

# Mine closure: a contingency plan to mitigate socio-economic disasters

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## **ABSTRACT**

The history of the mining industry indicates a lack of understanding among the decision-makers of the impact the closure of mines has on the industry and the associated effects on the society and surrounding environment. The policies of the mining industry do make provision for a planned mine closure, but not for an unexpected closure. This detrimental aspect of closures in the mining industry is highlighted in the present study.

The present study investigates how mineworkers' dependency on their employment at a mine affects their ability to sustain their livelihoods. Vulnerable livelihoods leave the community at a greater risk to be affected by a disaster, than the livelihoods of a community that is resilient and has sustainable resources. Even though mineworkers are not considered as poor at the time of their employment, a mine closure could render them into a status called 'transitional poverty'. This study also highlights that mineworkers who are skilled for mining operations only do not overcome the status of 'transitional poverty' and hence enter a phase called 'chronic poverty'. This stage constitutes their inability to negotiate livelihood strategies and livelihood outcomes that could sustain a household. Thus humanitarian assistance would be needed from outside sources.

Planning for unexpected mine closures should also be on the agenda of the mining industry due to the extreme consequences such an event holds for the mining community experiencing the event. In the case under investigation, the unexpected mine closures occurred in the Grootvlei mine in Springs and the Orkney mine owned by the Aurora Empowerment Systems Ltd. at the time of this study. These closures left the surrounding communities in need of food, shelter and clean water. The inhabitants gradually lost their livelihood assets. A contingency planning model is proposed at the end of this study to address the short-term and long-term consequences of an unexpected mine closure.

**Key words:** Contingency plan, disaster, disaster risk reduction, livelihoods, mine closures, mining community, socio-economic vulnerability, South African Department of Mineral Resources

## OPSOMMING

Die geskiedenis van die mynwese toon 'n gebrek aan insig in hoe mynsluitings die bedryf, die myngemeenskap en die omringende omgewing by die myne raak. Beleide vir die mynwese maak voldoende voorsiening vir beplande mynsluitings, maar nie vir myne wat onverwags moet toemaak nie. Hierdie studie lig die nadelige gevolge uit van mynsluitings wat onbeplan voorkom.

Die studie ondersoek hoe die mynwerkers se afhanklikheid van hulle indiensneming by 'n myn hulle vermoë beïnvloed om volhoubaar in hulle eie lewensmiddele te voorsien. Gemeenskappe met kwesbare lewensmiddele loop groter gevaar om deur 'n ramp getref te word, as daardie gemeenskappe met volhoubare lewensmiddele wat weerstand kan bied. Mynwerkers in die beroep word nie normaalweg as arm beskou nie, maar 'n mynsluiting kan hulle dompel in 'n fase wat beskryf kan word as "tydelike armoede". Hierdie studie fokus ook op die feit dat mynwerkers uitsluitlik vir die mynbedryf opgelei is. Omdat hulle ná 'n mynsluiting nie ander werk kan kry nie, beweeg hulle dus van die status "tydelike armoede" na "chroniese armoede". Tydens hierdie fase word mynwerkers se onvermoë duidelik om lewensmiddelstrategieë en lewensmiddelluitkomste daar te stel waarmee hulle 'n gesin kan onderhou. Gevolglik moet gesinne op humanitêre hulp staatmaak om die mas op te kom.

Die beplanning vir die onverwagse sluiting van myne moet ook op die mynbedryf se agenda geplaas word weens die uiterste gevolge vir die gemeenskap wat so 'n sluiting moet deurgaen. In die gevalle wat die studie ondersoek het, het twee onverwagse mynsluitings plaasgevind by Springs se Grootvlei-myn en by die Orkney-myn wat aan die Aurora Empowerment Systems Bpk. behoort. Die mynsluitings het die omringende gemeenskap wat van die myn afhanklik was, in 'n krisis gedompel wat kos, behuising en toegang tot skoon water betref. Die inwoners het geleidelik al hulle besittings en bates verloor. Hierdie studie stel 'n gebeurlikheidsplan voor waardeur gepoog kan word om die korttermynkrisisse en langtermyngevolge van so 'n mynsluiting op die omringende gemeenskap en omgewing te hanteer.

**Sleutelwoorde:** Gebeurlikheidsplan, ramp, ramp-risikovermindering, lewensmiddele, mynsluiting, myngemeenskap, sosio-ekonomiese kwesbaarheid, Departement van Minerale Bronne van Suid-Afrika

## **DECLARATION**

I declare that this study is my own work and has not been submitted before for any other degree or examination at another tertiary institution.

A rectangular box containing a handwritten signature in black ink. The signature is cursive and appears to read 'Attham'.

**Signature of student**

**Date: 6 December 2013.**

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## LIST OF ACRONYMS

BBSEE	Broad Based Socio-Economic Empowerment Charter
CP	Contingency Plan
CARE	Corporative for Assistance and Relief
DFID	Department for International Development
DRI	Disaster Risk International
DRR	Disaster Risk Reduction
HFA	Hyogo Framework for Action
HH	Helping Hand Welfare Organisation affiliated with Solidarity
ICMM	International Council of Mining and Metals
IASC	Inter Agency Standing Committee
IRCRC	International Red Cross and Red Crescent Movement
IDNDR	International Decade for Natural Disaster Reduction
MCCP	Mine Closure Contingency Plan
MPRDA	Mineral and Petroleum Resources Development Act
NAOMI	National Orphaned Abandoned Mines Initiatives
NGO	Non-Governmental Organisation (non- profit)
SLF	Sustainable Livelihood Framework of the DFID
UNDP	United Nations Development Programme
UNISDR	United Nations International Strategy for Disaster Reduction

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# **CHAPTER ONE**

## **INTRODUCTION TO THE RESEARCH AND THE PROBLEM STATEMENT**

### **1.1 INTRODUCTION**

It is estimated that about 13 million people in South Africa are employed due to the mining industry (Carroll, 2013). Currently the labour force of South Africa constitutes approximately 33 million people, and unemployment among this group is estimated at 8.5 million. Therefore the mining industry carries the weight of more than 50% of South Africa's total workforce (SA, 2013). It thus stands to reason that a mine closure could have a devastating impact on the national economy and also on the socio-economic well-being on household level in South Africa. The reason is that a significant number of families depend on the mining industry for their income and livelihood.

The history of the mining industry, however, indicates a lack of understanding among the decision-makers of the impact the closure of mines has on the industry and the associated effects on the society and surrounding environment. This detrimental effect of closures in the mining industry is highlighted in the present study. It is mentioned briefly in this chapter and then discussed in greater detail in Chapter three. The focus of this chapter is firstly, to provide the orientation and background to the study. Secondly, the research objectives are stated and the questions listed that guided the investigation. Thirdly, the research design is explained by discussing the methods that were used to collect and analyse data from the groups in question. This chapter is closed by a short layout of the successive chapters in this study.

The following section provides the orientation to the problem and explores the context and background for the phenomenon under investigation.

### **1.2 ORIENTATION TO THE PROBLEM**

The legislative and regulatory environment in which the event under investigation took place needs to be understood. Therefore firstly, the context for the legislation on mine closure will be laid out and thereafter the situation will be described that developed within the mining community.

#### **1.2.1 The mining industry's approach to mine closure**

South Africa possesses a rich concentration of the total mineral wealth of the world. Historically, mining activities together with agricultural production, have dominated the South African

economy to a large extent (Fourie & Brent, 2008:1). Most mines in South Africa however, are 50 years and older. These mines and have benefited from decades of profiteering and unchecked activities (Fourie & Brent, 2008:1). Such activities unfortunately also lead to the neglect of the environment and the negation of the developmental needs of the communities surrounding the mines (Fourie & Brent, 2008:3; Cronjé & Chenga, 2007:1). Legislation that addresses the irresponsible way in which mining was conducted in South Africa was proposed only after the mines were in operation (Fourie & Brent, 2008:1). Therefore, when these older mines were first established, the management naturally did not consider planning ahead a possible mine closure (Fourie & Brent, 2008:1).

The first legislative document to address all mining activities, not merely issues of mine closure as such was the Minerals Act (50 of 1991). This Act was compiled only as recently as 1991, and focused mostly on the effects that mining have on the environment. The Act aimed at addressing the long-term residual effects on the social, health and environmental well-being of communities that reside in the vicinity of mines. Such detrimental effects were mostly the result of the damage to the environment (Swart, 2003:489). This Act also included provisions on how a mining company should carry out mine closure at the end of its life cycle, mainly focusing on the restoration of the environment (Fourie & Brent, 2008:4). However, the socio-economic responsibility of the mining companies toward the mining communities did not appear in legislation until the implementation of the Mineral and Petroleum Resources Development (MPRDA) Act 28 of 2002 (28 of 2002; Swart, 2003:492).

The MPRDA and the Broad Based Socio-Economic Empowerment Charter of South Africa (referred to as the Mining Charter) pressurised mines to act responsibly and work towards upholding principles of sustainable development within the areas they operate (Cronjé & Chenga: 2007:1). The Amendment of the Mining Charter issued in September of 2010, added an emphasis of promoting the sustainability, growth and transformation of the mining industry (Amendment of the Mining Charter of 2010).

Issues of mine closure revolving around the socio-economic effects of such a closure are mentioned in the MPDRA and the in the Mining Charter. However, these regulations are limited in its description of the various aspects effecting the socio-economic environment of mining communities. For example, there is a reference to ghost towns being the “unintended consequence of mining operations” in the definition section in which Broad Based Socio-Economic Empowerment Charter (BBSEE) is outlined. The detail on how a mining community may be affected by the transformation of their town to ‘ghost town’ is not discussed. Furthermore, reference is made to “planning for enough resources to meet mine closure

requirements” (under clause 2.8 of the Mining Charter) but without much elaboration on what exactly is required from the mining industry on actual mine closure.

The challenge for the South African mining industry is to address the plethora of problems that typically arise as a result of mine closures. Planning for the event of a mine closure should not only focus on the rehabilitation of the environment, but should focus on the various socio-economic aspects of such a mine closure. These aspects may possibly play out in the surrounding mining community in the event of the mine being closed. Appropriate action would include a budget that makes provision for the added financial burden to mining companies when planning in advance for a possible mine closure (Fourie & Brent, 2008:4).

The difficulties associated with mine closures in South Africa revolves around two important aspects: on the one hand, the rehabilitation or restoration of the environment, and on the other hand, the dependency of the surrounding mining community for employment, services and a market for local businesses, which mainly is derived from the mines and mining activities (Fourie & Brent, 2008:4; Stacey *et al.*, 2010:6). The following section gives an overview of the events surrounding the mine closure that took place in the two mining towns under investigation. Two mining communities were affected: one in Orkney, depending on the Aurora-Grootvlei mine, and the other in Springs, depending on Aurora-Grootvlei mine. The two mines that provide for those towns were closed without prior warning or previous planning, due to the liquidation of the mining companies.

### **1.2.2 The roll-out of the event in the mining communities**

The present study investigates the closure of two mines formerly owned by liquidated Pamodzi Gold Ltd., the Orkney mine and the Grootvlei mine. During April 2009 the Aurora Empowerment Systems negotiated to take over the ownership of the mine, after the previous owners, Pamodzi Gold Ltd., were liquidated. The take-over process was finalised in October 2009. The liquidation of Pamodzi Gold liquidation was unexpected, since this was an established, prospering black economic empowerment company, which was active in one of the richest gold-producing areas in the world – Orkney since 2008. The Pamodzi-owned mines included the Springs Grootvlei mine, the Orkney Mine and the President Steyn mine in Welkom (Deep SA, 2006:1). The expectation was that by 2010 Pamodzi Gold Ltd. would increase their output of gold to 1 million ounces per annum. Instead already from early 2009, Pamodzi Gold Ltd. struggled to remunerate all of its workers (Stuit, 2009; Van der Walt, 2009:1). The following situations occurred at the two mines under investigation after the liquidation of Pamodzi Gold Ltd.

- Since February 2009, mineworkers experienced problems receiving their salaries and only certain shafts were in operation. Workers already were struggling to make ends

meet, when the mine was closed and they were sent home without salary during April 2009 (Van der Walt, 2009:3).

- During the period April 2009 to October 2009, the mineworkers needed emergency food-aid. Helping Hand (a welfare organisation, affiliated and partially funded by the labour union Solidarity, focussing on the alleviation of poverty) started a project, which provided food parcels to the unemployed mineworkers (Esterhuizen, 2011). Schools in Orkney and Springs launched projects to feed the children, and parents began collecting funds to support the mineworkers and their children (Van der Walt, 2009:1).
- In October 2009 the Pamodzi-Orkney mine and the Grootvlei mine in Springs were placed under new management of the Aurora Management Systems Ltd, who undertook to buy the liquidated mines from Pamodzi Gold Ltd. (Williams, 2009:7). The President Steyn mine was bought by the Harmony Gold Group in December 2009 (Competition Tribunal, 2009:1). For the mineworkers the perception was that their situation was restored. Six shafts at the Aurora Orkney mine were re-opened and seven shafts at Grootvlei mine in Springs, raising the hope that the situation in the communities surrounding these mines would change (Aurora, 2010; Williams, 2009:7).
- The situation soon changed. The new owners began to pay partial salaries from December 2009, and the crisis under the previous owners, described above, repeated itself in 2010 (Van Rensburg, 2012, Van Niekerk, 2012). The newly appointed managers of the Grootvlei and Orkney mines failed to pay employees' full salaries from April 2010 and the mining activities ceased, except for a few miners overseeing the 'care and maintenance' of the Orkney and Springs mines (Tempelhoff, 2010a:12). These 'care and maintenance-activities' included basic maintenance of the mining equipment and shafts, as well as the daily pumping out of mine water to prevent the shafts and the surrounding areas from flooding. These workers were not remunerated, in spite of working their normal shifts and beyond, to keep the mines safe and to prevent the mine and the surrounding environment from being flooded with toxic mine water (Oberholzer, 2010:38).

According to a report by Joubert (2011:2), all the shafts at Grootvlei finally were closed down early in 2011. This was due to the following factors: safety risks of working with badly maintained mining equipment; the continued non-payment of workers (after promises of pending remuneration); and the cut off of the electricity supply to the mines due to unpaid Eskom accounts by Aurora (Du Plessis, 2011).

This investigation in this study will focus on the period under the new management: the Aurora Empowerment Systems Ltd., (henceforth referred to as Aurora). In October 2009, the liquidation of Pamodzi Gold was finalised and the mines were handed over to Aurora. The issues surrounding these mines received extensive media attention. This included the non-payment of the Aurora mineworkers and the threat of a devastating environmental crisis posed by the mine water if the daily pumping of 108 000 mega-litres of water from the shafts would cease. (Oberholzer, 2010:38). In light of this background the problem statement is formulated in the next section of the study.

### **1.3 PROBLEM STATEMENT**

Mine closures are not a rare phenomenon in South Africa. Such events occur as a result of divergent circumstances, and not only due to economic liquidation. It may happen that a mine close permanently because of being issued a closure certificate at the end of its life-cycle. A mine may also close temporarily, due to maintenance, or because of closure under legislation. Sometimes only a partial closure takes place when a number of mine shafts are shut down (Fourie & Brent, 2008:30; Swart, 2003:490).

The closing of the Aurora mines in Orkney and Springs affected an estimated 5 300 mineworkers (with dependents) who lost their income (Esterhuizen, 2011; Sapa, 2010). As a result, the mineworkers and their dependents were living in dire circumstances and needing humanitarian assistance. Shafts at both mines were also flooded and ransacked, which caused permanent damage. The sudden closure of these mines left the surrounding communities in a state of crisis (Klopper, 2011).

The situation that developed within these two mining communities brings to the fore the enormous impact that the closing of a mine has on the socio-economic well-fare of such communities that surround mines. These events also highlight the fact that purposeful planning is needed for mine closures. In the case of an unexpected mine closure, the need arise for emergency action, in order to prevent a socio-economic disaster. In light of this problem statement, the present study seeks to investigate the need for a disaster-risk contingency plan aimed at protecting communities from the effects of an unexpected mine closure.

### **1.4 RESEARCH QUESTIONS**

To address the research problem and to propose a solution the following research questions can be posed:

1. What are the theoretical trends that underpin a socio-economic disaster?

2. What are the theoretical trends and approaches for contingency planning?
3. What are the regulatory and legislative frameworks that guide mine closure in South Africa?
4. What were the consequences in the cases of the closure of the two mines under investigation: the Grootvlei and Orkney mines and which lessons were learnt on increased socio-economic vulnerability due to mine closure?
5. What should a contingency plan consist of to prevent socio-economic disasters in the event of such an unexpected mine closure?
6. What recommendations can be made for cases in which a sudden mine closure occurs?

### **1.5 RESEARCH OBJECTIVES**

The research objectives can be differentiated into a main objective and specific objectives drawn from it.

The main objective of this study is to develop a contingency plan to help protect communities from a socio-economic disaster when facing an unexpected mine closure.

From the main objective flows the following specific research objectives:

1. Investigate and discuss the theoretical trends that underpin a socio-economic disaster.
2. Examine and discuss the theoretical trends and approaches to contingency planning.
3. Determine the regulatory and legislative frameworks that guide best practice in mine closure, which currently are or should be, implemented when closing mines in South Africa and internationally.
4. Document the lessons learnt about the increase in socio-economic vulnerability that results from mine closure.
5. Design and develop a contingency plan for the event of a mine closure, in order to mitigate or even prevent possible socio-economic disasters.
6. Make recommendations on the strategic handling of a sudden mine closure and establish a systematic approach to identifying, assessing and reducing the risks of disaster.

### **1.6 CENTRAL THEORETICAL STATEMENTS**

Mine closure and its consequences are investigated in the specific theoretical angle of Disaster Risk Reduction (DRR). This is the systematic approach to deal with the risk of disaster and is

employed by various UN agencies assisting the poor and destitute. The body of knowledge of which the DRR comprises provides the needed theories on, and approaches to the following aspects: vulnerability, sustainable livelihoods and planning, specifically contingency planning – and therefore the DRR underpins this investigation. This theoretical approach will be dealt with in more detail in Chapter two.

Godschalk *et al.* (1995:5) states that the impact of hazards can be reduced if advance action is taken to mitigate risks and minimise vulnerability to hazards. Furthermore, the DRR approach suggests that disasters can indeed be prevented (Rotach, 2008:6). A proactive approach is however needed to address disasters, to prevent or mitigate the impact of the next possible hazard (Godschalk *et al.*, 1995:5). To implement DRR strategies successfully, planning is required. The contingency-planning approach in planning theory is discussed next.

The aim of planning is to improve the use of time, human capital and resources, in order to achieve the objectives mentioned in a set goal for or strategic planning of an organisation (Knipe *et al.*, 2002:170). Glenn, as quoted by Van Niekerk (2001:26), states that the main aim of a contingency plan should be the preservation of life, livelihoods and property. Contingency plans and contingency measures ensure that proactive actions are taken to safeguard the livelihoods of communities (Mitome & Speer, 2001). Contingency planning also follows the basic guidelines of a good planning process. Such planning is usually formulated after disaster events and specifically reflects on lessons that were learnt and limitations shown up in the plans that were in place at the time of the disaster (Choularton, 2007:7; Godschalk *et al.*, 1999:5).

From the above it is evident that a contingency plan includes a pro-active approach and can help mitigate the effects of a natural hazard, such as a sudden mine closure. From the definitions on contingency planning mentioned above, it is clear that this type of planning entails a pro-active approach, planning ahead towards preventing or mitigating the effects of the next expected hazard and reflecting on lessons learnt from the process. This suggests that contingency planning may be a suitable approach to address sudden mine closures. Thus contingency planning is investigated in more detail in Chapter four. The following section explains the methodology that was used to investigate the phenomenon of mine closure as a hazard.

## **1.7 RESEARCH METHODOLOGY**

The methodology used in this study consists of two research procedures, a literature review and an empirical study, both of which will be discussed below.

### **1.7.1 Literature Review**

A literature review was conducted in order to map out the main issues in the field of study. The review also provided the background and context of the research problem (Strydom, 2005:253; Duvenhage *et al.*, 2011:37). The function of a literature study in qualitative research is twofold: to display the research paradigm underpinning the study and to demonstrate the researcher's knowledge about the available body of knowledge on the topic and the intellectual traditions that helped formed this knowledge.

The literature study in research enables the researcher to identify certain gaps, and will guide him/her to develop a full understanding of the theories that underpin the phenomena under investigation and of how this study could meet a demonstrated need (Delpont & Fouche, 2010:263). The literature study should also "embed the research questions into the larger empirical traditions" (Marshall & Rossman as cited in Delpont & Fouche, 2010:263).

Local and international sources were investigated on the following topics: DRR theory and approaches, planning theory, mine closure legislation, as well as best practices in mine closure and contingency planning. The literature study consulted the following material relating to the research theme: books, journals, newspapers, policies and legislation on mining, mining documents and documents provided by stakeholders who were actively involved in the mining communities of the two former Pamodzi-owned mines. The databases that were utilised include Sabinet, Ebscohost, Juta, Google Scholar and Google.

### **1.7.2 Empirical Study**

The empirical investigation consisted of a document study, semi-structured interviews, a focus group and observation. The researcher opted for the qualitative research paradigm, seeing that this method focuses on giving a rich description of the phenomenon under investigation. Qualitative research is typically more focused on making sense of research phenomena and of the functions to develop a theory from the data that was collected. This is done by following an inductive process, looking at the broader picture of the mine closure, and focusing on the affects in more detail on the household. (Weatington *et al.*, 2010: 526).

The qualitative research design has been criticised for its weakness according to which the researcher is not able to detach him-/herself from the research project. This implies that subjectivity may impact on the research, because the researcher may transfer his/her own preconceptions onto data collections and analyses. Thus objectivity remains a challenge to the researcher who is employing qualitative research methods. Triangulation of data was used to ensure that data is projected unbiased. Triangulation implies that data is verified against two

other sources. Triangulation of data assisted the researcher to be objective and to produce as close to a fully inductive research report as possible (Weatington *et al.*, 2010:527; Strydom & Delport, 2010:314).

### **1.7.2.1 Document study**

Data was collected personally during the period 2009 until May 2013. The researcher was given access to documents from the office of Helping Hand (Solidarity) who was directly involved in dealing with socio-economic issues at the time of the mine closure. Life stories were also collected in person and compiled from media documents such as newspaper articles, which describe the mineworkers and their dependents personal experiences of the mine closures. Life-story research that forms part of document study was used because of the details, descriptiveness and personal nature of the information that was gathered from the participants (Fouché, 2005:272). Documents issued by the government and articles published by the mining industry, magazines and journal articles were also collected and interpreted. [until here last]

### **1.7.2.2 Focus-group discussion**

Focus-group discussions are used by researchers because this method creates a process of sharing and comparing among the participants and produce large amounts of concentrated information (Greeff, 2005:301). Such discussions also provide a better understanding of people's feelings or thoughts about an issue, as will be investigated in this study. The focus group should consist of a group of people with a common set of characteristics and thus participants are selected from the group who experienced the phenomena under investigation (Greeff, 2005:300). Two focus-group sessions were planned but only one could take place due to transportation problems of the second group en route to the selected venue.

The discussion took place in the Orkney mine hostel that serves shaft four (4). The Helping Hand organisation assisted in providing contact details of probable participants for focus-group discussions. The purpose of the focus group discussion was to gather information on the immediate needs the families experienced after the mine closures, and to determine the effect of this closure on people's livelihoods and family life. The participants' contribution was used to formulate recommendations and to help identify gaps when developing the contingency plan.

### **1.7.2.3 Semi-structured interviews**

Semi-structured interviews were used to gain a detailed picture of the participants' experiences of the mine closure in question. The use of semi-structured interviews can help to obtain participants' beliefs about, or perceptions or accounts of, a particular topic (Greeff, 2005:296). The researcher conducted semi-structured interviews with some of the key role-players on how

the mining communities who were employed by the Aurora-Group experience the mine closure. These interviews included key persons at the NGO (Helping Hand) who provided assistance to the mining communities on a regular basis after the mine closure, as well as mineworkers and their wives in Springs and Orkney. These interviews helped the researcher to gain information on the impact the mine closure had on a personal level for the participants from the two communities in question. Information was also gathered on the positive effect of the activities that were organised by the NGO mentioned above to assist the mineworkers in crisis (Esterhuizen, 2011).

#### **1.7.2.4 Observation**

The two mining communities, Aurora-Orkney and Grootvlei mine in Springs, were observed by visiting the sites and the surrounding areas, making field notes and by taking pictures. A few short interviews with business owners and managers were also conducted during the observation of the sites, to establish the impact the mine closures had on them.

In conclusion, it could be stated that the document study, focus-group discussion and semi-structured interviews helped the researcher to establish a more definite insight into the effects of the mine closure on the individuals and their households. To ensure validity of the sources, the researcher made sure that the documents were authentic and reliable and were collected in person from the participants (Strydom & Delport, 2010:317).

#### **1.7.3 Data Analysis**

The data was analysed by means of conceptual (thematic) analysis. This process involves the sorting of data according to themes and phrases that the participants repeat (Oplatka, 2001). The aim of data analysis is to understand the various constitutive elements of the data by examining the relationship between concepts, constructs or variables, and to identify and find patterns or trends that can be identified or isolated, or to establish repeated themes (Mouton, 2006:108). The Sustainable Livelihood Framework and the CARE Household Livelihood Security Framework were used to identify themes and categories according to which the data that was collected could be analysed. The themes or trends that were identified were documented and gave the researcher the assurance of a clear and an in-depth understanding of the phenomenon experienced by the individuals and expressed in the collected data.

### **1.8 ETHICAL CONSIDERATIONS**

The research was done within the parameters of an ethical code of conduct, as prescribed by the ethical committee for the research entity under which this study was performed. This code of conduct was taken into consideration during the gathering of the data. The research and

method of data collection was done in a sensitive manner and the researcher was mindful of acceptable moral principles and guided by ethical reasoning. Participants were not deceived about the motives for or the purpose of their participation in the research. The purpose and limits of the research were explained prior to meetings with the interviewees and the focus groups. The researcher was careful to keep in mind the need to act in the welfare of the participants and not to regard her own interests above those of the participants (Weatington *et al.*, 2010:32).

Participation in this study was voluntary and occurred in the environment of the participant's choice. The individual interviews and focus groups were confirmed by appointment. Participants were employers of the two mines, or relatives such as wives or parents, business people and church workers, as well as the NGO workers of Helping Hand.

No participant was subjected to harm or risk of any kind, physical or psychological. Data was only collected from participants who were willing to share their experiences. No participant was forced to reveal information on their experience of the phenomenon in question to the researcher. Confidentiality was a priority and participants in the semi-structured interviews, focus groups and compilation of life stories have been assured that their contributions would remain anonymous (Duvenhage *et al.*, 2011:40).

Most of the research information was gathered from documents provided by Helping Hand. A variety of role players and one focus group partook in the sessions, which was voluntary. Helping Hand granted the researcher permission to use their archives and documents on the aid they have provided for the two mining communities who experienced this crisis. Consent forms were handed out to participants before engaging in the focus groups and semi-structured one-to-one interviews. Where possible, the interviews were recorded with the permission of the participants.

## 1.9 LIMITATIONS

Most of the contact information was gathered from documents provided by Helping Hand. The field research was done at the end of the second year that the mine was closed and some of the mine workers contact details have changed and were not available to participate in the research. The planned focus group meeting had to be cancelled due to financial constraints of the participants to travel to the venue. The chapter outline follows in the next section.

## 1.10 CHAPTER OUTLINE

The chapter outline for this study is as follows:

**Chapter one** gives a short overview of the study as a whole, starting by delimiting the scope of the study and explaining the methods that were used. The chapter introduces the research problem as well as the significance of the research.

**Chapter two** reflects on socio-economic vulnerability and livelihoods, in order to gain a full understanding of the needs that develop in a community after a mine closure.

**Chapter three** investigates the regulations and legislations regarding mine closure locally, as well as examining at how mine closure is dealt with in the international arena.

**Chapter four** provides the theoretical framework for planning and contingency planning.

**Chapter five** consists of a brief overview of the research methodology and analyses the empirical findings. The chapter outlines the consequences of mine closure, by referring to the two mines under investigation, the Grootvlei and Orkney mines. Chapter 5 concludes by examining the lessons that were learnt in terms of increased socio-economic vulnerability of the inhabitants due to mine closure.

**Chapter six** completes the study and provides the developed contingency plan, based on the information gathered from the investigation. Some recommendations are also made on how to manage unexpected future mine closures.

## 1.11 CONCLUSION

The purpose of this study, highlighted in the first five chapters of this study is to indicate the inherent vulnerability of mine workers, as well as the effect that a mine closure has on the household of a mine worker and on the community surrounding the mine. A contingency plan to mitigate the effects of a socio-economic collapse after a mine closure is proposed in the last chapter of this study.



# **CHAPTER TWO**

## **DISASTER RISK REDUCTION AND SOCIO-ECONOMIC VULNERABILITY: A THEORETICAL FRAMEWORK**

### **2.1 INTRODUCTION**

The previous chapter provided the orientation and background to this study. It gave an overview of how an unexpected mine closure affected the socio-economic circumstances of two mining communities. The investigation of this phenomenon is underpinned by Disaster Risk Reduction (DRR) theory, approaches and principles.

Adverse events turn into disasters when people's existence is affected in a significant way. People are affected in relation to how prepared they were before the event and how resilient they were during and after the event. The proactive approach in DRR will be successful if the following statement could be true: *Disasters need not happen* (Rottach, 2008:6). The mitigation of the effect disasters have is an important aspect of DRR and is linked to socio-economic vulnerability and livelihoods. There is a general paradigm shift in the field of DRR to prevent disasters by focusing on improving the resilience of communities in the face of disasters.

The study in this chapter provides the theoretical framework for socio-economic vulnerability and disaster risk reduction. The body of knowledge of Disaster Risk Reduction (DRR) provides frameworks, tools and mechanisms by which to understand and address the risks and challenges that disasters pose to communities and their livelihoods. Therefore DRR theories and frameworks underpin this discussion. This chapter unfolds as follows: firstly, it contains a study of the background and components of DRR; secondly, the socio-economic aspects of vulnerability are investigated. Thirdly, attention will be given to livelihoods and frameworks in which survival, risk and vulnerability will be explained. The socio-economic impact of disasters and the role of vulnerability in livelihoods according to DRR are investigated. An overview of DRR is discussed in the next section.

### **2.2 DISASTER RISK REDUCTION: AN OVERVIEW**

The relevant components and concepts within Disaster Risk Reduction are investigated in the next section, starting with a brief examination of the background of DRR. The basic elements of DRR are discussed, which will include defining some key terms in DRR.

### **2.2.1 Disaster Risk Reduction defined**

Disaster Risk Reduction refers both to the concept and the practice of reducing disaster risks: systematic efforts are made to analyse the concept, as well as to reduce or minimise the factors causing disasters. The following are all examples of disaster risk reduction: reducing exposure to hazards, lessening vulnerability of people and property, wise management of land and the environment, and improving preparedness for adverse events (UN/ISDR, 2012). DRR is defined as a systematic approach to identify, assess and reduce the risks of disaster. It aims to reduce socio-economic vulnerabilities to disasters, as well as dealing with environmental and other hazards that trigger these events (Twigg & Bottomley, 2011:1; UNISDR, 2009:10,11). From the definition it is evident that DRR is a systematic approach, which implies that planning is involved to reduce or mitigate disasters. Furthermore, such an approach supports the socio-economic well-being of a community.

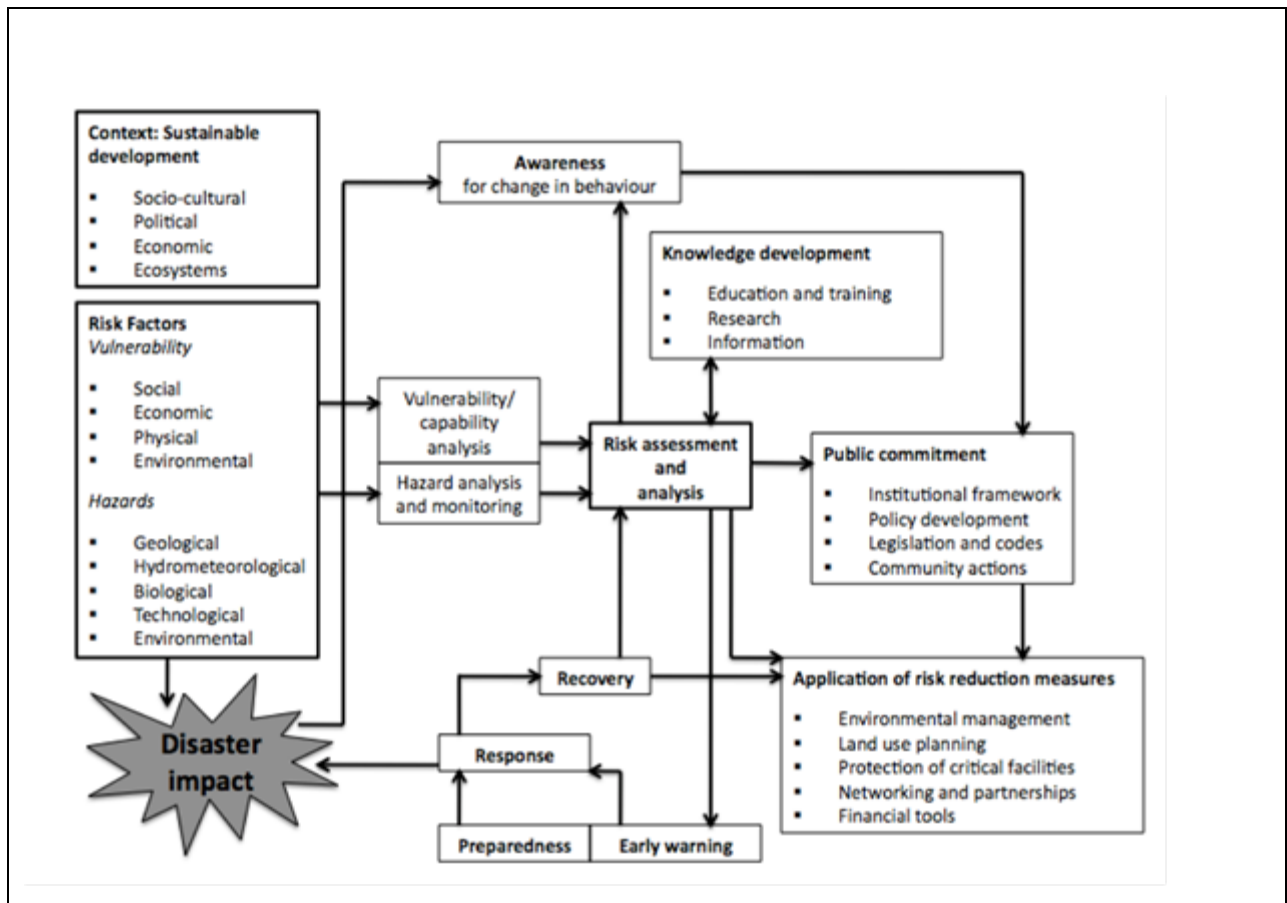
### **2.2.2 Background of Disaster Risk Reduction**

Disaster risk reduction is a field of study that gradually developed from the awareness of the need for sustainable development of the environment. The term DRR was formally defined for the first time in the Brundtland Report in 1987 (Wisner, *et al.*, 2012:15). This report led to global awareness and support for sustainable development as a response to economic poverty and environmental degradation. It suggested the importance of taking into account the needs of the poor as well as the livelihoods of future generations (Bacon, 2012:157-158).

The need to reduce the effects of disasters was addressed globally for the first time on 11 December 1987 at the 42nd session of the General Assembly of the United Nations. At this meeting the 1990s were designated as the International Decade for Natural Disaster Reduction (IDNDR) (Resolution 44/236 of 22 December 1989 cited in UN/ISDR, 2002). The basic idea behind the proclamation of the Decade was to bring awareness to the unacceptable and rising levels of losses in the world incurred due to disasters. The idea was also to utilize the wealth of scientific and engineering know-how in order to reduce effectively the losses resulting from disasters (UN/ISDR, 2000).

The Earth Summit on Environment and Development in Rio de Janeiro, Brazil took place in 1992, supporting the IDNDR. From this meeting stemmed an international recognition of the connection between development, environment and DRR (Bacon, 2012:158). In 2002 at the World Summit for Sustainable Development, this connection was emphasised further and disaster risk was incorporated as one of the consequences of mal-development (Bacon, 2012:158, Wisner, *et al.*, 2012:15). The next major step towards defining and framing DRR took place in 2004 with the development of a Framework for Disaster Reduction. This framework was

compiled by UN/ISDR and resulted in a document called Living at Risk (UN/ISDR, 2004:14). (see Figure 2.1 below)



**Figure 2.1: The Framework for Disaster Risk Reduction**

Source: (UN/ISDR, 2004:14)

The next big global action, the World Conference for Disaster Risk Reduction at Kobe in Japan, took place a few weeks after the Indonesian tsunami which shook the world and renewed global interest in reducing the risk of disasters (UNISDR: 2005:39,40). At this World conference for Disaster Risk Reduction in 2005, the Hyogo Framework for Action (HFA) 2005-2015 was accepted. The HFA is a non-binding and voluntary agreement signed by the participants at Kobe. This agreement provided a unique opportunity to promote a strategic and systematic approach to reducing vulnerabilities and risks in the face of hazards (Clarke, 2012). It underscored the need for, and identified ways of, building the resilience of nations and communities to disasters (UN/ISDR, 2006:1).

The HFA is a 10-year plan to make the world safer from natural hazards. This plan is reflected in five priority actions (UN/ISDR, 2012). The actions are the following:

- Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.
- Identify, assess and monitor disaster risks and ensure early warning is more effective and widespread.
- Use knowledge, innovation and education to build a culture of safety and resilience at all levels.
- Reduce underlying risk factors.
- Strengthen disaster preparedness for effective response at all levels.

The HFA contributes to participating countries' acknowledgement about the need that efforts to reduce disaster risks must be systematically integrated into policies, plans and programmes for sustainable development and poverty reduction, and must be supported through bilateral, regional and international cooperation, including partnerships between countries (UNISDR, 2006:3). The final goal of HFA is expressed in the following statement: "The substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries" (UN/ISDR, 2006:3).

### **2.2.3 The basic concepts of Disaster Risk Reduction**

Helen Clark, UNDP Administrator and former Prime Minister of New Zealand, mentioned that it is the mounting effects of disasters which have initiated the development of and support for DRR at international gatherings, like the one at Kobe in 2005. According to Clark, a few basic elements support the existence and relevance of DRR in the world today. The one element is the reality of the threat that disasters pose globally (UNISDR, 2012).

Sustainable development, poverty reduction, good governance and disaster risk reduction are the concepts used regularly within the DRR body of knowledge. They are mutually supportive objectives, towards reducing vulnerabilities and towards the strengthening of the capacity of communities. Accelerated efforts by countries supporting the HFA must be made to realise the goals of HFA mentioned above (UNISDR, 2006:3).

An important factor to consider is that, even though DRR has developed from, and is underpinned by sustainable development, this theoretical approach actually cuts across boundaries as it applies to both development work and emergency assistance within the context of sustainable development (Rottach, 2008:4; UNISDR, 2006:4). When implementing DRR activities in a community, every effort should be made to use humanitarian assistance in such a

way that risk is reduced and future vulnerabilities lessened as much as possible (UNISDR, 2006:5). It is important to understand DRR principles and approaches and its relevance to address a socio-economic disaster, like the one in question. Therefore the following concepts used in the literature are explored: hazard, disaster, risk, disaster risk and vulnerability. The term 'hazard' is defined and discussed next.

### **2.2.3.1 Hazard**

A disaster is triggered by an event; this is the common denominator in all disasters. This triggering agent (or agents) is called a hazard (McEntire, 2001:190). A hazard is a phenomenon or a process, either natural or human made, that can endanger a group of people, their belongings and their environment, if they do not take precautions (Twigg, 2007: 1). There are different types of hazards. Some are natural while others are caused by human beings, such as so-called industrial or technological hazards (i.e. explosions, fires or toxic chemical spillages). Wars and terrorism are also hazards caused by humans. Thus, it is clear that a hazard is the trigger or 'triggering agent' that could result in a disaster. A hazard can thus be caused by nature or by humans and the effect of the disaster is not related to the hazard or its origin but to the precautions that was taken before the event took place.

### **2.2.3.2 Disaster**

Disasters are defined as disruptive and/or deadly and destructive events that occur when a hazard (see Point 2.2.2.1 above) interacts (or multiple hazards interact) with human vulnerability (McEntire, 2007:2). A disaster does not cause vulnerability as such, but the degree of vulnerability of a community determines the effect a disaster would have on them (Wisner, 2004:4). The Disaster Management Act (57 of 2002) defines disaster as a progressive or sudden, widespread or localised natural or human-caused occurrence which:

- Causes or threatens to cause death, or disease; damage to property, infrastructure or the environment; or disruption of the life of a community; and cope with its effects using only their own resources.
- Is of a magnitude that exceeds the ability of those affected by the disaster to cope with its effects using only their own resources (SA, 2002:7).

The definition of disaster found in the Disaster Management Act (DMA) indicates that destructive or disruptive events are sudden or progressive. In DRR terms it is referred to as rapid or slow-onset disasters. Twigg disagrees with a definite categorising of slow-onset disasters versus rapid onset disasters. He states that such a distinction is actually artificial because a disaster triggered by a specific hazard could develop from a rapid onset to a slow-

onset disaster. A hazard, which strikes suddenly could be referred to as a rapid-onset disaster, but after a period in time, the same hazard could develop into a slow-onset disaster because of the damaging secondary long term effects (Twigg, 2004:248).

According to Wisner “the risks involved in disasters must be connected to the vulnerability created by people by their very existence.” (2004:4). Thus, disasters are a product of the social, political and economic environment. Wisner emphasises also that disasters could also be caused by communities’ increased vulnerability, due to the inadequate operations of the social systems existing within such a community. Examples of such *inadequate operations* would be if a society is exposed to governance where the law that regulates the safe construction of buildings is not enforced due to a culture that would accept bribes to turn a blind eye when regulations are not adhered to. This view is supported by McEntire (2007:190) who indicates that disasters could also be human-made. In other words, the trigger for a disaster can be of human origin – a hazard due to human actions. Thus, a disaster is not only caused by a natural hazard, but any serious disruption could result in a disaster. “Any serious disruption” refers to the disruption of the functioning of a community or society causing widespread human, material, economic or environmental losses, which exceeds the ability of the affected community or society to cope using its own resources (ISDR, 2004:17).

Disasters are also identified and described in types or in categories. These types or categories help researchers to understand the characteristics of a disaster that affected an area. Disasters are categorised by McEntire (2007:359,360) as follows:

- **Complex or compound disaster** – it involves multiple variables, like landslides, flooding, and fires occurring simultaneously.
- **Cascading disaster** – refers to an event that triggers additional hazards or impacts, for example an earthquake causes power disruptions.
- **Synergistic disaster** – is an event of which the impact results in concomitant disasters with an even bigger impact on communities, for example, the loss of power causes the disruption of communication systems.
- **Na-tech disaster** occurs when a natural disaster interacts with technology to produce or magnify effects, for example the tsunami in Japan which damaged the nuclear plant.

In view of the above-mentioned definitions and categories, a socio-economic disaster could be categorised as a *slow-onset* human-made disaster (e.g., due to a mass loss of employment people lose their livelihoods), which can develop into a *compound* disaster when social

structures and economic structures in a community collapse. The next section explores the term 'risk' in relation to DRR.

### **2.2.3.3 Risk**

In DRR, the perception of 'risk' plays a pivotal role where approaches and implementation are considered (Rottach, 2008:7). The term *risk* refers to the probability of an event and its negative consequences. It could refer to the risk of an accident, as well as potential losses from some particular cause (UNISDR, 2009:25).

When referring to risk in the context of DRR, more than one type of risk can be identified. The term 'acceptable risk' refers to the level of potential losses that a society or community considers acceptable given existing social, economic, political, cultural, technical and environmental conditions (UNISDR, 2009:4). Another context in which the term *risk* is used is 'extensive risk'. It refers mainly to a risk which is present in dispersed populations. Examples of such dispersed populations can be found in rural areas and urban margins where communities are exposed to and vulnerable to recurring and persistent hazardous conditions, for example the smaller islands in Central America which is located in a hurricane-prone zone (UNISDR, 2009:15).

### **2.2.3.4 Disaster risk**

The concept of "disaster risk" refers to the characteristics of hazards, their function and frequency experienced in a specified location, the nature of the elements at risk, and their inherent degree of vulnerability or resilience" (Twigg, 2007:1). The concept of disaster risk, creates the scope within which a community could be categorised as vulnerable or resilient. The definition of disaster risk reflects the concept of disasters as the outcome of continuously present conditions of risk. Disaster risk comprises different types of potential losses which are often difficult to quantify. Nevertheless, with knowledge of the prevailing hazards and the patterns of population and socio-economic development, disaster risks can be assessed and mapped, at least in broad terms (UNISDR, 2009:9, 10).

This concept thus explores the terms risk and disaster as they relate to each other, and also how other concepts used in DRR are closely linked to disaster, such as vulnerability and disaster. The more vulnerable a community is, the greater the risk of devastation when a disaster strikes. The term vulnerability is explored in the next sub-section.

### 2.2.3.5 Vulnerability

The term vulnerability is derived from the Latin word *vulnerabilis*, which means to wound (Copolla, 2006:25). “The vulnerability of people to disasters depends on their social, economic, cultural and political conditions, which are influenced by both internal changes and outside influences” (Rottach, 2008:6). The International Strategy for Disaster Research (ISDR) defines vulnerability as “the degree to which someone’s life, livelihoods, property and other assets are put at risk by a discrete and identifiable event, or cascade of events in nature and in society ...” (ISDR. 2004:6).

Vulnerability is also described as the extent to which people will experience harm from a hazard, and the extent to which property is damaged as a result of such a hazard. Present vulnerability involves who and what is at risk now, and future vulnerability indicates who and what may be at risk in the future according to projected development and population trends (Schwab *et al.*, 2007:366).

McEntire (2011:297) also explains vulnerability as a dual concept. However, he does not refer to present versus future vulnerability but distinguishes the factors that determine proneness to disasters and the variable that determines limited capacity. The variables leading to vulnerability are almost endless. The logical assumption to make on physical vulnerability is that causes for physical vulnerability include choice of a disaster prone location, risky construction practices, and the use of technology which could negatively affect the environment or the community using it, or being exposed to it. Social causes for vulnerability include at a minimum cultural and political issues, or population characteristics and economic circumstances that could have a negative effect on the well-being of a community (McEntire, 2011: 297).

In the definition of McEntire mentioned above, he makes it clear that the physical environment, the social structures of the community that operate within that environment and the economic circumstances that support the community are linked to each other and would therefore influence each other. Wisner takes this concept further and places vulnerability in the centre of a triangle of political, social and economic structures, which ultimately reflects people’s position within a society, as a consequence of their ability or inability to secure access to a large, resistant and sustainable set of assets (Wisner *et. al.*, 2012. 27).

McEntire mentions the “variables leading to vulnerability” and Wisner refers to the “ability or inability of people” within a community to secure access to assets. Thus, it could be understood that the lack of access to resources and the inability to secure access to resources can increase the vulnerability of a person or community.

Disasters have grave consequences for the survival, dignity and livelihood of individuals, particularly the poor, who are considered most vulnerable. The vulnerability of communities can also increase, given changes in the environment. Such changes can be in the demographics, or entail changes to a community's technological and socio-economic conditions, unplanned urbanisation and development within high-risk zones, under-development, environmental degradation, climate variability, climate change, geological hazards, competition for scarce resources and the impact of epidemics such as HIV/Aids. (UN/ISDR, 2006:1). One of the main aims of DRR is to reduce the vulnerability of communities and countries (UN/ISDR, 2006:3).

In conclusion, vulnerability indicates that people's livelihoods and properties are at risk. The risks that disasters impose on a vulnerable community relates to the level of vulnerability of the affected people to the crisis (UNDP: 2011). When people's livelihoods are affected in a disaster, their socio-economic status is also impacted on negatively. The socio-economic aspects of vulnerability will be discussed in the following section.

#### **2.2.4 Socio-Economic Aspects of Vulnerability**

Socio-economic vulnerability is explored in order to understand socio-economic disaster. In DRR the emphasis is on working with those who are the most vulnerable to the impact of shocks and stresses (Twigg & Bottomley, 2011:2).

Risk and vulnerability are directly related according to the following statement by Schwab *et al.* (2007:366): "Present vulnerability involves who and what is at risk now, and future vulnerability indicates who and what may be at risk in the future under projected development and population trends." McEntire (2001:190) elaborates on the interdependency of risk and vulnerability with the following definition: "Vulnerability is the dependent component of disaster that is determined by the degree of risk, susceptibility, resistance and resilience."

The focus of this section is on socio-economic vulnerability. From the definitions mentioned above one can conclude that socio-economic vulnerability implies risk and risk increases vulnerability. The risk of a disaster's negative impact on a community is also related directly to the general vulnerability of that community, as indicated by Wisner (2004:11). There are three risk-increasing pre-impact conditions that a community could experience prior to a disaster (Lindell *et al.*, 2007:158):

- socio-economic vulnerability;
- hazard exposure (how vulnerable a community is when exposed to a hazard);
- physical vulnerability (describes the vulnerability of the location of the community).

The impact of a disaster could have serious effects on a community. According to a report by Edwards (2012), the socio-economic impact of a disaster will be indicated by the following changes in a society:

- in community demographics after the disaster;
- in the prices of housing, services and the trade/retail market;
- in the demand for public services;
- in employment and income levels;
- in the aesthetic quality of a community.

In order to understand socio-economic vulnerability, the two terms are first discussed separately. The terms refer to both the social and economic structures within a community. These terms are interdependent to such an extent that in most cases in the studied literature the term is used as one concept, without separate definitions.

'Social structures' would refer to the relationships within a family as well as organised and informal community structures and activities that are a result of people sharing the same space in a community. Such structures can include municipality committees, schools, churches, sport clubs and societal events. Concurrently, social vulnerability refers to stresses and shocks inherent in the social structures and family relations of a certain community. The relationship between the social and economic structures in a community is such that when the economic structures which support a community fails, the social structures suffer the most (UNDP, 2003:53).

The other dimension of a community's socio-economic status concerns the economic structures. These structures refer to the businesses and their buildings and facilities, machinery and equipment used in creating employment, stocks and inventories, investments and the income and employment derived from that sector (UNDP, 2003:53). Economic vulnerability develops when, for example, major employers close (i.e. a mine-closure) and a huge number of people are unemployed as result. The ripple effect of a mass loss of employment throughout the community may be seen in the following indicators:

- employees moving out of the area because they have no place to work anymore;
- the disruption of the flow of goods and services that can affect local businesses and the industries serving that community;
- small business and farms in the affected area that may not have adequate savings or insurance to cover expenses and which cannot recoup their losses to stay financially solvent;

- local municipalities losing their means to provide services needed to support the community (Schwab., *et al.*, 2007:12).

In conclusion, it can be stated that socio-economic vulnerability refers to the vulnerability of the livelihoods of a community, in terms of a twofold structures: **social structures** which define and organise a specific community, and **economic structures**, which lead to the loss of livelihoods of the community (UNDP, 2003:53). The next section investigates the role poverty plays in socio-economic vulnerability.

#### **2.2.4.1 The role of poverty in socio-economic vulnerability**

Poverty is a set of conditions that comprises a number of related elements, such as poor physical status (poor health), powerlessness, isolation and marginalisation, as well as material insecurity. Poor people are exposed constantly to various risks and shocks that jeopardise their livelihood options (Frankenberger *et al.*, 2002:4). Poverty forms a major part of vulnerability within a community (James, 2008:8). In addition to the definition of Frankenberger, Wisner emphasises another challenge of poverty (2012:27) (also see Point 2.2.2.4), namely the inability to access resources. Poverty in a community could therefore lead to an inability to access resources, and it brings about the isolation and marginalisation of a community, households, persons and their livelihoods. Poverty may be considered as a major cause for socio-economic vulnerability. For example, the inability to access food, may lead to starvation.

The need for food is prevalent in communities identified as poor or socio-economic vulnerable. “Hunger is the bottom line for those who are chronically vulnerable due to poverty or those who are acutely vulnerable to disasters” (Christopolos, 2012:543). Lack of food, or a condition of food insecurity within a community, is better understood when linked to livelihoods. These are discussed in more detail later on in this chapter (see Point 2.3) (Christopolos, 2012:544).

Thus, poverty can be considered a major contributing element to vulnerability and can increase the consequences of disasters (James, 2008:8). Different phases of poverty are identified: ‘Intersect into poverty’, ‘poverty exit’, ‘transition poverty’ and ‘chronic poverty’. These terms are discussed shortly, as it is relevant for one who attempts to understand the poverty that developed in the ‘mining communities’ in question.

**Entry/exit into poverty:** Many events lead to communities entering into poverty or conversely, help people in communities to exit from poverty (McKernan & Ratcliffe, 2002:viii). There are a few common trigger events which cause people to enter into poverty. These events are employment changes, having to take care of a child under the age of six in the household, shifting from a two-adult to a female-headed household, loss of employment and onset of a

disability. A noted aspect of disasters is the cross-sectorial nature of employment and income loss by workers and their families due to the temporary cessation of productive activities after a disaster. This can have a serious negative impact on employment and family income, leading to a lack of basic supplies (UNDP, 2003:iv). Such a family could then enter into poverty, and when employment is restored, they could again exit from poverty.

**Transition poverty:** this describes a temporary condition of a household or individual due to a certain event (like a disaster). It could refer to both entry into poverty or exit from poverty. This could happen for example, when a mine closes, but the head of the household finds other employment or is re-employed at the same mine under new ownership, as was the case with some families in the mining communities discussed in this study. Such a condition is referred to as transition poverty. Loss of employment by the head of the household is one of the most significant triggers of such a transition into poverty (McKernan & Ratcliffe, 2002:45).

**Chronic poverty:** this type of poverty traps individuals and households in severe and multi-dimensional deprivation for several years and is often transmitted across generations. It is a situation where people are born in poverty, live in poverty and frequently pass that poverty onto their children. This type of poverty is characterised by its perpetual nature and persistence, the feeling of bare survival with no sign of escape, and the inability of those who suffer to resist shocks that lead to further impoverishment (Lwanga-Ntale, 2006:1). Chronic poverty or prolonged inability to access resources highlights the need for humanitarian assistance and is discussed in the following section.

#### **2.2.4.2 Socio-economic disaster**

A socio-economic disaster follows when vulnerability of people's livelihoods deteriorates into total collapse (Christopolos, 2012:547). Mining communities that depend solely on the mine for their livelihoods could be considered as socio-economically vulnerable (Stacey *et al.*, 2010:4). At the event of a mine closure, such as the one under investigation, it could lead to the total collapse of the mining community surrounding the mine due to the mass loss of employment.

Thus, the economic well-being of a community is affected negatively by a disaster. The ripple effect could even extend beyond the specific community or country. The secondary socio-economic effects of a disaster may also include unexpected population migration, disease transmission, trade reductions or widespread environmental modifications (UNDP, 2003:iv).

According to UNDP (2003:40), socio-economic disasters refer mainly to the effects of the loss of employment and income on a community. Coppola (2007:26) mentions that a socio-economic disaster does not only imply the loss of employment. It also refers to a humanitarian crisis, in

which a large number of people would be suffering due to negative impact a disaster has on their socio-economic well-being. Taking into account the investigation of concepts and consequences of socio-economic vulnerability mentioned above, a socio-economic disaster can be defined as follows the sudden loss (rapid onset) or gradual depletion of livelihoods (slow-onset) in a vulnerable community. This occurs when and after a disaster strikes, and a community is not able to recover on its own using its own resources, and humanitarian aid is therefore needed.

The aim of DRR is to protect the most vulnerable (the poor and destitute) by means of securing the livelihoods of communities. The extent, resistance and stability of livelihoods determine people's ability to avoid harm when dealing with disasters (Gaillard, 2009 as quoted by Wisner *et al.*, 2012:27). The study of livelihoods, which is discussed next, contributes to a better understanding of socio-economic disasters, as well as the mitigation of such disasters, within the framework of the general DRR approach.

## **2.3 THE SUSTAINABLE LIVELIHOODS APPROACH IN DRR**

DRR approaches and implementation aim at the prevention of disasters, which include the saving of lives and the improving of the quality and security of lives (Briceno, 2012: xxix). This is also reinforced in the "final expressed goal" of the HFA agreement which reads as follows: "The substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries" (UN/ISDR, 2006:3).

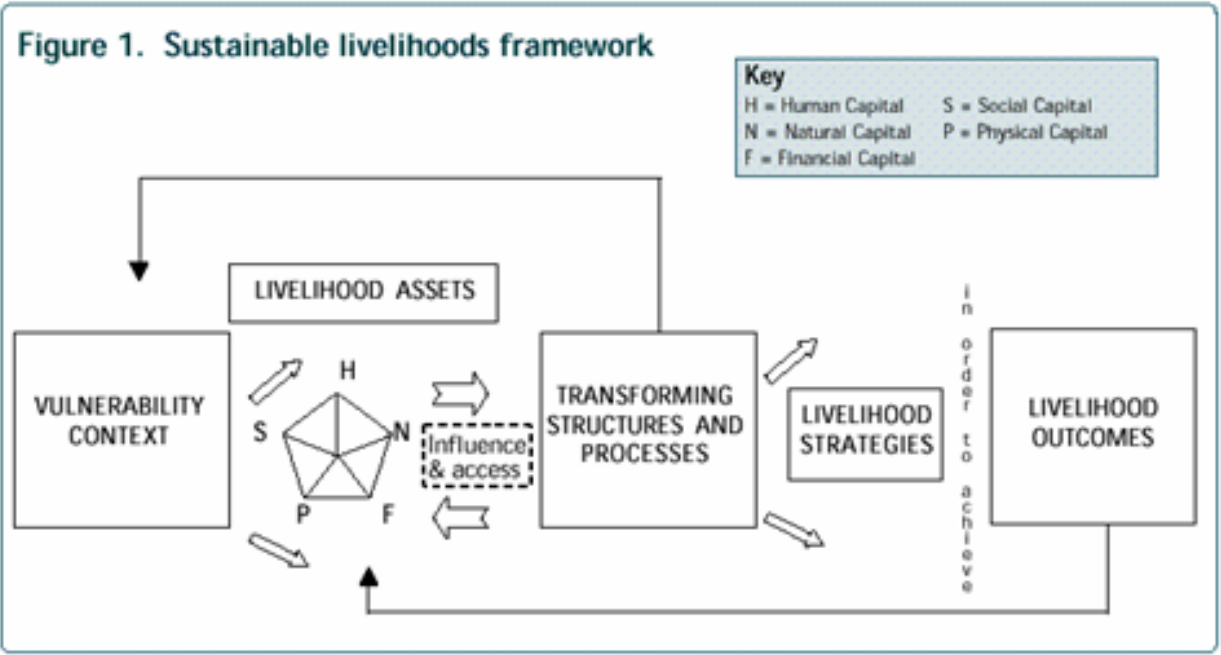
The risk of livelihood's failure determines the level of vulnerability of a household. The greater the share of resources devoted to food and the acquisition of health service, the higher the vulnerability of the household. This also indicates that livelihoods that are not secure produce vulnerable households. This is explained in more detail in the CARE Household Livelihood Security Framework (see Point 2.3.2) (Samahu, 2010a).

The discussion on the socio-economic issues of vulnerability (see Point 2.2.3), links vulnerability to insecure livelihood assets and therefore highlights the important role of livelihood assets of a community. The Sustainable Livelihood Framework (SLF) developed by the DFID (Department for International Development) in 1999 (DFID, 1999) is discussed in the next session as it seeks to identify triggers of poverty and to specifically address poverty and vulnerability in the context of livelihood security or the absence of it (UNDP, 2011).

### **2.3.1 The Sustainable Livelihood Framework**

The environment in which a community functions plays a pivotal role, since this is where the community negotiates its existence. Such an environment should provide sustainable

livelihoods to the community, in order for them to make a living. The Sustainable Livelihood Framework (SLF) (see Figure 2.2) is studied in this section. It is a tool that helps researchers to understand the relationship between the environment in which a community negotiates its existence and the livelihoods provided for within that environment. This tool is also helpful to explore the aspects of community structures, community life and livelihoods relevant to the study on socio-economic disasters.



**Figure 2.2: The Sustainable Livelihood Framework of the DFID**

Source: (DFID, 1999)

The (SLF) is therefore an important framework and assists in improving an understanding of livelihoods, specifically those of the poor and vulnerable in society. SLF is underpinned by a serious commitment to the elimination of poverty, which is one of the main aims of SLF, HFA, DFID and DRR (DFID,1999; UN/ISDR, 2006:3).

Twigg (2004: 50) mentions that poor people’s livelihoods are unlikely to be sustainable unless they can cope with the numerous external stresses and shocks that affect them. The SLF enables agencies to identify stresses and shocks that increase vulnerability of a community or to identify entry points toward strengthening a community’s capacity and resilience (Twigg & Bottomley, 2011:2).

The ideal status of secure livelihoods is described in the next definition: “A livelihood comprises of the capabilities, assets and activities for a means of living. A livelihood is sustainable when it can cope and recover from stress and shocks, maintain or enhance its capabilities and assets,

provide sustainable livelihoods for the next generation and which contributes net benefits to other livelihoods at local or global level”(Chambers & Conway 1991:6).

The SLF is centred on people and thus studies livelihoods on the level of a community or a specific group. The components of the SLF are discussed in the following section, starting with the vulnerability context (see Figure 2.3).

### **The vulnerability context**

The vulnerability context refers to the external environment of a community where the effects of stresses, shocks, trends and seasonality have a direct effect on the livelihoods assets of a community. This causes a chain reaction, affecting people’s livelihood strategies and outcomes. A negative input has an adverse effect on the assets, outcomes and strategies of the affected community.

### **Livelihood assets**

Each community has different quantities and forms of livelihood assets available to them. Assets protect a community from being vulnerable to disasters. Livelihood assets are present in the internal environment of a community as well as in the external environment. Wisner (2004:96) describes and lists these assets as different forms of capital. The capital available to the community to achieve their goals are then explicated as:

- human capital – skills, knowledge, health, and energy;
- social capital – networks, group, institutions, family relations;
- physical capital – infrastructure, technology, and equipment;
- financial capital – savings, credit, pension fund, medical aid;
- natural capital – natural resources.

### **Transforming structures and processes**

Transforming structures and processes refer to policies, institutions, organisations and other structures in which a certain community operates. These structures and processes could affect their livelihood assets, strategies and outcomes positively or negatively (UNDP, 2011). The analysis of transforming structures in the SLF serves as a tool to understand how the community under investigation was influenced by the closing of a mine.

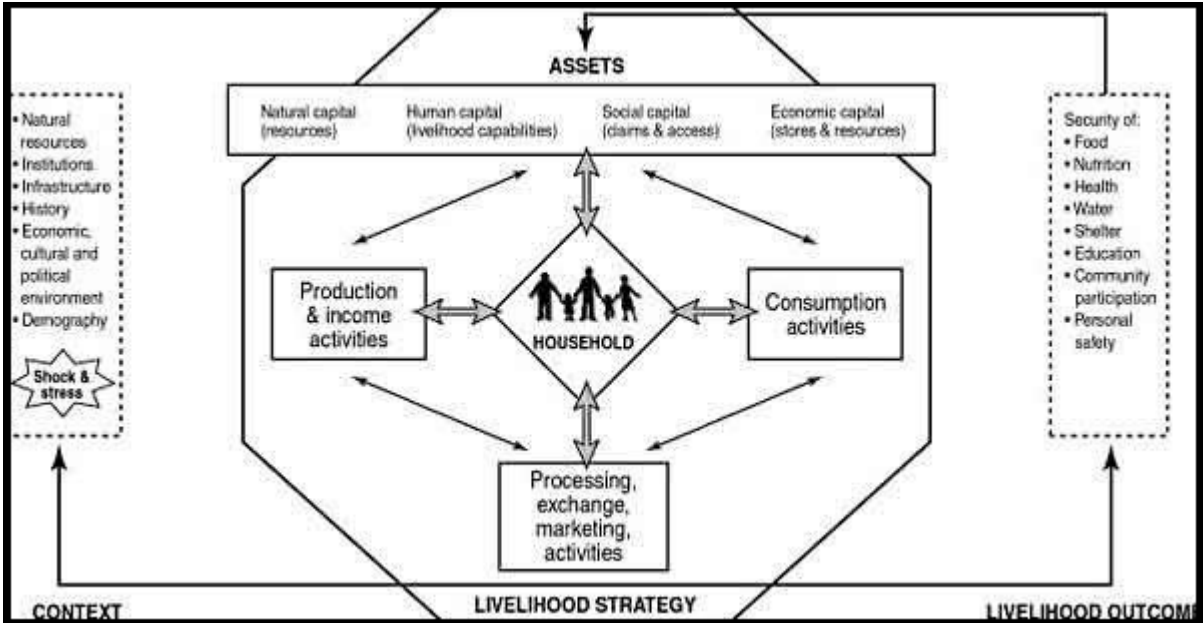
### **Livelihood strategies and outcomes**

Livelihood assets determine both the livelihood strategies a community adopts and the livelihood outcomes a community achieves. Livelihood outcomes refer to the goals the

community is seeking for themselves regarding their livelihoods (DFID, 1999). Livelihood strategies and outcomes also depend on people’s access to resources. Every household needs at least a minimum access to resources or livelihoods in order to be resilient when confronted by disasters. The Cooperative for Assistance and Relief (CARE) Household Livelihood Security model focuses on the basic needs of a household to obtain security for household livelihoods and is discussed consequently.

**2.3.2 The Care’s Household Livelihood Security Model**

The emphasis of the CARE’s Household Livelihood Security (henceforth HLS) model focuses on securing livelihoods, aiming to address poverty and vulnerability issues (see Figure 2.3). The CARE- model approach is suitable when dealing with large-scale poverty and is also adaptable to address context-specific constraints (Frankenberger *et al.*, 2001). HLS has become CARE’s basic framework for programme analysis, design, monitoring and the evaluation of household’s livelihood security (Samahu, 2010). This model is useful as it helps to gain an understanding of socio-economic vulnerabilities and how it could develop within a community.



**Figure 2.3: The CARE Household Livelihood Security (HLS) model**

Source: After Swift 1989, used by Frankenberger *et al.*, 2001.

The framework provides the opportunity to analyse the level of basic livelihoods of a family and their coping mechanisms in the absence of such livelihoods. The analysis of household security is determined by the interactions between assets, the household and the processing of these assets, as well as related activities of production, income and consumption. The framework explains the environment that should provide resources for the actions of production, income

and consumption, which are represented by the collective term: livelihood strategies. These activities, or the absence or inability of a household to participate in them would constitute the level of security/vulnerability that households face (Frankenberger, *et al.*, 2001).

The CARE's HLS framework supports the aim of the HFA and DRR in reducing people's vulnerability to disasters by aiming at protecting the livelihoods of households and communities. The components of the HLS are depicted in Figure 2.3:

The CARE's HLS is a framework that explains the relationship and interaction between assets of a household and its access to the resources that is provided in its environment. The main components of this framework (as depicted in Figure 2.3) are discussed in more detail below.

### **2.3.2.1 The components of the HLS**

The main components of this framework are the household box, the asset box, and livelihood strategies box. The livelihood strategy box will be discussed first.

#### *2.3.2.1.1 The Livelihood Strategy box*

The Household box features in the centre of the Livelihood Strategies box (see Figure 2.3.2). The placement of the Household box in the centre of the diagram displays the importance of the household in the CARE HLS framework. This is to emphasise that the household is the most important and most affected by livelihood strategies, as a result of the production activities, consumption activities and processing, as well as marketing and exchange activities in which it participates (or not). This unit responds and reacts to internal and external factors in the environment, which is represented in the Shocks and Stress box. In order for the household not to be vulnerable, it has to have assets and access to the elements mentioned above (see Figure 2.3).

Wisner explains the vulnerability of a household by comparing the ability to access resources with an inability to access them. Access to resources indicates that a household is resilient, hence inability to access resources indicates vulnerability (Wisner *et. al.*, 2012:27). CARE supports this view by explaining in this model that the access to supplies in the external environment as well as access to basic needs could be absent. Shocks and triggers in the external environment could break the cycle of growth. The result could be the depletion of household livelihood securities. Such a condition could lead to increased socio-economic vulnerabilities, which may escalate into a disaster if no action is taken.

### 2.3.2.1.2 *The Asset box*

The Asset box represents a variety of procurement strategies for food and cash. Assets refer to human, social and economic capital and represent the degree of vulnerability of a community. The Asset box explains the interaction of the household to access resources that are provided in the external environment. The level of interaction is determined by the quality/quantity and value of assets available to the household (Samuha (b), 2010). The CARE HLS model suggests actions that could be taken to strengthen the resilience of the household in order to reduce poverty. By assisting a household in the process of overcoming the condition of poverty, socio-economic vulnerability is reduced (Samuha (b), 2010). The related actions are as follows:

- Livelihood promotion, which aims at improving the resilience of households. Most livelihood promotion activities are longer-term development projects.
- Livelihood protection refers to actions taken that will help prevent a decline in household livelihood security. It also refers to alternative ways to create an income after the loss of employment.
- Livelihood provisioning refers mostly to direct provision of food, water, shelter and other essential needs in case of emergencies.
- Personal and social empowerment refers to interventions to increase the assets of a community by providing education, community mobilisation, career guidance and assistance.

### 2.3.2.1.3 *The Livelihood Outcomes box*

The CARE HLS framework's concept and analysis, grew out of a food security perspective, but recognises the fact that food security is not the only livelihood need that matter to households. This approach is based on an observation made in research, which showed that the need for food may be sacrificed when another need like personal safety is at stake. This only highlights the complex nature of poverty (Frankenberger *et al.*, 2002).

Household Livelihood Security (HLS) is defined as adequate and sustainable access to income and resources, in order to meet basic needs (Wisner *et al.*, 2012:27). Livelihood outcomes are positive when households have access to livelihoods, as well as security through access to food, water, shelter, education and community participation (see Figure 2.3). Household livelihood security would imply that the inhabitants are able to acquire, protect, develop, utilise, exchange and benefit from assets and resources. If a household does not have income earning activities and secure ownership of, or access to resources (both tangible and intangible), this

constitutes poverty. Livelihood outcomes are hampered and diminished when a household cannot withstand shocks or meet contingencies that negatively affect assets and access to livelihood strategies (Frankenberger *et al.*, 2001).

The CARE agency, responsible for developing the CARE HLS framework, identified three overlapping activities when addressing livelihood security. The first was activities revolving around the immediate supply of basic necessities, which include food, shelter, health, education and freedom of speech. The second set of activities attempt to strengthen personal and group assets. The third set of activities aimed to address the underlying root causes of poverty within a community (Sanderson, 2012:708). According to CARE, the immediate needs that develop after any adverse event lie in the Livelihood Outcomes box (see Figure 2.3). The next section examines the components of the frameworks used for the analysis of the mine closure as it was experienced by the two mining communities in question.

### **2.3.3 Using the SLF and the CARE HLS livelihood frameworks to analyse the data collected**

The study of the livelihood models assisted in the understanding of how the loss of people's assets as a result of mine closure increased the vulnerability of the mining communities in question, by negatively affecting their socio-economic existence. Such a condition could then develop into the total collapse of people's livelihood strategies and outcomes.

The CARE HLS framework helps to analyse and understand the root causes of poverty and the web of poverty, which is difficult to exit. This approach focuses on the well-being of the household, dividing it into three basic categories: (1) possession of human capabilities, (2) access to assets, tangible and intangible, and (3) the existence of economic activities (Frankenberger *et al.*, 2002). Assets of a household create opportunity and access to participate in livelihood strategies within an environment which is exposed to shocks and stresses.

The SLF framework focuses mainly on the bigger picture, the external environment in which a community exists, by describing the same basic components mentioned above. Together, these frameworks help to create awareness that the resilience of a community depends on access to resources through which the need for basic livelihoods like food, water and housing can be met.

The two livelihood frameworks discussed in this chapter have the following three aspects in common:

- **Livelihood assets** mentioned in both the livelihood frameworks (see Figure 2.2 and Figure 2.3) are human capital, natural capital, financial capital (economic), social capital and physical capital.

- **Livelihood strategies** are not mentioned in the SLF model but the CARE model indicates livelihood strategies to be production and income activities, consumption activities, as well as processing, exchange and marketing activities
- **Livelihood outcomes** are food security, nutrition, health, water, shelter, education, community participation and personal safety.

These three aspects were used to analyse vulnerability in the two mining communities under investigation. It also provided the themes and categories to analyse these two mining communities' experience of the mine closure in each instance. Communities' entry point into poverty happens at the level of the Livelihood Assets box (see Figure 2.3). This aspect is discussed in more detail in Chapter 5.

## 2.4 CONCLUSION

This chapter provided the theoretical framework of the DRR approaches to reduce vulnerability and to protect livelihoods. The declaration of the International Decade for Natural Disaster Reduction (IDNDR) was the first bold step in the international community towards creating awareness that the effect of disasters could be reduced. However, the goal to prevent disasters still has to be achieved (Briceño, 2012: xxviii).

Firstly, Disaster Risk Reduction was investigated by examining the background and approach of DRR. The Framework for Disaster Risk Reduction (see Figure 2.1) underpins this study as it provides the motivation for the mitigation of all disasters, including socio-economic disasters, after an unexpected mine closure. Secondly, this chapter dealt with vulnerability, risk, poverty and livelihoods, and discussed livelihood frameworks that explain how these concepts are interrelated. Poverty is the main reason why households and communities are at risk. Thus poverty is the main contributor to vulnerable livelihoods, even before an adverse event such as a mine closure. In light of this the investigation included all these aspects.

Thirdly, the realisation was discussed that a vulnerable community and household are at risk. At the event of a triggering agent like a mine closure, there is a need to understand the mechanisms of livelihood frameworks. The last section of this chapter studied the livelihood frameworks and how they support the understanding of vulnerability within the body of knowledge of DRR. The SLF-model holistically explains the status of a community within an environment that could influence the increase or decrease in a community's vulnerability to disasters. This influence becomes visible where livelihood assets determine livelihood strategies and outcomes.

The CARE-model stresses the importance of fundamental needs to be fulfilled on household level in order to build resilience. This is done by adding detail to the boxes that describe livelihood strategies and livelihood outcomes. Special focus was given in this chapter to socio-economic vulnerability. This issue still proves to be one of the major challenges when addressing DRR in most developing countries, which are riddled with poverty, war, refugee camps and prevalent food insecurity. Humanitarian assistance is needed regularly in parts of Africa that face socio-economic disasters due to civil war (Somalia), floods or droughts (Mozambique) and chronic poverty (Zimbabwe).

The study of the livelihood frameworks emphasised the need for sustainable livelihoods, and especially for the mining community, which could be described as intrinsically vulnerable due to the reality that mines have finite life cycles. The mining communities in question were already at risk since their livelihoods did not extend further than their employment at the mine. When a mine closes in such a case it could have a devastating impact on the community and the environment.

The next chapter investigates mine closure. It includes a study of the regulatory and legislative framework, locally and internationally. The best practices and approaches of local as well as international policies to mine closure are discussed.

## **CHAPTER THREE**

### **MINE CLOSURE: A THEORETICAL FRAMEWORK**

#### **3.1 INTRODUCTION**

The previous chapter dealt with DRR approaches and socio-economic vulnerability. The discussion on livelihoods helped to increase the understanding of the interrelationship between vulnerability and the effects that a disaster could have on a community.

This focus of this chapter is on the topic of mine closure, including the laws and regulations, best practices that are proposed and the challenges that mining companies face when closing a mine. "It sounds simple: explore, develop, operate, close, remediate. The mine life cycle on paper appears to be a clean project with a start and an end" (MABC, 2000 as quoted by Conner, 2003:1). However, mine closure is more complex and less straightforward due to the multi-dimensionality and mutual dependency that exist between the mining company and the surrounding mining community. In addition, the fact that mining operations contribute considerably to the growth and development of the mining communities, mine closure is a complex and challenging issue (Conner, 2003:4).

The investigation on mine closure in this chapter starts off with a discussion on mine closure within the South African context in order to gain an understanding of the relevant regulations and pieces of legislation on mine closures. Mine closure is therefore contextualised as point of departure for this chapter. Thereafter a discussion follows on policies and practices about mine closure that is followed internationally. The aim of the discussion is to establish whether the approach to mine closure in South Africa is in line with what is happening globally. The challenges and best practices for mine closure in general are then investigated. Lastly three examples of mine closure approaches are discussed. On the basis of this, recommendations are made in the last chapter of this study. The recommendations form part of the research objectives mentioned in Chapter one (see Point 1.4).

#### **3.2 MINE CLOSURE CONTEXTUALISED**

Mine closure can be seen as part of a mine's life cycle which typically culminates in the relinquishment of a mining licence, social closure, decommissioning and rehabilitation (Chamber of Mines of Namibia, 2010:25). The International Council of Mining and Minerals (ICMM) uses the following approach to mine closure: "An integrated approach to closure is one which takes the environmental and social considerations into account from an early stage and continues throughout a site's lifetime" (ICMM, 2010).

“For the past decade or more, the term “mine closure” has firmly entrenched itself into the lexicon of mine operators and regulators. Even ‘hard-nosed’ or ‘old school’ mining engineers have come to appreciate that this phase is just as important as the other stages of the mining cycle “ (Laurence, 2006:285). Unfortunately, mine closures have also become a contested and controversial matter with a number of unresolved issues that landed on the table of the government (Van Eeden *et al.*, 2009:52).

The global focus on sustainable development and the impact of the increased efforts to protect the environment in the last few decades have changed the way the mining industry approaches the issue of mine closure. Mine closure is a process and not a discrete event. Ideally, good practice of mine closure planning emphasises that planning for closure of mining operations should be done during the exploring phase, when the feasibility of the mine and the design and permits for mining are established (Stacey *et al.*, 2010:379; MMSD, 2004:3). Mine-closure planning should uphold the following principle with respect to the mining community: “using, conserving and enhancing the mining communities” (Stacey *et al.*, 2010a:9).

Mining operations have contributed considerably to the growth and development of the mining communities. As result, a significant percentage of households in South Africa depend mainly on the mining industry for their income. For example, gold and uranium mines have played a major role in the economy, history, and demography of South Africa (Van Eeden *et al.*, 2009: i).

The limited life span of a mine is both a reality and the biggest challenge of the mining industry with its huge workforce (Stacey *et al.*, 2006:6). When the ore-extracting activities of a mine have ceased and the final decommissioning and mine reclamation are completed, the life cycle of the mine has ended (Stacey *et al.*, 2006:6; Chemc, 2011).

Mines usually are closed at the end of its life cycle because of depleted resources, but may also be closed for other reasons such as economic, geological or structural reasons (Laurence, 2006: 286). Some mines in South Africa close because of reasons like liquidation, legislation or an earthquake. Partial closure may happen due to the need for necessary maintenance (Swart, 2003: 490). Unfortunately the last stage of mining, which is mine closure, still lacks the excitement or prestige surrounding the other phases (Laurence, 2006:285). This section aims to investigate the legislation on mine closure in South Africa and mine closure policies internationally, in order to establish a theoretical framework and understanding of mine-closure.

### **3.3 MINE CLOSURE: A SOUTH AFRICAN PERSPECTIVE**

The literature study on the South African policies and legislature on mine closure indicates that South Africa has adequate policies and targets for mine closure, especially in terms of social

and community development (Fourie & Brent, 2008:1). The following section investigates the policies and legislature on mine closure in South Africa, starting with a brief discussion of the background of the mining industry in South Africa.

### **3.3.1 A brief background**

South Africa has a very rich concentration of minerals if the total mineral wealth of the world is considered. Most mines in South Africa are 50 years and older and during those years mines have enjoyed decades of profiteering and unchecked activities. When the older mines first opened, they did not plan in advance for the possible event of mine closure (Fourie & Brent, 2008:1).

Historically a mine was closed simply by being boarded up and abandoned when an ore body was exhausted, or when production ceased (Limpitlaw, 2004:1). The irresponsible mining practices of the first mining companies left long-term residual effects on the social, health and environmental well-being of communities residing in the vicinity of the mine (Swart, 2003: 489). According to Swart (2003:489) the early legislation focused on 'surface rehabilitation' and the mining companies followed a reactive approach in which they complied with the mere minimum requirements. The next section discusses the legislative framework which seeks to regulate the South African mining industry.

### **3.3.2 The legislative framework of the mining industry in South Africa**

The following regulations and pieces of legislation are relevant for this investigation in the present study. The following are discussed below: the Minerals Act of 1991 (50 of 1991), the Mining and Petroleum Resources Development Act (28 of 2002), and the Mining Charter of 2010. These Acts are relevant for this study since they include guidelines and controls with which mining companies have to comply when closing their operations. The first act to address irresponsible mining practices was the Minerals Act of 1991 (Act 50 of 1991).

#### **3.3.2.1 The Minerals Act of 1991**

The Minerals Act 1991(50 of 1991) addressed the irresponsible mining activities of the past, which left long-term debilitating effects on various levels in mining communities (Swart, 2003:489). This Act did not have much effect addressing the socio-economic issues of mine closure, but it meant an introduction for mining companies to understand the consequences of the irresponsible mining activities of the past. The Minerals Act 1991 (50 of 1991) focused on the rehabilitation of the mining sites.

The difficulties which are associated with mine closures are not only the rehabilitation of the mining site and affected environment but also to find an answer to the question: what happens to the mining communities when the mine has closed? (Anglo American, 2003). The mine-closure phase is generally associated with reduced employment levels. This can have a significant negative impact on local economies and the mining community, as the mining community is solely dependent on the mine for its income (Stacey *et al.*, 2010:379; MMSD, 2004:3).

The next section explores the regulations and pieces of legislation in South Africa, which contain very explicit articulated policies and targets for mine closure, especially in terms of social and community development in the Southern Africa region. The Mining and Petroleum Resources Development Act (28 of 2002), addresses some issues regarding mining communities and are discussed in the next section.

### **3.3.2.2 Mineral and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002)**

The matter of the mining companies' socio-economic responsibility towards surrounding mining communities was not included in any legislation prior to the Minerals and Petroleum Resources Development Act, also referred to as the MPRDA Act 28 of 2002, (28 of 2002) MPRDA (Swart, 2003:492). Communities surrounding South African mines are in most cases synonymous with social problems, which include poverty, disease, unemployment, adult illiteracy, poor housing, family disorganization and uncontrollable migration as result of mining operations. Therefore the socio-economic responsibility of mining houses needs to be addressed by legislation (Chenga *et al.*, 2006:57).

The MPRDA (28 of 2002) was implemented to make provision for the equitable access to and sustainable development of the mineral and petroleum resources of South Africa. The aim also was to deal with matters connected these matters (SA, 2002:1), which include the socio-economic aspects of mining operations. The MPRDA (28 of 2002) contains specific regulations which aim to deal with socio-economic conditions of mining communities that arose from mining activities, as clearly indicated in the preamble of the Act:

- “The State affirms its obligation to protect the environment for the benefit of the present and future generations, to ensure ecologically sustainable development of mineral and petroleum resources, and to promote economic and social development” (Swart, 2003: 492).
- “The State recognises the need to promote local and rural development and the social upliftment of communities affected by mining”.

In Chapter 1 Section 1, the socio-economic development of the mining community is mentioned again. Point b (iv) refers to broad-based economic empowerment as being a social or economic plan that should assist or provide for the socio-economic development of communities hosting mining operations, or which are affected by mining operations because they provide labour to the mines (SA, 2002:5, the sections underlined above are the emphasis of the researcher, MA).

In Chapter 6, Section 25 (Rights and obligations of holder of mining rights) of the MPRDA it states that mining companies need to submit a social and labour plan as a pre-requisite for the granting of mining or production rights by the Department of Mineral Resources (DMR). In the Social and Labour Plan mining companies need to indicate a comprehensive Human Resources Development Programme, a Mine Community Development Plan, a Housing and Living Conditions Plan, an Employment Equity Plan, as well as an outline of processes to save jobs and manage the downscaling of mining operations or mine closure. These programmes are aimed at promoting employment and advancement of the socio-economic existence of all South Africans (DMR, 2010:4, emphasis by the researcher, MA).

The Social and Labour Plan has four objectives which all are relevant to this study. The objectives have been derived from Section 2 of the MPRDA (28 of 2002). They are (DMR, 2010:5) the following:

1. Promote economic growth and the development of mineral and petroleum resources in the Republic.
2. Promote employment and to advance the social and economic welfare of all South Africans.
3. Ensure that holders of mining or production rights contribute towards the socio-economic welfare of the areas in which they are operating, as well as the labour sending areas.
4. Utilise and expand the existing skills-base of mineworkers in order to empower the Historically Disadvantaged South Africans (HDSA's) and to serve the community.

The next section investigates the Broad-Based Socio-Economic Empowerment Charter for the South African Mining Industry that was released as a requirement of the MPRDA, in 2004.

### **3.3.2.3 Broad-Based Socio-Economic Empowerment Charter for the South African Mining Industry (Mining Charter) of 2004**

The Mining Charter was released in 2004 and its vision was to create an industry that would proudly reflect the promise of a non-racial South Africa (SA, 2004:1). The Charter was

developed to provide a framework for promoting the empowerment of historically disadvantaged South Africans referred to as the HDSA's. This objective of the mining and minerals industry is in line with Section 100(2)(a) of the MPRDA and the Constitution (1996) of South Africa, which refers to historical social and economic inequalities, especially regarding mining rights and the owning of mines.

The Mining Charter mentions regulations that are relevant for mine closure issues, and the protection of the socio-economic well-being of the mining community and the labour sending areas after a mine closes in the following statement: It proposes "integrated socio-economic development by mobilising all stakeholders, of host communities, major labour sending areas and area's that due to unintended consequences of mining are becoming ghost towns" (SA, 2010:2). 'Major labour sending areas' refer to areas from which a significant number of mineworkers have been recruited (SA, 2004:9). 'Ghost towns' refer to areas in which the economies were dependent on mining and therefore could not survive beyond the closure or significant downsizing of mining activities (SA, 2004:9).

The challenge for the South African mining industry is to implement the principles of the Mining Charter and the MPRDA. This would include looking after the mining community during and after a mine closure, as well as planning ahead for the event of a possible mine closure (Fourie & Brent, 2008:4). The next section will investigate the amendment of the Mining Charter..

#### **3.3.2.4 The Amendment of the Broad-Based Socio-Economic Empowerment Charter (Mining Charter) for the South African mining and minerals in**

The vision of the Amendment of the Mining Charter, released in September of 2010 by the Department of Minerals Resources, was to facilitate sustainable transformation, growth and development of the mining community (DMR, 2010). The aim of the revised Mining Charter was that it should help to implement transformation. The Mining Charter would be the instrument and specific targets would be set up. These targets would include the requirements set out in the Social and Labour Plan and with which mining companies should comply. Transformation in the mining industry will be assessed against the objectives of the Social and Labour Plan, mentioned above (see Point 3.3.2.2):

The Mining Charter addresses that would promote social and economic development of the HDSA's, the mining community and the labour sending areas:

- ownership
- procurement and enterprise development
- beneficiation

- employment equity
- human resource development
- mine community development
- housing and living conditions
- the sustainable development and growth of the mining industry.

Two of these elements have specific relevance as they specifically relate to socio-economic conditions of the mining community and labour sending areas. These are mining community development and housing and living conditions.

**Mining community development:** The mining community forms an integral part of mining development and there has to be a meaningful contribution towards community development. Mining companies must always keep the ethnographic identity of the workers in mind and invest the protection of that identity by utilising consultative and collaborative processes prior to implementation of mining projects. Consultation with all stakeholders, including the mining communities, is in line with international best practices in terms of rules of engagement and guidelines (DMR, 2010:4).

**Housing and living conditions:** The goal is to improve living conditions of mineworkers, especially those living in hostels. The aim is to create an environment where human dignity and privacy for mineworkers are protected, as it is considered to be crucial for the enhancement of productivity. The upgrading of hostels to house families is to be completed in 2014. The goal is to allow only one person per room occupation rate by 2014 and home ownership should be facilitated in consultation with organised labour (DMR, 2010:4).

The regulations mentioned above make provision for the socio-economic protection of the mining communities. The next sections look at the current state of mine closure to determine if these regulations have had any effect.

### **3.3.3 The current state of mine closure in South Africa**

There is a growing ethical consciousness in the mining industry, also in South Africa, that unused mines may no longer be abandoned. An abandoned mine refers to an area formerly used for mining or mineral processing, where closure is incomplete and for which the title holder still exists (Chamber of Mines Namibia, 2010:53). Mine owners are expected by law to leave behind decommissioned infrastructure and sustainable economic arrangements that do not hamper opportunities for communities to function once a mine is closed (Stacey *et al.*, 2010:6). The current state of mine closure in South Africa is affected by reluctance on the part of the

mining companies, and even Government, to take responsibility for issues surrounding mine closure and the costs involved to rehabilitate the mining site (Van Eeden *et al.*, 2009:i).

With regard to the environment, the mining companies in South Africa have to comply with legislation by submitting an environmental management plan (EMP) to the Department of Mineral Resources (DMR). Such a plan must be approved before mining operations may commence (Bosman and Kotze 2005 in Van Eeden *et al.*, 2009:60). To cease mining operations, a mine closure certificate is needed by the mining company (Swart, 2004 491). This certificate is discussed in more detail in the next section.

### **3.3.4 The issue of the mine closure certificate**

The Mineral and Petroleum Resources Development Act (28 of 2002) stipulates in Section 38(1)(d) that the holder of the mining permit must take responsibility for the area affected by mining. The area must be rehabilitated and brought to its natural state or the mining company has to comply with the principle of sustainable development as far as is reasonably practicable (Van Eeden *et al.*, 2009:58).

Section 34 of the National Environmental Management Act (NEMA), (107 of 1998) requires that a mine owner should have a mine closure certificate to avoid legal action when closing the mine, seeing that the owner could be held responsible for damage to the mining site (Van Eeden *et al.*, 2009:58).

Section 43 of the MPRDA (28 of 2002) provides for the issuing of a closure certificate by the Minister of Minerals and Resources and the transfer of closure liabilities to a competent person. The issuing of the mine closure certificate is beneficial to the mine owner. The reason is that such a certificate relieves mine owners legally of their obligations regarding pollution and negative environmental impacts due to the mining activities on the mining site and transfers the burden of rehabilitation of the mining site to the DMR (Fourie & Brent, 2008). However, the mine owner may only apply for such a certificate if it is not accompanied by an environmental risk report and a closure plan (Swart, 2003:492).

There are typically two factors that cause a delay in the issuing of closing certificates by the South African Department of Minerals and Resources (DMR) to mining companies. These factors are (1) the late submission of a mine closure plan and (2) the transfer of the responsibility to rehabilitate the mining site to the DMR. The main reason for the delay is usually the inability or unwillingness of the DMR to carry the burden of the rehabilitation of the mining site, due to the huge costs involved. This leads to the abandonment of mining sites and the

neglect of the mining community and its surrounding environment (Van Eeden *et al.*, 2009:58). The following section explores the socio-economic aspects of mine closure.

### **3.3.5 The socio-economic aspects of mine closure**

It should be remembered that the scope of this study is not on the remediation of the environment but to investigate another aspect of mine closure, which is the socio-economic impact of a mine closure on the surrounding community. The problem under investigation is the fact that the mining community is dependent, and in some cases solely dependent, on the mine for employment, services and a market for local businesses (Stacey *et al.* 2010:6). A study conducted by the Coaltech Research Association (Stacey *et al.*, 2010:3) and Van Eeden *et al.* (2009: abstract) identified specific socio-economic problems in the mining communities that were caused by mine closure. The socio-economic aspects that were pinpointed in the study mentioned above have also been encountered in the mining communities under investigation when the mines closed unexpectedly. The sub-section below outlines specific socio-economic problems in the mining communities which are caused by sudden mine closure.

#### **3.3.5.1 Confusion about the management of social risks**

In most cases communities were not prepared in advance for the loss of employment and the ensuing poverty. A study conducted by Conner (2003:11) which researched the effect of mine closure on communities revealed that the mining community suffered from shock. Both the emotional and economical spheres of the inhabitants' existence were affected. This is also supported by research conducted by Strydom and Herbst (2008), which indicated that a mine closure has a significant psycho-social impact on the mining community, affecting the social structures and economic well-being of a mining community. The present study also indicated a strong relationship between unemployment, retrenchment and emotional problems (Strydom & Herbst, 2008: 170). The study also revealed that the community displayed health problems such as hypertension, insomnia and psychological maladies like depression and feelings of uncertainty. Feelings of helplessness and anger were also reported (Strydom & Herbst, 2008:175). The community under investigation also expressed the opinion that the mine closure has had a devastating effect on the socio-economic existence of their community (Strydom & Herbst, 2008:176).

#### **3.3.5.2 Inappropriate training for self-employment**

The mining communities also experienced social changes related to job loss, for example unemployment and poverty. Even though plans for skills development and job creating schemes were proposed in the MPDRA (28 of 2002), these plans and schemes did not realise in time for

the miners who faced mine closures in the past. These miners had acquired skills only for employment in the mining industry, and job creation schemes failed as well (Du Plessis, 2011).

### **3.3.5.3 Illegal occupation of empty mine houses and ensuing vandalism**

Mineworkers lose their right to housing when the mine closes. However, their dwellings are left abandoned and are then inhabited by illegal occupants. This certainly has a negative impact on the existing social structures, as well as on the safety of the mineworkers' neighbourhoods. Mining sites are stripped of usable metal which are then sold by metal recyclers to obtain cash. The infrastructure and facilities of the closed mine is often vandalised. Mining operations cannot start again unless the mining structures are replaced, which would be at a very high cost to the new mine owner (Du Plessis, 2011).

### **3.3.5.4 Damage caused by pollution and ecological degradation**

A main concern is the pollution and ecological degradation that mining causes. Mine-water pollution is a serious problem in South Africa already (Lieferring, 2009). Abandoned mine shafts and illegal mining in these shafts present a serious problem to mining communities after the mine has closed. If dumps are not treated, particles containing hazardous chemicals blow from the mining dumps (Kleynhans, 2011).

Mining houses have developed mine-closure toolkits and best practices to address the issues of sustainable development and to improve the practices regarding mine closure. This is done in order to retain the social license to mine in the mining communities (Conner, 2003:4). Best practices for mine closure are discussed in the following section.

## **3.4 BEST PRACTICES FOR MINE CLOSURE**

There is a growing awareness in the mining industry that planning ahead for mine closure is important (Laurence, 2006:285). Globally codes of best practices and toolkits have been developed to assist mining houses to comply with the legal requirements of the MPRDA and the Mining Charter, as well as the goals of Sustainable Development, (Gammon, 2002 in Stacey *et al.*, 2010:6,384)

The best practices and mine closure toolkits seek to address the following concerns of stakeholders when ending the operations of a mine:

- The mine owners/operators wish to achieve liability free closure within a reasonable time frame.
- The government does not want to be left with high financial or social liabilities.

- Communities want the opportunity to at least maintain, but preferably improve, their quality of life.
- The socio-economic activities around the mine need to continue in the absence of mining activities.
- The environment must be rehabilitated to a point where pollution does not pose an unmanageable threat to life or its processes, and such that a dynamic equilibrium can be reached over time (Stacey, *et al.*, 2010:384).

Planning is an important element in proper mine closure. The next section discusses the implementation of Project Management in the mine closure plan.

### 3.4.1 Building closure into the project life cycle

Mine closures should be designed, planned and managed to adhere to the principles that uphold sustainable development. Fourie and Brent (2008) suggest that the principles of Project Management should be applied to address the challenges of planning for mine closure. Project Management is the body of knowledge concerned with principles, techniques and tools used in planning, controlling, monitoring and reviewing projects (Business Dictionary, 2013). A Mine Closure Model (MCM) was developed by Fourie and Brent (2008). The MCM is discussed below.

### 3.4.2 The mine closure model (MCM)

The Project Management Body of Knowledge (PMBOK) can be seen as a generic model to provide a structured approach for a desired outcome. It recognises five basic processes that are applicable to projects, programmes and operations. These five processes are Initiating, Planning, Executing, Controlling and Closing, and can be utilised to draw up a mine-closure plan (Fourie & Brent, 2008). These phases of a mine-closure plan involve the following actions:

- **Initiating phase:** The objectives and feasibility of the mining operation are established.
- **Planning phase:** The detail design of the planned mine closure plan is formalised, tested and documented.
- **Execution phase:** Mine closure commences and operations are closed down according to the plan presented to the DMR and takes place according to schedules.
- **Controlling phase:** This phase ensures that all requirements are met, the risks are addressed and the project is on track within the given budget.

- **Closure phase:** This phase takes the mine closure into completion by the decommissioning of the mining site, which is done according to legal requirements regarding the environment and the surrounding community (Fourie & Brent, 2008).

The advantages of using the MCM in mine closure planning, is that it promotes planning for closure in advance. and gives structure to the operators of the plan. MCM also promotes transparency and encourages the allocation of funding for the closure expenses at the beginning of the process (Fourie & Brent, 2008).

### **3.4.3 The mine closure toolbox**

The Socio Economic Assessment Toolbox was developed by Anglo American mining house in 2003. In short, it is called the SEAT mine closure toolbox. “The toolkit represents one of the most significant corporate investments we know of to equip personnel to better understand, plan, implement and account for mine closure” (Anglo American Mining House: 2009).

Closing a mine without due consideration for the environmental and social impact can create long-term challenges for those who are dependent on it or live close by. SEAT helps Anglo American's mining companies to achieve their social license to operate consistently with the expectations of stakeholders and the broader society. The seven key steps of SEAT are as follows (Anglo American, 2012 front page):

- Create a profile of the operations and the host mining community.
- Identify key stakeholders within the community and engage with them.
- Assess the impacts of operations – both positive and negative – and the community's key socio-economic development needs.
- Improve the management of socio-economic impact and issues during operation and closure.
- Work with stakeholders and communities to help address some of their broader development challenges they would face during and after mining operations.
- Develop a management and monitoring plan to mitigate any negative effects from the mining operations and to make the most of the benefits of the mining operations;
- Compile a report together with stakeholders to form the basis for on-going engagement with and support for the community.

SEAT plays a central role in programmes to meet the requirements of the International Council on Mining and Metals (ICMM) sustainability principle nine which is “to contribute to the social, economic and institutional development of the communities in which the Company operates” (Anglo American, 2012). This principle is underpinned by Anglo American’s decades of experience operating in and contributing to emerging economies throughout Africa, Eastern Europe and Latin America. Examples of successful international projects of mine closure are investigated in the next section.

### **3.5 SUCCESSFUL MINE CLOSURE PROJECTS INTERNATIONALLY**

Internationally, organisations are involved actively in addressing the adverse consequences of mining activities and mine closure. This is evident in the fact that International Mining holds an annual mine closure conference, where papers are presented by specialists in the mining industry (IM, 2012). Initiatives taken by these organisations to address mine closure issues include promoting research, transferring technology, and coordinating information exchange in good practice when dealing with the challenges of mine closures (Stacey *et al.*, 2010:8). Also in the international arena, best codes for practice towards an integrated approach based on good planning are implemented at the early stages of mining operations. The following three approaches to mine closure in the international arena are discussed:

- Firstly, the International Council of Mining and Minerals (ICMM) highlights the fact that mine closure requires the attention of multiple stakeholders. These entail the government, the global mining industry, the local community, and other international organisations that are actively involved in making sustainable development an integral part of the mining sector.
- Secondly, the approach taken by the Eden Project shows that non-involvement of a government does not necessarily have to have a negative effect on the successful implementation of mine closures.
- Thirdly, the NAOMI Project highlights the effects the total dependency of the mining community has on the mining operations in their area.

The subsequent discussion begins with an overview of the activities of the ICMM.

#### **3.5.1 The International Council on Mining and Metals**

The International Council on Mining and Metals (ICMM) was established in 2001. The organisation emerged from a research initiative by multi-stakeholders (the Mining, Minerals and Sustainable Development (MMSD) project), which examined the sustainability of mining in

future (ICMM, 2012:2). ICMM aims to improve sustainable development performance in the mining and metals industry (ICMM, 2012:2). Internationally “good practice” for mine closure is considered to be an integrated approach involving multiple stakeholders. The vision of the ICMM is that the leading companies work together with others to strengthen the contribution of the mineral and metal mining industry towards sustainable development.

The ICMM consist of twenty mining and metals companies, thirty-one national and regional mining associations, global commodity associations, governments, international organisations, communities, indigenous peoples, civil society and academia.working together. The ICMM builds meaningful relationships with its associates and member countries in order to promote mining operations that are in harmony with sustainable development (ICMM, 2012:2).

Thus, ICMM serves as a global agent for change and continual improvement on issues relating to mining and sustainable development. Member companies make a public commitment to improve their sustainability performance and are required to report on their progress on an annual basis. ICMM has five values that guide members on doing the work of the organization and how to interact with others (ICMM, 2010):

- Regarding mineworkers, an emphasis is placed on taking care for their safety, health and well-being. The same also applies to contractors, host communities on the site and to those dealing with the material or minerals that are mined.
- Respect for people and the environment is cultivated. The principles of sustainable development are upheld, and a sensitivity and responsiveness towards the host communities surrounding the mining operations are encouraged.
- Integrity is considered as the basis for any engagement with employees, communities, governments and others. This approach aims at ensuring the protection of the social license of the mining company in that host society.
- Accountability to the mining communities is maintained. In doing so, the mining companies do not take the social license to mine for granted and do what was promised as part of the mining contract and uphold commitments that were made by them.
- All mining activities and meetings done in collaboration with all stakeholders should be transparent, inclusive and open to all, when addressing the mutual challenges of mining operations and the possibility of a closure (ICMM, 2010).

ICMM specifically embraces the participation of the local community in decision-making from the earliest stages of mine development, keeps the community engaged throughout and has plans

for closure at the earliest opportunity. ICMM practices uphold that on-going support is provided for local communities; even after closure (Chemc, 2011).The next section discusses the Eden Project of the Post-Mining Alliance.

### 3.5.2 The Eden Project and the Post-Mining Alliance



**Figure 3.1: Photo of Eden Project in Cornwall UK, Europe**

Source: (Eden Project, 2011)

When mines close the detrimental environmental and socio-economic legacy can be significant. The Post-Mining Alliance is an independent, not-for-profit group, based at the UK's Eden Project. It is a former clay mining pit that was transformed into an environmental tourism attraction and educational charity (Eden Project, 2011). The Post-Mining Alliance finds ways to regenerate former mining sites for the benefit of the local community and natural environment (Eden Project, 2011). Their mission is as follows:

- Catalyse action on mining legacies – helping to convert liabilities into opportunities.
- Stimulate the uptake of good practice in integrated mine closure.

- Encourage the finding of solutions where risks, responsibilities and opportunities are shared (Eden Project, 2011 par 4).

Many organisations in Europe have become partners to the Eden Project. Their goals are to the following:

- Collaborate with industry partners to find positive solutions for specific mining sites.
- Collect and share case studies of good practice from around the world.
- Convene events in industry to develop successful approaches to post-mining regeneration.
- Network with regional centres of excellence and to deliver inspiring education on issues of mine closure, as well as to muster public engagement for this cause.

The Eden Project does not depend on government funding. It is run by the community and other stakeholders, who successfully uphold the principle of sustainability. The closure of a mining site is steered in such a way that the occurrence is to the benefit of the community. The following discussion is on the NAOMI project.

### **3.5.2.1 The NAOMI project (National Orphaned/Abandoned Mines Initiative)**

NOAMI, established in 2001 in Canada, was an initiative created by the provincial ministers for mining as a way to identify policies and programmes that could be recommended to help clean up abandoned mines. This project consist of a multi-stakeholder advisory committee representing non-governmental organisations like Mining Watch and Northwatch, as well as private industry, government and First Nation groups (Larmour, 2011). Robert Holmes, Chair of Naomi's abandoned mines committee, supported the idea that planning in advance for mine closure is needed, with the following statement: "If you are going to spend the effort to clean up the abandoned mines we have now, then you should spend the effort to prevent new ones from happening" (Larmour, 2011).

The NAOMI (National Orphaned/Abandoned Mines Initiative) operates in Canada on orphaned or abandoned mines. These mines are abandoned and the owner cannot be found, or is financially unable or unwilling to carry out the clean-up as part of the rehabilitation of the mining site. Abandoned mines exist within all mining jurisdictions in Canada. Many abandoned mining sites are near to, or in the vicinity of a ghost town. The goal of the NAOMI project and its partners was to address the issue of abandoned mining sites for the next 5-10 years (Naomi, 2011).

Abandoning of mining sites is an occurrence that still happens today quite regularly. Abandoned mining sites and ghost towns are evidence of the tendency within mining communities to be totally dependent on the mining operations that supply them with employment. Secondary businesses that existed and benefited from an economically active community, such as a local municipality, presence of schools, small businesses and churches diminished and in some cases ceased to exist completely in the towns where the mine had closed and had been abandoned. This phenomenon is referred to in the Mining Charter as “ghost towns that are the unintended consequences of mining” operations and mine closures (SA, 2010:3).

### **3.6 CONCLUSION**

A significant percentage of households in South Africa depend on the mining industry for their income. Mine closure did receive a lot of media coverage in the last few years. This was sadly not because of a success story of a rehabilitated mining site, but because of the negative impact the closing of mines had on their surrounding environment and on the communities depending on these mines for employment.

The discussion in this chapter firstly contextualised mine closure by defining the concept and investigated approaches to such closure. Secondly, mine closure in South Africa was discussed, referring to legislation from 1994 to 2010 on mine closure and socio-economic issues in the mining industry. Thirdly, the focus was on best practices where the PMBOK principles to mine closure was proposed as one of the most effective approaches.

Lastly, to round off this chapter, international approaches were discussed, which related to important issues discussed in this study about mine closure:

- Firstly, mine closures need not only be successful if the government is involved, as demonstrated by the Eden Project.
- Secondly, mine closure is an activity involving multiple stakeholders, where the mining community should also participate in the planning to close the mine, as demonstrated by the ICMM approach.
- Thirdly, the effects of the mining community’s dependency on the mining operations were highlighted in the discussion of the NAOMI project.

These three important matters regarding mine closure were seen as main objectives that need to be addressed in the Contingency Plan. This plan will be put forward in Chapter 6.

Another important point that will be brought to the fore when discussing the Contingency Plan is that the project management approach is very suitable when planning for mine closure (see Point 3.4); and thus seems to be the best way forward for mining companies. Mine closure proves to be a controversial matter with a number of unresolved issues. The next section focuses on the theory of planning and planning in practice to address the problems that develop in a mining community when a mine closes unexpectedly.

## **CHAPTER FOUR**

### **CONTINGENCY PLANNING: A THEORETICAL APPROACH**

#### **4.1 INTRODUCTION**

The previous chapter discussed the following aspects related to mine-closure: legislation, regulations, best practices and how these practices are implemented. The challenges that the finite life cycle of a mine poses for the mining industry is most visible in unexpected mine closures. Such events lead to sudden mass unemployment and the unforeseen loss of livelihoods. Contingency planning as a strategic tool is investigated in this chapter to determine how such a strategy could address the socio-economic problems when a mine closes without fore-warning. Nowadays, due to the fear of terrorist attacks, cyber-crime, pandemics and the increasing costs of disasters, more organisations than ever before are considering contingency planning to help protect their people, assets, and facilities (Martinet, 2006:1). Appropriate contingency planning can minimise the effects of an adverse event. It can also help an organisation or business enterprise to prepare for the worst in the event of a disaster (Wang, 2004:24-25).

The purpose of this chapter is to establish a theoretical framework for contingency planning. This cannot be done without first acknowledging the wider framework in which the study is conducted, namely the body of knowledge of Disaster Risk Reduction. The theory of contingency planning is underpinned by planning theory and therefore this theory will be investigated in the first part of this chapter. The basic elements of all planning will be discussed. In the second part of the chapter, the theory of contingency planning is investigated by examining approaches and basic elements of contingency plans. In the third part, existing contingency plan models are discussed to explain how contingency planning is used to deal with emergency situations. The models that are discussed were developed by scholars, and some are in use by agencies involved in DRR activities on a regular basis. Subsequently planning theory will be discussed.

#### **4.2 PLANNING**

Strategic planning policies and planning theory in general gained the support in most organisations and business enterprises involved in DRR. Every organisation that implements good planning, acknowledges that this strategy is beneficial to the organisation and that an efficient plan could leave an organisation better prepared to face an uncertain future (Tiffany *et al.*, 2010:1). Thus, the planning is important to realise organisational aims and objectives. In the

next section, a deeper understanding of planning and planning theory is sought, starting with the definition of planning as such.

#### **4.2.1 What is planning?**

Planning mainly refers to the managerial activities that determine goals for the future and describes the appropriate means to achieve these goals (Knipe *et al.*, 2002:179). According to Martinet (2006:1): “Planning is a forward thinking process.” Planning also improves the use of time, human capital and resources, in order to achieve objectives mentioned in a set goal or strategic plan of an organisation (Knipe *et al.*, 2002:170). Planning therefore, denotes a view of the future, as seen from the present, based on certain assumptions (Tiffany *et al.*, 2010: 10). From these definitions planning can be described as follows: an effective tool which helps people to be prepared for the unknown future and that effectively organises activities for the most effective use of time, money and human resources. The following sub-section investigates the important elements of planning theory, namely the function and objectives of planning.

#### **4.2.2 The function and goal of planning**

The function of a plan is prepare people, to sort planned activities into logical steps of priority, and to provide a sense of unity and purpose across different levels of an organisation, and in the process to address uncertain future events. Planning in an organisation can also mean to set goals that provide direction and a purpose according to a certain objective (Knipe *et al.*, 2002:179). Planners hope to achieve a unified purpose through coordination and integration of plans across all levels of government, non-governmental organisations (NGO’s), the private sector, individuals and families (FEMA, 2010:1; Twigg, 2004:289).

The function of a plan is also to help a manager or organisations’ corporate management to capitalise strengths, improve on identified weaknesses, pursue opportunities, and overcome adverse developments that may emerge in the organisation or business concerned. Planning helps the role-players to respond proactively to changes in the internal and external environment of such an enterprise (Dorsey, 2008:1).

Effective plans typically convey the goals and objectives of the intended operation and the actions needed to achieve them (FEMA 2010: preface). The goal of planning can be achieved by following an order of activities, divided into four distinct phases: (Donnelly *et al.*, 1987 in Knipe *et al.*, 2002:180). These phases can be outlined as follows:

- Set objectives that define future goals to achieve.

- Take action, which implies that there are also means available for the action to be taken and planned objectives to be met.
- Procure the resources to maintain the activities, which are necessary to meet the goals. This implies that resources will be maintained and made available in the needed forms, types and quantities, which are required to achieve the set goals.
- Implement the plan. This involves rolling out the plan in the organisation in order to meet planned objectives, under the guidance of supervisory structures.

In conclusion, it could be stated that the goal of a plan should also be able to provide effective and timely responses. The function of planning is that it helps improve management and thus contributes to the possibility of success of an organisation or enterprise. Plans do not function as scripts that can be followed to the letter, but should rather be flexible and adapted according to the actual situation. Planning is also required to reach goals, such as those goals in the Hyogo Framework for action that was mentioned in Chapter two (see Point 2). In that case the focus was on the implementation of DRR goals and approaches to promote sustainable development and reduction of poverty. The next section explores planning theory that is relevant for disasters and for to help reduce activities that carry the risk of triggering a disaster.

#### **4.2.3 Principles of effective planning**

All planning indicate that certain activities are organised into logical steps. Planning for disasters also represents this logical organising, as is evident in the Disaster Management Act (57 of 2002). The act gives clear guidelines on prevention and mitigation of disasters in four logical steps:

- I. Determine levels of risk.
- II. Assess the vulnerability of communities and households to disasters that may occur.
- III. Increase the capacity of communities and households to minimise the risk and impact of disasters that may occur.
- IV. Monitor the likelihood of/and the state of alertness to disasters that may occur.

To plan for disasters allows people the time to deal with anticipated problems before the onset of a crisis. Planning also help identify constraints and focuses on operational issues. This strategy also helps to establish networks of available and ready people – support that are critical in a crisis before an impending disaster (IASC, 2010).

Quarentelli (cited by van Niekerk, 2005:29) mentions ten steps that are considered as the most significant and general principles of good planning, within the context of DRR. According to these steps, planning:

- 1.... is a continuous process;
- 2.... involves attempts to reduce the unknowns in the anticipated disaster situation;
- 3.... aims at evoking appropriate actions;
- 4.... must be based on what is likely to happen;
- 5.... must be based on valid knowledge;
- 6.... should focus on general principles (stay flexible);
- 7..... is partly an educational activity;
- 8..... has to overcome resistance;
- 9..... must be tested;
10. ... is not management.

From the above ten steps it is evident that planning seeks to organise, prepares for the unexpected and encompasses activities on different levels of management, or of progress and processes. These ten steps can be used by managers or persons involved in planning activities as a guide to measure effective planning processes and plans.

The next sub-section focuses on other aspects of planning theory such as the aim of planning and the function of planning in an organisation.

#### **4.2.4 Planning for disasters and disaster risk reduction activities**

The scope of this chapter was to investigate DRR approaches to planning and how plans are implemented to address disasters. Planning for the various aspects of disasters would therefore also include planning for the different phases/periods of a disaster. During such systematic planning the sequence/phases/periods in which a disaster event takes place need to be identified. Schwab *et al.* (2007:19) mentions four phases in the full live-cycle of a disaster. The phases are named as follows:

- preparedness (before impact);
- response (immediately after impact);
- recovery and rehabilitation;
- Mitigation (these activities should also lead to preparedness for the next possible disaster, thereby closing the circle).

Daniel Delle-Guistina (2007:595) also conceptualises disasters in terms of phases, but calls it 'periods' in which certain activities take place that are coordinated with planning. The following

periods of a disaster can be identified. These are the periods of: warning, threat, impact, taking inventory, rescue, remedy and restoration. Each term describes the main activity that takes place within the specific period. Planning entails an essential strategy to deal with all of the mentioned aspects of disasters: their phases/periods and characteristics.

From the discussion above it is evident that a disaster event follows a certain sequence. Therefore it makes logical sense to plan for disasters in accordance with these phases as the disaster occurs. The onset of a disaster is clearly not the ideal time to begin planning. Institutions and businesses well in advance should know their requirements in order to deal with a disaster situation and how they will act on it (Coppola, 2007:210). Some key questions need to be addressed when planning for disasters (AID, 2011):

- What could happen?
- What would be required to alleviate the situation?
- How would action be taken?
- What materials, supplies and staff would be needed?
- What preparations are necessary?
- What will the process cost?

Contingency planning can also help management to consider longer term risks and determine measures to help mitigate disasters (AID, 2012). The following sub-section focuses on elements of contingency planning such as the aim and function of such planning.

### **4.3 CONTINGENCY PLANNING?**

According to James (2008:192), contingency planning is necessary in situations where rapid change is expected. Disasters cause such situations and therefore contingency planning will be investigated as an approach to address socio-economic disasters, where rapid changes take place. The focus will be on the ability of a community to secure food and other resources that are needed to make a living.

#### **4.3.1 What is contingency planning?**

This section conceptualises the term 'contingency planning' as it is used in the body of knowledge of DRR. Contingency planning is defined by the ISDR (1999:18) as follows: "A management process that analyses specific potential events or emerging situations that might threaten society or the environment and establishes arrangements in advance to enable timely, effective and appropriate responses to such events and situations."

Choularton (2007:3) defines contingency planning as: “A process, in anticipation of potential crisis, of developing strategies, arrangements and procedures to address the humanitarian needs of those adversely affected by crises”. Contingency planning is also a “management tool used to analyse the effects of a potential crisis and ensure that adequate preparedness measures are in place” (AID, 2012).

Thus it should be clear that, no matter how carefully a management team formulate, implement and evaluate their strategies, unforeseen events can make a planned strategy obsolete in no time. Contingency planning (henceforth referred to as CP) is a management tool that can be used by managers to be proactive and prepare for unforeseen future events. Contingency plans are useful to analyse the impact of potential crises. Such strategic measures ensure that adequate and appropriate arrangements are made in advance to respond in a timely, effective and appropriate way to the needs of the affected population(s).

#### **4.3.2 The basic components of a contingency plan**

To manage the processes of CP remain a major challenge for humanitarians beset with changing variables, such as competing demands, limited staff, time and resources (Choularton, 2007:1). A few basic components are part of all contingency models and documents and could be considered vital to any contingency plan. These components are mentioned by various authors in the literature on Disaster Risk Management. The present study has selected the most general and basic components which are relevant when compiling a contingency plan to deal with a socio-economic disaster. The first component addresses the issue: Who will be in charge?

##### **4.3.2.1 The Contingency Plan Manager**

Contingency plan managers spend most of their time refining plans, updating resource lists, and conducting exercises aimed at planning. They are the custodians of the contingency plan (Wisner, 2004:335). In the case under investigation, such a person would be part of a labour union or NGO, directly involved with the plight of the mining community. The manager should also be able to anticipate what will be needed and what should be prepared for, and then be able to mitigate in advance (Martinet, 2006:10).

##### **4.3.2.2 Logistics management**

Logistics management is responsible for the timely delivery of disaster emergency aid and, the movement of personnel and supplies at all points (Hutchinson, 2004:5, 24). An essential action is the documentation of the following: personnel, their responsibilities, activities, supply points and other information crucial to deal with the disaster. The first priority of such a list is to

document the critical information: the names of all employees, their contact information, and their emergency points of contact, preferably family members outside the immediate area. Also on the list should be local response numbers and medical assistance teams, as well as contact information for critical system providers such as suppliers, repair technicians, and utility companies (Hutchinson, 2007:23).

A contingency plan should also cover the communication between managers and the role-players who are actively involved when responding to an emergency. This component of a contingency plan is referred to as the communication system.

#### **4.3.2.3 A Communication system**

The communication system makes out one of the most important aspects of contingency planning. When a disaster strikes, decisions should be made immediately. The communication and information systems must support the role-players' ability to communicate. Irrespective of the medium the system uses, of critical importance is a viable means of communication between all teams and role-players that are involved in the disaster situation (Anderson, Compton, & Mason, 2004; Silverman & Weston, 1995 in Hutchinson, 2007:34). An integral part of such a communication plan comprises a central reporting area, Central Communications Centre, or contact person who has direct access to the Contingency Plan Manager and other partners and who is in contact with the mining community throughout (Reid, 2005:99).

The last and most important aspect of a contingency plan is that it should have access to adequate funding to address a situation. Such a plan should also enable the role-players to respond effectively until the crisis situation has been resolved, without the operation being interrupted due to depletion of funding.

#### **4.3.2.4 Funding and budget**

A most important component of a successful contingency plan is the available financial resources. The term budget is defined as a set amount of money that has been allocated for a particular item, purpose or event. These finances could be made available over a specific or fixed period. In this sense, budget can also refer to the itemisation of anticipated expenses during that specific period (PMBOK, 2010). The old proverb "saving for the rainy day" makes good sense when considering the funding of a contingency plan. Funding of an emergency situation needs to address the following questions (Toal, 2013):

- What kind and how much of funding is required?
- Which activities will be undertaken to raise funds?
- Which resources will be utilised that will need funding?

- Where will the funds come from?

When the disaster is declared and response activities commences, the funding must be available and adequate. An organisation develops a budget which is based on projected income and expected expenses. The budget should allocate the necessary finances to a contingency plan for unexpected events (Scott-Martinett, 2006:32).

#### **4.3.3 The aim of contingency planning**

“The aim and contribution of a contingency plan is the development of a process for identifying and responding to unanticipated or less-likely events “(Goodstein *et al.*, 1993 in Scott-Martinett 2006:11). According to the International Red Cross and Red Crescent Movement (IRCRCM) the aim of CP is to mitigate the destructive effects of a disaster by ensuring timely and effective provision of humanitarian aid to those who are most in need. Timely response is an important component of CP as emphasised by the IRCRCM (2007:7): “Time spent in disaster response planning equals time saved when a disaster occurs.”

It is also evident that CP is an important tool to address multiple aspects of disaster response. This strategy enables disaster managers, to anticipate and to prepare for disasters. This enables them to provide efficient and timely responses according to the need that arises, in order to mitigate the effects of a disaster. The following sub-section focuses on the function of CP.

#### **4.3.4 The function of contingency planning**

According to Van der Waladt (2008:147) the function of a contingency plan is to facilitate a smooth transition to the workaround plan. This represents preventive actions that will reduce or mitigate the negative impact of the risk event. A contingency plan should answer the questions of: what, where and how much action will take place.

An important function of CP is to strengthen people's capacity to meet the needs that develop as a result of disasters. In this way they will be able to respond to those post-disaster needs (Kadzatsa, 2011:56). Building capacity is defined as a combination of all the strengths and resources available within a community, society or organisation that can reduce the level of risk, or the effects of a possible disaster (ISDR, 2004:16). Capacity could be structural or non-structural. Non-structural capacity building refers to the strengthening of the human behaviour in response to disasters. Structural strengthening of capacity entails adapting designs to the environment in which the community finds itself, for example changing how the houses are built in a specific area or planting trees in an area that needs protection from hazards related to wind and flooding (Wisner, 2004: xii).

To date only a few formal analyses or evaluations have been carried out on the impact of humanitarian CP in the event of a disaster. Nevertheless, a majority of practitioners agree that CP is effective in improving humanitarian response in the following ways:

- It enables individuals, teams, organisations and communities to establish working relationships that can make a critical difference during a crisis.
- It helps to reinforce coordination mechanisms by keeping such resources active, and by clarifying roles and responsibilities before a crisis.
- It enables more effective assessment and planning time before an event – interventions which is not possible during the event when the assistance is needed.
- It identifies constraints, such as information gaps, before a crisis strikes and provides an opportunity for people to take action and deal with these impediments beforehand (Choularton, 2007:1).

Van Niekerk (2005:32) states that CP functions within the framework of disaster or emergency management. Such planning is pro-active and serves as a reactive measure to mitigate possible disasters and prevent risks. Table 4.1 indicates the differences between CP and emergency planning (EP).

**Table 4.1: Differences between CP and EP**

<b>Emergency preparedness plan</b>	<b>Contingency plan</b>
1. Based on potential scenario, historical data and assumptions.	1. Based on actual unfolding scenario and real-time information.
2. Carried out on regular basis (usually annually).	2. Carried out in the face of an eminent, unfolding emergency.
3. Identifies capacity gaps and defines action plans based on risk-reduction actions (prevention, mitigation, preparedness, response and recovery). Identifies trigger mechanisms.	3. Defines response strategy based on the risk-reduction actions (preparedness, response, and recovery) which are identified during the scenario-planning section of emergency planning.
4. Identifies and formalises the emergency and response team.	4. Focuses on response protocols –functions that the response team will perform.
5. Intended as capacity building tool for the emergency response’s operational plan. Integrates risk management into programming.	

Source: CARE (2006)

CARE supports the view of van Niekerk by stating that CP functions at its best when done in the context of a well-articulated emergency plan (CARE, 2006). Emergency planning therefore includes CP but also involves broader activities such as stock piling, creating partners, managing of stand-by capacities and training of staff (Choularton, 2007). Table 4.1 list the most important differences between Emergency planning (EP) and Contingency planning (CP).

The most important difference between EP and CP planning is that the latter is not an emergency plan as such, but is implemented as part of an emergency plan. The focus and strength of a contingency plan is its focus on an immediate and timely response to a crisis. Both the aim and the function of CP suit the purpose of this investigation, which entails the mitigating of a socio-economic disaster that follows an unexpected mine-closure.

The following sub-section investigates the different approaches agencies take when developing and implementing CP.

#### **4.3.5 Contingency planning approaches**

There are different approaches to CP and its processes. The scope of this chapter is not to elaborate on each approach, but to introduce these approaches briefly, as it enhances the understanding of CP. In the literature study conducted to investigate CP, three prominent approaches were identified: the scenario building approach, the project management approach and the strategic plan approach. These approached are discussed in the following sub-sections.

##### **4.3.5.1 Scenario planning**

Scenario planning (SP) involves the development of certain scenarios, based on the expectance of a specific hazard. These scenarios then form the basis for a response plan (Choularton, 2007:3). According to Global Crisis Solutions (GCS) (2012:2), scenario planning is the central pillar of any contingency plan. By using and contemplating various scenarios, intervention plans can be developed. Scenario building is based on certain informed assumptions about a possible situation that may develop. These assumptions about what may occur are used as a point of departure. In scenario building the effect of the expected hazard is measured as if it occurs within a certain time frame and sequence (Choularton, 2007:13; GCS, 2012:2).

Early warning systems and indicators are an important component in a scenario based contingency plan. An example of SP as an approach to CP is the contingency plans developed by the Office for Coordinating Humanitarian Assistance (OCHA) for the South African Development Community (SADC) region. OCHA forms part of the United Nations Secretariat that is responsible for a number of affiliated organisations' coherent responses to disasters. The

mission of OCHA is to provide humanitarian assistance in partnership with other actors, advocate the rights of people in need, promote preparedness and prevention and to facilitate sustainable solutions to communities that were struck (OCHA, 2012). Ocha utilises contingency plans as their main approach to deal with emergency situations contains scenario planning in the planning phases.

Expected contingencies in the SADC region are mainly floods and droughts. These possible disasters were identified by OCHA as the events with the highest probability to take place in the region (OCHA, 2012). Scenario planning and assumptions, supported by a hazard and risk analysis, about Zimbabwe's expectance to experience drought and flooding are listed below.

#### **Scenario 1: Scenario planning and assumptions**

- Drought scenario 1: Increase of the food insecure population up to 1.6 million
- Planning assumptions scenario 1: Food-aid response to 1.6 million managed by government and partners such as the World Food programme (WFP) (Zimbabwe & UN, 2012:13).
- Areas most likely affected: Districts listed here, for example Manicaland South, Northern Mash Central and East.

#### **Scenario 1: Hazard and Risk analysis**

- Probability: almost certain
- Consequences: moderate to major: food shortages, loss of livestock and livelihoods, shortage of water, crop failures, outbreak of diseases, population movements and school drop-outs.
- Overall risk: high

The overall objective of this plan is to ensure preparedness, in order to mitigate the effects of a disaster, and for timely coordinated responses (Zimbabwe & UN, 2012: 7). However, in this case OCHA utilised partnerships, inter-agency responses and cluster meetings to employ the plan and employ emergency response activities, which are discussed in more detail below (see Point 4.4.2).

#### **4.3.5.2 Project management.**

Contingency planning (CP) could be conducted by employing the managerial tool of project management. Project Management is the acquired knowledge and skills applied by using a formal set of tools and techniques. The aim is to initiate, plan execute, monitor, control and close projects (Visitask, 2011). Project Management is suitable for this study since it provides a

systematic approach towards CP, aiming at achieving specific goals, and based on a phased development of tasks and progress that can be measured. The process involves all concerned parties and such a team can include skilled specialists for the task (Visitask, 2011). The Intersectoral Contingency Plan developed by Van Niekerk (2005:84) depicts this approach in terms of the following five steps:

- **Assessment phase:** In this phase the situation in which the event is expected to occur is investigated and certain assessments are made regarding the following dimensions: political and environmental, community and role-players. as well as risk and vulnerability.
- **Planning phase:** Planning for the event takes place in this phase. The plan is documented and distributed. All the stakeholders participate in the planning. Planning for risk reduction takes place.
- **Execution phase:** This phase refers to the activation of a plan, after the trigger event. The information for this phase provides guidance about the command and control of the contingency plan. It specifies under what circumstances the plan will be executed, and who is responsible to make the call for executing the plan.
- **Review and rehearsals:** This aspect of the plan includes exercises and workshops with the community. To include the community in the exercises creates community awareness and provide education on factors such as risk reduction, resilience and improved life choices.
- **Updating the plan:** After the review and rehearsals, reviewing the exercises and workshops could bring about adjustments to improve it. By continually updating the plan, the contingency plan will remain current and adaptable to changing circumstances and policies that may affect the implementation of the plan for the specific community in a certain time frame.

The contingency-plan steps of van Niekerk correlates with the phases of a project in the definition mentioned above. This project consists of the following elements (PMBOK 2000 as quoted by Van der Waldt, 2008:11):

1. Initiating processes: Authorising the plan.
2. Planning processes: Defining and refining objectives and selecting the best course of action to attain the objectives of the plan.
3. Executing processes: Co-ordinating people and other resources to carry out the plan.

4. Controlling processes: Ensuring that the objectives are met by monitoring and regularly measuring progress; corrections can be applied if necessary.
5. Closing processes: Formalising acceptance of the plan.

Project management as a management tool can be useful in all forms of planning, including CP. The previous chapter (see Point 3.4.2) describes a project where the management approach is utilised as a solution for mine closure best practice. The phases of a basic project plan can also be used as the framework for a contingency plan. Therefore these phases may prove to be a suitable approach for CP aiming address mine closures. Another relevant approach that also is gaining support is the strategic planning approach to CP.

#### **4.3.5.3 Strategic planning**

CP should not be considered as an isolated, specialised process. The strategic approach to CP integrates it into the strategic planning of the organisation, thus making this part of the planning process right from the foundational phase. An organisation is normally in business to stay in business, so practicing CP is a logical and useful component of successful business operations.

A new trend in CP is to include this intervention in strategic planning, in order for it to become an active part of an organisation from the beginning of all planning phases. “By including the continuity strategies in the company’s strategic plan, they are naturally reviewed periodically and updated when the strategies of the company change. The business continuity strategies become part of the corporate culture and a natural part of management thinking. Additionally, since this new element has been added to the company’s existing planning program, the marginal cost associated with maintaining it is substantially reduced” (Stagl, 2003 in Scott-Marinet, 2006:3).

Non-governmental organisations (NGO’s) and public sector entities can also benefit from this approach, seeing that funding and budgeting ahead of time is one of the benefits of such a strategic planning process. NGO’s will also be prepared on all levels and will be able to assist in time with requirements for specific emergency situations. Thus, strategic CP could benefit governmental and non-governmental organisations. Contingency planners can bring strategies to the table, which indicate that the entity can benefit from mitigation and minimise its losses (Scott- Martinet, 2006: 65).The structure of contingency plans should display certain key elements based in planning theory. These elements are discussed below (see Point 4.1).

#### **4.3.6 The key elements to contingency plans**

Choularton (2007:6) identifies certain key elements that should be present in any contingency plan, irrespective of where the plan is to be implemented or what organisation compiled the plan. These elements are:

- A scenario giving an account of the possible course of events that could occur.
- A response strategy developed on the basis of the scenario, including specific intervention objectives and targets, and beneficiary numbers. This strategy forms a link between the scenario document and the subsequent plans.
- Implementation of the plan, which indicates how the response plan is going to be achieved. For example: The response plan involves the participation of partners committing themselves to assist, e.g. partnerships formed with the local government.
- An operational support plan that sets out the administrative logistical and other supporting requirements of a response, and also stating the role of partnerships.
- A preparedness plan proposing actions to improve preparedness, which is inevitable during the planning process. Such a plan aims to improve response to specific and general crises.
- A budget developed for the funding of both the preparedness plan and the actual response activities that is planned.

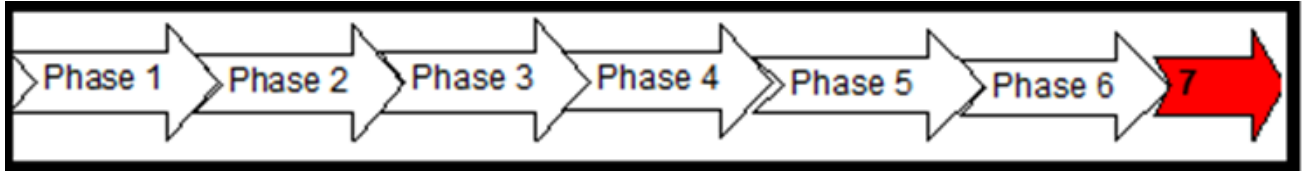
These key elements could be used as a guide or starting point to determine the way forward when an organisation has to develop a contingency plan. This will ensure that the important and basic elements involved in CP are included. The next section investigates models for CP.

#### **4.4 MODELS FOR CONTINGENCY PLANNING**

The models under investigation are: the linear model employed by Disaster Risk International (DRI), the cluster model of the Inter Agency Standing Committee (IASC) and the process model used by the International Red Cross and Red Crescent Movement (IRCRC). These models represent three basic approaches to CP currently used by agencies. As such these models provide insight into the mechanisms and components needed to address contingencies resulting from a hazardous event. The different models will be discussed subsequently.

#### 4.4.1 The linear model for contingency planning

The first model to be discussed is the linear model used by Disaster Risk International (DRJ, 2011). The phases used in the linear model for CP reflect the steps that were mentioned in the project management approach (see Point 4.3.4.2).



**Figure 4.1:** The linear contingency plan model of Disaster Risk International (*DRI*)

Source: (Applied from DRJ, 2011)

##### **Phase 1:** Project initiation

These activities also include defining the problem that is addressed in the plan. The objectives of the business are stated and to what extent activities to rescue the business will be performed during a disaster. (This implies decisions on the level of disaster recovery against business continuity.) Planning the scope and calculating the cost of the projects takes place in this phase, as well as appointing the continuity steering committee. The terms and policies also are determined on which the plan is based and will be executed (DRJ, 2011:1).

##### **Phase 2:** Functional requirement

Activities in this phase include analyses of the following aspects: the risk involved, business impact and business functioning that is time-sensitive. Other important facts and factors are considered that could affect the organisation or business. This includes possible unexpected events. Alternative business/organisation strategies are determined against a cost benefit and finally the budget is finalised for the continuity program (DRJ, 2011:1).

##### **Phase 3:** Design and development (designing the plan)

In this phase the plan, scope and objectives are documented. The recovery team are appointed who are responsible for recovery activities and their responsibilities are stated. The components of the basic plan are listed, the scenario for the execution of the plan is discussed, and documented how role-players will be notified of developments. Crucial matters are all discussed and documented, such as the keeping of vital records and off-site storage, personnel control and the effects of data loss on the project (DRJ, 2011:1).

#### **Phase 4: Implementation (creating the plan)**

During this phase the emergency response procedures are determined (such as evacuation). The establishment of a command and control emergency operation centre to deal with the management of the crisis is discussed and the operation centre team is appointed and their duties finalised. The operations of the operation centre are documented, as well as the delegation and designation of the responsibilities of each role-player. Recovery and restoration procedures, vendor contracts and purchase of recovery resources are documented in advance (DRJ, 2011:1).

#### **Phase 5: Testing and exercising (post-implementation plan)**

During this phase the exercise program and its objectives are documented, the planned dates for execution of the exercises are fixed and the objectives for the testing and exercising of the plan are documented. The corporate awareness programmes are also compiled by which to promote the buy-in of personnel and role-players into this plan (DRJ, 2011:1).

#### **Phase 6: Maintenance and updating (updating the plan)**

Dates are set to determine times for updating the plan and for maintenance actions that were identified during the exercises. The budgets are established for updating and maintenance activities. The following important decisions and activities are finalised: the nature of software required for this task, the reporting structure, plan distribution and the maintenance of security during a disaster (DRJ, 2011:1).

#### **Phase 7: Execution (implementation when disaster occurs)**

This represents the closing phase of the project management cycle. It starts with declaring the disaster and stating the conditions on which the plan is to be executed. The execution of recovery operations commences after the conditions for execution of the plan are met and the disaster is declared (DRJ, 2011:1).

#### **4.4.2 The Cluster model (daisy-wheel model) of IASC**

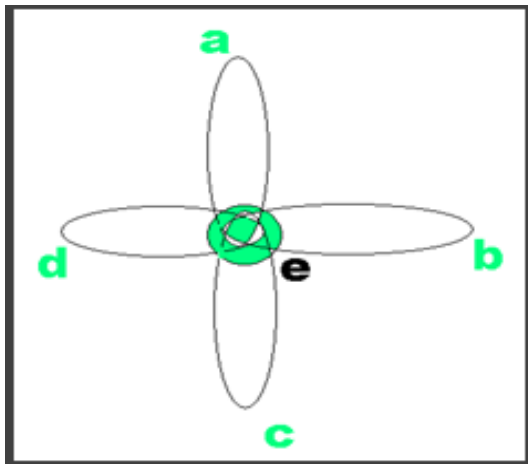
The daisy-wheel approach is used by The Inter-Agency Standing Committee (IASC). This model represents an over-arching framework developed to guide the collective action of different organisations or groups, which are divided into functional clusters. The IASC makes use of such clusters that are responsible for specific aspects of contingency actions. Each cluster functions on its own, taking responsibility for its field of expertise or task appointed to the cluster during and after a disaster.

Each cluster also functions as part of a group response to a disaster. One cluster may be responsible to provide food parcels and the other to provide shelter to the affected community. In each cluster, the basic steps of contingency plans are followed when providing assistance (IASC, 2007:7). These clusters follow certain basic steps according to: a scenario, response strategy, implementation plan, operational support plan and preparedness plan. The preparedness plan is based on a budget, which is also the responsibility of each cluster. The main function of each cluster is to co-ordinate cooperation for action by the participants of this programme, as was negotiated on previous meetings of IASC (2007:6).

The cluster approach, represented in the daisy-wheel model above, is used as the primary mechanism to coordinate different agencies in order to provide effective humanitarian assistance. The clusters portray the inter-agency planning process and connect the different agencies, sector planning and cluster planning. This is done by limiting (and breaking down) the inter-agency process to a minimum set of necessary components. By organising the various responsibilities and activities for each cluster, it helps to prevent duplication of activities and thus reduces the risk of wasting time and funds that were made available for responding to a disaster (Choularton, 2007:9).

The cluster approach provides a unique forum which involves the key UN and non-UN humanitarian partners. This forum allows the agencies to interact, to plan and respond to adverse events in their regions of responsibility (IASC, 2011). The role-players of these agencies that are internationally active in a specific function will be contacted when assistance is needed. For example, the health team will be needed when an outbreak of cholera is reported in a certain area after a flood. The health team will not be activated if no medical emergency is reported as part of the disaster response. Inter-agency CP represented in the daisy-wheel model, provides a common, over-arching framework to guide the collective action of all partners and role-players. These include individual agencies/organisations and sectors/cluster groups. This form of CP does not replace the need for planning by individual agencies/organizations. Cluster activities only provide the opportunity to respond effectively as a team, where each group provides in a specific need that may arise in a post-disaster community. The daisy-wheel model and the cluster approach provides focus and coherence to the various levels of planning that are required to mount a humanitarian response effectively and thus successfully (IASC, 2007:7).

The daisy-wheel model could be applied within another model, as will be demonstrated in Chapter 6 (see Point 6.5). The purpose of such a merging of models is to bring agencies together for more effective response. The next model discussed is the one used by the International Red Cross and Red Crescent Movement (IRCRC).



- **a, b, c, d.** refers to Clusters or sectors responsible for specific activities, for example: health, protection, nutrition, shelter, etc. They are called Home Country Team.
- **e:** refers to inter- agency contingency planning.

**Figure 4.2: The daisy-wheel model used by IASC**

Source: (IASC, 2011)

In conclusion, the daisy-wheel model allows for organisation-specific planning. The diagram that is utilised (see Figure 4.2) illustrates the activities and interrelationships between role players. The daisy-wheel approach is employed when organised participation for assistance is needed. The role and importance of clusters are that they provide a strategic coordination mechanism to ensure the effective delivery of the humanitarian response. Clusters aim to provide strategic direction through the creation of small steering committees' or 'strategic advisory groups' of key operational partners (of which the number depends on the context of the disaster) (IASC, 2012).

#### **4.4.3 The process model of the International Red Cross Red Crescent Movement**

The contingency process model is used by the International Red Cross and Red Crescent Movement (IRCRC). This movement is a world leader in disaster response and places a huge emphasis on humanitarian action. Agents implementing this model use CP as an essential part of their operations (IRCRC, 2007:2).

Effective preparedness for and response to emergency situations are fundamental elements of the mandate of the IRCRC. The organisation considers disaster response and CP to be the responsibility of every level within their ranks. They also utilise a CP approach on a community-based outreach to identify those who are most at risk and vulnerable to disasters.

Many procedures to manage emergencies are common to all disasters, regardless of the hazards involved. Response activities by the IRCRC are conducted within each country. These

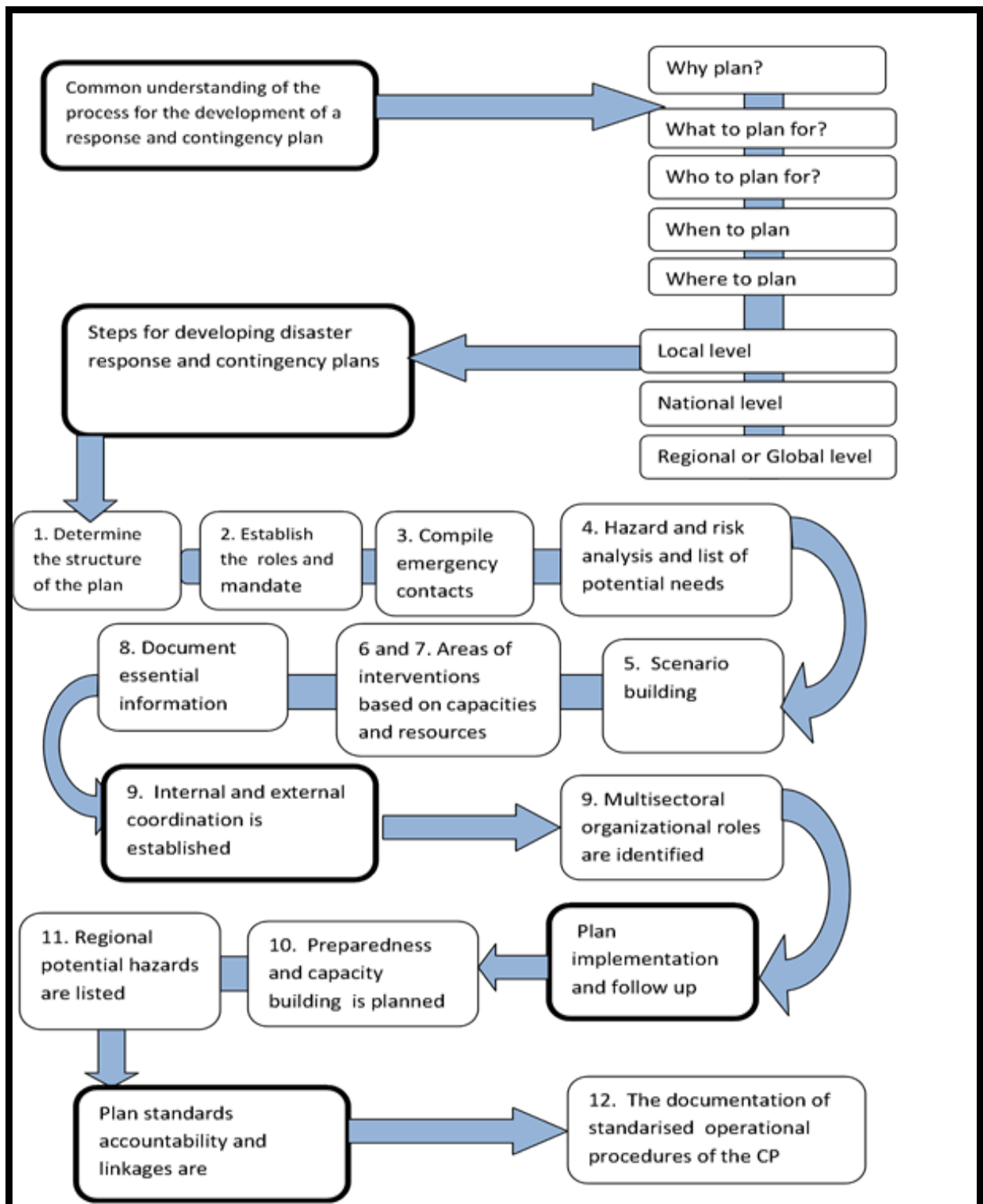


Figure 4.3: The Contingency process model of the IRCRC

Source: (IRCRC, 2007:2)

- Answer the question: **Who to plan for?** This principle takes the local communities into account. The IRCRC upholds the principle that the local communities should be considered important partners in all planning phases. According the IRCRC, best practice response activities, is to consider that it is family, neighbours and members of the local community who are always the first to arrive on the scene when a disaster occurs. Thus, their advice is that planners should tap into local knowledge and include this information in community preparedness and plans for disaster response (this makes the IRCRC a truly community-based volunteer organisation). Answer the question: **when to plan?** This principle revolves around community preparedness and response plans; the plan is prepared before the onset of a disaster, based on previous experiences and is then executed during the adverse event.
- Consider **where to plan?** This principle reflects the approach of IRCRC which is that the community should participate in planning. The IRCRC process model is a community based model, and educating those whose lives or homes might be at risk during a disaster is a critical component of disaster response and CP according to the IRCRC (2007:36). Concluding thoughts on CP follows next.

#### 4.5 CONCLUSION

The focus of the chapter was on contingency planning (CP). The theory of planning was investigated as it forms the basis of all planning, including the said CP. In the first part of this chapter the aim, function and objectives of planning and CP were discussed.

The second part of the chapter contained a more detailed description of CP. The following aspects of CP were mentioned: contingency plan approaches and basic elements of such plans. Lastly, CP models were examined as they are implemented by different agencies.

CP is one among various planning tools to address issues that develop as result of an adverse event. Current crises are extremely global, intertwined and non-textbook in nature. The words used to describe the disasters of recent years are 'unthinkable' and 'inconceivable'. Uncertain issues such as food security are and remain difficult to address during disasters (Lagadec, 2006: 490). For this reason, CP is a suitable approach when planning to deal with emergency situations. The reason is that CP helps to mobilise effective action and resources for such crises. CP also mobilises stakeholders' commitment to react in a coordinated manner in these circumstances (GTZ, 2010:10).

Thus, one may concur with Martinet (2006:1) that "contingency planning is a forward thinking planning process" (GCS 2012:2). Disaster managers and CP must move forward with the

discipline, in order to be able to address the multifaceted challenges of this era. Lagadec (2004:507) states that rear-view mirror management is no solution. New and innovative solutions are needed by DRR practitioners.

The following chapter discusses the research design and examine the results from the research conducted in the two mining communities in question, who experienced a sudden mine closure.

## CHAPTER FIVE

### EMPIRICAL RESEARCH FINDINGS

#### 5.1 INTRODUCTION

The literature study conducted in Chapter 2, 3 and 4 contributed to a better understanding of the underpinning theories, principles and approaches to a community's vulnerability, livelihoods, as well as mine closures and planning for such events. The previous chapter focused especially on planning theory in general and theories concerning contingency planning (CP) in particular. Various implementations of CP were discussed in order to determine the best planning approach by which to address socio-economic disasters. The emergency situation that developed due to a drastic increase in the socio-economic vulnerability of two mining communities after an unexpected mine closure, provided the motivation for the study. Therefore the focus is on planning and contingency planning to find a suitable approach to deal with such situations (see Point 1.2.2).

This chapter continues the investigation by starting off with an explanation of the research design used by the present study to investigate the phenomenon in question. The findings of the research are then discussed by dealing with the research questions that revolve around the circumstances of the mining community. The research was conducted within the boundaries set out by a specific research design and guided by certain ethical considerations. The first part of this chapter describes the research paradigm and design that was used to investigate the event of a mine closure. In order to produce scientifically valid findings the researcher employed techniques and strategies that are suitable and accepted scientifically in the field of Social Sciences.

A qualitative research design was followed. Firstly, the point of departure for this chapter is to motivate the methods that were utilised to collect qualitative data. The advantages and disadvantages of each method are discussed and how it could have affected the outcome of the research. The method for the validation of the data is introduced to motivate how the researcher attempted to achieve scientifically verifiable data. Thereafter researcher's compliance to the ethical code of the NWU is discussed. Secondly, this chapter deals with the empirical findings of the research by answering two research questions:

1. What were the consequences in the cases of the closure of the two mines under investigation: for the Grootvlei and Orkney mines?

2. What lessons were learnt about the increase in socio-economic vulnerability caused by the mine closure?

The collected data was analysed and categorised, guided by the variables that indicate vulnerability in the livelihood frameworks that were investigated in Chapter 2 (see *Point 2.3.1* and *Point 2.3.2*). The participants' experiences were documented and coded according to different categories. The research design and methods used to gather data is discussed in the next sub-section.

## **5.2 RESEARCH METHODOLOGY**

The qualitative research design has been used as this design has been established as an appropriate method when a rich description of a phenomenon is needed. This was the case with the data gathered from the participants about their experiences. The disadvantage of a research design as a qualitative study lies in the fact that it is difficult to determine and ensure the objectivity of the researcher towards the interpretation of the findings (Weatington *et al.*, 2010:527). The technique for the collection of the empirical data is discussed next.

### **5.2.1 Sampling techniques**

Sampling done in qualitative research answers to the question: "What are the components that must be included to provide a valid representation for the research of the effects of the event and the community under investigation?" (Luborsky & Rubenstein, 1995:2.) The method used in the present study was purposive sampling, also known as judgmental, selective or subjective sampling. This implies that the selection of the units under investigation was based on the judgement of the researcher (Lund Research Unit, 2010).

Three main groups were identified from which data was collected.

Firstly, participants were selected from the mining community. Data was collected from the mineworkers and their relatives. This was done by means of life stories, semi-structured interviews, focus groups, field notes and recorded interviews. At the NGO, Helping Hand (HH), interviews were held with six (6) key personnel who were directly involved with the mining communities. They contributed through interventions such as the distribution of food parcels, media coverage of the mine closure and assisted with the re-deployment of the mineworkers. In the mining community of Springs, the role-players who assisted with the HH projects were interviewed, as well as four (4) mineworkers and four (4) mineworkers' life partners. The participants of the semi-structured interviews were selected from a provided data base that provided contact details. Most of the interviews lasted 30-45 minutes. Shorter interviews were conducted with three people during the observation of the two venues.

Secondly, the printed media provided some of the main the sources for the document study. These include newspaper articles, and publications on the internet, publications from the mining industry and publications issued by the government. The investigation consisted of an extensive document study over a period of more than three years, starting off with articles dated in 2009 until 29 April 2013. Documents with case studies were collected from HH offices and accessed from the internet. Publications were collected from the mining industry, for example MiningM<sup>x</sup>, as well as from the Department of Mineral Resources (DMR). Publications by Government discussing mine closure and life stories of affected mineworkers were collected from the printed media. Many life stories of mineworkers were already available in the documentation provided by HH and other published articles on the families that suffered due to the mine closure. To ensure validity of the sources, the researcher collected unpublished documents and reports in person. Therefore these sources can be considered authentic and reliable (Strydom & Delpont, 2010:317).

Thirdly, members of the labour unions were interviewed who were involved directly or indirectly with the plight of the mineworkers and the loss of their employment.

## **5.2.2 The collection of data**

The empirical investigation consisted of a document study, interviews and observation. The information was gathered from the mining community by means of life stories, semi-structured interviews and focus groups. The questions asked in the interviews are listed in Addendum 1 (see A 1). Data collected from participants were done on hard copy, or through audio recording and also field notes. Personalised life stories and reports were collected from the participants who partook in the interviews. Written field notes were taken and interviews were recorded. A short explanation follows of the techniques that were used for data collection.

### **5.2.2.1 Life-story research**

Life-story research was undertaken because it provides insight into the personal experience of the participants. The life story describes a person's life's course (the story of one's life or what one perceives as meaningful parts of one's life). Such a story is mostly a personal narrative and an account of personal experience delivered orally by the individual (Denzin, 1989; Sarbin, 1986; Wallace, 1994, in Oplatka, 2001). All of the above mentioned documents and stories helped the researcher to establish a more definite insight into the effects the mine closure had on the individuals and their households at the mines under investigation.

### **5.2.2.2 Semi-structured interviews**

Semi-structured interviews typically are used to form a detailed picture of the participant's beliefs about, or perceptions or accounts of a particular topic (Greeff, 2005:296). Therefore semi-structured interviews formed an integral part of this investigation. Semi-structured interviews were scheduled with some of the key role-players in the mine closures.

Key persons were also approached to establish contact with the mineworkers and to set up interviews at HH. The interviews were conducted at their venue, with role-players who were directly involved with the mine. The information gathered from the semi-structured interviews provided insight into the detrimental effect that the experience of the mine closure had on the participants from the mining communities in question.

### **5.2.2.3 Data collection through focus groups**

A focus group can consist of four (4) to eight (8) people (James, 2008:112); or eight (8) to twelve (12) people (Witkin & Altschuld, 1995:162). Focus groups are used by researchers because this technique creates a process of sharing and comparing information and experiences. Participants of focus groups also produce large amounts of concentrated information (Greeff, 2005:301). Focus groups provide a better understanding of people's feelings or thoughts about an issue. This is also the focus for investigation in this study, namely a group of people with a common set of characteristics (Greeff, 2005:300).

Two interviews through focus groups were planned but only one focus-group meeting were actually held. This was done with the mineworkers at the Orkney mine who were living on site. The participants from Springs did not live on the mining site but in the city. Thus, due to the loss of their transportation (they did not have access to transportation any more), semi-structured interviews were conducted instead in person and telephonically. The situation that arose as a result of the specific needs in the one mining community necessitated use of alternative research methods (semi-structured interviews) which still were supporting the paradigm of qualitative research.

A focus-group interview consisting of five people was conducted at the Aurora Orkney mine site. The focus group that were selected were employees of the Aurora-Orkney mine, who had experienced the phenomena under investigation. A larger group of mineworkers indicated that they would be participating in the group session. However, due to unforeseen circumstances at the site, only five persons arrived that day. The focus group thus consisted of four mineworkers and one relative who is a dependent of one of the group. The purpose of the focus-group discussions was to gather information on the immediate needs the families experienced after

the mine closure. The contributions of these group members helped the researcher gain an understanding of the issues surrounding mine closure. The members also contributed to the recommendations that will be presented in the next chapter.

#### **5.2.2.4 Observation**

The two sites in Orkney and Springs, the Aurora-Orkney mine and the Grootvlei mine in Springs, were visited to gain insight into the situation that developed in the mining communities under investigation. Additionally, a number of interviews were conducted with business owners and field notes were taken. These interviews lasted approximately 5 to 15 minutes. The businesses were approached and an interview with the manager or owner requested. If the person accepted the appointment, the nature of the research was explained and permission to partake in the research was confirmed before the interview was conducted. The purpose of these interviews was to establish the consequences of the mine closure on the economic sphere of the two mining towns in question. In other words, the aim was to assess the outcome on the surrounding businesses and on the miners and their dependents that made up their clientele.

The observation lead to the awareness of the dire circumstances under which the mining communities were making a living more than eighteen months after without prior notice they arrived at closed gates. The observation also confirmed the magnitude of the damage on and to the mining site. The deterioration of the buildings and the remaining equipment on site was visible. The effect of the mine closure was made clear by the many closed businesses in the vicinity of the shafts and the hostels. Data obtained from the observation correlated with the information provided by the interviews, the newspapers and other documents collected by the researcher. These sources added important and additional insight to the severity of the effect of the mine closure on the community. It also provided an opportunity for the validation of the gathered information. The next sub-section describes how the data was captured and analysed.

#### **5.2.3 Capturing of the data**

Audio recordings were made of the semi-structured interviews and the discussions of the focus group, supported by field notes. Notes were also taken of the telephonic interviews and during the observation at the mining sites. The recorded interviews were transcribed and printed. These documents and the data gathered from the media and at HH were then studied and coded according to themes. The themes were numbered, and sorted into the three categories derived from the study of two livelihood frameworks, the SLF Livelihood framework and the CARE HLS framework.

#### **5.2.4 Validation of gathered data**

The data that was collected was verified by means of the method called triangulation of data. Triangulation of data is used to compensate for a weakness of the qualitative-research method: the possibility that researchers might interpret the data in the light of their own perspectives (Strydom & Delpont, 2010:314). The term 'triangulation' is derived from the discipline of surveying and refers to the use of landmarks. One landmark alone locates a person in one direction. With two landmarks that person is able to locate him-/herself somewhere between the two landmarks, in which case the third confirmation of the landmark's location is a strong indicator of accuracy. The purpose of triangulation is thus to eliminate incorrect analysis of data. Triangulation of research data serves as a validity check which is a crucial part of scientific research. According to Patton (1985:187) there are different types of triangulation:

- Data triangulation refers to the use of a variety of data resources in a study.
- Investigator triangulation indicates that the study involved a team of different researchers and evaluators.
- Theory triangulation is done when the researcher uses multiple perspectives to interpret a single set of data.
- Methodological triangulation employees multiple methods to study a single problem.

The validation of the data for the present study was done by means of data triangulation. Data was triangulated by comparing findings from the sampling of the three identified resource groups mentioned above (see Point 5.2.2).

#### **5.2.5 Ethical considerations**

Participation in this study was voluntary and no participant was subjected to harm or risk of any kind, physical or psychological. The information that was collected from the participants was treated as confidential and only after forms were signed, interviews were conducted in the form of semi-structured interviews and by means of focus groups. The interviewees who participated through telephone and personal interviews were informed during the observation about the reason for the research. Thus their consent was obtained first to involve them in the research. All participation to the research conducted for this study was voluntary.

Ethical considerations were considered in approaching the key persons, who acted as gate keepers for the groups from whom the data was collected. In line with ethical guidelines for gate keepers, they are not allowed to give consent for participation in the research on behalf of

the respondents (McRae, *et al.*, 2013: 3). Gate keepers were utilised to establish contact with the mineworkers so that the research could be explained and their voluntary participation to the research project verified. Consent forms were signed by the focus group and before the semi-structured interviews were conducted. Furthermore, consent to record and use the information for the research project, was obtained from the participants before any interview or recording was made. Prior to the semi-structured interviews, focus groups and personally collected life stories, the participants were assured that their contributions would remain anonymous (Duvenhage *et al.*, 2011:40). Data collection was undertaken within the boundaries set by the ethical committee of the NWU:

- autonomy, which indicates respect towards someone and displaying an understanding of human dignity;
- benefit to the research participant;
- non-harmfulness which implies that the research participants were exposed to no harm or damage;
- justice – a visible dispensing of fair treatment, and equal distribution of risks and benefits among communities (NWU, 2010:47-48).

The researcher was sensitive to and mindful of moral principles and relevant ethical reasoning for collecting data from the interviewees who had experiences that could be described as traumatic or difficult to process. For this reason a traumatised participant who was not ready for interviewing was not included in the research. Also, the planned second focus-group session was cancelled to accommodate the participants' problem of not getting transport to the selected venue. Participants were not harmed or deceived regarding their participation in the research. The researcher was careful and always followed the need to act with the welfare of the participants in mind, and made an effort to avoid placing her own interests above those of the participants (Weatington *et al.*, 2010:32).

### **5.3 DATA ANALYSIS ACCORDING TO IDENTIFIED CATEGORIES AND THEMES**

The mine closure experienced by the two mining communities was referred to as a human tragedy. This tragedy caused human suffering due to negligence and the inability to manage the mine and run the mining operations (Joubert, 2011, 2; Tempelhoff, 2011, 8). An investigation was therefore conducted on how this closure affected the livelihoods of the community. The collected data was analysed by means of conceptual (thematic) analysis. This process involved the sorting of data according to themes and phrases that emerge repeatedly in the collected data (Oplatka, 2001). According to Mouton (2006:108), "The aim of data analysis is to

understand the various constitutive elements of the data collected, through an inspection of the relationship between concepts, constructs or variables, and to see whether there are any patterns or trends that can be identified or isolated, or to establish themes.” The themes or trends that are identified and sorted are categorised and/or labelled, in order to provide a system according to which the researcher can document the findings. This process should then assure the researcher that he/she has established a true and profound understanding of the individuals’ experienced of the events expressed in the gathered data (Patton, 1985:33). In the literature that was studied no mine closure was ever categorised as a socio-economic disaster as such. The purpose of the data analysis is to establish the level of the deterioration of livelihoods as result of the mine closure. The mining community has been vulnerable prior to the mine closure, but could not be categorised as poor. The analysis was done by examining the three categories mentioned in the livelihood frameworks (see Point 2.3.4, Figure 2.2 and Figure 2.3). These categories are:

- livelihood assets expressed as different forms of capital –named as Category A;
- livelihood strategies described as activities of a household in its socio-economic environment – named as Category B;
- livelihood outcomes as results from activities performed in the context of livelihood strategies – named as Category C.

In each category certain themes were identified and listed in a table (see Table 5.1). The themes were identified according to variables that indicate an increase or decrease in vulnerability of a community or household – unique to each category mentioned above. The collected data was analysed to determine whether the vulnerability of the mining community increased after the mine closure. The categories and themes in which the data was sorted, are provided in the table below (see Table 5.1).

The data in terms of the categories and the themes mentioned were analysed and the findings used to answer the research question about the consequences for the mining community who experienced the mine closure. The analysis of the collected data began by focusing on the livelihood assets.

Livelihood assets consist of five (5) elements:

- Human capital: the community’s capacity, which is articulated in their skills, knowledge, health and energy (DFID, 1999:19).

- Natural resources: the geographical characteristics and space in which the community finds itself and the area a household has available to itself to make a living on (DFID, 1999:23).

**Table 5.1: List of categories and themes used to analyse the data collected**

<b>Categories</b>	<b>A. Livelihood assets</b>	<b>B. Livelihood strategies</b>	<b>C. Livelihood outcomes</b>
Theme 1	Human capital	Consumption activities	Nutrition
Theme 2	Natural capital	Processing activities	Health
Theme 3	Financial capital	Production, exchange and marketing activities	Education
Theme 4	Social capital	None	Food security
Theme 5	Physical capital	None	Water
Theme 6	None	None	Shelter
Theme 7	None	None	Community participation
Theme 8	None	None	Personal safety

### **5.3.1 Category A: Livelihood assets of the two mining communities**

- Financial capital: the community's access to income, savings, credit, medical aids and pension funds (DFID, 1999:27).
- Physical capital: infrastructure, technology, as well as relevant equipment and tools (DFID, 1999:25; FAO: 2009).
- Social capital: networks and connections through family structures and relationships, as well as social structures in society such as churches, clubs, schools, etc. (DFID, 1999:21).

#### **5.3.1.1 Theme 1: Human capital**

Human capital was analysed according to the following four variables: skills, knowledge, health and energy. The mineworkers' skills were restricted to the mining industry only. When the mine closed this group could not find other employment. Therefore they were the ones who suffered the most from the effects of the mine closure, as they were unable to find other employment to replace the level of income they received previously for working on the mine. In most cases these mineworkers had to accept employment with lower salaries due to their level of education and lack of working skills. Data from the interviews revealed that a group of workers did find alternative means of employment due to their skills; most of these workers had to settle for a lower salary in their new employment. About a thousand (1 000) mineworkers stayed on at the mine hostels, with no food and clean water (Tempelhoff, 2010a:19).

A large group of the workers in the hostels and living in mining houses, were unable to find work. This was due to various reasons, amongst others the inability to pay for the travelling expenses to attend a job interview, or their lack of ability to work outside the mining industry. In general there was a feeling of hopelessness and despair amongst the mineworkers who did not find employment and some completely gave up on hope to find employment. This group was described as “broken of spirit” to get out of their problems (Klopper, 2011). The mining environment was also affected by the mine closure – a finding that will be discussed next.

### **5.3.1.2 Theme 2: Natural Resources**

Data collected from the document study revealed that criminal charges were brought against Aurora (mining company) for discharging inadequately treated acid mine water into the wetlands surrounding the Springs area. Water samples have been collected by the South African Police Service (SAPS), (SAPA, 2010). As a result of the charges laid against them, the owners of the mine could be held liable according to the Minister of Water and Environmental affairs (SAPA, 2010). The Department of Mineral Resources fined the liquidators of the Aurora group for the pollution the mine water caused to the Blesbokspruit, which forms part of the Marievale Wetlands near Springs (Tempelhoff, 2010b:9).

Data that was gathered from the semi-structured interviews revealed that the vegetable gardens of the miners residing at the hostels were watered from untreated mine water and at Orkney and Springs. Mariette Lieferink (cited in Béga, 2010), the chief executive of the Federation for a Sustainable Environment, pointed out that because there already has been widespread ill-health and a destroyed ecosystem due to the untreated mine water, the government subsidy to assist Aurora in funding the treatment of the polluted mine water will be too late. Residents reported a strong odour of hydrogen sulphide at night, from the Blesbokspruit (Béga, 2010). A scientific report published by Lani van Vuuren (2013) confirms that the Blesbokspruit is contaminated by Acid Mine Drainage (AMD) (Orf, 2013:22).

### **5.3.1.3 Theme 3: Financial or economic capital**

The main effect of the mine closure at the Orkney- and Grootvlei Aurora mines were the mass loss of employment. At first, Aurora Empowerment Systems (Aurora) promised that they will not lay off any of the workers (Van Rensburg, 2010: 7). However, within a few months after the take-over from the previous owners, the workers were unemployed. As result, most of them lost their medical aids, UIF benefits and their pension benefits, some after working 25 years for the mining industry (PMG, 2013). It is reported that even though the money for their pension and medical aids was subtracted from their salaries, the mining companies did not pay over their money to the respective funds (Tempelhoff, 2010b, 12).

Aurora also did not pay over the miners' Unemployment Insurance Fund (UIF) payments to the UIF. Reports (PMG, 2013) that value-added tax (VAT) was never paid on any of the transactions made by Aurora. Aurora was also sued by foreign business men for writing out cheques that bounced, for a total worth of nine (9) million rand (Groenwald & Rawoot, 2010). The mine owners were accused by the media for running the two mines on a Ponzi scheme. This practice involved making payments based on promises of money based on forthcoming income and funding, which never realised in the case of Aurora (Pauw, 2012). By 2012 the mine owners did not have the available finance in their bank accounts, and no hope was offered by the mine owners that outstanding salaries would ever be paid.

#### **5.3.1.4 Theme 4: Social capital**

Deterioration was reported of networks and social groups in which the mineworkers partook before the mine closure. Mineworkers had to change their life styles to adapt to their newly acquired statuses of low income/no income. Some of the mineworkers, who were part of the Care and Maintenance team, had to sleep in at the mine. They actually had no money for transport to take them home, since they have had received no salary yet for four months (Tempelhoffa, 2010:10). The mine closure negatively affected a number of 40 000 people, as the findings showed that mineworkers who were laid off, had an estimated 4-10 dependents to look after (Du Plessis, 2011). The number of workers who suddenly became unemployed at the two mines were 5 300 according to calculations by the media, and according to estimates of HH, about 40 000 mineworkers and their dependents were affected (Media publication by Deikema, 2010).

A great number of participants and many reports indicated an overall presence of depression and feelings of hopelessness among people in the communities concerned. Instances of substance abuse, domestic violence and divorce escalated. There also were a number of reported suicides, suicide attempts and attempted family murders after the mine closures (Oberholzer, 2010:38; Deikema, 2010).

#### **5.3.1.5 Theme 5: Physical capital**

**Equipment and tools** (see Figure 5.1 and Figure 5.2): The mines who provided employment to 5 300 workers were stripped of equipment, which reportedly were sold as scrap metal. The pumps cost approximately R1.4 million each, and the pump motors approximately R1.3 million each. The mine had eleven pumps. Grootvlei mine reportedly was left in ruins. It would cost more than R500 million to restore operations as the shaft headgear and rigging equipment were removed and cut up for scrap metal as well. This equipment can be seen in working condition in the picture below (see Figure 5.1). These equipment will cost more than R100 million to replace.

When approached on this issue, the owner reacted, “I do not owe you any explanation” (De Lange, 2011: 2). Furthermore, the flooding of the mining shafts worsened the damage to the mines, and currently will cost millions to repair, before mining operations could take place again (Du Venage, 2011)

The first picture (see Figure 5.1) was taken when the mine was in operation in 2008, with all the mining equipment in place. The second picture, taken in 2013, shows the total destruction of the mining site and evidence that the mines were stripped – as was reported during the interviews with the mineworkers. In this second picture (see Figure 5.2) of the same shaft and area, there is no sign of mining equipment, and the mine shaft is open and not fenced.

**Technology:** The companies that have supported the mines with basic services such as electronics, electricity and security, were not paid and their services were duly terminated. Some of the smaller businesses that benefitted from the mining operations and workers’ salaries were closed down or went bankrupt after the mines closed. Electricity was cut in 2010 due to the non-payment of bills to Escom and because the amounts exceeded the mine-owners’ ability to pay (Du Plessis, 2011). The following information illustrates the situation clearly:

*Electricity and water cut of at the hostels, blocked toilets. There is no electricity, food and water at the hostels newspaper report; interview and a government publication (PMG, 2013).*



**Figure 5.1: Photo of the Ndlovu shaft at Grootvlei in 2008 in operation**  
Source: MiningMx, 2013



**Figure 5.2: Photo of the Ndlovo shaft and mining site at Grootvlei in 2013**

Source: MiningMx, 2013

**Infrastructure:** The buildings, in which the mine offices were situated, were left empty and were not maintained. There was no electricity and mine hostels were reported to have no water to flush toilets (PMG, 2013). The entrance to the gate and the roads was not maintained and showed signs of damage. The pipes were rusting because of a lack of maintenance and caused a safety risk to the workers who were part of the Care and Maintenance operations (Tempelhoff, 2010:9). Workers of the Care & Maintenance unit complained that the lights on their safety helmets were faulty and miners had to rotate the helmets among them to have light when working underground. Electricity at the mines and at the homes of mineworkers was cut off mineworker due to lack of payment to Eskom and the local municipalities (Deikema, 2010b). The next sub-section focuses on how the mining communities' livelihood strategies were affected by the mine closures, as the following response illustrates:

*The mine was destroyed, the environment endangered and equipment for employment was removed* – Interview at HH, and government publication (PMG, 2013).

### **5.3.2 Category B: The livelihood strategies of the two mining communities**

The data analysis of the next variable identified from the collected data portrays the effect of the mine closure on the livelihood strategies of the mining communities in question. The impact on these strategies was divided into three themes according to the CARE framework (see Figure

2.3). These themes are: production and income activities, consumption activities and production, exchange and marketing activities.

#### **5.3.2.1 Theme 1: Production and income activities**

This sub-section also relates to *Human capital* and *Financial capital* (Category A, Theme 1 and 3). Mineworkers are reported to have arrived at closed gates in April 2010. Their main activity to provide income to their families was ended abruptly, leaving them in despair. The damage to the mining sites also destroyed all possibility of the mines being in operation soon (De Lange, 2011). The two pictures (see Point 5.3.1.5) depict the destruction of one of the shafts.

#### **5.3.2.2 Theme 2: Consumption activities**

The lack of income and loss of cash flow excluded the mineworkers and their relatives from normal activities, which they had access to prior to the mine closure. The workers and their families needed food parcels because the non-payment of salaries from April 2010 to October 2010 left no finances for basic livelihoods (Deikema, 2010a; Deikema, 2010b). These include being able to partake in social activities such as eating at restaurants and going to places of entertainment provided by the city and municipality. Interviews with the business owners during the observation of the mining site confirmed a severe drop in the mining communities' ability to partake in these activities. The families affected by the mine closure did not even have the finances to buy groceries and the basic personal items which they needed (Tempelhoff, 2010a:9). One interviewee stated the following:

#### **5.3.2.3 Theme 3: Production, exchange and marketing activities**

The mining communities in question depended on the mine as their main source of income. The workers' salaries provided them the opportunity to partake in the local market. When the mines closed they lost their ability to participate in this aspect of their livelihood strategies. Production and exchange opportunities were not a main activity, even though it was reported that the mineworkers living at the hostels maintained vegetable gardens to sustain themselves and their families. The mine closure affected the mineworkers living in the mining town differently than those who remained at the hostels.

A newspaper reported: *More than 1000 mineworkers are waiting at the hostels, with no clean running water, and without food* (Tempelhoff, 2010a:9).

No data was collected from the miners living in town that reflected any activities of production or exchange of livelihoods, other than the salaries that they received for working on the two mines mentioned in this study. The weakening of the two communities' livelihood strategies affected

their livelihood outcomes. The following sub-section investigates how the mine closure affected the miners' livelihood outcomes.

### **5.3.3 Category C: Data analysis of the livelihood outcomes**

Livelihood outcomes are determined by assets and livelihood strategies. Both these aspects are affected by stresses and shocks in the environment. In the sustainable livelihood frameworks these livelihood strategies are also referred to as the vulnerability context. The different livelihood outcomes are: food, nutrition, health, education, water, shelter, personal safety and community participation.

#### **5.3.3.1 Theme 1: Nutrition**

Nutritional status is often considered one of the best outcome indicators for overall livelihood security. The reason is that this status captures multiple dimensions such as access to food, health care and education (Frankenberger *et al.*, 2001). The inability of the households to provide nutrition for their children is evident from the following responses:

*The mineworkers are living in terrible conditions at the hostels for months; there is no food, water or electricity* – Parliamentary commission document (PMG, 2013).

*My neighbour died, I think he was depressed, there was nothing to eat. Another neighbour died of hunger* – Interviewee: mineworker.

*I fell pregnant. I was under stress all the time, not having enough to eat during my pregnancy. My baby was declared dead after it was born* – Interviewee: mineworkers life partner

Malnutrition was reported by all the participants. This condition resulted in miscarriages and bouts of depression among children and adults. Children felt ashamed of their situation at home. As a result, suicide attempts and suicidal behaviour were reported in the mining communities, the media and in the semi-structures interviews. Proper nutrition is crucial as an expression of general health and well-being of a community, of which regular access to food is only one aspect. Nutrition is also very important in supporting psychological behaviour (WHO, 2013). The status of the general health of the community after the mine closure had also deteriorated.

#### **5.3.3.2 Theme 2: Health**

Conditions of health-threatening situations were reported from all the sources of collected data. The mining environment caused very serious concerns about health issues. Evidence was reported of the deterioration of the physical health as well as the psychological health of the

mining community. This condition manifested in tendencies of depression, increased mental health issues, substance abuse and suicides. The following responses from the interviews corroborate this situation at the mines.

*My husband became a diabetic* – Interviewee: mineworker's life partner.

*There was an increase of substance abuse and domestic violence after the mine closure* – Interview at HH.

Diseases that were mentioned in the media and was found from the collected data, were diabetes, heart conditions, miscarriages, depression and, for children, learning difficulties which impacted negatively on their school performance. The following comments confirms this:

*Divorces occurred; schools had to provide food for the children who arrived at school hungry, people moved in together, and two to three families in one home* – (Deikema, 2010a; newspaper report).

*We have one man who drank ant poison, he said he was tired, and he cannot provide for his family* – (Du Venage, 2011).

#### **5.3.3.3 Theme 3: Education**

A lack of children's desire to perform well at school was reported by mothers who were interviewees. Two of the participants indicated that their children experienced learning problems during this event. Children had to cope with their households' new financial position in which parents were not able to provide new school clothes so that some had to wear second hand clothes to school. One child was reported so embarrassed about this domestic situation that he attempted suicide – taken from interview at HH .

Children were taken out of school because of non-payment of school fees (Deikema, 2010). Some children also did not have access to their yearend academic results because their parents owed money to their school –taken from interview with mineworker. Children arrived hungry at school and as a result feeding schemes were launched at the schools (van der Walt, 2009:1). This state of affairs links with the following theme, food security.

#### **5.3.3.4 Theme 4: Food security**

The two communities had no food security during this event. Food parcels were distributed to the miners and their families on a regular basis, between April 2010 and December 2010 (Deikema, 2010a, Deikema 2010b). The fact of a family needing food parcels indicates a chain reaction, which is started off by the lack or absence of resources to obtain food. Food parcels

provide basic foods and do not always make provision for the needs of the family for proper nutrition to ensure psychological health as well as growth and development in children.

Food security is an extremely important aspect of the CARE Household Livelihood Security (HLS) framework. The need for food is almost in every case the first sign of a community's vulnerability and of a condition of poverty (Frankenberger *et al.*, 2001). Every household was affected by the lack of food after the mine closure. The community lost their access to food due to the non-payment of their salaries for a prolonged period. This condition becomes apparent from the responses below:

*I ask myself if live is still worth living if you have lost everything and have nowhere to go, and no food to eat – Life story: mineworker.*

*The mineworkers were not receiving any salaries for 8 months and depended on food parcels in 2009, were back into the same situation within 4 months (Du Venage, 2011).*

*Mineworkers did not receive salary for 8 months –Interview at HH.*

*The mineworkers received food parcels for almost a year – Interview at HH*

*We distributed food for 72 days at the Orkney mine – (Gift of the Givers:2012).*

*The mineworkers received half their salaries at the end of December 2009, and this continued into March 2010, then in April, the mine closed and no salaries were paid – Interview at HH*

The variable indicating the deteriorating condition of the mining community's health is linked closely to the variable that will be discussed next: water.

#### **5.3.3.5 Theme 5: Water**

Polluted mine water, untreated by the mine owners, was not only posing a health threat to the community exposed to the water, this hazard was threatening to flood the whole municipal area on the long run. The impact on the mining community was not only on conditions of personal health, but on the entire external environment on which the community members depend for their existence. The following comments describe the situation experienced by mineworkers:

*108 000 mega liters must be pumped out of the mines daily to prevent the flooding of the shafts of the mines in the vicinity of Grootvlei mine, and of Nigel – (Oberholzer, 2010:89)*

*The pumps that should pump out the water were (sic) sold – Mining Industry Publication (MiningMx 2013).*

*The mine shafts do not have fences around them, the mine dumps are not treated and it holds risks to the mining community living in that area. The polluted mine water are used to irrigate the vegetable gardens where the mineworkers' lives – Interview at HH.*

The communities' vulnerability was increased due to the risks to which the inhabitants were exposed because they were exposed to the polluted mine water. Some members even had to use polluted water on a daily basis while living at the mine hostels where the water was supplied to water the gardens.

#### **5.3.3.6 Theme 6: Shelter**

Mineworkers have received partial salaries for three months and thereafter from April 2010 no remuneration at all. The partial payment and non-payment of their salaries influenced their ability to keep up the payments on their housing. Mineworkers, who did not live in the mine hostels lost their homes and were forced to find less expensive accommodation. Some families moved in together and two to three households shared expenses. Some families had to leave town and went to live in areas that provided arrangements for informal settlements. Many hostel residences had nowhere to go and stayed on in the hostels that were not supplied with running water and electricity anymore.

The Food and Agriculture Organisation sorts shelter under livelihood assets, physical capital (FAO, 2009). The CARE's HLS livelihood categorises shelter under livelihood outcome. For the purpose of this study, the need for shelter was sorted under its own theme (as can be seen above).

#### **5.3.3.7 Theme 7: Community participation**

Before the mine closure, there were mining community reports from business people that some of these families had access to higher middle class lifestyles. They could eat out regularly, some families possessed more than one vehicle and they participated in normal activities in their local municipalities. Mineworkers could plan for their children's education, and some supported their children in further studies after school. After the mine closure these families had to go on foot when they needed something in town, and in some cases they found themselves in situations where they had to beg for food from local businesses and churches. The parents also could not pay the fees for their children to participate in tertiary education anymore.

#### **5.3.3.8 Theme 8: Personal safety**

When the mines were in the 'care and maintenance phase' the few workers that did go down the shafts had to face the danger of faulty tools, unsafe shafts and defective mining equipment

that did not comply with health and safety legislations applicable to the mining industry. The abandoned open mine shafts posed a threat to the safety of the communities living in the vicinity of the mines. The mine dumps were not treated, and the polluted mines were left uncontrolled. Thus the mining residue could run free to pollute water resources in the area. Incidents of shooting, riots and deaths were reported regularly as a result of mineworkers' unrest and subsequent illegal mining. Illegal mining occurs at both the mining sites due to the absence (removal) of the fences that should deter trespassers from entering the shafts, as well as the absence of security personnel. The security agency who was responsible to protect the Aurora Empowerment Systems Ltd. owned shafts in Orkney and Springs withdrew from the premises due to the non-payment of the security agency (MiningMx, 2013).

#### **5.3.4 Lessons learnt from this investigation**

According to the definition by Stacey *et al.* (2010:6) mentioned above, the mining community was already vulnerable as to the sustainability of their livelihoods. The reason was that they depended on only one source of income, namely from the mine where they were employed. The lessons learnt from this situation are discussed by comparing livelihood outcomes of the mining community. Their livelihood before the mine closure is compared to what they have lost as a result of the mine closure. This is in spite of being vulnerable as a mining community, even before the mine closed.

The event of the mine closure describes a total collapse of the workers and their families' livelihood assets and outcomes. These dire circumstances as a result of the mine closure impacted negatively on their livelihood strategies and depleted their livelihood assets. According to Christopolos (2012:547), a socio-economic disaster follows when vulnerability of livelihoods deteriorates into total collapse (Christopolos, 2012:547). Thus, the mining community was not secure in sustaining their livelihood assets. Thus, when the main income of the heads of the households were lost due to the mine closure, their livelihoods gradually deteriorated into a total collapse, hence the mention of a socio-economic disaster.

Another lesson learnt from the data analysis, was that the mineworkers did not immediately leave the mining site to find alternative employment. This delay in their ability to generate salaries to meet the needs of their dependents, negatively affected their livelihood outcomes after the closing of the mine in April of 2010. The main reason for the workers staying on after the closure, was that they regarded the mine owners as credible and believed their promises that the situation would be restored and that the workers would be paid full salaries soon after. Some mineworkers still arrived for work each day even after the mine had closed. They worked in the shafts, performing 'care and maintenance' tasks such as preventing the mine from

flooding. In spite of this participation no salary was paid into their bank accounts. Some of these workers were staying on in the hostels, waiting for the mine owners to keep their promises.

There is a clear misconception that led to their decision not to seek other employment as soon as possible after the closure. This was based on the belief that the mine closure was to be a temporally situation as understood by all parties involved. The necessary steps to protect the total deterioration of their livelihoods were delayed because of the expectation that the situation would return to normal in a matter of weeks. By the time the mineworkers and the labour unions realised that the situation was entering into a longer term than expected, and that the workers were not going to be paid, the loss of their assets and livelihoods were beyond recovery. Thus it became a socio-economic disaster and they needed humanitarian assistance. Most mineworkers who did not find other employment had to make radical lifestyle adjustments. Such adjustments included moving to informal settlements, sharing homes with two or three other families and sharing scarce food resources amongst each other to avoid starvation.

According to HH (Klopper, 2011) the mineworkers who were skilled were able to find alternative employment faster than those who did not have any skill other than the basic skills required to go down the shafts and mine for gold. Some workers were unable to find suitable employment that could meet their former financial responsibilities. Drastic lifestyle adjustments had to be made by this group, in order to cope with much lower salaries. They had to accept these lower salaries because they were in no position to negotiate for higher remuneration, giving their level of education and skills for entering the broader labour market.

Another lesson learnt from this event is the trend that mineworkers, especially those who lived in the hostels, did not desert the closed mine. Some worked without salaries while waiting for the situation to change. The researcher could identify two possible reasons for this trend from the interviews and document study.

1. Trust in the new owners: There was the expressed trust that the new mine owners had enough financial resources to pull the mine out of the previous liquidation situation and make a success of it. The mineworkers expected a well governed mine and regular salaries from the new well-to-do owners.
2. Loyalty to the mine set-up: The workers were loyal to the mine, as this set-up was all they knew. This was accompanied by their knowledge of the mine and their loyalty to the members of the shafts in which they worked. (In all cases the miners reported that there is still gold in the mine, and they were willing to mine 'immediately' if requested.) The loyalty of the mineworkers was commended even in parliament (Parliament commission, 2013).

The mines at Grootvlei and Orkney changed ownership often; therefore the workers believed that their situation would be only temporal, and they did not expect this situation to drag on for three years.

The repeated and unanswered question in the media and from the collected data was: How is it possible that a situation like this could develop and the mine owners did not seem to be available to respond to the plight of the mineworkers whom they employed? The mining authorities and local government were not held accountable for the damage to the mining site and the environment by the local, provincial or by the national government for what befell the miners and their families and the surrounding environment. Some role-players only got involved when the situation already was a socio-economic predicament and was discussed in parliament as a human tragedy. For example, in 2012, the Unemployment Fund allocated payments to some workers. Only mineworkers who received a low annual income did receive pay outs. This left the foremen and mineworkers who received higher salaries without any form of compensation, in spite of all the reasons mentioned above why they need to be compensated. Some workers were not paid out any money because the labour records received from the employers was not up to date and correct and the Department of Labour could not trace these records (Parliament Commission, 2013).

The only positive input bringing relief to the suffering communities came from the labour unions and the NGO's who assisted the mining community with food parcels and tended to other needs that arose from the mine closure. Solidarity: Helping Hand (HH) played a pivotal role in avoiding a crisis when the mines closed. Their immediate and timely involvement helped mitigate the effect the mine closure had on the socio-economic well-being of the mineworkers and their dependents. HH also initiated legal investigations which lead to court cases in which the mineworkers' case was presented. Gift of the Givers supported the mineworkers with food in Orkney for several months. The efforts of the NGO HH, to increase awareness about the situation resulted in widespread media attention and fund-raising projects. Eventually the case was presented to the parliament on numerous occasions (Du Plessis, 2011).

The National Union of Mineworkers (NUM) got involved in distributing food parcels to mineworkers, but did not assist their members with finding alternative employment. NUM still had to deal with these workers as recently as in 2013, with reported problems in the media of shootings, unrest and unhealthy situations at the mine hostels where their members stayed on after the mine closure.

Coppola (2007:26) mentions that a socio-economic disaster does not only entail the loss of employment but also implies a humanitarian crisis, in which a large number of people would be suffering due to a severe negative impact on their socio-economic well-being. According to the

United Nations Development Program (UNDP) (2003:iv) the loss of employment and income by workers and their families due to the temporary paralysis of productive activities after a disaster can have a serious impact on family income, leading to a lack of basic supplies. The UNDP's definition describes the situation that developed in the mining communities in question. This situation resulted in the collapse of their livelihood assets, livelihood strategies and livelihood outcomes, after the mine closures.

#### **5.4 CONCLUSION**

This chapter dealt with the research done on the phenomenon of mine closure, starting with the research design that was used. The Qualitative research method that was chosen for the present study was motivated and explained. Data for the research was collected by means of a document study, semi-structured interviews and by observation. The data was analysed in themes and compared to categories found in the literature study. The livelihood frameworks provided the categories to interpret the themes found in the data.

The following key findings were reached:

1. The mineworkers were already vulnerable because their livelihood assets were not sustainable. The workers depended solely on the mine as their main source of income.
2. The employees did not prepare in advance for the mine closure, and also did not expect the mine closure to become a permanent situation.
3. It is clear that mineworkers do not leave their residents on the mine sites easily. They rather tend to wait for the mine to change ownership and then start working for the new mine owners.
4. The local and provincial government did not get involved and were unable to identify this development as a socio-economic disaster, as the crisis was not formally declared a disaster by Government. This may indicate a tendency that disasters caused by natural events still receives more attention from Government than human made events those in question.

From the concepts that were operationalised and data collected, the situation at Grootvlei and Orkney has left the mining community socio-economically vulnerable. Some sources have described the events as a human tragedy. There is a need for increased awareness of the socio-economic impact and the related suffering that accompanies a human-made adverse event such as the one that befell the Grootvlei and Orkney mines. In these instances a large number of people lost their employment and livelihoods and thus needed humanitarian assistance to cope with the adverse situation.

In conclusion, it could be stated that the mining community was not aware that the mine would close and therefore did not prepare for such a crisis in advance. Furthermore, seeing that the mine was their only source of income, the mine closure had a devastating effect on the socio-economic well-being of the community.

In the following chapter recommendations are made and a contingency plan is proposed that labour unions could implement to mitigate the effect of a mine closure, should it occur.

## **CHAPTER SIX**

### **CONCLUSION, MINE CLOSURE CONTINGENCY PLAN AND RECOMMENDATIONS**

#### **6.1 INTRODUCTION**

The mining sector has to deal with difficult labour-related issues on a regular basis. These are accompanied by crisis such as power outages that cause an enormous loss in profits and the increasing expenses to maintain a mining site in relation to the profits made from the mining operations (Anon, 2008:64). The mining industry as an employer to a huge workforce in South Africa has therefore been riddled with problems, one of which is the mass loss of employment in the event of mine closures. The purpose of this study was to compile a contingency plan to address the socio-economic emergencies that develop after a mine closure. The need for a contingency plan is highlighted in the first chapter, where the background is described to the event investigated in this study. Chapters' two to four contain the theoretical study about mine closures and chapter five discusses the empirical research on this phenomenon.

The discussion in the second chapter dealt with theory and frameworks that explains vulnerability, poverty, livelihoods and socio-economic disasters, in the context of the DRR Body of Knowledge, which are contributing factors to accelerate the effects of a mine closure on a mining community. In the third chapter mine theory is discussed about mine closure issues were discussed, starting with the South African perspective, regulations and legislations. After that best practice for mine closure was investigated following with the successful implementations of mine closures by organisations such as ICMM, the Eden Project and the Naomi Project.

The fourth chapter focused on planning, introducing planning theory and principles underpinned by DRR approaches and principles. Furthermore, contingency planning was discussed as an approach to address mine closures. The chapter closes with contingency plans as it is implemented by organisations such as Disaster Risk International (DRI), Inter Agency Standing Committee (IACS) and the International Red Cross and Red Crescent Movement (IRCRC). The context of Chapter five describes the research design, the research report and lists the consequences of the mine closure for the mining communities in question.

This chapter (chapter 6) deals firstly with the main research objective, which is to compile a contingency plan in order to help mitigate socio-economic disasters such as mine closures. The research objectives are listed followed by an explanation on how the study has met these specific research objectives, one of which is the presentation of the Mine Closure Contingency

Plan (MCCP). The recommendations to mitigate the socio-economic effects of a mine closure are then listed. The next sub-section states these research objectives.

## **6.2 RESEARCH OBJECTIVES**

The problems addressed in this study relates to the substantial workforce in South Africa who depend for their income on the mining industry. According to DRR conceptualisation, disasters are viewed as complex problems which would demand a collective response by multiple stakeholders from different disciplinary and institutional groups. These concepts provided the suitable theories, principles and frameworks to address the event under investigation. The research that was conducted addressed the research objectives stated in chapter one (see Point 1.4.3) as will be explained below.

### **6.2.1 Research Objective 1: Investigate and discuss the theoretical trends that underpin a socio-economic disaster**

Chapter two addressed the first research objective. Socio-economic vulnerability has been studied and discussed by investigating poverty and examining two livelihood frameworks (see chapter 2.2 and 2.3). Vulnerability is related directly to sustainability of livelihoods. It was established that a mining community that depends solely on the mining operations to sustain their livelihoods, is the most vulnerable to a sudden mine closure. This situation describes the vulnerability of the mineworker and the included risks when employed by/in the mining industry of South Africa.

The mining industry provides external livelihood capacities to the mineworker, in the form of employment that manifests as salary, pension, medical aid and UIF benefits. These elements can be referred to as the *economic aspect* of people's employment as mineworkers. The location of their employment links the workers to the wider environment of the mining community, which includes the administrative services, public infrastructures, and political spheres that operates within that community (Twigg & Bottomley, 2011). These elements represent the *social aspect* of being part of a community. The mineworker is therefore part of a complex system of interrelated socio-economic units. Therefore to deal with a mine closure, the role-players will have to meet the mineworker's needs within the wider complex environment, and not only compensate for the loss of a monthly income in terms of a salary. The combined socio-economic aspects of a mining community are affected when a mine closes. A mine closure can cause a total collapse of the socio-economic system within a community, which then may develop into a socio-economic disaster.

### **6.2.2 Research Objective 2: Examine and discuss the theoretical trends and approaches to contingency planning**

The second objective was to investigate the theoretical trends and approaches to contingency planning. Chapter four investigated planning theory and focused on Contingency Planning as a means to address the socio-economic losses associated with an unexpected mine closure. The contingency planning approaches that were selected to be utilised in the compiling of a contingency plan to address unexpected mine closures were: the strategic planning approach combined with a project management approach.

### **6.2.3 Research Objective 3: Determine the regulatory and legislative frameworks that guide best practice in mine closure, which currently are or should be, implemented when closing mines in South Africa and internationally**

The third research objective is discussed in chapter three. The aim was to determine the regulatory and legislative frameworks that guide the practice of mine closure in South Africa. Furthermore the aim was to establish best practice in mine closure that are or should be, implemented in the closing of mines in South Africa and internationally. This also means determining the consequences a mine closure holds for the mining community.

### **6.2.4 Research Objective 4: Document the lessons learnt about the increase in socio-economic vulnerability that results from mine closure.**

Chapter five contains the lessons learnt about the increase in the socio-economic vulnerability resulting from a mine closure. The most important lesson was that the mining community was vulnerable already before the disaster. In addition to being solely dependent on the operations of the mine for income, most mineworkers did not acquire any skills other than those needed for their employment at the mine. Thus, after the mine closure the workers were unable to negotiate alternative employment. The sections of the present study that deal with the lessons learnt from the mine closure (see Point 5.3.3) identify probable reasons for the negative impact of such an event on a community. This impact was interpreted in terms of deficiencies in the mining industry to provide sustainable employment. Such deficiencies were also identified from the literature study and the data collected in the empirical study on the mining industry as an employer. These deficiencies were found to be the following:

- Mines have a finite life span. Mineworkers are at risk if they depend solely on the mining industry to help sustain themselves and their dependents for their lifetime up until and through retirement.

- The mining industry in South Africa with its large work force is currently a high-risk business riddled with problems. Therefore this industry cannot provide the prospects of a stable working environment, nor promise a secure income to the mineworkers who depend wholly on a salary for their livelihoods.
- The mining industry employs many unskilled labourers who are then trained and developed for mining operations. However, these workers do not find employment easily in any other industry after a mine closure. In most cases they have to settle for much less income and a considerably lower quality of life.
- Mine closures have a devastating effect on the quality of life of the mining community, as well as that of the mineworkers and their families who are affected directly. However, this issue does not receive sufficient attention from governmental institutions in terms of official assistance. In the cases that were investigated, the assistance for the mining communities who were confronted by a mine closure came from the mineworkers themselves, from the community members providing mutual assistance and the NGO's together with the labour unions.
- Mineworkers who lost their homes and possessions in most cases still owed money on these items. The need for debt counseling was expressed in the interviews, and could be one of the measures to protect families from losing their material livelihood in future incidences of mine closures.
- Local churches supported the families who were part of their congregations on a longer term than the food aid provided by Helping Hand (HH). However, these church initiatives did not receive any media coverage or outside financial assistance, especially at the stage when there were no more media reports on the situation of the mine closure.
- Laws exist with sufficient provision to prevent the negative effects of a planned and unexpected mine closure. This is done by regulations according to which mine-closure planning and the Social and Labour plan must be submitted even before the exploration of a mining site. However, there is not enough evidence that these Acts are implemented and that non-compliance are punished, as prescribed in the Mining Charter (SA, 2010:6). Evidently this was not the case with the mine closures under investigation.

The lessons learnt and discussed in the previous chapter are used as a guide to make recommendations for the compiling of the Mine Closure Contingency Plan. As was seen, the aim of this plan is to help mitigate the effects of a mine closure and in this way prevent a socio-

economic disaster in the surrounding community and environment. This contingency plan is the focus of the following sub-section.

### **6.2.5 Research Objective 5: Design and develop a contingency plan for the event of a mine closure, in order to mitigate or even prevent possible socio-economic disasters.**

A contingency plan aimed at addressing a mine closure could have a two-fold function:

1. Provide assistance to build resilience into the livelihood strategies of mineworkers and their dependents.
2. Create the ability for an organisation to respond and meet immediate needs for sustenance in a mining community after a mine closure.

The aim of such a plan is to mitigate the effect that a mine closure could have on the socio-economic vulnerability of mineworkers. The plan should also measure up with the recommendations mentioned below (see Point 6.2.6). All CP, irrespective of the group or entity that drives and funds the plan, should be compiled of basic components. Components identified for the purpose of this study, were suggested by a number of authors (see chapter 4) have been selected and is discussed in the following points.

#### **6.2.5.1 The basic components of a contingency plan for mine closure**

The processes that entail remains a major challenge for humanitarians who have to attend with changing variables such as competing demands, as well as limited personnel, time and resources (Choularton, 2007:1). The components suggested for use in this plan are provided below.

- **The Contingency Plan Manager**



**Figure 6.1: Diagram used for indicating the Contingency plan manager**

The contingency plan managers spend most of their time on refining the plans, updating resource lists, and conducting exercises. They are thus the custodians of the contingency plan in use (Wisner, 2004:335). In the case under investigation, it is

suggested that such a person may be a member of a labour union or NGO, directly involved with the plight of the mining community. This manager should also be able to anticipate the basic needs and what should be prepared for, and mitigate in advance (Martinet, 2006:10).

- **Community participation**

Contingency planning (CP) can be quite useful in disaster management when citizens are involved sufficiently. Citizen groups should be more like 'partners' in CP rather than just a community told by authorities what to do in times of crisis (Boin *et al.*, 2005 in Ten Brinks *et al.*, 2010:66). It is crucial that the mining community should be represented in all meetings that focus on planning for possible mine closures.

- **Funding and budget**

The funding of the plan, when it needs to be set up, will be the determining factor for successful implementation in an emergency situation. The budget should be determined in the planning phase, but the funding made available when the disaster is declared. This is closely related to the next point which deals with the question on how much should be made available and how should it be distributed.

- **Logistics and stock**

Logistics management is responsible for the timely delivery of emergency aid in case of a disaster, the movement of personnel and the distribution of supplies at all points (Hutchinson, 2004:5,24). The logistics department should be able to supply and manage sufficient stock to meet the needs as required in a crisis situation. It also involves the careful documentation of supplies, as well as distribution plans for personnel, focusing on their responsibilities, activities and the supply points. The goal is to be able to give the assistance needed for as long as it is needed.

- **A communication system**

When a disaster strikes, quick decisions must be made, and the communication and information systems must support the ability to communicate. It does not matter what medium the system uses, the critical factor is a viable means of communication between all teams and role-players involved in addressing the disaster situation (Anderson, Compton, & Mason, 2004; Silverman & Weston, 1995 in Hutchinson, 2007:34). Therefore the communication system is one of the most important aspects of Contingency planning (CP). An important part of such a plan is a central reporting area,

Central Communications Centre, or a contact person who has direct access to the Contingency Plan Manager and other partners, and also to the mining community (Reid, 2005:99).

- **Training, review and testing**

All the staff, role-players and stakeholders should receive training on the disaster plan itself. Individualised training may include first aid, practical exercises involving equipment and vehicles, debriefing techniques and participation in disaster-plan exercises. Training should be tailored to the organisation and its specific emergency plan (Hutchinson, 2007:35).

The plan should be tested through exercises to assess how the components fit together and whether they flow into each other. Empirical evidence has shown the necessity of testing plans for responses in case of disaster (Hutchinson, 2007:37). Van Niekerk also states that reviewing and rehearsing the plan is one of the most important phases (Van Niekerk, 2005:81).

#### **6.2.5.2 The approaches used to compile the proposed Mine Closure Contingency Plan**

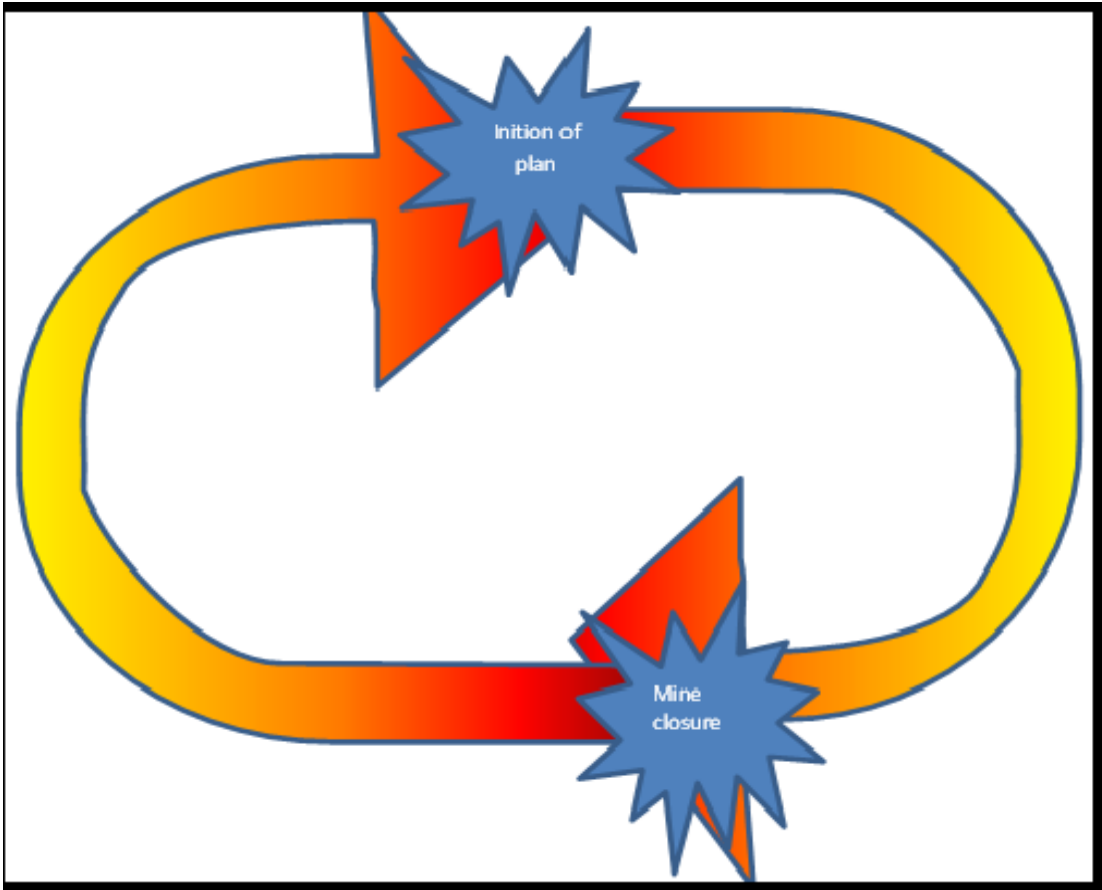
Contingency planning approaches and models were discussed in Chapter four. The Mine Closure Contingency Plan (MCCP) was compiled using these approaches and models discussed, to address the socio-economic crisis and losses associated with mine closure. The first approach that is utilised in the MCCP is the strategic contingency planning approach (see Chapter Four, Point 4.3.4.3). The strategic approach is a continuous process in the contingency plan proposed, represented by the yellow and red arrow (see Figure 6.3)

##### *6.2 5.2.1 Strategic planning approach*

Strategic planning aims at planning ahead, to provide the necessary funding ahead of time so that the needed aid such as food parcels would be made available. Strategic planning is also employed to achieve the recommendations mentioned below (see Point 6.5.6) on the creation of a mine closure insurance fund. Strategic planning also involves a long-term process, where on-going community participation would lead to trust for the organisation allowing them to represent themselves in planning for mine closures. Trust for the organisation that developed and orchestrates the contingency plan would develop and it would also create awareness for the mine closure contingency plan. The situation is more lucrative when a community is aware of a plan to assist them – a design in which they have been involved from the beginning. Then it could be expected that this community would participate by responding after an adverse event such as a mine closure.

Another part of the strategic planning proses (phase), should be to develop the skills of mineworkers. Activities that could focus on such a development should include programs and workshops to develop skills that could provide employment other than that provided by the mining industry.

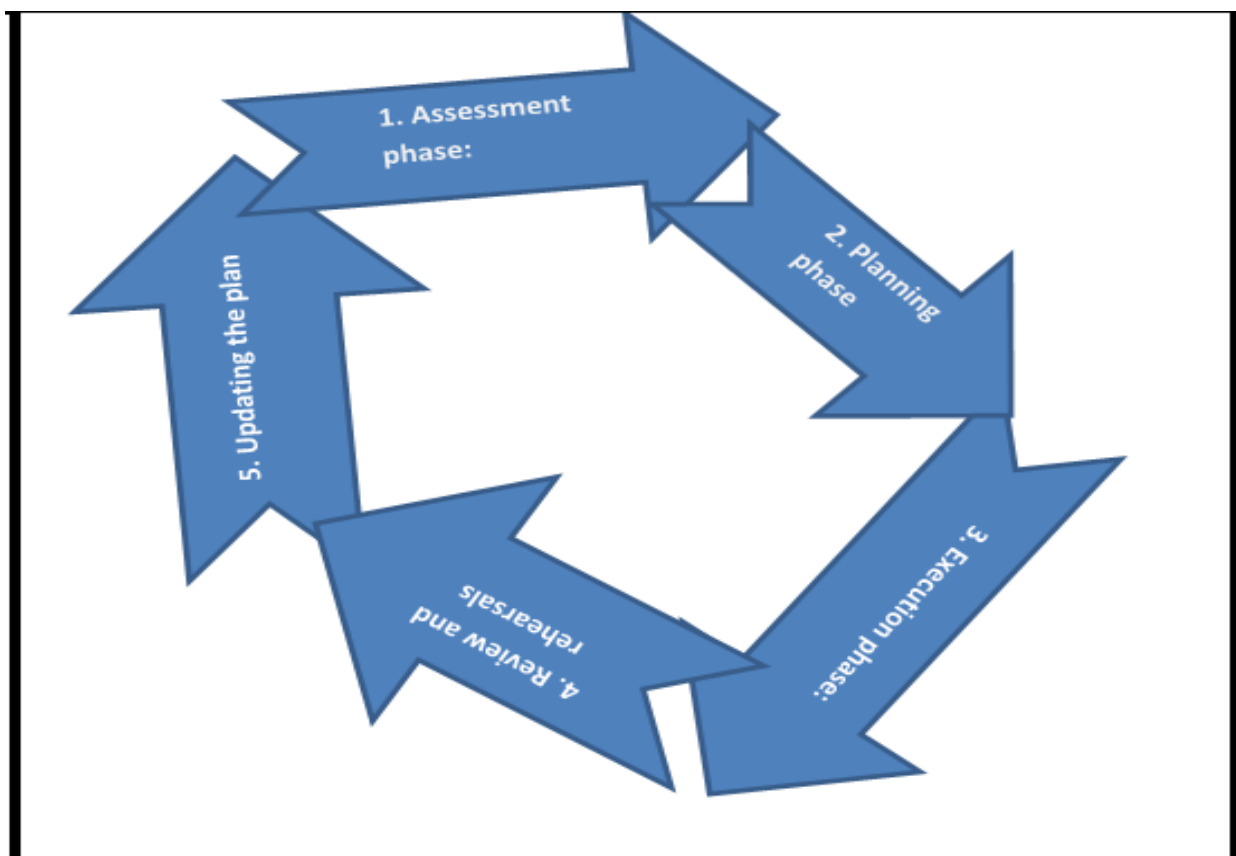
Strategic planning therefore is indicated in the diagram below (see Figure 6.4). Such planning is a continuous activity of the MCCP, which involves the following: providing for funding in terms of a budget, building stock for assistance, funding to develop skills of mineworkers, as well as an insurance fund in the event of mine closures. The budget should also be maintained and evaluated on a regular basis between the initiation of the plan and the mine closure event, as indicated in the diagram (see Figure 6.4). The diagram of the strategic plan depicts strategy planning as an on-going planning process that forms the basis to all the planning activities of the MCCP as a unit (see Figure 6.6).



**Figure 6.2: Diagram of the strategic planning approach in the MCCP**

#### 6.2.5.2.2 The project planning approach

The second aspect discussed in chapter four (see 4.3.4.2) is the project planning approach. Project planning methodology provides an important guide to establish basic successive phases for the Contingency plan. The most important contribution of the project-planning approach to this model is that it indicates a logical order of activities. The phases which are ordered according to the logical process of planning are: to initiate the plan, to execute the plan, to monitor and control the plan and then to close the project (see Point 4.3.5.2). After the plan is monitored, the cycle starts again with the initiation of the changes in the plan that needs to be implemented before the next execution of the plan. The phases of the Multisectoral Contingency Plan of van Niekerk (2005:84; (see Addendum 1), display the process of a contingency plan, based on activities and responsibilities that follow a logical and on-going cycle. The cycle indicates that the plan is not stagnant and completed, and should therefore be evaluated and updated on a regular basis. The plan should be subjected to changes if the evaluation points towards it. The plan's effectiveness and gaps should be monitored, and researched continually to improve the effectiveness and relevance of the plan. The diagram below depicts the process flow based on a project-planning approach of the MCCP.

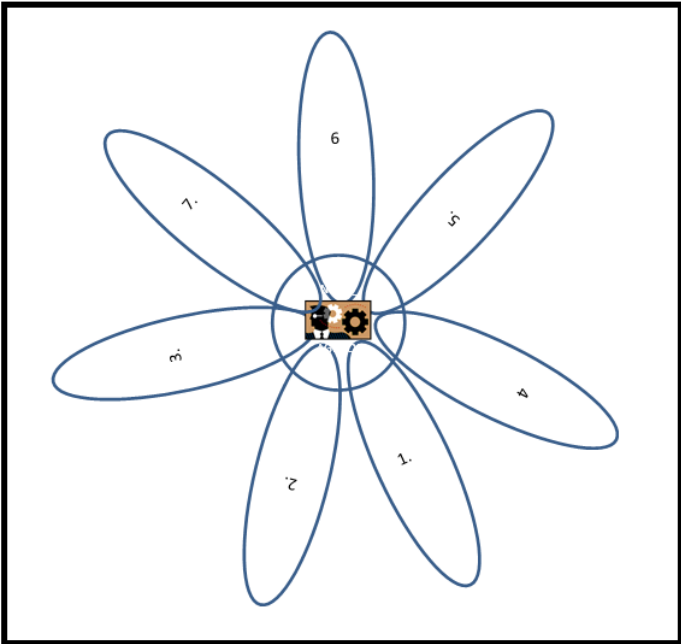


**Figure 6.3:** Project planning approach depicted in the phases used in the MCCP

The phases which are ordered according to the logical process of planning are: to initiate the plan, to execute the plan, to monitor and control the plan and then to close the project (see Chapter Four under 4.3.5.2). After the plan is monitored, the cycle starts again with the initiation of the changes in the plan that needs to be implemented before the next execution of the plan takes place. The phases of the Intersectoral Contingency plan of van Niekerk (2005: 84) (see Addendum 1), displays the process of a contingency plan, based on activities and responsibilities that follows a logical, in an on-going cycle. The cycle indicates that the plan is never stagnant and complete, and should be evaluated and updated on a regular basis. It should be subjected to changes as result of evaluation of the plan, monitoring the effectiveness and gaps, and research to improve the effectiveness and relevance of the plan. The next diagram depicts the process flow, based on a project planning approach of the MCCP

*6.2.5.2.3 The inter-agency approach*

The inter-agency planning approach, depicted in the daisy wheel model below (also see 4.4.2) is the third approach in structuring the MCCP. This approach is used because the DRR supports responses of multiple stakeholders, as well as community participation. Thus, the MCCP is based on the principle of multi-stakeholder/inter-agency participation.



**Figure 6.4: Depicting the inter-agency function of clusters**

The approach based on inter-agency could be utilised as it provides for the involvement of a group of people, termed ‘cluster meetings’ or ‘clusters’. These clusters provide for a meeting structure that determines different roles and coordination among representatives in the instance

the plan is executed. Each cluster can take responsibility for one aspect of the needs that develop during a disaster such as a mine closure. The following clusters are proposed:

- **Cluster 1:** The mine profiling cluster
- **Cluster 2:** The mining industry's watch-dog cluster
- **Cluster 3:** The scenario-planning and early-warning cluster
- **Cluster 4:** The media and communications cluster
- **Cluster 5:** Finances and procurement cluster
- **Cluster 6:** The emergency aid, response and restore cluster
- **Cluster 7:** Skills development and re-employment cluster

An important requirement is that the partners (members that attend the cluster meetings) should include representatives from the mineworkers, the public sector, the mining industry, a representative from the labour unions for mineworkers, the private sector, churches, the media, NGO's and volunteers.

### **6.2.5.3 The Mine Closure Contingency Plan (MCCP)**

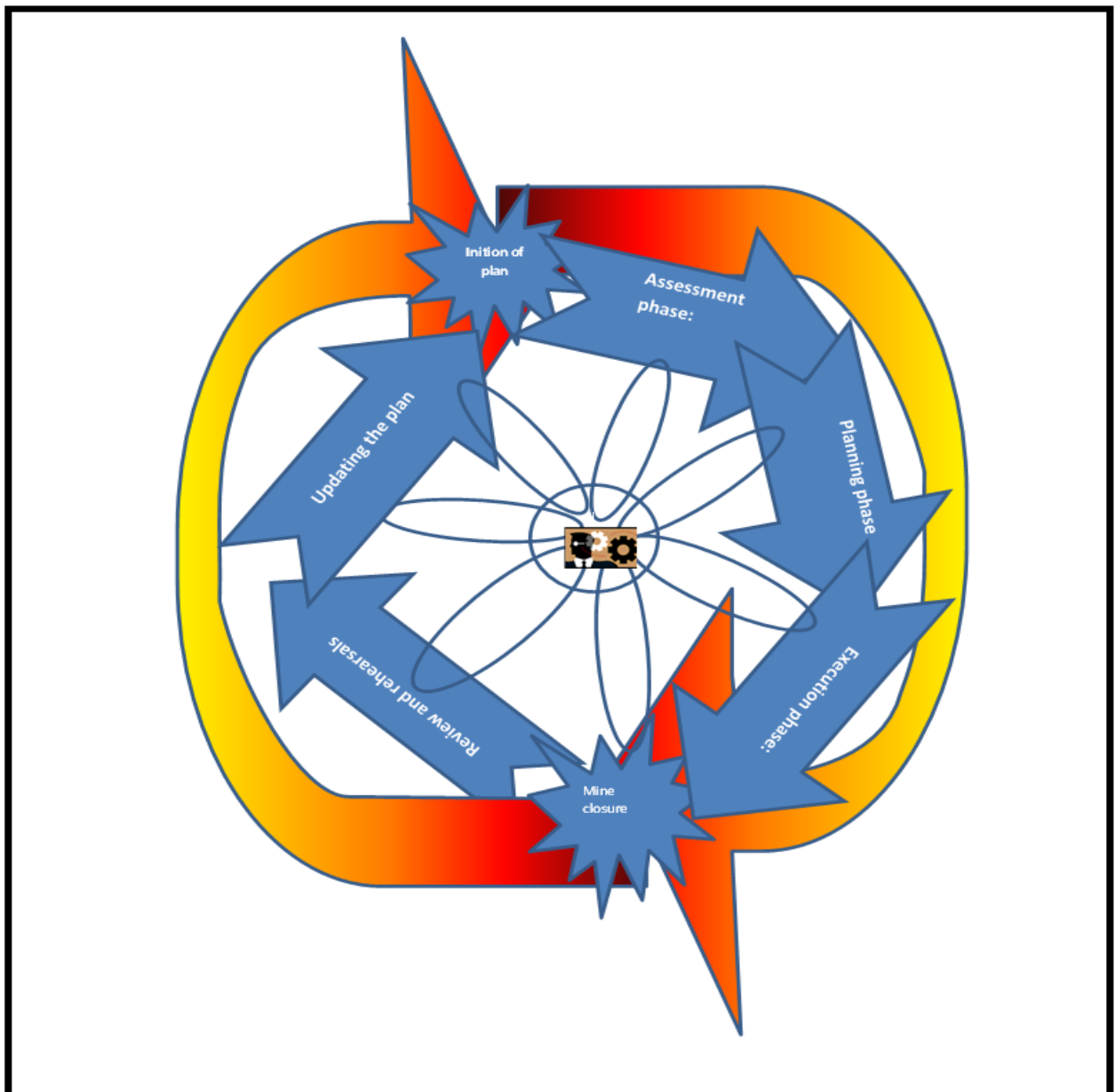
The main objective of this study was to compile a contingency plan to help mitigate the effects of a mine closure on the socio-economic vulnerability of mineworkers. This plan should also measure up with the recommendations mentioned below (see Point 6.2.6). The diagram of all the parts mentioned above is depicted in Figure 6.6 to follow.

- **Phase 1. Initiation the plan (Assessment phase):**

During this phase probable role-players, the political arena and the environment in which the situation will roll out are identified and documented. The Contingency Plan Manager is appointed in this phase. The suggestion is that a member from a labour union takes the lead with this plan. The MCCP's assessments of risk and vulnerability (Van Niekerk, 2008:82) would include the setting up of the database. This database should contain not only detailed information of the mines and their expected life cycles, but also profile the mineworkers in terms of age, skills development, dependents, et cetera. The function of the database is to ensure an awareness of mines that are at risk of closing, and is the most important part of this phase in the plan. This database would provide the data needed to implement an early warning system on mine closures. This phase activates the following four clusters:

- **Cluster 1:** The mine-profiling cluster
- **Cluster 2:** The mining industry's watch-dog cluster
- **Cluster 3:** The scenario-planning and early-warning cluster
- **Cluster 4:** Finances and procurement cluster

The next phase is the planning phase. It will be discussed in the next section.



**Figure 6.5** The diagram of the Mine Closure Contingency Plan

- **Phase 2. Planning phase:**

The document should be prepared by asking the questions mentioned in the IRCRC process' flow plan (Point 4.4.3): Why plan? What to plan? Who to plan for? Scenario planning should be part of this phase (see Point 4.3.4.1). Scenario planning for mine closure is based on the proposed database that should be created to satisfy the requirements of recommendation four (see Point 6.2.2). All the role-players, the mining community and other stakeholders, such as environmental specialists and the local municipality, are invited to participate. The aim is planning for the day when it would be necessary to execute the plan. In this phase all seven (7) clusters will be activated to participate in the meetings.

- **Phase 3. Execution phase:**

The execution phase documents the actions to address the questions: where and when will the plan be executed? The Inter-agency approach is recommended in this phase (also in the previous two phases, the assessment and planning phase). In the execution phase the Contingency Plan Manager makes important decisions on utilising the budget and the logistics made available in the strategic planning phase (see **Point 6.2.3.5**). Activities that form part of this phase should take place after thorough consultation between the parties mentioned in the planning phase. Clear indicators of roles and responsibilities must be communicated and planned beforehand. To avoid duplication and waste of resources this will take place in the clusters responsible for each activity.

In the execution phase the following clusters will be activated:

- **Cluster 3:** The scenario-planning and early-warning cluster
- **Cluster 4:** The media and communications cluster
- **Cluster 5:** Finances and procurement cluster
- **Cluster 6:** The emergency aid, response and restore cluster

- **Phase 4. Review (evaluation) of the plan:**

The project and rehearsals should include exercises and workshops. The mining community, who will be supporting the mineworkers' families, should be involved in this phase. This phase involves review and improvement exercises and workshops that explain the purpose and place of the MCCP to the important role-players.

The reviewing (evaluation) of the plan would find answers to the following questions compiled by Payne (1999:112): 1) Is the plan relevant to a mining community? 2) Does the plan cover all the action needed to address the situation? 3) Is the plan feasible? 4) Are the

resources available to implement the plan when it is needed? 5) Are all the role-players available who are needed to address a mine closure?

- **Phase 5. Updating the plan:**

The focus should be on updating the plan, doing regular exercises and presenting strategic workshops about the MCCP. The aim of such actions is to create awareness of the expected effects of a mine closure and to educate the community on this topic. Mineworkers should be made aware of their intrinsic vulnerability in which they depend on the mine for their livelihoods. As such these workers may use opportunities to build the resilience of their households prior to a mine closure. In this phase it is proposed that all seven clusters will participate in the process.

It is recommended that the plan should be updated regularly, to ensure that the database that is profiling the mines of South Africa is up to date. This is also the opportunity to focus on reports from mineworkers who act as whistle blowers. These agents attract attention to the warning signs of mine closures and the non-compliance to the Social and Labour plans of the mine owners. When updating the plan, these reports could be received and analysed for the appropriate action.

#### **6.2.6 Research Objective 6: Make recommendations on the strategic handling of a sudden mine closure, and establish a systematic approach to identifying, assessing and reducing the risks of disaster**

In light of the findings of the study the following recommendations are made to seek solutions to the identified gaps from the data analysis. Recommendations are made regarding the wider environment of the mineworker mentioned above (see Point 6.2).

##### **6.2.6.1 Recommendations to labour unions of mineworkers**

The first recommendation is that mineworkers must be involved in planning for closures and in all other matters that involve them and the sustainability of their employment. The workers should be made fully aware of the risk of a mine closure when they are employed at a mine. They should learn to prepare for such an event while they are employed. This training can be offered by the mining house that recruited these workers. Labour unions could play a pivotal role in bringing this awareness across to mineworkers and prepare them beforehand. Furthermore, the MPRDA (28 of 2002) discussed previously (see Point 3.3.2.2), indicates that the mining industry does have a responsibility for the socio-economic development and upliftment of the mining communities surrounding the mines.

Community participation is extremely important when attempting to mitigate a disaster. Research done by a DFID funded inter-agency group (see Point 2.3.1), found that community participation will be encouraged when the members understand their own vulnerability in a certain situation. It is also important that community members should be involved in all activities and the planning to deal with an expected emergency. This inter-agency group has also found that a community builds trust in an organisation's ability to mitigate a threat, and to assist their vulnerability to the threat. This trust is established when community members are able to voice their concerns, represent themselves and their marginalised groups on equal grounds with the local stakeholders (Twigg & Bottomley, 2011). Without such trust and the full participation of vulnerable communities in the design and management of a contingency plan, there is a risk that these members will not respond to warnings about an imminent disaster (Twigg & Choularton, 2012; see Point 4.4.3).

The second recommendation is the creation of an insurance fund benefit which focuses on possible mine closure. Even though loss of employment is not unique to an industry, the phenomenon of mine closure certainly is unique to the mining industry. The purpose of the insurance fund would be to provide for mineworkers in the event of a mine closure. This would entail mineworkers who may not receive salaries for a period, until they find new employment. Mine-closure insurance policies secured by a joint funding effort from the government, the mining industry and labour unions could solve the problem. When a mine is declared closed for any reason (see Point 3.2), such a policy should pay out and funds should be made available to workers until the re-opening of the mine or re-employment takes place. Labour unions could be the most likely custodians of such a policy as part of the membership debit order.

Mine-closure insurance, made available in monthly payments for a fixed period or as a lump-sum payment, would provide protection during the months when the workers are not remunerated. Such insurance would ensure that the mineworkers do not lose their homes. It would also solve the problem of households not being able to cover immediate needs at the loss of the breadwinner's income. Thus mine-closure insurance benefits could serve as protection of livelihoods while the main source of income is lost. This measure could assist workers in the period of temporary closure of a mine or during the period of transition from one employer to another.

The third recommendation is that Helping Hand (HH) and other labour unions dealing with mineworkers such as National Union of Mineworkers (NUM), should take the leading role to act as watch-dogs on behalf of the mining industry. The role of these institutions as watch-dogs then would be to ensure that mine owners who employ their members, do uphold the principles of the Social and Labour plans proposed by the Mining Charter and the MPRDA (28 of 2002;

see Point 3.3.2.2 and 3.3.2.3). Thus the mine owners are obliged to follow up on their commitment to develop the skills of the mineworkers. This will enable these workers to acquire skills that are not limited to the mining industry. Such skills will help build the resilience of the mineworkers after the loss of employment when a mine closes. In this sense learning new skills would help mitigate the devastating effects a mine closure has on the mineworkers, their livelihood assets, strategies and livelihood outcomes.

A fourth recommendation is to establish an early warning system for mine closures (see Point 4.3.5.1). This would require maintenance of a database, which profiles all mines in operation in South Africa. An informant system, consisting of a group of mineworkers, could be used to provide the relevant information by which to profile and update the database. Necessary information for such a database includes the monitoring of mine activities or unrest, closing of shafts, identifying problems related to salary disputes and the non-payment of salaries. If such information would be available on a website, it could help make mineworkers aware of the period during which they could expect to be employed at a specific mine under normal circumstances. Mineworkers could then plan ahead for possible unemployment when the mine's life-cycle has ended.

A fifth recommendation is that the DMR should take action to regulate the SLP's to assist from their pro-active monitoring of compliance to the commitment of mining houses, to mitigate the effects of a mine closure.

This study suggests that HH should be appointed as custodians of this mine-profiling register, as it would be to their benefit to support their members and other mineworkers in time. Scenario planning could also be based on the monitoring of these events. This could be done in corroboration with the existing data about the financial assets of the mine and the mine owners, its capacity to produce ore, and the expected date of closure.

#### **Scenario 1: Scenario planning and assumptions**

- Mine closure threat scenario 1: Increase in the level of unrest at the mine.
- Planning assumptions scenario 1: Meetings with members of the labour union to establish whether the situation is under control or not.
- Areas most likely affected: Name the mine(s) where the scenario for a probable mine closure is developing.

#### **Scenario 1: Hazard and risk analysis**

- Probability: Early stages of unrest. Uncertain whether the situation would deteriorate.
- Consequences: Loss of salaries due to 'no work no pay'-policy at the mines.
- Overall risk: Medium (needs to be monitored)

Such an early warning system as explained above would assist all parties involved to be proactive. This would enable them to determine an expected serious decline in employment in certain areas. The system would also indicate when MCCP could be executed to mitigate socio-economic effects of a mine closure, before it escalates into a disaster. The ideal situation would be if the implementation of the MCCP and the recommendations on mine closures could be followed by a concerted effort by all parties who will be affected by a mine closure. These could include the government (DRM), other labour unions, the local municipality and the private sector. However, it is expected that the labour unions that are the most concerned for the welfare of their workers and who focus strongly on the eradication of poverty, would be the most likely to drive and maintain the MCCP.

#### **6.2.6.2 Recommendations regarding dependency of mineworkers on assistance**

It often happens that the households depended solely on the mineworker's salary prior to a mine closure. Therefore the remuneration for skilled labour plays a crucial part in the family's dependency profile after a mine closure. Unfortunately, mine-shaft workers in general have little or no schooling and are skilled only to help produce ore and to mine minerals. Thus, the current state of the largest group of mineworkers in South Africa is such that they are solely dependent on the mining industry for their income (Du Plessis, 2011; Esterhuizen, 2010).

The danger of the situation mentioned above is that livelihoods are affected when a mass loss of income occurs. This section elaborates on three identified levels of humanitarian assistance mentioned by the CARE livelihood framework (Frankenberger *et al.*, 2001), which can be implemented in emergency situations. For the purpose of this study and to be relevant to the topic of mine closures, these activities will be linked to the expected level of dependency a community has on the organisation providing the emergency assistance. The more dependent the community is on external assistance, the more difficult it would be for the assistance to be sustained by a humanitarian organisation. This is especially the case if the crisis situation prolongs over two or more years, as was the case with the communities affected by the mine closures under investigation. The three levels are:

- ***Livelihood provisioning*** will result in an acute level of dependency. This level implies that the community will depend heavily on aid received from outside resources. This aid would be extremely expensive to sustain if the situation extends over a long period. Activities that involve the direct and timely provision of food, water, shelter and other essentials, often are the aid that is needed first in an emergency (Frankenberger *et al.*, 2001). This level indicates a community's complete inability to access resources and therefore represents acute dependency on the emergency aid activities. To some extent this could also indicate that the community is passive and do not make its own plans to

cope. This scenario represents the situation the emergency aid workers experienced after the mine closure in Springs and Orkney. A section of the community became too dependent on the emergency aid and did not extend them to do something for themselves.

- **Level 2: Livelihood protection** will result in dangerous levels of dependency. The community still depends on assistance from outside more than negotiating terms themselves, in order to increase their own abilities to access resources. Livelihood protection refers to activities that help prevent a decline in household livelihood security. These activities include programs that focus on early warning systems, cash or food for work, alternative means to provide food such as seeds and tools to create a vegetable garden, health education and plans to protect the community in case a hazard strikes. This represents a level of preparedness and willingness to negotiate some kind of access to resources. However, the community is still dependent on outside sources for providing the means to overcome the situation. Thus this group still displays a total dependency on activities of emergency aid.
- **Level 3: Livelihood promotion** will result in a sustainable level of dependency. In this case the community has developed skills and alternative livelihood resources that decrease their sole dependency on the mining industry. Livelihood promotion refers to programs and activities aimed at improving the resilience of households. These include programs that focus on the following aspects: savings, insurance for mine closures, credit and information on debt counseling. The programs also focus on alternative means of labour income such as from entrepreneurial efforts and marketing of products. This activity relates to the goals of the social and labour plans relevant to this study, which are mentioned in the Mining Charter and the MPRDA (see Point 3.3.2.2 and 3.3.2.3). These goals entail the socio-economic development and upliftment of the mining communities in the vicinity of the mining operations. Mineworkers should therefore take responsibility to undergo training, in order to be able to accept employment outside the mining industry, if such a need arises.

Thus, livelihood promotion includes institutional development at the place of employment of the mineworker, as well as personal empowerment and community involvement. These activities are aimed at developing people's skills so that they will not be that severely affected by a sudden loss of employment. It can therefore be expected that such people would be able to negotiate other forms of income without depending solely on emergency assistance from aid agencies. This will help mitigate the effects of the mine closure on such workers' livelihoods.

In light of the above the mine closure plan proposed in this study is built on the principles of strategic planning, incorporating the possibility to include longer term development projects addressing the dependency issue of mineworkers on the mining industry. This strategy is also in line with the goals of the Social and Labour plans which mines should submit in compliance to the MPDRA (28 of 2002). Building resilience in households involves long-term planning. Mitigation of the effects of a mine closure is therefore not only based on short-term solutions. This leads to the discussion on the contingency plan to address mine closures.

### **6.3 AREAS FOR FUTURE RESEARCH**

Legislation and regulations for the mining industry in South Africa make provision for planning for the event of mine closures, even before mining operations may commence. The areas for future research would be instances where mine closures take place outside the normal life-cycle for mines. Scenario planning and the development of an early warning system to identify mines that are at risk of early closure are crucial strategies. This describes an important area for future research that was only mentioned briefly in this chapter (see **Point 6.2.6.1**), namely that closure planning should be in place.

Another area of research would be to determine means to build mining communities' resilience and also to find a workable solution for developing the skills of mineworkers. In spite of the Social and Labour plans, mine-workers still lack the ability to obtain employment other than that which is available in the mining industry. Mine closures lead to another disastrous situation, which is a mass loss of employment. Mass unemployment occurs not only after disasters occur but as result of an economic downturn, which results in the closing of businesses that provide employment. Relevant research is also necessary on the issue of addressing socio-economic disasters caused by a mass loss of employment. During the literature review no author or other source indicated that a mine closure or any mass loss of employment could lead to a socio-economic disaster that requires humanitarian assistance.

### **6.4 SUMMARY OF RESEARCH STUDY**

This study investigated CP as an approach to help mitigate the devastating effects a mine closure has on the livelihoods of a community. This occurrence was conceptualised within the body of knowledge of DRR. The introduction to the problem has been presented in chapter one, which described the event of two mining communities experiencing a mine closure after the business of the mine's owners was liquidated.

The discussion in chapter two explained the theory and frameworks that underpins socio-economic vulnerability. This was done by examining vulnerability, poverty and two livelihood

frameworks, in order to gain a deeper understanding of how vulnerability is linked to people's access to resources.

The legislations and regulatory framework for the mining industry that addresses mine closure was investigated in chapter three. Best practice and successful mine closures were discussed by exploring three issues that were identified in this study, namely 1) the mineworkers in South Africa who mostly depend on the mining industry for their livelihoods, 2) not only Government involvement ensures successful mine closure practices and 3) success could be achieved through a partnership by a number of role-players and stakeholders acting in terms of a unified goal. Such a partnership would complete a mine closure that does not affect the socio-economic sphere of the community negatively and impede the rehabilitation of the mining site.

In chapter four methodology and theory were analysed that underlie all planning. Furthermore the focus was on CP as the planning approach best suited to address mine closures. Approaches and models of CP were discussed. The mining community and its response to the effect of the mine closure was the focus of chapter five. Research was conducted to identify the consequences of the mine closures on the two mining communities in question.

The recommendations to address a mine closure in future are presented in this chapter, as well as a proposed contingency plan to implement at the event of such a closure. Mine closures are primarily the responsibility of the mine owners and the DMR. Nevertheless, this study has shown that the first year and for two more years after the mine closures took place other factors were more prominent. The community's response and participation, as well as the concern and activities of labour unions and NGO's were the only reactions to the crisis and the impending socio-economic disaster.

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## **ANNEXURE 1: Interview Schedule**

1. What was the first need experienced after the mine closure?
2. How long did it take after the mine closure to loose belongings and assets?
3. How did the mine closure affect your family and relationships in your family?
4. How did the mine closure affect the mining community in general?
5. How did the mine closure affect your children/ the children of the mineworkers?
6. Did you/they look for other employment immediately?
7. If answer is no: Why not ? If yes: Did you/they find employment?
8. Did you/they expect that the mine would close?
9. Did you/they expect that the mine closure would be permanent?
10. How did the mine closure affect the financial status of your family?

## ADDENDUM 2: Intersectoral Contingency Plan Model

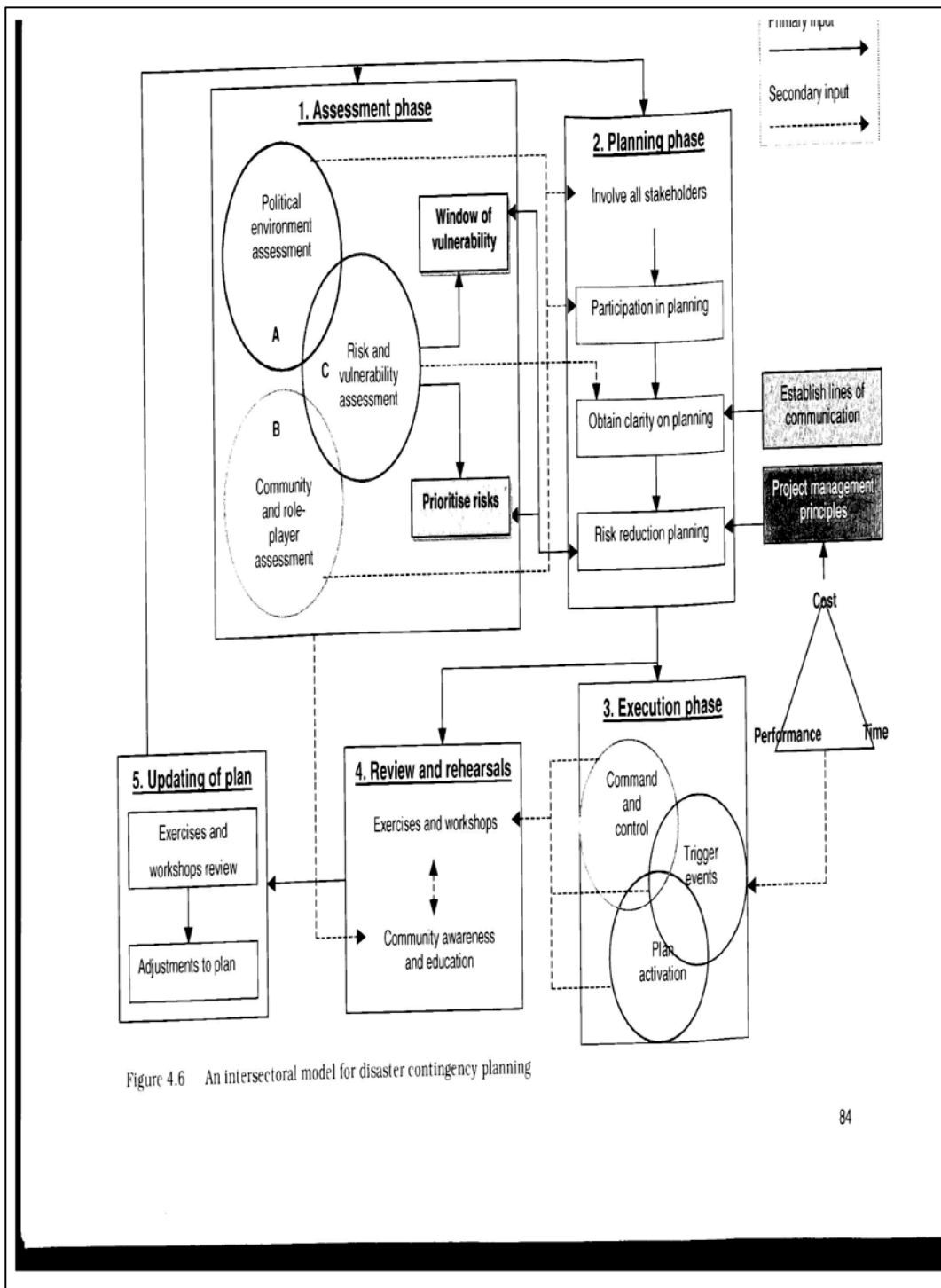


Figure 4.6 An intersectoral model for disaster contingency planning

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Figure 8.1 Intersectoral model for Contingency planning

Source: Van Niekerk (2005:85)