to develop indicators that can be used to predict disaster risk. Those with architectural skill and abilities use it to construct infrastructure that will reduce risk associated with identified disaster risk. Structural and non structural measures are applied in many parts of the country for disaster risk aversion. Communities have various experts ranging from herbalists, traditional healers, insects gatherers and livestock specialist with skills that are used when disasters strike. The research empirical findings established that in Zimbabwe IK forms the base for survival strategies and decision making for rural communities. Rural communities have a large and diverse body of IK for DRR based on traditional wisdom (see sections 7.3.3; 7.3.4 and 7.3.4 in chapter 7). These findings are consistent with literature, which defines IK as experience-laden; practice-oriented and culturally embedded, and more holistically oriented (Berkes, 1995; Donovan, 2010). IK is spiritual, holistic, ethically based and intuitive, hence it has a large social context for the individual is treated the same as his surrounding, no separation from relations between human and non human entities (Mercer, 2012). IK integration of beliefs and practices form is very strong.

9.2.2 Objective 2: Determine IK impact on DRR policy formulation in Africa and other parts of the globe

This objective was achieved using literature review and partly empirical findings. Literature review revealed that many communities in the Americas and Africa are still relying on IK for many activities for their livelihoods. Empirical findings presented in chapter 7 confirmed this

assertion. Pidatala and Khan (2003) posited that in India women plays a major part in the use of IK in animal husbandry as they are responsible for collecting fodder for cattle, milk them as well as well as gather, dry and use cow dung for energy purposes. They also play a vital role in post-harvest operations and storage of grains (Pidatala & Khan, 2003). The World Bank (2001) findings from other African countries also confirm IK vital role played by women in assuring food security.

In Lesotho and other parts of rural South Africa, the production of sorghum plays an important role in the social, cultural political and economic arenas is very rich in IK for the preservation of seeds and soil preparation. This has an implication in minimising the impact of climatic hazards, pest control, storage and harvesting among others (World Bank, 2001; South Africa Department of Agriculture, 2002). However it has been noticed that IK is silent in most policy documents. With the exception of South Africa that has IK well pronounced in its policy document, other SADC countries have tended to work with relief codes and with an approach of being prepared for delivering calamity relief (Manyena, 2013). The emergency response systems based disaster management models adopted from the west have generally overshadowed the DRR aspect of disaster management, and particularly IK within DRR. IK has not been harnessed to fit into the current scientific framework for DRR (Wisner, 2004; Donovan, 2010; Mercer, 2012). As a result, there is a general lack of information and understanding of the need to integrate or mainstream IK into DRR. To achieve this integration would require a blend of approaches and methods from science and technology and from IK (Baumwoll, 2008).

Literature review in chapters 2, 3 and 4 including empirical findings has evidence indicating that communities are aware of IK technologies and have implemented successfully in a number of communities in Africa and beyond.

9.2.3 Objective 3. Examine the main theories, models and practices explaining IK

Literature review was used to achieve this objective by making a detailed analysis of theories and models on DRR in chapter 4. There are various models that explain IK importance for DRR even though they do not look into its inclusion into DRR policy. Some of these models include the ecosystem that seeks an appropriate balance between the conservation and use of

biological diversity in areas where there are both multiple resource users and important natural values (Sudmeier-Rieux *et al*., 2006). This observation make the model relevance to this thesis as the areas of study has very active in farming communities, forestry, fisheries, protected areas and cultural practices among many other fields. Ecosystems matter to DRR. Gaillard (2010) asserts that ecosystems can be managed to lessen disaster risk more effectively. Ecosystems supply valuable protective services, including buffers like forests, wetlands and wildlife (Sudmeier-Rieux *et al*., 2006; Wisner, 2010, 2014). The ecosystem model is also linked to the sustainable livelihoods model for they open up many option with regard to livelihoods. Communities can be able to use their IK to tap into the available livelihoods in the ecosystem such as hunting, farming, recreation and so on (Baumwoll, 2008). The use of IK among communities within an ecosystem improves the social well being thus resulting reduced vulnerability to disaster risks. The IK for DRR Model is also a model that advocates for integrating knowledge, actions and stakeholders for DRR. DRR (Gaillard & Mercer, 2012) recognises that there are different forms of knowledge valuable in addressing disaster risk. This observation is consistent with the empirical findings shown in Table 7.4 and 7.6 of chapter 7. Tibby *et al*. (2008) further asserts that actions at different scales, from the top down and from the bottom up, are necessary to reduce the risk of disaster. DRR requires a large array of stakeholders operating across different scales to collaborate. The road map for the integration of IK into DRR put more emphasis on horizontal process (Gaillard & Mercer, 2012). They also advocate the integration of IK with scientific knowledge since scientist and geographers dismiss IK (inside knowledge) as inferior to (outside knowledge) scientific (Wisner, 1995; Mercer, 2012).

The main models in support of the inclusion of IK into policy are those that point out that DRR requires a large array of stakeholders operating across different scales to collaborate. The models put more emphasis on horizontal process and also advocate the integration of IK with scientific knowledge. Indeed in DRR there are many stakeholders who possess various kinds of knowledge as already noted in chapter 7 Table 7.6. Most of the stakeholders are not scientist or experts as labels given to scientists symbolising authority and prestige. Those that have IK do not have any label, but they are knowledgeable. The integrating knowledge, actions and stakeholders for DRR model, ecosystem model and the Integrating indigenous and scientific knowledge bases for DRR model have some recognition of IK but they fail to promote the inclusion of IK into policy. However they tend to acknowledge that IK is very

critical for DRR and those that have IK should be considered in decision making. IK is validated and verified with those that use it unlike western scientific knowledge that is validated by the global community who has nothing to do with what happen in a particular locality. IK is also continually evolving through internal creativity, experimentation and contact with external systems and knowledge. IK has demonstrated a movement away from top-down technological focused solutions to the more context specific 'local' solution (Agrawal, 1995). Local communities in disaster risk prone areas often initiate own distinct ways of addressing disaster risk. It therefore makes sense that local communities should be the prime stakeholders of DRR. The models identified above have some benefits for the thesis in identification of IK used by communities to deal with disaster risk in Zimbabwe, with an ultimate aim of establishing how this knowledge could be included into DRR policy to further reduce vulnerability.

9.2.4 Objective 4: Explore specific categories of IK can be identified as valuable to DRR and applied to a community, regardless of its unique characteristics

The research empirical findings came up with various domains of knowledge discussed in detail in sections 7.3.6; 7.3.7 and 7.3.10 of chapter 7. The domains are very useful in DRR since communities are using the knowledge for their self-sustenance. The inherited knowledge (K1) and knowledge commonly known and practised by all (K2) proved to more valuable in all the districts studied. Other domains also that emerged are document (K3) and knowledge practised by individuals but known to the community (K1-1).

9.2.5 Objective 5: Describe the ways IK currently feature in various policies in Zimbabwe

The objective was achieved through an in-depth analysis of policy documents as presented in chapter 5. The analysis revealed that IK does not feature in any of the policies presented namely the natural resources policy, drought policy, DRR policy and land policy. The only policy that IK featured according to Mawere (2013) in Zimbabwe was the Tribal Land Act of 1979 that was repealed in 1982. The policy aimed to put in place the Communal Land Act of 1982. The aim of the Communal Land Act of 1982 was in way to review common property rights. When the policy was repealed it gave way to the formation of the Communal Areas

Management Programme for Indigenous Resources (CAMPFIRE) initiated within the Zimbabwe's Department of National Parks and Wildlife Management (DNPWM) (Mawere, 2013). The custody to manage resources responsibly was now with rural communities who had total knowledge of their environment (Mawere, 2013). The CAMPFIRE collapsed after the government of Zimbabwe failed to hand over power to traditional leadership. Without power, traditional leaders were not effective in executing their mandate to manage natural resources effectively (Rukuni, 1994). The government reasons for failure of the CAMPFIRE were in adoption of modern science as the only way in management of the environment. The current thinking in the Zimbabwe government is still biased towards scientific paradigm at the expense of IK. Science is the only way to policing environment issues and DRR issues in Zimbabwe not IK. The connection of rural communities with ecologies is viewed as useless regardless that rural communities possess abundant knowledge as demonstrated in this research study. Other policies as well like the 1998 national policy on drought management does not show the relevance of IK and it not known at provincial level (PA) including the head of Environmental Management Agency (EMA) (Mawere, 2013). The fast track land reform saw the policy being abandoned. The traditional leaders were not consulted and the policy failed.

The policy arena based on this analysis shows that there should be thorough consultation between many sectors and institutions. Zimbabwe has continued to look down on IK in the policies discussed above in development of its policies as exemplified with the environmental and drought policies. This is despite that these policies are national policies that should be aiming to revive traditional practices that help to solve challenges experienced by rural vulnerable communities.

9.2.6 Objective 6: Identify elements that inform and guide the current DRR policies /policy statements in Zimbabwe

Empirical findings and the literature review addressed this objective. The literature review revealed that policy-makers have given primary attention to the outcomes and suggestions of the hazard paradigm (Gaillard, 2010). Policies in many parts of the world (Gaillard, 2010) still rely on command and control and top down frameworks that emphasise scientific knowledge. Empirical findings also showed that the current policy in Zimbabwe for DRR

also subscribes to this paradigm hence the need to influence the inclusion of IK. Extension workers from various government departments (agriculture, health, veterinary services) and other development agencies working with rural communities rely more on science and shun IK. It is only in international arena where policy makers have considered ideas from the vulnerability paradigm (GNDR, 2011; IFRC, 2011). The Hyogo Framework for Action (HFA) is a result of these developments of international policy documents, which are not binding treaty. They do not have concrete targets and thus remains vague to entail concrete outcomes at the national level (UNISDR, 2005).

Civil society, DRR practitioners and NGOs have reacted to these dominant technocratic policies advocating for increased involvement of those affected by disasters in policy and actions towards DRR (DRR) (Marsh and Buckle, 2001; Delica Willison & Gaillard, 2012). Voices have called for recognising local people and communities (for definitions of communities in the context of DRR (Delica Willison & Gaillard, 2012). Local communities are being seen as not helpless in facing natural hazards and that local knowledge is a valuable resource (Anderson and Woodrow, 1989; Maskrey, 1984, 1989). These movements have thus pushed for community-based DRR (CBDRR). The CBDRR is now a practice that has gained momentum worldwide (Heijmans, 2009; Pelling, 2007).

9.2.7 Objective 7: Examine the sustainability of IK systems in relation to policy formulation in the DRR field in Zimbabwe

Empirical findings and in part literature review addressed this objective. IK is sustainable for it is always evolving. Section 7.3.11 in chapter 7 provided a detailed discussion on sustainability of IK. Some of the IK technologies that have been in practise in the past are still used today in Mangwe, Guruve, Lupane and Hwedza as evidenced by the photographs presented in precedent sections. This is due to the methods of IK transfer and resilience of IK including rural communities. Dialogue with participants in all the four districts revealed that storytelling is an important aspect of IK as it embodies life's lessons and shows how knowledge is transmitted to all. Stories (K1) are the cornerstone of vulnerable communities' culture and an essential part of learning to ensure survival into the future. Stories are told to convey several different lessons depending when and where they are told and by whom (K1).

Storytellers are no longer old people but middle aged elders who are now the living repositories for all current challenges. The stories provide lessons that apply in the present; but they also connect the past to a way of life. Stories have many layers of meaning, giving the listener the responsibility to listen, reflect and then interpret the message. Stories incorporate several possible explanations for phenomena, allowing listeners to creatively expand their thinking processes so that each problem they encounter in life can be viewed from a variety of angles before a solution is reached. All people, young and old, love stories. Community gatherings open with a prayer, song, or ceremony to symbolise cleansing the mind/body/spirit to get ready to listen in the manner described above. The (*Zunde, Nhimbe)* are IK concepts where communities work as partners with joint ownership. The concepts are also used as farmer field school for acquiring skills, sharing IK information and knowledge for DRR.

Traditional chiefs and village elders observed that the concept *Zunde* in Shona or *Isiphala* in Ndebele constitute an informal, in-built social, economic and political rallying mechanism. It allows the traditional chief to have control over people under his jurisdiction and share his views among the community. The *Zunde* is used by the chief as rallying mechanism over his area of jurisdiction thus securing their safety. It s revival in the four districts also guarantee sustainability of its practice in the country. The *Zunde* practice is consistent with many communities in Zimbabwe. *Zunde* agricultural practice has withstood the test of time and is not outdated regardless of the socio economic and cultural changes that Zimbabweans have gone through. The practice instils hard work among all members of society that include children and women. The *Zunde* practice does not hold that women and children should not work but take into consideration their knowledge during implementation phase. These IK practices are in a way ensuring the sustainability of IK for it is still being cascaded to wider community groups both men women and the young. As was observed rural communities had more old and young populations.

Indigenous communities have their own tools for DRR practices including transmission of information for prevention, preparedness and recovery. The participants identified the tools as religious ceremonies (*bira, mukwerera*), livelihoods practices (see sections on beekeeping, *Zunde* concept), oral storytelling and experiential instruction (K1, K2, K3). These forms for DRR are among some of the means that inform and guide DRR in the vulnerable

communities in the study areas and still in use. Traditional leaders and participants drawn from all the study sites concurred that IK can only be understood through the traditional teaching methods like ceremonies, apprenticeship including experimental practice of the particular community where the knowledge comes from or originates. The threat to sustainability of some of the IKs is due to mixture of many tribes with different belief systems especially in many parts of the new adopted resettlement villages due to land invasion in most parts of the four districts. The most affected districts being Lupane and Hwedza. The people in these new areas do not get support from traditional leaders, government and NGOs. IK technology for making manure in the resettlement areas has found few takers as some have not accepted it due to their beliefs in use of modern fertiliser. IK skills for technologies that are abundant in all communities are not practised all fort some participants felt they are no longer compatible with modern ways of crop farming.

IK in rural communities is shared among people and empirical findings show that traditional leaders work to increase the influence of a wide range of stakeholders within their communities. This is seen in rainmaking ceremonies of which the *Zunde/Isiphala* concept or the *Nhimbe* concepts are some vivid examples. There are challenges with regard to government, which tends to promote scientific and technocratic solutions. Influencing the process that include IK under the leadership of the Provinces are generally not considered successful due in part to public participation processes that are perceived as flawed, and lack of resources and expertise at a local government level. Rural communities strongly believe that decisions regarding DRR are made in well in advance of public participation processes hence public participation activities are more symbolic than substantive. That said, however, this research also revealed an important trend in public involvement in decision making through IK events that share ideas, skills and build rural communities capacities to deal with disaster risk (see sections 7.3.8; 7.3.9; 7.3.9.3 and 7.3.9.4 of chapter 7). The IK for DRR Model discussed in detail in chapter 5 sections 4.8 also advocate for integrating knowledge, actions and stakeholders for DRR. That said the research proposes some recommendations that help inclusion of IK for DRR.

9.3 RECOMMENDATIONS

The final objective of this research was to provide recommendations. Out of this study of the inclusion of IK into DRR policy for Zimbabwe come some lessons with wider applicability in other contexts. Thus there are quite a number of recommendations provided in this section.

9.3.1 Recommendation 1: Develop institutional linkages reinforcement between DRR and Rural sectors to facilitate the inclusion of IK into DRR policy (local government, village assemblies, traditional leaders, IK experts as presented in table 7.6 in chapter 7)

DRR has to be built in as part of the day to day management component for rural communities and thus it cannot be institutionalised to ending up as one isolated department. One should realise that disasters are so closely linked to social and economic and human dimensions of rural people well being. These aspects cannot be managed in isolation. Therefore, an inter-disciplinary coordinating mechanism is suggested to take decisions pertaining to DRR starting from mitigation, preparedness and recovery aspects. The mechanism can be institutionalised at the district level.

9.3.2 Recommendation 2: Develop DRR strategies for rural communities through rural livelihoods regeneration and revival

The livelihoods of rural communities from the empirical findings suggest that agriculture (land, crop and livestock) provide rural occupations and IK base. IK technologies for DRR can start from this sector but also taking into consideration that the technologies are sustainable and within reach for many communities. The strategies highlighted chapter 8 (5 and 6) there is need to incentivise and protection of IK holders with skills and expertise (herbalists, healers) to safe guard the loss of these to outside pressure. This will result in strengthening existing capabilities of rural communities.

The findings have also demonstrated that IK skills and resources many of them have the potential to reduce the disaster risks such as drought, floods, insects manifestation, animal diseases among others. Thus, the policies should be formulated for regeneration. This should

not be done for mere preservation of IK skills and resources but implementation to help rural vulnerable communities. IK is very important for sources for livelihoods that are critical in the disaster reduction and linkages for keeping culture intact and ecological preservation as explained in the ecosystem model in chapter 5 section 4.4 and figure 4.5. The most important aspect that should not be looked down upon is availing rural communities' access to resources that generate livelihoods like land. The real stakeholders (rural communities) should enjoy the benefits of such developments not the middleman. Land is constantly being lost when it is a very crucial resource for DRR through corrupt practices.

9.3.3 Recommendation 3: Improving quality of education and incorporating IK for DRR in the education curriculum to revive IK technologies

The education sector is critical for DRR and development of IK. IK should be taught from primary school up to university level. The research findings have brought out that lack of education and the looking down upon IK technologies and practices indirectly makes rural communities vulnerable to disasters (see figure 8.1 above). Hamdi (1996) and Edwards (1994) assert that linking theory and action is very crucial for research to be worthwhile stressing the important linkages in understanding and action. According to Edwards (1994) expert knowledge and understanding is prerogative of universities and studied in abstract from processes so that action is not divorced from understanding reality. Hamdi (1996) put emphasis on the thinking that there should be promotion of a variety of learning and teaching settings that explore ideas to devise new practices and moving away from reductionist and critical research. With this in mind, the author proposes some strategies for improving DRR policies and practices in Zimbabwe. These point to the essential shifts in the existing policy approaches so that vulnerability of rural communities can be effectively reduced through the inclusion of IK in the context of Zimbabwe. The findings that revealed the enormous wealth of IK, skills, resources and capacity of rural communities to reduce disaster vulnerability is the underlying basis for these suggestions. The decisions makers can actually rediscover, built upon, explore and regenerate at any level be it strategic level or practical level for reducing disaster vulnerabilities.

IK especially K1 is inherited hence communities just implement it without knowing why they do things the way they do. Education can come in and address such gapes from young age in

primary school. Literacy programmes that are initiated by the Government may not actually help beyond enabling people to read and write (sign). A well formulated education rooted in IK cultural context, should be given an opportunity. Rural communities' conscious of their values and thinking processes *vis à vis* external ones should be looked into and applied. Communities' actions and taking control of their own lives is through a well developed conscience that can be achieved through education. This can be done by documenting IK that is coming out from research and that which has survived in heritage records. Educational institutions can start incorporating IK in their studies especially geography, building, science, home economics and so on to generate interest in local skills and practices.

The inclusion of IK should not be romanticised but has to avoid some of the weaknesses and outdated aspects that increase vulnerability as shown in the model 8.1. Experts from both the academia and community (traditional leaders, elders, healers, herbalist) can take a lead by performing the role of 'training the trainers' among the community. Other sectors can also play an important role in this such as CBOs and NGOs. Local governance can take over when it is sustainable to do so.

9.3.4 Recommendation 4: Establish platforms that encouraging community involvement for them to share the use of IK practices for DRR

The study recommends establishment of platform for sharing IK practices for providing a more realistic and local-specific strategy since the community understands their situations due to past disaster experience. The inclusion of this IK into formal DRR policy that use IK can be on the basis of increased successes of IK technologies like Zunde, beekeeping, food security practices, livelihoods and many others described in chapter 7. These can be cascaded to other areas that have similar cultural practices. Embedded within this should be promotion of use of local resources and pooled labour to address challenges of labour intensity. The IK framework for reducing vulnerability in the context of rural communities of Zimbabwe requires moving from external resources to local resources in skills and technologies for DRR. The establishment of Platforms for sharing ideas and skills might take the form of creating appropriate structures at the community level, through which people can participate effectively in the decisions that affect their lives. Community based approach, which aims to understand the way communities deal with different disasters, their level of understanding of

disaster, and their capacity to manage it in an effective and sustainable manner, would be the best way to implement DRR programs. Community participation should not be viewed only as a consultation process, or using committees of inquiries but also as an effective empowering process to address the root causes of vulnerability.

9.3.5 Recommendation 5: Development of strong Rural Communities' governance structures

The development of governance structures can be a starting point for rural communities to engage at their level and show they are serious about their practices. For example traditional chiefs that were instrumental in the revival of the Zunde raMambo concept emphasised that it has to be cascaded to the village and later households. Instead of the concept remain into one field that is of the chief, there will be villages' Zunde and household Zunde. For such process to be adopted it requires strong governance structures that would lobby the government for its implementation. Empirical findings demonstrated that some villages chose not to use IK due to the notion it is outdated or some organisations would help when disaster strike. Those rural communities that use IK practices did it for their own private lives and or mainstream livelihoods. This may imply that engagement with government agencies or any other agency becomes a struggle due to lack of consistency. Strong governance structures at community level can also leverage on the degree of empowerment of traditional leader who can influence conservation traditional values and practices. Policies that support traditional institutions and empower traditional leaders can strengthen knowledge of, and respect for, traditional sacred sites.

9.3.6 RECOMMENDATION 6: GRANT TRADITIONAL LEADERSHIP AUTHORITY AND POWER

The process for DRR should be led by traditional leaders and most importantly, vulnerable people. Traditional leaders have inherited knowledge (K1) hence they can only be central to the DRR process when they have power so that they can lead information gathering and DRR activities. Granting authority and power to traditional leadership in rural communities could be empowering even for older people and for women, whose specialist knowledge would be important for DRR. Some important role of leadership is to openly dialogue thus granting

power and authority to traditional leaders may assist in this respect. Leaders are the ones who typically manage information that informs decision making processes. Rural communities with their own committees, and community networks of individuals in different locations could have responsibility for monitoring the local signs at certain times of year, and communicating the information in an appropriate way under their own leadership.

To make the recommendation acceptable so that it can work, it is evident some activities must be combined with increased government responsibility for many powerful people, including some local government officials, have an interest in preserving their status quo. An important step toward empowering traditional leaders with respect to land use decisions involving sacred forests and other areas is to inform modern political leaders-District-level officials, District Council members (the ward councillors), and chairmen of the WADCQs and VIDCOs-of the locations and boundaries of sacred sites. In doing so however, the caveat mentioned above regarding the potential benefit of the traditional flexibility of "sacredness" should be kept in mind.

Issues of controlling resources, cultural compatibility and sustainability of livelihoods, equity, empowerment and governance have an effect of IK use for DRR and should be taken into consideration into policy formulation. These issues are some of the challenges of dialectical nature for reducing vulnerability of communities to disaster risk of any kind within their communities.

9.3.7 Recommendation 7: Developing IK capacity

The empirical findings demonstrated the capacities of rural communities and how they can predict disaster risk using plants and animals and practices for reducing vulnerabilities. Capacity becomes a very important component in DRR for IK skills can then be developed. IK is a result of rural communities using their capacity to develop skills. This research would suggest that beyond the obvious need for information related to IK for DRR, there is also a need for developing IK capacity and this can be through a broader educational component. Communities can be provided with the information and tools to project and address their vulnerabilities that emerge from multiple sources not simply vulnerability caused by exposure to disaster risks but other social sources of vulnerability. IK capacity can also be

developed through stakeholder participation in decision making. The Table 9.1 below provides some examples that can assist in this regard using empirical data in section 7.2.3 and 7.3 including Tables 7.1; 7.2.4 and 7.4.

Table 9.1 Examples to increase rural communities' IK capacity

Steps to be taken in Local DRR	**Steps to be taken in Local Risk Prevention**
• Investigate and define types of risk in • the local context (use IK) • Assess threats and vulnerabilities, including social ones • Recording information on families settled in risky areas using IK methodlogies. • Use IK to define local priorities to reduce vulnerabilities, with the participation of all sectors, including those that are not considered to be directly affected	• Carry out reforestation projects using taboos, beliefs • Undertake work to protect rural infrastructure using IK technologies • Pass local administrative rules using IK, e.g. prohibiting sand extraction, tree cutting, the exploitation of community resources, construction codes based on IK technologies and beliefs
Steps to be taken in Local Risk Preparedness	**Steps to be taken in Local Risk Mitigation**
• Use of IK for hygiene, security, nutrition, etc. • Draft specific intervention plans for individual threats and risks (drought, flood, insect infestation activity alert plan based on IK) • Setting up and maintaining local early-warning mechanisms based on IK • Using IK games to carry out emergency situation trials during simulations • Inserting rural local disaster prevention plans into national-level plans	• Use IK informal education to raise awareness among the population, groups and organisations, on hazard risk • Use IK events and practices like *Zunde, Nhimbe, Mukwerera* to develop sensibilisation, "conscientisation" and capacity building activities for DRR • Use IK taboos, beliefs to pass local administrative rules, like in prohibiting sand extraction, tree cutting, the exploitation of community resources • Assume local responsibilities in DRR

IK skills can be developed with resources like wood, stones, grass, and land among others. The most valuable resource for IK development is the land. The land defines the relationships of rural communities for many generations and the cultural practices have determined people in particular context or relate to resources at their disposal. Deeply embedded world views also govern the relations of communities hence any changes on the land affect disaster vulnerability. The land is a collective resource and symbolic entity that has been preserved for many generation with its biodiversity to help mitigate disaster risk as well provide livelihoods and critical for IK capacity building.

There was a critical amount of IK present among the people, which can survive through various actions by the community, private and government sectors. A number of recommendations being proposed in this thesis for ensuring the survival of IK are that government policies and AGRITEX practices should promote the conservation and use of traditional foods, farming practices and medicinal use through closer interaction in developing concepts and technologies for rural communities. This may improve food security and human livelihoods. People should be encouraged to practise IK as this leads to renewed respect among local people for their own culture and technological expertise. Use of local knowledge may benefit DRR by providing more realistic evaluations of local needs, environmental constraints and natural resource production systems. These initiatives can aid capacity development for IK.

9.3.8 Recommendation 8: Preservation of the philosophy of IK transmission though models

It is important to recognise that philosophy is a key component in the transmission of IK. In other words, the how is as important as the what. The research findings in chapter 7 has shown that in traditional cultures, teaching and learning is through a means of observation, participation, experience, and practice in the performance of daily skills rather than through verbal instruction. The method called modelling, is grounded in culture and has relevance in DRR. Although it may not be totally relevant to learn exactly the same skills that were required in years past to survive, in the natural world, the modelling approach remains relevant for teaching skills that are essential for DRR.

Modelling approach is culturally relevant and would be keeping with IK perspectives. In all the four districts it was evident that there are several important considerations when including IK transmission. The role of family and extended family in the teaching and learning context is central. The family includes extended members, who are aunties, uncles, cousins, and grandparents. Grandparents not only include immediate grandparents but their brothers and sisters as well. More recently the role of family has been impacted by modern influence and migration. Traditionally, the responsibilities of the kinship group were an important factor in maintaining and sustaining the culture of a people. This concept can be expanded into DRR for it is capable of providing all the knowledge and wisdom for DRR.

9.3.9 Recommendation 9: Establish or strengthen the legislative/legal framework and mechanisms.

Public policy requires the participation of many actors and stakeholders for decision making regardless that executive power for responding is required as suggested in the IK Model for integrating knowledge, actions and stakeholders for DRR figure 4.6 in chapter 4. The reasons are that issues of DRR applications should be motivated and based within governmental responsibilities. There is also a need to decentralise DRR responsibilities at the local community level were the vulnerable can apply their knowledge. DRR to be successful, it has to be applied at local or community level (Baumwoll, 2008).

Because traditional religious values, taboos and IK beekeeping practices appear to have motivated forest protection in Hwedza, Lupane and Mangwe, and because the power of traditional leaders seems to be related to rates of forest loss, the conclusion is that to conserve forests, a strategy that links the conservation of culture and nature is more likely to be effective than a strategy that ignores traditional beliefs, values, and IK institutions. This strategy of working directly with the traditional leadership to reinforce customary laws for forest conservation provides an interesting contrast to the other districts, in which modern legal approaches were proposed, such as passing by laws at the district level to create botanical protected areas.

Final comments on recommendations are that disaster risks in the four districts studied will persist. There is likelihood of more challenges to be faced as resources are depleted, populations increase, climate change impacts are more evident resulting in rural communities struggling with many social and livelihood changes that impact their resilience. However, IK vulnerability approaches and the suggested recommendations are accepted and implemented; they may offer not only new ways of conceptualising the problem of DRR, but keys to the solution. Disaster risks are in part human-made and can also be ameliorated wiselythrough well thought better decisions. This research challenges Mangwe, Lupane, Guruve and Hwedza communities and decision makers to better anticipate the consequences of their actions in the land to make vulnerability reduction a societal value.

The research on the inclusion of IK into DRR policy had a great impact of the researcher. The next section presents research process impact to the author.

9.4 CONTRIBUTION OF THE RESEARCH

The results of this research study have both a theoretical and conceptual significance. Contributions to conceptual knowledge were made through increased understanding of the progression of vulnerability in four districts studied and a framework was developed adapted from the PAR model of Wisner *et al*. (2004) presented in chapter 4 (see figure 8.1 in chapter 8). This framework, developed from the findings of this case study, adapted the PAR model. The model normally presented within the context of developed nations with economic, social and political circumstances differ from that of a developing country like Zimbabwe, which makes it a unique application. Hazards research particularly concerns itself with the search for explanations for adjustments to the risk of future disasters (Mileti, 1980).

The review of IK decision making, and findings related to community and institutional perspectives and values, highlighted current IK practices for DRR that are used in rural communities in Zimbabwe. The study also identified some of the inherent weaknesses of DRR policy for Zimbabwe if community resilience and vulnerability reduction are goals. The study builds on critiques of IK use in DRR; specifically, there is now a call for considering promoting IK as pointed out in literature review. Local communities in disaster risk prone areas often initiate own distinct ways of addressing disaster risk. The empirical findings have shown manifestation of IK used for DRR in rural communities in Zimbabwe. These initiatives are when further analysed may or may not be beneficial for DRR (Tibby *et al*., 2008; Shaw *et al*., 2008, 2009). However, IK is a precious resource that can facilitate the process of DRR in cost effective, participatory and sustainable ways (Howell, 2003). This research confirmed the need for IK importance for its inclusion into DRR policy. It showed clearly that community and institutional perspectives and values related to DRR are dependent on a complex mixture of cultural, political, and economic variables that should be challenged if communities are to become more resilient to disaster risk. This study showed that systemic change will be necessary - at multiple scales, and with strong leadership. Otherwise, status quo decision making will continue and vulnerability to disaster risk will be attenuated as poor decision making practices continue.

Other contributions of the this research include the presentation of a number of community and institutional values, attitudes and motivations that directly impact preferences for certain types of mitigation approaches and preferences for certain decision making processes. The views of past and current practice within Zimbabwe that advocates for technocratic solutions to DRR were assessed. In the context of Zimbabwe four districts studied, the many of the contributors to vulnerability are less related to a lack of financial or livelihood options at household levels that is assets in the original model provided by Blaikie *et al*. (1994). Contributors to vulnerability are loss of sustainable livelihoods (land), loss of IK skills, lack of political clout, weak governance at local level, low desire to use IK practices as their belief IK is outdated among many other factors. Problematic attitudes and beliefs that were identified in the research included, for example, the general perception that vulnerability reduction is the purview of government agencies, that government will respond to disaster risk damages by providing large amounts of financial resources to restore a community to original status, and a preference for structural solutions to disaster risk over changing human behaviour in rural communities.

In critically assessing what communities do to address disaster risk, the most recent conceptualisation of vulnerability was adopted and applied using models discussed in chapter 3 and 4 paying attention to 'institutional treatment of risk', meaning that institutions such as government agencies construct knowledge related to disaster risk and relay it to the public in ways that fail to acknowledge IK practices used. Valuable empirical contribution of this work was in approaches that are used by rural communities in addressing many disaster risks they face using structural and non structural ways (see section 7.3.7 of chapter 7). Rural communities when faced with disaster risk make decision that are based on their acquired knowledge and implement to reduce vulnerability. Empirical findings also revealed the obvious that lack of acknowledging and community participation in policy prevent the use of IK practices in DRR. The importance of moving communities to increased resilience to disaster risk and vulnerability reduction makes them become politically legitimate (Pearce, 1997). When rural communities are empowered and become very proactive then risk reduction and vulnerability reduction become a reality.

The use of photography in the research was a successful innovation. There was an establishment of participants thoughtfully reflecting and selecting what to photograph in

capturing important IK practices that showed community characteristics and values. The photographs captured IK practices that help to inform about disaster risk and how rural communities deal with vulnerabilities (see photographs in chapter 7). The in-depth interviews transect walks and group processes deepened the researcher's understanding of community dynamics, fears, beliefs and judgments about disaster risk and exposed some of the community dynamics and conflicts related to DRR.

The research at community level provided the participating communities with an archive of photographs including the commentaries from interviews and focus groups. This was done to fulfil the promises that were made before data collection. The gesture may provide some point of departure in discussions of community futures in the context of disaster risk. Mileti, (1999) and Pearce, (2001) posited that community level communication and grassroots involvement related to disaster risk decision making is a means of creating more disaster resistant communities. Beer and Hamilton (2002), further assert that when one help communities to generate and share knowledge their own IK with regard to disaster risk it is an important step in ensuring sustainability. The author hope that photographs in traditional leaders homestead will provide some impetus for community level DRR and vulnerability reduction discussions with more bias on their IK practices and measures.

This study confirms that IK concepts, is illusive and slippery and not immune from what may be called the 'Social Sciences Disease of Definitions' (SSDD). It can range from meaning something to meaning nothing. Thus, IK construct can be viewed from a variety of angles rather than interactions from an integrated framework.

Lastly, this Doctoral Thesis has taught me that there are people out there willing to help others and that willingness, passion and desire for achievement, everything is possible in life and that life itself is a journey. How each one of us undertakes various expeditions in life is different and this has been my route that the Almighty chose for me and I complied. Opportunities for further research and innovation are so abundant.

9.5 AREAS FOR FURTHER RESEARCH

Research work is not complete in itself. Research questions arise from other research question, hence updating the wealth of knowledge has a process that is incremental in nature.

The thesis findings enabled the researcher to uncover other areas for further research and these are suggested as follows:

- The documentation of IK on reasons for various technologies is implemented for DRR and their implications should be studied over time, perhaps through longitudinal research approaches. This would enable to determine implications over time periods.
- The relationship between DRR and resources emerged as a very significant research finding in this work. Further research work can be carried out and explore in what ways the relationship between disaster risk change issues of resources situation. Questions such as, how does finding resources result in vulnerability in Zimbabwe?
- A detailed research study in treatment and preservation of seeds, IK conflict resolution that contribute to DRR in each cultural district is suggested for Zimbabwe. The ultimate goal will be to create an IK bank as there is evidence from this thesis of the disappearing cultural heritage. As already discussed in chapter 6, ethnography is cumbersome, many researcher can contribute in the study with assistance from students in the IK field.
- Research studies on IK can be undertaken by other qualitative researchers looking into other untouched characteristics of vulnerable rural communities.
- Development of indicators can also be done that would be used to test a particular context such as livelihoods sustainability, governance, cultural continuity and compatibility, material resources and the land control among others. Professional researcher may team up and carry out research work in any of the identified areas.

9.6 CONCLUDING REMARKS

Traditional communities rely on IK. However while IK is of great importance in the lives of the communities studied in all the four districts of Zimbabwe, little has been done to document it. It has been handed from one generation to another through orally. It is evident that IK practices in Hwedza, Guruve, Mangwe and Lupane have been employed successfully in addressing food insecurity and many other types of disaster risk. However, it is important to note that not all indigenous practices are beneficial to disaster management of a local community; and not all IK can a priori provide the right solution for a given problem. Any practice should be scrutinised for its appropriateness, just like any other technology.

The preservation and protection of indigenous people and their knowledge is recognised in this thesis as a means to achieving disaster reduction. However, much still needs to be done at the policy levels to enable genuine and sustainable participatory processes of engagement of a multiplicity of knowledge systems. IK is widely being abandoned by the elite in Zimbabwe as was observed during data collection. Government employees resort to alien and "modern", but unsustainable DRR values and practices. There is therefore an urgent need to nurture IK policies that form the backbone of IK in Zimbabwe. Rural communities, the governments and development agencies should revitalise and reengineer DRR policies, legal and institutional frameworks at the central and local government levels, and traditional institutions to support a vigorous promotion and development of IK. These measures should be backed by appropriate research to document pertinent information and define effective educational programmes to increase awareness and understanding on the subject. This process must be participatory and involve all stakeholders.

In bridging knowledge systems to solve real world problems, there is a need to ensure that the issues addressed and contexts in which knowledge is applied are those important to indigenous peoples, not just to science. This may mean engaging communities as much about their social and political knowledge as their ecological knowledge, and enabling them to position that knowledge. Most importantly, there should be insistence that vulnerability to various disaster risks is an issue worthy of ongoing scrutiny and cooperative planning to improve decision making in hazardous lands and use IK capacities to cope and adapt effectively over the long term.

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APPENDIX A: RESEARCH DATA COLLECTION LETTERS

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

AFRICAN CENTRE FOR DISASTER STUDIES
Research Focus Area: Social Transformation
North-West University
PUK Campus
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2520
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2 November 2011

TO WHOM IT MAY CONCERN

MR WILFRED LUNGA: Permission to collect data

Mr Wilfred Lunga is currently an enrolled **PhD student** in the Programme: **Philosophiae Doctor in Development and Management** (Disaster Studies) at the North-West University (Potchefstroom Campus).

The title of his thesis is:

THE INCLUSION OF INDIGENOUS KNOWLEDGE SYSTEMS INTO DISASTER RISK REDUCTION POLICY IN THE CONTEXT OF CLIMATE CHANGE: THE CASE OF ZIMBABWE

In order to complete his thesis the candidate must conduct a substantial part of empirical investigation and fieldwork in the country, Zimbabwe. It would therefore be appreciated if Mr Wilfred Lunga could be permitted to collect the necessary data in order to accommodate the abovementioned. Mr Wilfred Lunga has the necessary orientation, motivation and capacity to deal responsibly with confidential information.

Your kind consideration of this request will be greatly appreciated.

Yours sincerely,

Prof. Dewald van Niekerk
Director: African Centre for Disaster Studies
North-West University

MINISTRY OF LOCAL GOVERNMENT URBAN AND RURAL DEVELOPMENT

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DEPARTMENT OF CIVIL PROTECTION

Reference : *Y/CP/2*
Date : *9 June 2012*

Wilfred Lunga
12 Cinnamon Close, Coline Valley
Chisipiti , Harare

Dear Sir,

SUBJECT: PERMISSION TO COLLECT DATA FOR PHD RESEARCH STUDY: TITLE OF THESIS IS: THE INCLUSION OF INDIGENOUS KNOWLEDGE INTO DISASTER RISK REDUCTION POLICY FOR ZIMBABWE

The above matters refer.

Reference is made to your request to carry out field study on Indigenous Knowledge in Mashonaland Provinces in Guruve and Hwedza districts and Matabeleland provinces Lupane and Mangwe districts for your PhD at the North West University, Potchefstroom campus. I am happy to grant you such permission for the said purpose and will support you should you need assistance.

M.S.Pawadyira
Director Civil Protection

MIN. OF LOCAL GOVT. PUBLIC WORKS AND NATIONAL HOUSING
DEPT. OF CIVIL PROTECTION
20 JUN 30
P. BAG 7706, CAUSEWAY
ZIMBABWE TEL: 04-791287

APPENDIX B: INTERVIEW GUIDE QUESTIONNAIRE FOR TRADITIONAL LEADERS, DISTRICT AND PROVINCIAL (KI)

(As the interviewer, introduce yourself, explain the objectives of the interview, and request the respondent's consent to be interviewed. Note the respondent's name, position, and job title; describe his or her duties; and enter the institution's name and location and the date of the interview.)

My name is Wilfred Lunga. I am a PhD student studying at North West University Potchefstroom campus in South Africa. The title of my research study is the Inclusion of Indigenous Knowledge into Disaster Risk Reduction (DRR) Policy for Zimbabwe. You/ your institution have been identified as key in this process and Iam kindly requesting your participation in the study. The results of the study will only be used to inform DRR programme particularly shaping interventions in your community and in Zimbabwe DRR programmes.

BASIC DATA

1. Name of the position/institution/agency/Community: ----------
2. Age category

    1= 18-35 years
    2= 36-50years
    3= >51 years
3. Family size
    1= 1-5
    2= 5-10
    3= >10
4. Gender
    1=Male
    2=Female
5. Please indicate your level of education:
    1=No formal education
    2=Primary Schooling
    3=High school
    4=College
    5=Graduate Degree
    6=Postgraduate degree
    7=Other
6. What is your ethnic group?

    1=Ndebele
    2=Karanga
    3=Zezuru
    4=Sotho

5=Tonga
6=Korekore
7=Manyika
8=Ndau
9= Kalanga
10=Other (specify)?

7. What is your religion?
1=Christian
2=Moslem
3=Tradition
4=Christian and traditional
5=Moslem and traditional
6= Other (please specify)

8. Which group would you place yourself among the following:
1=Farmers (Peasant using IK/modern using new technologies)
2=Traders (use barter/use modern methods of trade)
3=Village leaders,
4=Hunters (poachers/professional),
5=Herbalists,
6=Fuel wood collectors,
7=Wood carvers,
8=Gatherers (of fruit, snails, etc.)
9= Other (specify)

9. How long have you lived in this community? (year/s)
1=Less than one year
2=1-5 years
3=6-9 years
4=>10 years

10. What is the type of your shelter?

1=Traditional pole and dagga,
2= Shack rudimentary material/appropriate technology
3=Modern brick and zinc roofed)
4= Other (specify)

11. Which of the following are the most useful livelihood strategies in your household
1 = Indigenous Livestock farming (Hard Mashona, Tuli, Nguni breeds)
2 = Indigenous Vegetable production (Nyevhi, Tsunga, Boora etc)
3 = Indigenous Crop production (Small grains e.g Rapoko, Sorghum, Millet etc)
4 = Hunting and gathering of insects, wild fruits, etc
5= Remitances
6=Self reliance, medicine man etc
7=Other (Specify…….)

BASIC DISASTER INFORMATION

12. What do you understand by the term disasters?

---

13. What hazards are commonly experienced in your community/district/ province?

(Identify as many as possible)

1=Drought
2=Wildfire
3=Windstorm
4=Floods
5=Human diseases
6=Extreme temperatures
7=Cyclone
8=Earthquake
9=Pests (Insects, locusts, Birds manifestation)
10=Livestock diseases
11=Industrial accidents
12=Road accidents
13=Lightning
14=Goblins
15=Wild animals
16=Others (specify)

14. What disasters has your community experienced in the past 15 years?

.....……

- *What were the noticeable impacts of these disasters?*
- *How have the people dealt with the disasters in the today and in the past?*
- *What more proactive measures can the communities/traditional leaders do to deal with such disasters in your communities?*

15. Describe any preparations that your community/ Civil Protection Department (CPD) / others organisations has done in anticipation of disasters.

Community……..……

CPD What sort of disaster-relief interventions has the area been getting from the community (Traditional leaders, other community members) and national government?

……..……

Others organisations……

16. Do you think disasters can be prevented? Yes/No

If yes, how?

…….....……

If no why?

……..…….....

17. Describe challenges you experience in getting disaster-relief interventions in this area?

……

……....

HOUSEHOLD ACTIVITIES AGAINST DISASTERS IN THE COMMUNITY

18. How have your household/community/ responded to or coped with disasters in the past?

.....

.....

19. What steps, if any, have you or someone in your household/community taken to prepare for any kind of a disaster?

CATEGORIES AND TRANSMISSION OF INDIGENOUS KNOWLEDGE

20. What do you understand by the term indigenous knowledge (IK)?

---

21. How do you know about indigenous knowledge?

1=Folklore
2= Spirit mediums
3=Traditional songs
4=Formal education (school/college/universi1=ty)
5= Informal education (friends, parents, associates)
6= Radio
7= Television
8= Internet
9 = Phone
10 = Experience (specify
11= Other (specify)

22. How is the traditional knowledge being transmitted? (Through what e.g. Observation, participation in activities, stories, songs etc., explain)

---

24. At what age are children/young people taught different DRR related activities? Divisions of tasks complexes by gender and age of learner.

Task	Sex		Age in years	
	Male	Female	Male	Female

25. How are young people taught about DRR issues?

1=Sequentially
2=Randomly

26. What IK do you use in the community? (Please tick)

Category	**Indicators**
1= Cultural tradition	stories
	songs
	Rituals (bira, mukwererera)
	Traditional games
	Livelihood
2=Connection to a place	Spirituality (midzimu) *Identity*……..
	Sacredness of place
	Feelings about place
	Cultural connection
3= Ecological ethic	Animal behaviours e.g. giving birth early or late
	Manifestations on plants
	Changes in the environment
	Occurrence of rare events
4= Environmental ethic	Harvesting medicinal plant using mouth
	Selective cutting of trees
	Minimum soil tillage
	Taboos/beliefs/customs

27. Which categories of indigenous knowledge identified above are the most valuable to DRR as applied to your community?
    1= Cultural tradition
    2= Connection to a place
    3= Ecological ethic
    4= Environmental ethic

28. How are you using indicators above in disaster risk reduction? (mitigation, preparedness, response and recovery)

---

29. Are there taboos and customs governing/controlling disaster events in the community?

    - Which taboos/beliefs and customs are strong and still adhered to today?
    - Mention and explain any DRR Traditional ceremonies/rituals, when are they performed and for what purpose(s)?

30. Are IK DRR practices useful?
    In the past? ----------
    At present?----------

31. Are they being maintained?
    1=YES
    2=NO

    If YES/NO explain how/why?

32. Suggest means of sustaining them – the role and influence of modernization and changing life styles.

---

33. Does IK used for DRR compete or synergy with modern/government institutions?

- Are people ready to adopt the modern DRR approaches in your community?
- In your opinion what are the reasons for the IK practices to disappear?
- Can you suggest on how to revive good IK practices for DRR?
- How can traditional institutions work hand in hand with the modern institutions for DRR?

34. Are DRR procedures implemented by state and non state actors recognise Indigenous Knowledge the community use? Yes/No Please explain your answer.

- *What gaps exist and how can that be addressed?*
- *Can you describe what you believe would be the ideal process for including IK into DRR policy in Zimbabwe?*
- *What would you do to include other stakeholders/community residents for making decisions to reflect Indigenous Knowledge, values, perception of community capacities, and attitudes towards public participation in decision-making?*
- *How would you address barriers that may arise?*

GOVERNMENT INITIATIVES ADVOCACY AND POLICY PROCEDURES

35. What attempts have been done in the past by the government to prevent disasters in the area? e.g. Training in hazards, disasters, agriculture, awareness campaigns, water harvesting etc? ……..……..

36. Have these attempts been successful? If yes, how? ……..**.....**

If no, why?……..... ……

37. What more proactive measures can the government do to deal with such disasters? ……

38. Which institutions should be responsible for disaster management portfolio and why? Please rate these according to importance from 1 to 5 (5 being the most important),

1=Traditional leaders
2= Social Development
3= Environmental Management Agency
4= Forestry Commission, and any other
5= Other/ specify. .....

39. What specific policies are in place meant to deal with or respond to disasters in your community/ province?

- Do you think the policy / response measure was/ is a sustainable one for the future? and HOW?

40. What capacity building efforts exists around issues of DRR in the community/district/province?

- *How often are these conducted and how recent was awareness training on DRR?*

- *What issues were covered and how adequate were issues that were covered especially as it relates to Indigenous Knowledge?*
- *What gaps in capacity among staff and stakeholders alike on DRR issues ?*
- *What can be done to ensure that those knowledgeable in Indigenous Knowledge fully participate and benefit from DRR trainings?*
- *Finally, I would greatly appreciate any additional comments and suggestions you may have regarding our discussion*

Thank you.

APPENDIX C: INTERVIEW SCHEDULE FOR KEY INFORMANT GUIDE (KII)

BASIC DATA

(As the interviewer, introduce yourself, explain the objectives of the interview, and request the respondent's consent to be interviewed. Note the respondent's name, position, and job title; describe his or her duties; and enter the institution's name and location and the date of the interview.)

My name is Wilfred Lunga. I am a PhD student studying at North West University Potchefstroom campus in South Africa. The title of my research study is the Inclusion of Indigenous Knowledge into Disaster Risk Reduction Policy for Zimbabwe. You/ your institution have been identified as key in this process and Iam kindly requesting your participation in the study. The results of the study will only be used to inform DRR programme particularly shaping interventions in your community and in Zimbabwe DRR programmes.

BASIC DATA

1. Name of the position person/institution/agency/Community: ----------
2. Age category

    1= 18-35 years
    2= 36-50years
    3= >51 years
3. Gender
    1=Male
    2=Female
4. What is your ethnic group?
    1=Ndebele
    2=Karanga
    3=Zezuru
    4=Sotho
    5=Tonga
    6=Korekore
    7=Manyika
    8=Ndau
    9= Kalanga
    10=Other (specify)?
5. What is your religion?
    1=Christian
    2=Moslem
    3=Tradition
    4=Christian and traditional
    5=Moslem and traditional
    6= Other (please specify)

6. What is the type of your shelter?
   1=Traditional pole and dagga
   2= Shack rudimentary material
   3=Modern brick and zinc roofed
   4= Other (specify)
7. Which of the following are the most useful livelihood strategies in your household
   1 = Indigenous Livestock farming (hard Mashona, tuli, Nguni)
   2 = Indigenous Vegetable production (Nyevhi, Tsunga, Boora)
   3 = Indigenous Crop production (Small grains e.g. Rapoko, Sorghum, Millet)
   4 =Self reliance through home gardens, medicine man etc
   5= Remittances
   6= Hunting and gathering of insects, wild fruits, etc
   7=Other (Specify…….)

BASIC DISASTER INFORMATION

8. What do you understand by the term disasters?

   ---
9. What hazards are commonly experienced in your community/district/ province?
   (Identify as many as possible)
   1=Drought
   2=Wildfire/veldtfire
   3=Windstorm
   4=Floods
   5=Human diseases
   6=Extreme temperatures
   7=Cyclone
   8=Earthquake
   9=Pests (Insects, locusts, Birds manifestation)
   10=Livestock diseases
   11=Industrial accidents
   12=Road accidents
   13=Lightning
   14=Goblins
   15=Others (specify)
9. What do you understand by the term indigenous knowledge (IK)?

   ---
10. How do you know about indigenous knowledge?
   1=Folklore
   2= Spirit mediums
   3=Traditional songs
   4=Formal education (school/college/university)
   5= Informal education (friends, parents, associates)
   6= Radio
   7= Television
   8= Internet
   9 = Phone
   10 = Experience (specify

11= Other (specify)

IK CATEGORIES

11. What IK do you use?

Category	**Indicators**
1= Cultural tradition	stories
	songs
	Rituals (bira, mukwererera)
	Traditional games
	Livelihood
	Other (specify)
2=Connection to a place	Spirituality (midzimu) *Identity*……..
	Sacredness of place
	Feelings about place
	Cultural connection
	Other (specify)
3= Ecological ethic	Animal behaviours e.g. giving birth early or late
	Manifestations on plants
	Changes in the environment
	Occurrence of rare events
	Other (specify)
4= Environmental ethic	Harvesting medicinal plant using mouth
	Selective cutting of trees
	Minimum soil tillage
	Taboos
	Other (specify)

12. Which categories of indigenous knowledge identified above are the most valuable to DRR as applied to your community?
    1= Cultural tradition
    2= Connection to a place
    3= Ecological ethic
    4= Environmental ethic
13. How are you using indicators above in disaster risk reduction? **(mitigation, preparedness, response and recovery)**

    - *How welll prepared is the community, district and province to deal with any disaster situation?*
    - *What strategies (adaptation systems) are in place at all levels to prevent and mitigate against the effects of disaster risk?*
    - *What DRR programs/ interventions are being implemented at community/district provincial level?*
    - *How are Indigenous Knowledge targeted in these interventions?*

14. What Indigenous Knowledge is used after disasters in your community?

- *What can be done to enhance IK contribution in DRR issues at community/ district/ provincial level?*

15. What variables do you think most influence the level of vulnerability? (perception of vulnerability)

- *What gaps need to be addressed to ensure realisation of maximum potential out of these perceptions of vulnerability?*
- *What is the contribution of different stakeholders taking into considerations of these perceptions of vulnerability to address DRR issues?*
- *What platforms exists and how effective are these for exchange of information on DRR and IK?*
- *How is information on DRR and IK disseminated to different stakeholders including the general population?*
- *What challenges are faced in disseminating IK and DRR information and what can be done to improve access tthe information?*
- *Are there any IK studies for DRR that inform policy and interventions when disaster strike vulnerable communities?*

INDIGENOUS KNOWLEDGE AND INCLUSION INTO DRR POLICY

16. What DRR policies, procedural documents and manuals exist at national levels?

- *What gaps in policy on DRR exist and how can they be addressed?*
- *What is the process for making and influencing DRR decisions from your point of view?*

17. Which methods of disaster risk reduction are used in your community?

- *Which methods would you classify as indigenous knowledge?*
- *How have you come to understand the Indigenous Knowledge used for DRR*
- *Would you want to see the methods being adopted and used elsewhere and how should this be done?*
- *What type of advice do you give to communities to deal with the Hazards/disasters in their localityi/district/province?*

18. Which other bodies collaborate with communities in DRR?
    1=Government extension staff
    2=NGOs
    3-Research Institutions
    4-Traditional institutions
    5=Any other
19. What indigenous knowledge are locals using in hazards control in the area?
    1=Cultural tradition
    2=Connection to a place
    3=Ecological ethic

4=Environmental ethic

20. Which of the identified indigenous knowledge are still in use?
    1=Cultural tradition
    2=Connection to a place
    3=Ecological ethic
    4=Environmental ethic
21. Why have some of local methods disappeared and (rank them in terms of importance)?
    1=Extension advice
    2=Less effective
    3=Forgotten them
    4=Elders do not pass them on
    5=New generations refuse their use
    6= Other (specify)----------
22. Can you describe what you believe would be the ideal process for inclusion of IK into DRR policy?

    - *What would you do to include other stakeholders/community residents for making DRR decisions to reflect Indigenous Knowledge, values, perception of community capacities, and attitudes towards public participation in decision-making?*
    - *How would you address barriers that may arise? (Reveals informants' perceptions of how to improve decision making process and increase sustainability)*
    - *If you were to anticipate in future changes to how DRR is done in Zimbabwe and particularly the role of communities in DRR actions relevant at a local level, what changes might those be?*
23. What type of vision do you hold for a **vulnerable** community?

    - *Has there been any community level visioning done to your knowledge? If so, can you describe the main characteristics of that vision, and your reaction to those priorities and goals?*
    - *Do you feel the disaster risk poses a threat to the vision you, or the community, has of the future? If so in what way?*
    - *Can you describe possible future scenarios and what is contributing to the achievement of those visions?*
    - *What actions (if any) have been taken to reduce your community's vulnerability to disaster risk? Have they made you feel less or more vulnerable to threat? Explain that assurance (or lack of)?*
    - *What do you believe would contribute to better decisions to reduce local vulnerability to hazards? (provide information on both structural and non-structural measures to respondent any actions (if any) that have not been done that ought to be examined?*
        - *Finally, I would greatly appreciate any additional comments and suggestions you may have regarding our discussion*

Thank you.

APPENDIX D

FOCUS GROUP DISCUSSIONS

(As the facilitator in the focus group, introduce yourself, explain the objectives of the focus group discussions, and request the respondent's consent to be a participant. Note the respondent's name, position, and job title; describe his or her duties; and enter the institution's name and location and the date of the focus group discussion.)

My name is Wilfred Lunga. I am a PhD student studying at North West University Potchefstroom campus in South Africa. The title of my research study is the Inclusion of Indigenous Knowledge into Disaster Risk Reduction (DRR) Policy for Zimbabwe. You/ your institution have been identified as key in this process and Iam kindly requesting your participation in the study. The results of the study will only be used to inform DRR programme particularly shaping interventions in your community and in Zimbabwe DRR programmes.

1. **How do you understand Disasters and Disaster Risk Reduction (DRR) ?**
   - *What is your understanding of Disasters and DRR in your community?*
   - *What disasters are prevalent in your community?*
   - *What is the impact of the disasters at household and community level?*
   - *What have you done to deal with the disasters in your community?*
   - *Zimbabwe Disaster Management Act - have you seen this act or been briefed on the requirements?*
2. **How do you understand Indigenous Knowledge (IK)?**
   - *What is your understanding of IK in disaster risk reduction?*
   - *What is your understanding of IK in Zimbabwe?*
3. **How does your community approach disaster risk reduction?**
   - *What characteristics does your community have that you feel helps manage with the hazard/disaster risk they experience?*
   - *What characteristics might prevent or hinder the community from managing effectively with the hazard/disaster risk?*
   - *Which platforms exist to share information on indigenous knowledge for disasters/hazards affecting you?*
4. What are the current institutional arrangements within Department of Civil Protection (DCP) for disaster risk reduction at national, provincial and District levels?
   - *What are the approaches to risk assessment, early warning systems, prevention, mitigation, preparedness, impact assessment, response and recovery?*
   - *Are there any considerations for IK in the approaches to risk assessment, early warning systems, prevention, mitigation, preparedness, impact assessment, response and recovery?*
   - *What traditional leadership structures exist and what role in DRR do they play?*

- *How are the decisions made on how to best protect your community from disaster risk? Do you feel a part of that process?*
- *Do the decisions seem in line with your personal values? Explain.*
- *Who made/makes the decisions on what actions to take? Explain.*

5. **Please describe the ideal disaster risk reduction system that should be implemented in Zimbabwe.**
   - *Which gaps can be identified towards the ideal disaster risk reduction situation in your community and Zimbabwe?*
   - *What would the ideal organisational structure for DRR entail in your community?*
   - *What are the current capacity and resources needs of the various households in your community, and at national level, for the successful implementation of disaster risk reduction in Zimbabwe?*
   - *Have any problems been identified in established community disaster management units at ward level and how can these problems be overcome?*
   - *Do the established structures have the necessary resources to face the challenges of disaster risk reduction?*
   - *What other approaches, can the community use other than DCP established structures?*
6. **Do you think the inclusion of IK in of disaster risk reduction will be effective in improving DRR in Zimbabwe? Yes/No**
   - *Would you support the inclusion of IK into DRR policy in Zimbabwe? Please give reasons.*
   - *What difficulties need to be overcome?*
   - *Can you think of other initiatives, other than the current disaster risk management under CPD in dealing with disasters in Zimbabwe?*
   - *Describe why the initiatives would work better than the DCP initiatives for Zimbabwe?*
7. **What should the inclusion process of IK for disaster risk reduction entail?**
   - *What hindrances would there be to inclusion of IK into DRR policy?*
   - *What can be done to overcome the hindrances?*
   - *How should effective participation of various stakeholders be facilitated in disaster risk reduction in Zimbabwe?*
   - *How will necessary resources be obtained for IK to function effectively in the country for DRR?*
   - *Finally, I would greatly appreciate any additional comments and suggestions you may have regarding our discussion*

Thank you.

APPENDIX E

INFORMED CONSENT AGREEMENT FORM

Name of Researcher: Wilfred Lunga
Institution: North West University Potchefstroom Campus
Degree: PHD Disaster Studies
Research Topic: Inclusion of Indigenous Knowledge into Disaster Risk Reduction Policy. The case of Zimbabwe.
Purpose of study: Model development
Methodology:
This study is going to be conducted using a blended research design of qualitative and quantitative. Data will be collected from Traditional leaders, DCP staff, selected Communities at risk in Zimbabwe and some other selected informants through the use of interviews, document analysis and semi-structured interviews. Participants will be required to fill in questionnaires or engage in face to face interview, focus group discussions with the researcher where data will be recorded on an audio-recorder. Completion of a questionnaire should not take more than 45 minutes while the face to face interview should last approximately 30 minutes per person.
Research Ethics
Persons who are willing to participate in this research should read the following information carefully so that they can make an informed decision about their participation.
Conditions for Participation
Participation in this research is voluntary and participants should do so out of their own free will. The participant is free to withhold any information that they may decide not to share with the researcher or withdraw from an interview at any point if they feel like doing so for whatever reasons
Protection accorded to Participants

1. Confidentiality: Each participant's privacy will be maintained.
2. Anonymity: Names of institutions and individual participants will not be divulged, instead, pseudo names will be used which may in any way link the participant to the data collected.
3. Risk: There will not be any risk involved in participating in this research, permission to conduct this research was granted by the Ministry of Higher Education and responsible authorities for institutions.

Data Analysis
Qualitative data gathered will be analyzed using the manual sort and count, classified, categorized and trends and patterns analyzed as they emerge, while quantitative data will be subjected to statistical analysis using the statistical package for the social sciences (SPSS) and presented in tables and graphs.
Use of Data Collected
The end product of this study will be a Doctoral Thesis. It is envisaged that some of the chapters or the entire document may attract a variety of publications later on. All information about the participants will be treated with strictest confidentiality and will not be revealed to anyone else except the persons noted unless required by law.
Benefits and Compensation
There are no direct benefits to any individual participants other than some satisfaction that as a citizen and an academic, you have assisted.
In broadening the knowledge base related to an understanding of your chosen profession Help the nation in understanding the indigenous knowledge, disaster issues, livelihoods and

vulnerability with a view of assisting policy makers in solving a contemporary problem that affects the socio-economic well being of your country.

INFORMED CONSENT

The purpose and conditions of my participation have been clearly explained to me and have been availed to me. I understand what my participation entails. Furthermore, I understand that my participation is voluntary, and l will be allowed to ask questions, withhold any information that l may deem unfit to divulge, withdraw from participation at any point without any penalty. I have read and understood the Informed Consent Agreement and l sign it freely and voluntarily and a signed copy has been given to me.

Signature of volunteer participant ……

Date ……

Signature of Researcher ……..

Date ……..

If you are willing to participate and you need to seek any clarification about anything related to this study please contact Wilfred Lunga on 0773 284 425 or 0712 303 885 or 0733 753 862 (ZIM) or 0027 732 036 541(SA): e-mail address: lungawcampeon@gmail.com or contact Professor Dewald van Niekerk, PhD promoter at African Centre for Disaster Studies North West University P. Bag X6001, Potchefstroom Campus, Potchefstroom 2520. Zimbabwe. Tel +27 18 299 1620, Fax +27 231 5590.e-mail dewald.vanniekerk@nwu.ac.za