

**DEVELOPMENT OF MINING SETTLEMENTS IN NAMIBIA:
AN INVESTIGATION INTO PROSPECTS FOR
ROSH PINAH, KLEIN AUB AND TSUMEB**

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A DISSERTATION SUBMITTED IN FULFILMENT
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ABSTRACT

The dissertation examined the development and potential prospects of three diverse mining settlements in Namibia - Rosh Pinah, Klein Aub, and Tsumeb. It is a case study in settlement geography aiming to investigate problem areas and their potential solution towards sustaining people-centred urban stability, growth and development, linked to the assistance of private-public local and regional development planning in an environment of global mining competition.

The integrative literature review revealed that publications on Namibia predominantly offer a descriptive account of past and present mining settlements in the country. The focus of this study on prospects for mining settlements in the context of local and regional urban development planning evolved together with the revitalised integration of Namibia's mining industry in global markets. Refocussing the role of Namibian mining settlements on spatial development disclosed the need for research in problem formations, processes, perspectives and concepts to assist in securing knowledge and capacity for future development with or without mining activities.

The methodology was based on five concepts, namely (i) Christaller's Central Place theory (1933) which influences spatial analysis and development models until today; (ii) human migration perceptions; (iii) a life-cycle model for mining settlements adapted from Luca's mineral life-cycle model for resource towns (1971); (iv) the theoretical framework of Local Economic Development (LED); and (v) aspects of mining economics. The mixed-method approach to investigations facilitated the collation of primary data involving semi-structured questionnaires and face-to-face

interviews. The data set formed the foundation for an in-depth analysis of the case study settlements' scenarios. Linked to an indicator-supported viability model, the data analysis revealed distinct capacities of each settlement to achieve their people-centred urban sustainable development.

Rosh Pinah, seemingly calm, well organized and well-managed, exposed a strong dependency on mining development that may harbour the potential for future decay and stagnation. This imponderability resulted from misapprehended local economic diversification efforts which could not unleash desired effects. At present, Rosh Pinah is to be rated 'unviable'. The settlement might face the fate of Klein Aub, which prospered during its mining era, then declined, became depleted and has stagnated ever since the closure of the mine. Without external stimulus Klein Aub's prospects are bleak. Tsumeb, in contrast, exhibited great potential for socio-economic viability. Its dependency on mining has been resolved and the town continually transforms its urban structures and functions with the assistance of private-public engagement in joint local to regional LED-oriented long-term planning.

In conclusion, lessons learnt from the three case studies point towards possible solutions which could pave the way towards sustainable growth and development of mining settlements in Namibia. Weaknesses which apparently are inherent in the country's mining settlements and were observed during field study, should serve as a basis for future research and human capacity building, in order to establish a sustainable discourse among all key role players in planning the politico-economic, socio-cultural, and natural environment for the future generation.

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LIST OF ACRONYMS

ATM	Automatic Teller Machine
CBD	Central Business District
CCM	Catering Contracts Management
CSR	Corporate Social Responsibility
e.g.	for example
EPL	Exploration and Prospecting Licences
FNB	First National Bank
GSN	Global Seismological Network
i.e.	that is
LAA	Local Authorities Act
LDC	Long-Distance Commuting
LED	Local Economic Development
LIH	Labour Investment Holdings
MCF	Mine Closure Framework
MLSW	Ministry of Labour & Social Welfare
MME	Ministry of Mines and Energy
MMSD	Mining, Minerals and Sustainable Development Project
MoHSS	Ministry of Health & Social Services
MTC	Mobile Telecommunications Company
MUN	Mineworker's Union of Namibia
NAM-MIC	Namibian Mineworkers Investment Corporation
NamPort	Namibia Port Authority
NHIES	Namibia Household Income and Expenditure Survey

NCCI	Namibia Chamber of Commerce and Industry
NCS	Namibia Custom Smelters
NDP	National Development Plan
NIMT	Namibia Institute of Mining Technology
OMEG	Otavi Minen- und Eisenbahngesellschaft (The Otavi Mining and Railway Company)
POW	Prisoner of War
PPP	Public-Private Partnership
RPZC	Rosh Pinah Zinc Corporation
SEA	Strategic Environmental Assessment
SIA	Social Impact Assessment
SMEs	Small and Medium Enterprises
SWACO	South West Africa Company
SWANLA	South West African Native Labour Association
TCL	Tsumeb Corporation Limited
VCT	Voluntary Counselling and Testing

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DECLARATIONS

I, Vita Stankevica, declare hereby that this study is a true reflection of my own research, and that this work, or part thereof has not been submitted for a degree in any other institution of higher education.

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Vita Stankeviča

[25February 2015]

1 INTRODUCTION

Worldwide, human societies continue to search, extract, and use minerals and metals in order to sustain their economies nationally in global context. The uneven distribution and location of the natural resources has resulted in raw materials' mining often being undertaken in remote areas with little physical infrastructure. Subsequently, mining contributed to the development of insular or regional settlement networks and their connection to linear transport and communication systems. These systems, then, may harbour a fundamental asset-bearing potential, the realization of which requires suitable land use planning within the framework of national planning policies, both today and in future.

1.1 Orientation

In Namibia, mining activities and mineral trade have existed for centuries. It is, however, only since the 19th century that the search for great mineral wealth led to the formation of mining communities, some permanent, many only temporary. Only a few of these eventually grew into mining settlements. Early studies on growth and development of mining settlements agree that the establishment of these settlements generally does not follow geographic patterns. The growth stimulus for mining settlements originates from the occurrence and wealth of minerals, so that settlements in their early stages bypass gradual and orderly evolution of an urban system. Several mining settlements did indeed experience a fast and flourishing development, but either ended up in complete collapse or were left with a life-long struggle for survival. The majority, though, never attained prosperous long-term development. Only a few have endured and managed to transform themselves into self-sustaining settlements,

which - while still struggling through economic hardships – are going strong towards an upward trajectory of development.

The question that arises is what caused some mining settlements to succeed while others failed. This question has hardly been researched in the academic arena of Namibia. While much research has been conducted on the growth and development of mining settlements from a historic perspective, e.g. Söhnge (1967), Gebhard (1994) and Schneider (2009), much fewer investigations have dealt with contemporary processes including prospects for mining settlements, e.g. DiBoscio (2010) and Littlewood (2014).

The drive of this study within the framework of settlement geography is to carry on with the filling of knowledge gaps on mining settlements in Namibia, setting the scene for wider discussion or debate about the role of mining industry as an agent of urban growth and spatial development.

The study focuses on three mining settlements in Namibia, namely Rosh Pinah, Klein Aub, and Tsumeb. After a brief account of each settlement's history, present-day characteristics and contemporary processes are disclosed, followed by the exploration of possible pitfalls, potentials, and future prospects, in local and regional context - all within the concept of sustainable urban development. The three settlements share a common base in that sense that they all developed due to the discovery of a mineral deposit. Each represents a different type and size of mining settlement continuity in

Namibia, thus unravelling different developmental paths and bearing different local and regional importance.

It is imperative to clearly define the definitions used in this research, namely ‘mine site’, ‘mining community’, and ‘mining settlement’. The absence of collectively accepted definitions of ‘mining settlement’ has prompted a variety of research works, the correlation of which proves difficult. In this present study, the term ‘mining community’ refers to a community that accommodates miners usually next to a mine site, the place where mining operations are carried out. It resembles ‘a mining camp’ with its purpose to extract the mineral deposit, and is similarly vulnerable to fluctuations of the resource value. A ‘mining settlement’, on the other hand, constitutes a type of human settlement, and thus has specific functions and the geographical characteristics of an urban centre. Inhabitants of such settlements are generally urbanised, more resilient to commodity market fluctuations, and largely independent, and thus essentially different in politico-economic and socio-cultural terms in comparison to ‘mining communities’ which usually experience a high degree of dependency on the natural resources exploited in their area.

1.2 Problem formations

The origin of mining settlements is rarely seen as problematic in their initial stage when the industry positively contributes to the socio-economic development of local and regional communities which previously lived in depressed, perhaps remote areas. Job creation, income generation, and poverty alleviation are among the prominent contributions of such a settlement, in concurrence with the Namibia Vision 2030

(Republic of Namibia, 2003) which projects the improvement of local infrastructure, the construction of access roads, and the amplification of investment flow.

Problems typically start to arise with the dissemination of news on possible job opportunities in conjunction with a new project, which promptly triggers an increase of human migration. Initially, migration comprises the work force for the mine operations, but it is immediately followed by an influx of people intending to supply goods and services. This migration tends to mark the beginning of structural and functional problems in the mining settlements of Namibia. People looking for employment and opportunists move to mining settlements in the hope of securing jobs from new local or regional developments. The extent of uncontrolled local in-migrations may outsize the accommodation capacity of the settlement. Subsequently, the migration causes the inability of the settlement to absorb all migrants and thus leads to the formation of informal settlements on the outskirts of a formal mining settlement. This may be exacerbated by mining companies' labour policies which employ people for work in remote areas with long distance commuting arrangements (fly-in/ fly-out or drive-in/ drive-out). Family members cater for the needs of mine workers and, at the same time, are highly dependent on them. Ultimately, they will contribute to the in-migration surplus.

In times when mining settlements receive their original boost for economic growth, the mining industry often does too little to ensure sustainable community development, and the initial excitement of upwards economic development may overshadow the lurking gloom. The mining operators open and develop mines for profit and not for

social welfare and responsibility. In Namibia, mining companies are not yet required to safeguard long-term developments in the mining areas and the regional context they operate in. The current legislative framework is still fragmented, with diverse issues of mining being addressed in different laws and regulations. For example, environmental issues are governed by the Environmental Management Act 7 of 2007, while issues relating to mine labour are captured in the Labour Act 11 of 2007 and the Public Health Act 36 of 1919. The lack of a comprehensive mine closure legislature leaves companies to operate according to their own perception and conscience of their social responsibility. At least, the most recent closure process of the Okorusu Fluorspar Mine north of Otjiwarongo (Namibia), one of the largest of its kind in the world (Immanuel & Kaira, 2014), triggered a rising concern for the mining community's interests which is quite promising.

During the operational life of the mine, settlements may prosper under the management of mine operators who are primarily concerned with meeting the demands of the people within the settlement. The settlement's need for goods and services is provided for by the mine operator and brought in from outside. Such arrangements tend to disrupt the local economic diversification and creation of close relationships of settlements with their adjacent regions. Limited economic diversification may reduce potential for a survival of a mining settlement. It slows down development of a settlement or may even causes a complete collapse of local and regional economic development. With the view on international experiences gained over decades in the successful handling of waves of mine closures, structural diversification as well as functional transformation for urban (sustainable) re-

development, two regional examples deserve attention: (a) the former mining town of Pittsburgh in the Pennsylvania anthracite region (USA), monitored for instance by Deasy & Griess (1965), Miller (1989), Dublin (1998), Dublin & Licht (2005), and (b) the polycentric mining towns of the Ruhr Region (Germany), documented in an Atlas edited by Prosek *et al.* (2009). Both examples share the severe suffering of people following economic and social downturn as a result of continuing decline of the coal mining industry, and both examples managed to achieve new functionalities and sustainability.

Still, it is appropriate to utter a word of caution here: It must be emphasized that even political and financial support may not guarantee the sustainable re-development of mining regions, their communities and settlements. For example, Swain (2007) and Haney & Shkaratan (2003) researched the disorganization and ruin of the Donbas region, which was characterized by severe job losses, closure of local enterprises, decline of infrastructure and mass out-migration after closure of more than half of 230 coal mines. This downward development turned mining settlements of the entire mining district into ghost towns, e.g. Stepnohirsk, Snizhne, Petrovske, Vuhlehirsk, and Torez. Another example is the whole Burnie mining region of Australia which in 2008 was severely affected by the global financial crisis. Mass retrenchments had a major impact on businesses and slowed down the local economy. In the isolated mining town of Broken Hill, 30% of the population became unemployed (Parliament of the Commonwealth of Australia, 2009).

Figure 1 summarizes problem areas evolving from mine closure. Rehabilitation of urban settlement from local to regional decay requires the formulation and implementation of spatial planning policies to facilitate sustainable re-development.

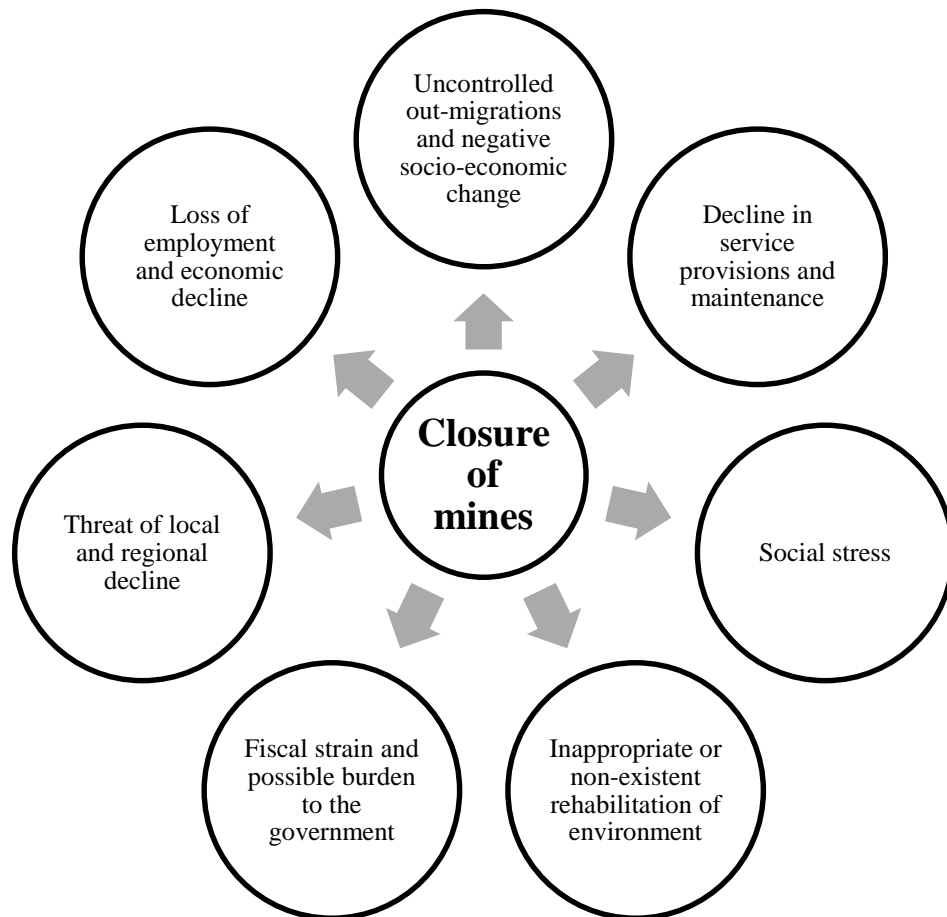


Figure 1. Problems of mine closure on settlements reflected in the reviewed literature.

Mine closure is a phase dreaded in the development of any mining settlement. Services that depended on the mining company for funds or operational capacity may disappear. This, in turn, places enormous pressure on local and regional retail networks and small scale businesses, which themselves entirely or at least to a large degree depended on the operations of the mining company. The decline after closure can be sharp and

unexpected. A sense of angst and strikes, caused by gradual retrenchments followed by mine closure, leads to the decay of a once prosperous mining settlement.

Mine closure reduces businesses not only within its settlement but also in all adjacent regions. Many mine workers return to their places of origin, but others who would be content to stay in the settlement, are unable to do so. Once they are without employment in an urban area, they have no other means of support and no system in place for social insurance. The living standard of the community is thus compromised. The hype of mining may result in depression leaving the national government to deal with the problems of an environmental, social or financial nature. Today, mine closure plans ought to be comprehensive and include environmental aspects of mine closure. Local and regional governments may not be prepared, but be called to task, to take over the responsibility of maintaining existing services. Burdens of socio-economic disruption vis-à-vis demands change and transition may not only be passed to the Government, but also to future generations.

With a short term vision for any mining settlement's future, lack of assessment of benefits and damages from mining projects it performed, the deficiency of understanding possible problem formations or ignoring to attend to urban and regional planning, the future of such settlements may be bleak, not only in Namibia.

1.3 Objectives of the study

The Year 2009 witnessed global economic slowdown and aftermath of the copper price plunges that affected the Namibian mining industry, leading to the closure of the

Tsumeb mine, putting Otjihase and Matchless mines under ‘care and maintenance’, and reducing production outputs. Despite the shocks of plunging metal prices (which recovered by 2010), the interest for mineral extraction has not diminished, and Namibia still holds significant commercial promises in mining. This is attested by several exclusive prospecting licences (EPLs) issued by the Ministry of Mines and Energy (see Appendix 1), even in the last recent years. The drive for mineral wealth does not subside as minerals are still essential for human survival and well-being. With the recovery of global and national economies, more advanced geophysical investigations and the mineral wealth of Namibia may promote future opportunities and perspectives for growth and development, suggesting the likelihood of founding new mining settlements. In view of such possible development and the still juvenile scientific experience which Namibia has in local settlement and industrial development expansion, the need for contemporary understanding of mining settlements evolves.

The purpose of this study was to investigate Namibian mining settlements in order to fill knowledge gaps and build capacity pertaining to contemporary processes and problem formations of these settlements. Objectives were to analyse three different mining settlements, namely Rosh Pinah, Klein Aub and Tsumeb in order to unravel complex relationships between aspects of problem formations, assessing what contributed to success or pitfall as well as finding answer to how these settlements may transition to viable urban communities, and lay the foundation for a contemporary settlement study focusing on the country’s mining industry as an agent for development in the field of settlement geography. The research on processes and

problem formations occurring in the distinctly different mining settlements aim to broaden the understanding on mining communities and settlements in Namibia. This knowledge might be invaluable when analysing mining settlements for future local and regional spatial planning purposes.

2 LITERATURE REVIEW

Literature on mining settlements in Namibia is scarce, reflecting previous research under different historical and political settings. Authors explored urban structures and mainly concentrated on mining experiences and financial accomplishments of mining companies, but rarely presented the settlements in their geographical context. Literature is filled with accounts of the mineral rushes (e.g., Söhnge, 1967; Smalberg, 1975; Gebhard, 1999; Levinson, 2009; Schneider, 2009) and small mining settlements developing into towns where in remote and isolated locations the possibility of wealth attracted people and initiated the growth of these settlements. The ‘happy history’ accounts are descriptive, reciting stories of fast growth of the settlements, and only a few authors attempted to analyse them. The dissertation of DiBoscio (2010) is among the first contemporary studies on the economic sustainability of mining towns in Namibia. The deficiency of such analytical studies attests the fact that Namibian mining settlements are a long-neglected subject in political, economic and particularly in settlement geography.

The literature review exposes previous works on mining settlements. The lack of a comprehensive geographical approach to researching such settlements in Namibia and the need for guidance to anticipate the future development of mining settlements highlighted the necessity to widen the scope and to organize the literature review into specific thematic groups, each covering a different aspect of mining settlements. The aspects of reviewed literature can be visualized as follows (see Figure 2):

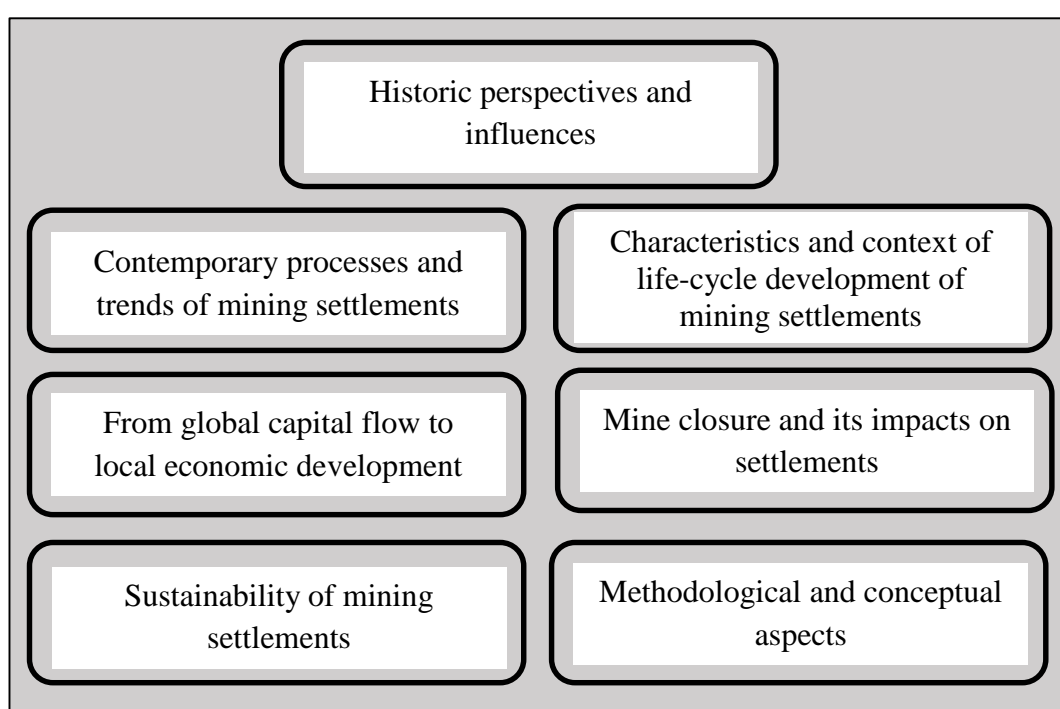


Figure 2. Thematic groups of reviewed literature.

Once the literature was organized in this way it became possible to harvest the manifold knowledge scattered across various streams of research in a more systematic way. This enabled the formulation of prospects, conclusions and planning aspects which constitute the objective of this research. Appendix 2 contains an inventory of the literature study, covering the key issues and sources from which problem areas were deducted, as well as the knowledge gaps within each aspect of the reviewed

works. The literature review showed that a full appreciation of all aspects would deserve a publication of its own.

2.1 Historic perspectives and influences

Information on the historic background and factors influencing the foundation and development of mining settlements in Namibia was harvested from different sources: (a) recorded historic material, as e.g. compiled by Galton (1853), Anderson (1857), Baines (1864) and Vedder (1966), which record history since the early 18th century; (b) a large body of contemporary research (e.g., Söhnge, 1967; Kinahan & Vogel, 1982; Kinahan, 1991; Schneider & Schreuder, 1992; Schneider & Seeger, 1992; Miller & Van der Merwe, 1994; Miller & Sandelowsky, 1999; Gebhard, 1999; Nujoma, 2009; Schneider, 2009), which cover topics on the mining history, and point out that the mining, smelting of metals, and trade in smelted metals were known to indigenous people long before the arrival of Europeans. Works by Schneider & Schreuder (1992), Nujoma (2009) and Schneider (2004) indicated that the earliest activities related to mining occurred *inter alia* in the surroundings of Tsumeb, Onganja, Matchless, Drierivier, Oamites, and Klein Aub. These locations correspond to present day mining sites and known mineral deposits. There is however no evidence in the literature of the existence of mining settlements of a permanent nature prior to the arrival of the early European travellers.

The first temporary mining camps evolved during the 18th century (Seckelmann, 2001) when Namibia attracted increased interest from European traders and mineral exploitation was performed in a 'harvest and move pattern'. This 'harvest and move

approach' in the literature on natural resource development means that resources were harvested as quickly as possible and once the resource was depleted, the developer moved onto a new mineral deposit, abandoning the previous mining site, leaving it open and un-rehabilitated. Subsequently, such settlements were closed down and abandoned (Natural Resources Canada, 2011). One example were the guano¹ deposits which were discovered in Namibia on Itchobe Island in 1828 and opened the door to an influx of people from Europe. At times, 6000 men were scrambling for guano (Levinson, 2009). Every night, the men had to leave the island to stay in a tented camp town on the mainland. This movement of workers which resembles present-day long distance commuting (LDC) arrangements in mining operations with contribution to local development is widely disputed in literature. Robertson, Jarvis, Mendelsohn & Swart (2012) argued that by the middle of 1845 guano resources were depleted and miners of foreign origin moved on or started a new exploration in search for more resources. The extraction neither contributed to the local economy nor left any bearing on settlement patterns in Namibia. Clearly, this shows that this mode of resource extraction was beneficial only to foreign economies and did not have any impact towards sustainable development in Namibia. Similarly, other mining sites which had grown around mineral deposits (e.g., Natas gold mine, Sinclair copper mine) disappeared with the depletion of mineral resources or once mineral traders had lost interest in a particular commodity, - yet another piece of evidence that a mining industry which does not establish linkages with the local milieu is not capable of triggering any significant development in the place where the resources are extracted.

¹ Guano: excrements from seabirds, seals or bats, of enormous economic value to humans as fertilizer.

The mining settlements of the time basically operated as remote nodule mining camps of their ‘mother country’.

The early guano discoveries and other smaller mineral occurrences greatly stimulated the interest in the quest for mineral wealth in Namibia towards the end of the 19th and beginning of the 20th centuries when first large scale mining projects emerged. This coincided with a turning point in the history of the establishment of mining settlements, an epoch of fast and grand evolvement of mining settlements in remote locations as a result of mineral rushes. Several sources, e.g., Söhnge (1967), Gerhard (1999), Kohl & Schoeman (2004), Levinson (2009), and Schneider (2009), all recorded the vibrant mining activities of the 20th century, distinguishing three distinct areas of mining interest and their particular localities. These are: i) diamond areas along the Namibian west coast; ii) various base metals (copper, silver, lead, zinc, tin) in central Namibia; and iii) uranium deposits in Erongo Region. All three important mineral groupings have retained prominence until today and remain popular objects of mining interest.

The historic discovery of the diamond by Zacharias Lewala in 1908 is widely documented in literature. Kohl & Schoeman (2004), Schneider (2009) and Levinson (2009) recited glamorous stories of the time and the small mining settlements which evolved in desolated areas in the Namib desert, where development of the settlements followed the diamond rush which had started in 1908. The prospect of great riches in a distant and hostile environment drove the initial impulse for the development of Kolmanskop, Elizabeth Bay, Bogenfels, Pomona, Charlottental and Oranjemund, all of which became hubs of diamond-related activities at the time. Most of these mining

settlements were short-lived, and reverted back into desert environments. Only the desert sand which envelops the old structures reminds visitors of the glorious days of the diamond fever (Schneider, 2009) and the sombre history of the local people.

The 1853 discovery of copper in the Cape Colony triggered a more thorough search for ore metal, and soon afterwards the 'copper rush' also reached Namibia (Smalberger, 1975; Schneider, 2004). The discovery of copper in surrounding areas of Tsumeb led to the foundation of Tsumeb mining town in 1893. Within a short period of time, it grew from a small mining camp to be proclaimed a town in 1905, surviving ups and downs and still going strong (Gerhard, 1999). Other metal mines which triggered development of small mining settlements and thus highlight the potential for small, but permanent, mining settlements near a mine, are the Uis tin mine, Kombat and Klein Aub copper mines, and the Rosh Pinah lead and zinc mines. All of these settlements still persist in different stages and conditions until today.

Despite the discovery of uranium in 1928, it neither triggered the evolution of migrations or formation of new settlements in Namibia, nor did it create any particular interest until the 1950s. This was when intensive exploration got underway by the Rio Tinto mining company which identified a few low-grade alaskite ore bodies north of the rugged Khan valley (Roesener & Schreuder, 1992; Cassidy, 2009; SAIEA, 2011). With the global increase in the demand for uranium in the 1960s and 1970s, a first uranium rush emerged which resulting in the founding of Arandis. Keeping in mind the apartheid political system in Namibia at the time, it is clear that Arandis was established in 1976 under two different influences - the mineral boom and the

apartheid system. The settlement in the Namib Desert was founded to accommodate the black workforce of the mine. Contemporary studies mainly analyse aspects and consequences of the apartheid labour system, but deal little with questions on the settlement's nature from a geographical point of view. DiBoscio (2010) induced a fresh look into the contemporary processes by analysing mining enterprises in Arandis and regional economic development.

The initial uranium rush subsided in the 1980s and 1990s. The settlement which had been built as a necessity during the apartheid era was close to collapse in newly independent Namibia; the fight for survival was immense. Renewed interest into uranium production was prompted in the early 2000s, triggered by the global trend towards the reduction of greenhouse gases and development of "clean energy". Uranium prices shot up instantly, causing another cycle of uranium rush in the Erongo Region (SAIEA, 2011). Interest in uranium mining was rising while the mining industry in Namibia suffered a decline. Local newspapers were filled with stories about the upsurge of interest in uranium (see Appendix 3). As a response to the emerging uranium rush, a Strategic Environmental Assessment (SEA) was performed in 2010, which suggested the growth of several new mining settlements and expansion of existing urban centres in Erongo Region. According to SAIEA (2011), the growth of these settlements was expected to be so enormous that local authorities of existing settlements in the area became alarmed, unwrapping large scale capital projects in order to accommodate the possible influx of people. The impact did not meet the expectations, and the sudden and short-lived upsurge in developments during the latest uranium rush thus did not alter the urban pattern in the Erongo Region of Namibia.

The reviewed literature on historic events of the mining industry in Namibia and its spatial development only hints at the underlying factors of success and decline of particular mining settlements by presenting varied historic accounts of events that occurred at the time. Clearly, more studies are needed to contextualize the historic background into a broader perspective of local and regional urban development in Namibia.

2.2 Characteristics and context of life-cycle development of mining settlements

The lack of analytical research on mining settlements in Namibia justified the need for a literature review on other parts of the world in order to understand the role and characteristics of mining settlements in general, and their positioning in the field of urban geography. This includes the genesis, typology, characteristics and factors which influence the development and growth as well as the formation of linkages between mining settlement and a region.

A mining settlement sets off its development based on the wealth of raw materials. It is a complex liaison of the wealth, size and quality of the resource, cost of extraction, distance to markets, and transport. The availability of labour, power and capital is equally important in determining a settlement's development (Morrill, 1970; Smith, 1971; Renner, 1976). It is noted by Bone (1998) and Halseth, Sullivan & Ryser (2002) that the presence of the resource does not guarantee the evolution of a permanent settlement, but if the resource is economically viable to mine, a settlement may be established even in very remote and hostile environments. Reviewed publications acknowledge the unique status of mining settlements as urban structures which (i) do

not follow predictable patterns of development, (ii) do not endure a long and gradual evolving history, (iii) whose growth might be sudden and fast, and which (iv) evade all known rules of expected growth from the small economic activities in the area (Rose, 1967). Such settlements often reflect decisions and labour policies of the mining company, revealing specific characteristics of a mining settlement in its physical layout, its demographics and its social and economic characteristics (e.g. Cosgrove, 2001). The physical layout of mining settlements may vary from a simple mining camp accommodating the labour force in single hostels or compounds, up to well-planned residential areas. It often spatially reflects the contrast between housing for senior staff and simple mine workers, and thus the chasm between mining community and local residents, and exhibits a distinctive division between the older and younger parts of the settlement. Such spatial segregations within mining settlements are discussed in several studies by Maude & Hugo (1992), Cosgrove (2001), Granville (2001) and Drewes & Aswegen (2008). Their case studies exposed several forms of inequalities resulting from the operational and management policies of mining companies as well as from the legislative framework of the host country where the mining takes place.

Literature includes an interesting aspect regarding the different socio-demographical compositions of mining settlements, and how mine labour needs are reflected in the recruitment policy of a company. Studies of Johansson, Talman, Tykkyläinen and Eikeland (1992) on the demographics of mining settlements revealed that different mining companies and their varying attitudes towards their labour force are reflected in a settlement's geophysical and socio-economic appearance. Reviewed publications agree on common traits of mining settlements, such as the population being

predominantly male; the majority of people being in the economically active age group; low levels of education, and a certain proportion of people with highly specialized skills. The social fabric of mining settlement is diverse and accommodates people from different regions with diverse cultures, different values and understanding of social networks (Esptein, 1973). Such a social organization may be very weak and challenge any sensible development or even threaten any future viability.

Mining is often blamed of widening gender imbalance within the mining community, with women bearing an inadequate share of the benefits and being marginalized. Gender issues of mining settlements have received increased research attention, which fills a previously neglected research gap. This is particularly highlighted by studies of Wilkinson (1991), Neitzert, Mawhiney & Porter (1997), Dansereau (1997), Musvoto (2001), Cosgrove (2001), Hoadley, Limpitlaw & Weaver (2002), MMSD (2002) and Lozeva & Marinova (2008, 2010). All these emphasized the importance of gender issues in understanding the development and stages of mining settlements in preparation for the transition which will follow the mine closure. Musvoto (2001) argued that excluding women from participating and contributing to the mining communities does not promote the goal of sustainable livelihood, noting that women's skills and income generating power become particularly crucial when the mine starts to deteriorate and their male partners lose jobs.

Mining settlements may vary in population age, but one main characteristic of mining settlements is that they consist of younger population groups in comparison with the national average. Maude & Hugo (1992) argued that there usually is a very small

proportion of people older than 65 years. The youthfulness of mining settlements is diagnostic. However, there is a clear distinction in education levels among the residents. Residents involved in the mining industry are better educated and receive higher incomes (Davies *et al.*, 2012) than community members without affiliation to the mining industry. The publication by the Natural Resources Canada (2003) titled *The social dimension of sustainable development and the mining industry* found that the problem of lower education levels can be remedied to make a positive impact through specific programmes, but the lack of motivation of local residents to participate in such education and skill training programs deters success. The aim of finding a job is higher than improving education. Yet, improved skills may translate into larger numbers of successful local enterprises, contributing to the settlements diversification and viability after closure of the mine (Natural Resources Canada, 2003).

Mining settlements are developed for the sole purpose of extracting mineral wealth as fast as possible and with maximum profit, although the viability of such mining settlements is questioned (e.g., Leadbeater, 1989), suggesting that mining settlements can only exist while the mine is still operating in the area. Generally, a mine is the principal industry and employs a large proportion of the settlement's population, while other supporting businesses or industries often are directly or indirectly related to the mine and its labour force by means of service provision or the supply of goods. Employment in the mine's supporting industries depends on the local needs of the mine, while the life span of the mine is dependent on the cyclical and competitive behaviour of the global commodity markets. The settlement's future economic well-

being is influenced by the mine operator's procurement approach, the employment policies, and the national legislature guiding the industry (Bradbury, 1985; Bone, 1998). The diversification, or lack thereof, of the economic base of a mining settlement often is of no concern to mining companies or the legislative framework. However, Davies, Maru and May (2012) presented studies where the lack of economic alternatives to mining, particularly in developing countries, was associated with lack of managerial and entrepreneurial skills in the local population; and thus challenged the prospect of a sustainable future for a different reason.

All mining settlements undergo a life-cycle, and all will be threatened by decline in their development at some stage. Keyes (1992) pointed out that while some mining settlements struggle through the hard times, others simply cease to exist. The dynamics of the mining cycle may bring both, life and death, to mining towns.

The existence of economic cycles were identified by Clement Juglar in 1860. He was one of the first to develop an economic theory of business cycles (Tanning, Saat & Tanning, 2013). Juglar (1862) identified the seven to eleven year fixed investment cycle within which one can observe oscillations of investments into fixed capital. This idea of cyclic development was soon picked up by other researchers, particularly economists. Peet and Hartwick (2009) pointed out that Great Depression which hit the world's advanced economies in the early 1930 was the turning point which changed philosophies of economic development and triggered increased interest in crisis occurrences and the cyclical nature of development. Theories on the cyclic nature of economic development were built on Kondratiev's (1925) work *The Major Economic*

Cycles who predicted the stock market crash in 1929. Kondratiev (1925) identified three phases within a 50-year cycle: expansion, stagnation and recession (Kondratiev, 2002). Schumpeter (1934)² kept alive Kondratiev's ideas and further developed his theory of business cycles and development, proving that economic change was abrupt and discontinuous rather than smooth and orderly. Unlike Kondratiev, Schumpeter distinguished smaller short-term cycles of approximately 40 months, medium size cycles covering the span of 9 to 10 years, and long-term business cycles of 50 to 55 years (Schumpeter, 1961).

This new idea of the cyclic nature of business development impacted the research across different research fields and spread to philosophies on mining developments, particularly in the field of economics and mining, and later into mining and settlement development. Howett (1929) was one of the first to advocate that mineral production goes through cycles and Lucas (1971) was the first to adapt the original mineral life-cycle model for single sector communities and for investigating the growth of a community. In the 1970s, he pioneered the interest among academics to apply the concept of a cyclic nature of the mining industry and its effects on settlements' development. Based on his findings, Lucas developed a four-stage model, whereby the life-cycle of a community begins with i) a construction of the mine, followed by ii) an

² Schumpeter's book "The Theory of Economic Development" was first published in 1911 under the name "Theorie der wirtschaftlichen Entwicklung" and the first English edition was published in 1934. The two editions are not identical because Schumpeter chose to make some changes in the text, he emphasized in the preface of the English edition that these differences between the version from 1911 and the one from 1934 had not altered the essence of the book (Croitoru, 2012).

employment of mine labourforce, iii) a transition phase and iv) a maturity phase which is a final stage of a town's development.

Similar to Kondratiev, who also did not have a collapse stage in his cycle of economic development, Lukas did not foresee an abrupt end of the mining settlement. Since the inception of the theory, various researches have expanded the range of possible life-cycles of mining settlements. Bradbury (1984) and Bradbury & St. Martins (1983) modified Lucas' life-cycle model by adding another stage - the withdrawing of mining operations, suggesting an inevitable and evident decline of the mining settlement. Their explanation was not conclusive as many questions remained unanswered; for example, they did not provide exact closure in their life-cycle model. The model was evolutionary in depicting the trajectory of the development, but not particularly suited to capture the distinctive factors beyond the stage of economic development (Gill & Smith, 1985; Johnston & Lorch, 1996). Their model did not provide answers after closure of mining operations. In pursuit of dealing with planning issues, Bone (1998) adapted an earlier life-cycle model of Lucas, but modified by researchers who focussed on change in population size. This prompted him to classify resource towns into (i) boom-bust towns; (ii) towns of uncertainty; (iii) diversified towns; and (iv) sustainable towns, recognising the possibility of mining settlements' decline and eventual collapse. The limitation of his classification lays in the narrow differentiation between 'diversified' and 'sustainable' towns. While economic base of 'sustainable' resource town was created on renewable resources, the economic base of 'diversified' town was based on non-renewable resources. Bone's (1998) classification did not permit any deviation. The economy, politics and national migration policies could all contribute

to transform a settlement. A former 'boom and bust' town could be revived as a 'diversified' urban centre or a 'sustainable' town, which could experience a severe economic downfall. However, dependency on a non-renewable resource does not guarantee unlimited growth, but it may remain in dependency.

Adding on population issues in mining settlements, Hernadi & Fraser (2012) found that mining economies are at large to determine the future of the mining settlements. They argued that only profitable mines with a large resource base are able to survive global economic fluctuations or declines and to keep a reasonably sized workforce employed over several decades and mining cycles. With the case of Kimberley they reasoned that this type of mining settlements can become more permanent with a loyal population which is more attached to the area and usually has capacity to prosper from the generally higher incomes earned by working in the mining industry (Hernadi & Fraser, 2012; Davies *et al.*, 2012).

Decline is the stage most feared in the cycle when the future of a mine and its settlement is unclear (MMSD, 2002). The reasons for decline can be numerous: exhausted mineral deposit, failed commodity markets, conflicts in labour relations and isolation from a larger regional town (Cosgrove, 2001; MiningWatch Canada, 2001) and political issues (Hewett, 1929), but the survival of the mining industry is linked to the global commodity prices which determine whether or not a mine will continue operating. Neil & Tykkyläinen (1992) presented an additional nuance by suggesting that cyclical inabilities can be aggravated by the tendency of mining companies to undertake major developments and exploration projects near the peak of the mineral

cycle. Inevitably, there is a time lag between initiating the development of a mine and the beginning of production. The initiation of a mining project is linked to the peak in commodity prices and, by the time the mine is supposed to go into full production, the commodity market conditions may not be the same as when the mine was developed, which threatens the viability of the mining operations as well as the stability of the community. The idea is similar to Lichtenberger's (1992) dual cycle model where urban expansion is preceded by urban redevelopment. In Lichtenberger's model political change is a catalyst for such a development, while Neil & Tykkyläinen (1992) rather point at global economic markets. This proves that distinctiveness is a key to mining settlements and cannot be placed in a specific model, without including the global economic and political processes as well as the local context of mining settlements (Johnson & Lorch, 1996).

2.3 Processes and trends of mining settlements

First discussions and analyses of contemporary processes and trends in the mining settlements emerged during the 1970s. Bowles (1982) and Halseth *et al.* (2002) argue that the development and management of mining settlements have moved through different stages of settlement planning. Historically, most developments centred on the construction of a 'company town' where construction and operation of the town was part of mine planning and operation. With the emergence of more comprehensive urban planning in later decades, the mining industry moved to incorporate a broader range of social and economic considerations into community development. The settlement's dependency on the mine decreased by the mining company's stimulating

and strengthening of local authorities, thus providing assistance rather than being directly involved in the town management (Halseth *et al.*, 2002; Marchand, 2005).

The developmental trend changed once again with the onset of the idea of sustainable development in the 1980s. The mining industry was perceived trying to move away from the company town model and, wherever possible, to locate their labour force from existing urban centres; and by doing so to reduce the community's dependency on the mine and contribute towards local and regional development (MMSD, 2002a). In very remote and isolated areas, mining companies and, in particular, governments of host countries often opt for the long-distance commuting (LDC) model of sourcing their labour force without building a traditional mining town; the mine labour force is flown or driven in. There is a clear divide in the reviewed literature regarding the benefits *versus* negative impact of this type of mining arrangement. O'Faircheallaigh (1995) argued that mining may bring its own set of implications for rural and remote communities, particularly when the community has no previous experience of mine employment. An opposite 'opinion camp' (e.g., Natural Resources Canada, 2003; Chamber of Minerals and Energy Western Australia, 2005; Western Australian Regional Development Council, 2010) considers the LDC option to be less disruptive to local communities than residential towns, despite the insignificant contribution of mining towards regional development. The final report of the Mining, Minerals and Sustainable Development Project, the renowned publication of the MMSD (2002a), which was sponsored primarily by international mining giants, development agencies and institutions specializing in mining, defended the interests of the industry. However, it acknowledged that the presence of the long-distance commuting

arrangements in mining industry invariably means that the communities living nearby gain less in terms of jobs, business opportunities, and the multiplier effects.

Job creation often is singled out as a major benefit from mining for both, local communities and the region (e.g., Iyanda, 1999; World Bank & IFC 2002b). However, the perception of mining as an industry being able to create mass local employment in recent years is widely disputed. Those opposing the mining industry's ability to create employment (e.g., MiningWatch Canada, 2001; Power, 2008) and doubting its contribution to the local and regional development argue that the current distinctive trend of mining companies to invest in very expensive hi-tech technologies leaves less investment into labour force. The operation of sophisticated mining equipment requires highly skilled professionals which often are difficult to find among the local or regional community. Job opportunities are lost in favour of foreigners. According to data of the Annual Review of the Namibian Chamber of Mines (2010) and the Namibian Labour Force Surveys (Republic of Namibia, 2010, 2013), the total employment in the mining sector of Namibia has indeed shrunk considerably since 1990, supporting the reasoning of those researchers who are doubtful of mining benefits on local or regional job creation.

The literature which questions mining and its benefits for the local and regional development also expresses concern over hidden agendas of those foreign-controlled international corporations which benefit from a country's natural resources and transfer most of their profits to their (no longer western only) headquarters, thus leaving little benefit for local or regional development (Fair, 1982; Lanning & Mueller,

1979). This phenomenon reveals similarities to the historic ‘harvest and move pattern’ mentioned earlier, except that it is now embedded in a contemporary context. Despite factual evidence of decreasing job opportunities in the mining industry, much needs still to be known to validate the notion of ‘mining is bad’ *versus* ‘mining is good’. There is little to no research or inventory which has tried to evaluate the actual benefits from mining against the harm that mining potentially could cause in the mining settlements and regions of Namibia.

A new mining development attracts migrants, as the expectation of job opportunities creates an influx of people. Studies on migration, offered by, for example, Jackson and Poushinsky (1971), Godfrey (1990, 1992), Moodie & Ndatshe (1994), Halseth (1999) and Bury (2004) occasionally debate migration processes to mining settlements, but neglect the influx of a non-mining community to the settlement and often leave it up to the reader to judge whether such influx is ‘good or bad’. The relationship between the influx into the mining settlement and the settlement’s ability to diversify is pointed out, suggesting the notion that more people would help the settlement to diversify through more business activities other than mining. In light of this concept, in-migration should not be judged as being a social evil, but rather be investigated further to establish whether or not it contributes to the diversification of a mining settlement from a single industry town towards a higher-order urban centre. Yet, this has not been researched in Namibia.

Namibia’s population is unevenly distributed within the country, with the south being the most sparsely populated and the north being the most densely populated parts of

the country. Mining developments are mainly located in the southern part, resulting in a formation of a labour movement pattern from north to south. In Namibia, the apartheid era with its racial segregation and homeland policies, restrictions and strict control on the mobility of the non-white population, left strong scars on the contemporary migration processes and pattern. From the Namibia's independence in 1990, the political freedom made possible increased movements of people around the country (Hastings, 1999). The newly acquired freedom of movement is a democratic right that poses additional challenges to urban and regional planning. Causes for migration in Namibia are not mutually exclusive (Pendelton & Frayne, 2000). Economic, socio-political and natural factors are all cited as being crucial for internal migrations in Namibia. Rural unemployment and 'under-development' is blamed for the overwhelming human migration from northern Namibia and the subsequent urbanization. The interest to analyse and understand 'migration' in Namibia has increased considerably. Research on migrations focus on an analytical understanding of rural-urban migration and urbanization processes in Namibia (e.g., Amutenya, Andima & Melber, 1993; Andima, Kahuika, Melber, 1994; Melber, 1996). The limitation of these studies is their excessive focus on larger urban centres like the capital city of Windhoek (Frayne & Pendelton, 2002). Migration trends of mining settlements are as yet studied only through investigations of the labour hire system of the apartheid regime.

Riley (2011a) argued that the temporary nature of the mining industry and the uncertainty of the mining activities constrain any mine labour force to enter a long-term commitment to settle permanently and to develop a strong sense of place with

connections to the community in the resource region. Similarly, in Namibia, migrant dwellers continue to regard their rural origin as a 'home', mainly because the majority of the nuclear family members continue to reside there (Tvedten & Mupotola, 1995). This has implications not only for the social organization and income levels in urban areas, but also for the willingness of people to invest in urban life. Due to the large share of earnings that are transferred back to their rural 'homes' (Stark, 1991), the mining settlements' successful transformation into an urban centre is hindered.

When a mine is about to close down, many mining settlements become deserted once residents move away, particularly the educated youth and people in economically active age groups (Robinson & Wilkinson, 1995; Kilian, 2008). In absence of studies confirming this desertion for mining settlements of Namibia, foreign experiences support these adverse effects of such out-migrations. A diminished share of educated young people in a mining settlement reduces the settlement's capacity to transit into a self-sufficient urban centre. Smaller settlements are harder hit as they suffer comparatively greater losses of population than larger settlements. O'Hagan and Cecil (2007) stated that the size of population is an essential factor in prediction of possible migration trends after closure of a mine.

Migration is a multi-dimensional system which has numerous impacts on the settlement's development. The reviewed work underlines how crucial the understanding of this problem formation is for the forward planning of mining settlements.

2.4 Overview of mine closure and consequences on mining settlements

The past thirty years have seen rapidly developing research interest on mine closures and how they affect mining communities and settlements. This is documented, for example, by authors like Keyes (1992), Neil, Bradbury & Tykkyläinen (1992), Robertson, Devenny & Shaw (1998), Haney & Shkaratan (2003), Pack (2005), Moller, Flugge & Murphy (2006), Macdonald, McGuire & Weston (2006), Laurence (2009), Stacey, Naude, Hermanus & Frankel (2010) and Digby (2012). The universal research focus seems to agree that ‘mine and settlement’ are a symbiosis which deserves yet much more attention.

In the past 15 years it has been widely recognized that it is insufficient for re-development planning to simply reclaim mine lands. The critical study of politico-economic and socio-economic problem formations and their early resolution are equally important.

The closure of a mine is the final outcome in a series of mining cycles (exploration, development and closure) and thus should not be overlooked as an unexpected problem, but rather be seriously considered as a straightforward and anticipated event (Keyes, 1992). Digby (2012) argued that closures in the mining industry often are more dramatised, compared to close-downs of other kinds of industry, as mines often constitute a large proportion of the local economy. Closure or withdrawal of mining activities will impact on the local economy (unemployment, low wages, lack of inward investment); on demographics (out-migration of the young and skilled); on public

infrastructure (poor housing, deterioration of public institutions); and via the lack of leadership (crime and anti-social behaviour).

Traditionally, the general myth is that mines close due to exhaustion or depletion of reserves. While in certain cases this may be true, a considerable volume of literature confirms that this is not a main reason for mine closures. Publications, for instance, by Johansson *et al.* (1992), Keyes (1992), Australian Government (2006) and Laurence (2009, 2011) discussed several reasons for closure of mines such as economic causes, operational causes, unpredicted geological considerations, technical issues related to methods of mineral extraction, social or community pressures, mine safety or environmental impact breaches, and changes of the political and regulatory framework. Mine closure causes severe distress on communities living near the mine, as well as threat of economic and social collapse – possibly of an entire region. The loss of employment is one of the most serious and long-lasting consequence of mine closure. Haney & Shkaratan (2003) argued that even five or more years after the downsizing of the local mining workforce, a community is still struggling to find alternative income sources. “Mine closure usually means a severe reduction in income at best, and a huge cost in terms of social and environmental mitigation at worst” (World Bank & IFC, 2002a, p. 1). Decline will affect the next link in the industrial chain, the closure of which will soon follow suit and thus deepen the decline of the whole region (Spooner, 1981). The community whose traditional way of life has been negatively affected after the mine closure may now suffer a regression into an even worse situation than it had known prior to the development of the mine (Power, 2008).

Miller (2002), investigating small rural communities in crisis in Canada, concluded that such communities often lack resources, time, required education and skills. The social environment in the community worsens significantly with the closure. In general, communities end up poorer than before due to environmental and social damage (Evans, Goodman & Lansbury, 2002; Nel, Hill, Aitchinson & Buthelezi, 2003). Digby (2012) stated that many mineral-rich countries are skills-poor and have large vulnerable populations. If mine closures do not translate into further opportunities, the resulting socio-economic problems may potentially affect an entire country. Social evils, whether violence, women and child abuse, increased drug and alcohol abuse, prostitution, spread of diseases, HIV/AIDS, depressed expectations, power struggle, extreme social hierarchy and paralysis of normal ways of decision-making, all may escalate and turn into a vicious cycle of problems in the mining settlement (Kuyek, 2003; Kilian, 2008; Laurence, 2009; Sharma & Rees, 2007). The distresses of mine closure are similar to those which Johanston (1982, p. 257) discussed and abstracted in his cycle of poverty. 'Poverty cycle' studies which have emerged in recent years (e.g., Shildrick, MacDonald, Webster & Garthwaite, 2010) may well correlate with the socio-demographical context of the mining settlements suffering the downturn of the mining cycle. Digby (2012) observed that social issues are difficult to address as they deal with human perceptions, hopes and expectations, as well as with fundamental matters of skills, jobs, local beneficiation and sustained quality of life.

DiBoscio (2010) elaborated on the sensitive issue of mines assuming the role of government by providing much needed local services such as hospitals and schools.

All of these may then fall into disrepair after the departure of the mining company, since they were never really 'owned' by the local community and government who never developed a sufficient capacity to manage these institutions sustainably themselves. Existing infrastructure and oversized buildings may not be suitable for subsequent local use, and after mine closure, the community might inherit an expensive infrastructure for the maintenance of which they have neither the resources nor the capacity. The oversized and modern infrastructure may become a liability instead of an asset (Spooner, 1981; World Bank & IFC, 2002a; Kuyek, 2003; Limpitlaw, 2004). Most mine assets have little value after closure and it may not be easy to find new uses for mine infrastructure. Reclamation can be extremely expensive. Inappropriate rehabilitation of the environment may leave long-term consequences and hinder the potential investments to attract other industries (Spooner, 1981; World Bank & IFC, 2002a; Laurence, 2009). In order to avoid such pitfalls, Macdonald *et al.* (2006) suggested designing the mine's infrastructure from the onset with the post-closure needs of local communities in mind. This, of course, requires community input during the design process. It may mean placing infrastructure in locations which more suitable to local villages than to mining operations, and working to dovetail mining development plans with regional government and community plans, so that the infrastructure does not become the sole responsibility of the mine. By achieving these goals, there is much greater chance that community development programs sponsored by mines will become sustainable and not remain 'nice' projects of the mine management during the operation of the mine (Macdonald *et al.*, 2006).

The dependency of a local government on the mine for infrastructure and service provision might turn out potentially devastating for the mining settlement and the whole region after closure of the mine. The drastic cessation of significant capital influx and the inability of local and regional administration to generate sufficient revenue to cover the cost of running their jurisdiction causes some settlements even to give up their municipal status because they can no longer afford to maintain their services (Kahn *et al.*, 2001; Kuyek, 2003), and those settlements which did not have municipal status are hesitating to have it proclaimed.

The reduced size of urban population and communities changes the demand and supply pattern in the whole region (Leadbeater, 2006). Communities which do not recover after closure often end up in a permanent state of financial and social stress and fiscal strain and are unable to recover these costs by themselves. Struggling communities may be left to pass the burden to other levels of the government (Marchand, 2005). In order to minimize negative effects, World Bank (2002), Macdonald *et al.* (2006), Digby (2012) and Hernadi & Fraser (2012) emphasized the importance of preparation for mine closure. A century ago, when mines ran out of reserves, production stopped and mines simply were abandoned (World Bank & IFC, 2002a; Mulvey, Baker & Scott, 2012). This process was considered to be mine closure and thus inevitable. Nowadays, of course, mine closure requires to return the land to a useful purpose, taking into account the physical reclamation, alleviation of the socio-economic stress, and the long-term community sustainability (Veiga, Scolbe & McAllister, 2001; World Bank & IFC, 2002a). Today, therefore, mine closure is a management challenge rather than a technical act (ICMM, 2008).

Several aspects need to be considered in preparation for mine closure, such as: (i) early planning for closure and, from time to time, re-evaluation; (ii) need for on-going communication with varied stakeholders; (iii) environmental monitoring right from the conception of the project; (iv) necessity of economic diversification of the settlement throughout the mining cycle; and (v) assistance for mine employees and their families come mine closure time. Studies of Marchand (2005) and Laurence (2009) suggested that mining settlements recover more easily from mine closure if the shock of the closure is reduced. Local authorities and community must pay attention to early warning signs - usually in the form of poor financial performance of the mining company, or considerable shifts in global commodity markets, all being signs that the resource is nearing depletion. It should be a standard procedure for the mining company to give the local community some advance notice of when the economic shock will occur. Laurence (2009) reasoned that, although not always possible, well-planned mine closure would usually result in a less disastrous aftermath.

It is widely agreed that every mine closure is site specific, which local circumstances will determine local post-mining outcomes, and that little can be learnt from generalization. Still, Digby (2012) emphasised that although there are issues that are site specific, different from one location to another, relevant in one culture but not another, there are always universal elements of acceptable good practice. Successful mine closure requires trilateral consultations between mining companies, government and communities living near the mine, together with long term commitments and stakeholder cooperation (Mudder & Harvey, 1998). This idea has been postulated for the last decade, and mining companies publicly stress the importance of community

involvement. In reality, however, companies are very wary to discuss mine closure, as they fear negative reactions from shareholders, employees and community members. They often resort to rather sell the mine than to face reality. DiBoscio (2010) and Digby (2012) observed a tendency of larger mine operators to transfer a mine to smaller, less-skilled operators as they near their end of operation. Instead of discussing the problems with communities, these large operators prefer to quietly disappear. Yet, communities are able to accept closure if the matter was discussed with them (Macdonald *et al.*, 2006). Digby (2012) viewed this as an indication that mine operators are still struggling to work effectively with local communities to plan ahead beyond closure. Early preparation for the mine closure is thus recommended. Hernadi & Fraser (2012) and Macdonald *et al.* (2006) supported the notion that it is very difficult to create alternative economic activities and to provide suitable skills for a fully dependent community in the late stages of a mining operation. Planning and preparation for a sustainable future for the mining settlements involves early analysis within the past and present context to find alternative ways for a settlement to sustain itself. The assessment of community priorities and commencement of planning for the future is required even before a significant new project is proposed, including the drawing up of future land use plans, inventory of preferred industries, and formulating policies for new developments and their extend.

There is a wealth of knowledge about communities transiting from one economy to another. Judging from different experiences in history, the outlook is not always optimistic for finding an alternative economic base which could maintain the same size and same economic standard of the mining settlements after mine closure. Clements

(2003) analysed different dimensions of decline. From his analysis emerged the concept of an ongoing cooperative relationship of the company, the town, and the work force. Whatever their different interests, the continuing production of the mine was crucial to the existence of each. The decline of the mining settlement reduced its business, but did not much alter the mix of commercial establishments. The experienced cycle of decline, however, demonstrated that it was mining which propelled the engine driving the town forward. Many towns are then unable to find an alternative, and Clemenson (1992, p. 113) concluded: “mining has no substitute in the short run”. Keyes (1992) argued that emphasis should not be on finding a substitute for the mining industry, but rather, that “a collection of smaller businesses, preferably complementary, could go a long way in generating considerable economic activity” (Keyes, 1992, p. 39).

Planned mine closure is still a new concept in mining regions. Yet, there are excellent examples with a range of solutions proposed to deal with the decline of mining settlements, and to trigger the transformation from a single industry settlement to a multifunctional settlement. Hernadi & Fraser (2012) praised the success story of economic development of Kimberley in Canada. They illustrated how a mining town was transformed to a successful tourism destination through development of several golf courses, a ski resort, conference centre, walking and biking trails, river rafting and fishing, camping and vacation homes, finally increasing population, attracting tourists and a variety of business opportunities. Hernadi & Fraser (2012) emphasized that this success required ample planning. The advantages of the area’s unique features were assessed, and large investments into the creation of facilities which attract visitors were

acquired from joint ventures between government and private enterprise. The co-operation of industry and government was instrumental.

The transformation of Elliot Lake is another success example. Neitzert *et al.* (1999) described how after mine closure the settlement experienced an out-migration and a crash of the local real estate market. Property prices plunged and mining company homes became abandoned. The municipality developed a scheme to attract retirees to the area. After the collapse of the real estate market, affordable housing and investment into facilities for senior citizens convinced retired people to stay and others to move in. Neitzert *et al.* (1999) claimed that the retirement scheme successfully stabilised the population of the settlement and a small service industry continued to remain active.

Feagin (1988) presented the success of Houston City transforming itself from an oil city to a comprehensive city despite periodic downturns of the oil industry in the past. He reasoned that an advantage for smooth transformation was Houston's favourable location, but only along with resources to develop pillar industries and extending the industrial chain as far as possible. The presence of banks, medical, educational, cultural institutions assisted in the transition.

Weber (2005) presented visions for the Kennecott Utah Copper mine being transformed into an 'eco-industrial park (EIP) at multiple Kennecott locations, particularly around tailing impoundments. He suggests future getaways to Oquirrh Mountain recreation and tourism areas, new cultivation projects for export (vegetables and herbs) and regional organic food markets, supplemented by high-value cultivation

of cut flower plantations. Another idea envisaged turning the mine into a renewable energy production centre.

Not all of these suggestions and ideas may suit the Namibian situation, but the examples from different case studies provide a kaleidoscope of ideas with a positive view on how mining settlements have found their way forward. The interaction of mining, local economy, and communities in the setting of developing countries, however, differ from those of developed countries. Approaches to tackle mine closure and post-mining planning with alternative socio-economic and environmental options are rarely published (CSMI, 2010b), although lessons on good practice may help understand the universal problems and current processes in mining settlements in pursuit of success. Digby (2012) proposed the following aspects to consider in strive for success: (i) a change of mindset from the earliest stages to already focus on a design for closure, (ii) create and nurture a constant dialogue with local community, and (iii) constantly look outside the mining sector for solutions. However, experiences, e.g., gained in Ghana show that different attempts to diversify the local economy of mining communities did not materialize. Hilson and Banchirigah (2009) found that diverging mindsets of stakeholders promoted failure, thus demonstrating that local specifics of mining communities must be studied carefully. Success is not reachable without understanding the mindset and ambitions of the local community, and in conjunction with the background of the local and regional economy.

2.5 From global capital flow to local economic development

Globally, the capital intensive mining industry constantly requires the acquisition of (inter- and multi-) national investors, who are seeking opportunities to profitably invest in mining shares and, thus, to sustain the production of the mining industry. Such capital is difficult to find in Namibia, resulting in the fact that the country is rather trying to attract capital flows which usually are deployed by large multinational mining companies. The role of the mining industry on economic development of mining areas and settlements cannot be separated from internalising how global capital moves and influences local development. The mining industry very rarely finds its capital locally. The Namibian mining sector relies on foreign investment, thereby exposing national and local economies to the global processes of capital movement, inducing problem areas such as financial controlling or leakage.

During the 1950s, economic growth in developing countries was discussed amongst two opposing politico-academic camps, namely the Marxist and the post-modern versus neo-liberal convictions. Debates about economic growth and uneven development emerged in writings of economists (Perroux, 1955, 1988; Krugman, 1991) and of geographers who placed the notion of uneven development into spatial dimensions (e.g., Harvey, 1982; Smith, 1984; Derek, 1994; Storper & Walker, 1989). Harvey (1982) explored the geographical dimension of Marx's theory of capital accumulation and a more distributive, people-centred future. Smith (1984) analysed 'uneven development' through capital movement. Both authors claimed insight into uneven spatial development, fixed capital formation, ground rent, the credit system, crisis formation and globalisation. Harvey's accumulation cycle may very well explain

the contemporary mining cycle and the developmental trend which is so crucial for the understanding of the growth and fall of mining settlements within the mining cycle. He argued that the phase of economic stagnation is a gentle mechanism of technological adjustments for capitalist enterprises, and a good period for a variety of arising opportunities. He explained his observation with larger surplus value to profit enterprises due to lower labour wages and lower interest rates, which may partially compensate for lower commodity prices. Relating his accumulation cycle to Lucas' (1971) life-cycle of mining settlements, the bottom low of stagnation for the mining enterprise is merely a self-restructuring mechanism, but for the mining settlement it is time to fight for survival. Smith (1984) related this stagnation period to underdevelopment when unemployment has increased and the labour productivity has dropped. Low labour productivity is thought to be due to the labourers' dissatisfaction, as would be expected in times of downsizing and wage cuts. Similarly to the capital movement theorists, migration research suggests that close to the closure or downsizing of a mine (stagnation period), out-migration from the mining settlement will increase while the settlement declines (e.g., Marchand, 2005), thereby demonstrating that labour is just another form of capital which moves on toward another location come stagnation. Thus, both vertical and horizontal processes would be related to Smith's (1984) idea of capital movement in his underdevelopment theory.

The recovery from economic stagnation is faster for the mining enterprise than for the settlement itself, for the reason that, as soon as the expansion of the mining industry begins, labour wages still remain low and the settlement's recovery is slightly falling behind the capital accumulation cycle in mining economics. Harvey (1982) noted that

the governments could play a greater role in almost every aspect of the reproduction of capital. They could be instrumental in balancing the development through labour legislation and fiscal and monetary restraint. If applied to Lucas' life-cycle theory, such administrative instruments may smoothen the cycle of extreme booms and busts.

If Smith's (1984) 'uneven development' pattern is applied to urban areas, it resembles Lichtenberger's (1992) city life cycles. Smith (1984) pointed out that the geographical decentralization of capital in the construction of suburbs led to the underdevelopment of the inner city which causes the steady devaluation of entire inner city districts and thus gives way to gentrification and redevelopment. The inner city, underdeveloped with the suburbanization of capital, re-focused on development attracting more capital. Storper & Walker (1989) noted that the mobility of capital and the characteristics of the local labour market may interact differently in different settings and thus produce different models of economic growth.

Another distinct group of economic studies by 'unbalanced' growth theorists, explores the influence of mining on regional development. Perroux (1955, 1988) introduced the idea of economic growth nodes and emphasized that economic development is not uniform over an entire region, but takes place around a growth pole which in turn triggers the development of other industries. Applying this theory to the mining industry, it was argued that developing a large mine in a depressed area would have a positive trickle-down effect through other upstream and downstream industries, and thus support the development and expansion of economic activities in the whole region. During the 1960s and 1970s, the growth pole concept had great influence on

policy makers worldwide although the desired process failed in many cases (Parr, 1999). Since negative spillover effects often could not be controlled (Ades & Chua, 1997; Murdoch & Sandler, 2002), ultimately, the growth pole strategy was abandoned. Adams-Kane & Lim (2011) and Speakman & Koivisto (2013) concluded that the perceived lack of success of growth nodes may have arisen from academic debates which focused more on theoretical explanations than on the empirical study of growth nodes, and thereby limited the research to a fairly narrow treatment of the topic.

The growth pole concept is not new to Namibia. It has been applied in regional planning and development. While there is a lack of examples demonstrating the success, the concept is still deliberated. Christiansen (2012) referred to three such growth points in Namibia: (i) Windhoek, (ii) the Walvis Bay/ Swakopmund, Henties Bay and Arandis triangle, and (iii) the so called Otavi-Tsumeb-Grootfontein triangle. The prospective growth node Walvis Bay/ Swakopmund, Henties Bay and Arandis was discussed in the light of the expected upcoming uranium mines as well as off-shore phosphate projects and potential off-shore oil resources. In the view of falling global uranium prices and the government's moratorium on planned marine off-shore phosphate mining in Namibia, the discussion on progresses of this growth node has turned silent.

The Export Processing Zone (EPZ)³ Act was looked upon as another tool to enhance a local economic diversification through spill overs by forming backward and forward

³ The Namibia Export Processing Zone Act of 1995 offers export-oriented manufacturers a range of internationally competitive advantages in form of free-tax regime (no corporate tax, no duties and value-added tax (VAT) on machinery, equipment, raw materials imported into Namibia for manufacturing purposes) for the life time of approved project, companies are allowed to repatriate their capital and profits and guaranteed equal treatment of local and foreign investors.

linkages with local enterprises. Today its benefits are questioned by, e.g., Jauch (2001, 2002, and 2006), Endresen & Bergene (2006), Nujoma (2009), Rosendahl (2010) and Masawi (2014). The implementation of growth node model prompted insufficient interaction between large companies and local suppliers. The backward linkages were limited to small scale basic services only (e.g., procuring security and safety services, cleaning, catering, transporting and banking services), and local enterprises distanced themselves from strategic decisions. The required linkages tended to keep the start-up and growth of local enterprises at a low level, and the full local economic development potential was rarely harvested (DiBoscio, 2010; Rosendahl, 2010).

In response to these disappointing results of traditional ‘top-down approaches’ of the growth pole, the development policies shifted towards local economic development (LED) strategies in 1980s (Mitchell, 2002). The LED concept built on the existing growth pole theory, initially focusing more on manufacturing and less on service provision or on mining. It was seen as incompatible with the ‘new’ thinking which underlies LED (DiBoscio, 2010), and was allegedly not particularly conducive to the type of growth the LED endorsed in developing countries. Nonetheless, the LED concept spread around the world, partially because of the minimal success achieved by central governments in regional development under the mounting pressure to address social and economic problems which affect sustainable development (Nel, 1999; Akah, 2008). The process was ‘bottom-up’ where communities take control and assume responsibility for development planning which is designed to suit the distinctive conditions of their locality, capitalizing on local opportunities (Ross & Friedman, 1990). Over the past decades, the LED movement has become a preferred

instrument for economic development of communities in many countries around the world (Akah, 2008). Concepts relating to LED issues have become a focus for social sciences (Syrett, 1995; Akah, 2008).

Barberia & Biderman (2005) recognize that LED strategies in developing countries are still in their early stages and just start to be accepted and flourish. Since neighbouring South Africa's independence in 1994, the LED movement emerged rapidly. It arose out of the persisting problems of slow economic growth and widespread poverty, combined with changes in the national and international economic environment. The effective inability of many central states to intervene at the local level have provided a strong impulse towards more locally based initiatives. Authors such as Nel & Humphrys (1999), Nel (2001), Rogerson (2003), Simon (2003) Rogerson (2004a, 2004b), Nel & Rogerson (2005), Akah (2008) and Mahlawe (2010) have captured implementation of the LED strategies in South Africa.

The spread of LED ideas is slower in Namibia. The LED strategies are not widely known in Namibia, documentation is fragmented, with the media only reflecting on some local authorities which tried to implement the LED initiatives in larger urban centres. Geiseb (2008) pointed out that LED activities in Namibia often are limited to the provision of the development of open markets to accommodate growing informal trading activities, which, however, are primarily driven by the interest of the local authority to control and regulate the informal sector. Some SME support initiatives (Erastus-Sacharia, Hansohm & Kadhikwa, 1999; Nuyoma, 2010; Stork, 2010) noted the ambition of servicing urban land for business expansion and industry development

in their local authorities. Geiseb's (2008) findings were summarized in the report on the state of LED in the country. It showed that formal approaches to LED are only evident from the initial adoption of a LED Policy Framework in March 2000, which intended to equip local authorities with a reference guide to initiate programmes and activities aimed at stimulating their local economy. Unfortunately, 15 years later, efforts beyond the policy framework are still constrained, while claiming that Namibia experiences capacity challenges at various levels, from the central government to local authorities, as well as lack of consulting expertise to render required services. While LED awareness has increased significantly over the last few years, most local authorities are still trying to drive economic development activities without the proper guidance of suitable LED strategies and/or policies in place, and hampered by lack of funding (Geiseb, 2008). As highlighted by Shawn and Meyer-Stamer (2005, p. 9.) "LED costs money, if only for the training of local officials and for the consultants who are invariably hired to elaborate the strategic LED plan".

Rodriguez-Pose and Tijmstra (2007) explained the two approaches in LED: the one emphasizes economic growth at local level and is referred to as 'pro-growth'; the other is more concerned with welfare of people, aiming at poverty reduction and exclusion, and is referred to as 'pro-poor' (Barberia & Biderman, 2005). South Africa has taken a 'pro-poor approach', prompting questions whether the strategies of this approach are more effective in terms of poverty relief than the spin-offs of 'pro-growth' strategies (e.g., Nel & Humphrys, 1999; Nel, 2001; Rogerson, 2003; Simon, 2003; Tomlinson, 2003; Rogerson, 2004a; Rogerson, 2004b; Nel & Rogerson, 2005).

Akah (2008) leaned to the opinion that a rationale behind many LED initiatives in South Africa is the fact that people living in their localities are becoming increasingly concerned about their economic future. Rather than wanting to be left with the result of economic strategies pursued at national level, they want to be in charge of their own economic future through LED initiatives.

The LED approach covers four main areas of interventions: (i) support to small and medium scale businesses (Cook & Hulme, 1988; Mitchells, 2002), (ii) creation of public-private partnership (Binza, 2008; Binza, 2009), (iii) sector development (Perry, 2010; Hobson, 2011; Rodriguez-Pose & Tijmstra, 2007), and (iv) regional development. Each approach has distinct objectives on how to achieve local development, but the rationale behind the implementation of LED often is the same, namely employment creation. Mahlawe (2010) noticed that the tactic which a community chooses may depend on the size of the location. Larger centres are increasingly focused on creating stronger relationships with the private sector, thereby creating frameworks for long-term market expansion. The LED initiatives in smaller centres, on the other hand, where unemployment is high and the informal sector booming, tend to be project-based, or, in some cases, the government is perceived as key provider of development solutions and employment. There is a slight relation to Christaller's (1933/1968) suggestion that, as a settlement grows, the range and number of economic activities also increase; a dimension to be investigated in future. Barberia and Biderman (2005) noted that both, activity types as well as locality, matter when LED is to be successfully implemented.

DiBoscio (2010) pointed out that conventionally the discussion on implementation of LED in mining settlements was controversial, particularly because mining has been considered incompatible with ‘new’ LED thinking. The changes started with the shift to the sustainable development model in mineral exploitation. The sustainable development approach has distilled key principles from modern growth theory, offering large mining companies a guiding policy for practical implementation. The mining companies responded positively to this paradigm shift as they realized that ‘sustainability’ could improve their organization, making production more efficient and, most importantly, improving global competitiveness (Porter, 1990). The LED approach was incorporated as a component of a corporate strategy.

Akah (2008) found that, although Local Economic Development in South Africa enjoys wide recognition, it seems incomprehensible why local communities seemingly cannot exploit their economic resources sufficiently to overcome poverty. Apparently this is not observed in South Africa only. With the view on industrialized countries, Barberia & Biderman (2005) along with Cunningham & Meyer-Stamer (2005) were puzzled about the limited evidence of LED effectiveness and posed the question whether introducing LED is really worth the time and effort.

At local level, LED initiatives surface and disappear. Their strategies are rarely implemented in costly long-term projects. Local authorities usually have no budget for these activities, which means that LED takes a backseat as it cannot serve as a quick-fix. In fact, Cunningham & Meyer-Stamer (2005) highlight that many ‘strategic’ approaches enforce this perception since they emphasize the need for lengthy

mobilisation, research, and planning processes before any payback may be expected. Another interesting point by Cunningham & Meyer-Stamer (2005) was that LED may not achieve expected success in places where local governments do not have any tax authority. If a local authority does not gain tax benefits from a vibrant local business sector, it is very difficult to implement such strategies. Even if local governments are willing to undertake LED, it is by no means certain that they possess the communicative and organisational skills necessary to deliver the concept in an effective way.

Large mining companies, in turn, often report on large amounts of capital invested in African countries for mining development and openly state how they contribute to socio-economic development at a grass roots level in mine-affected communities. Kilian (2008) revealed that in reality, however, communities in the developing world have usually been completely bypassed by any development benefits from projects and are often left in a marginalised state in which they are far worse off than before the mine opened. Spooner (1981) and Maude & Hugo (1992) explained that profits from mineral extraction often are leaked out or being diverted internationally and do not reach local or regional communities. Miles & Kinnear (2008) confirmed evidence of such leakage from mining, although noted that a leakage may vary from company to company. DiBoscio (2010) explained that the better a company performs, the more investment a community will receive from this source.

Additionally, mining cycles may affect the mining company's investment flow to the local community. Economic slowdown in mining results in lower profits for mining

companies, thus reduced investments into local communities, which then are likely to slide into a period of economic decline. The findings of DiBoscio (2010) supported the view that the main economic potential from mining companies may lie not just in the companies' cash flows, but in their ability to trigger a process of broader economic development, which should largely be driven by their significant institutional and organisational presence, strong managerial capacity, and ability to influence local players and established structures of economic governance.

Economists try to measure economic effects of mining on the region through multipliers which depend on the ratio of mining-generated finances in relation to the spending within a region. Assuming money is spent within a region, it would likely stimulate additional economic activities (Eggert, 2001; Armstrong & Taylor, 2000). Thus, in very remote mining areas where the mine labour force is brought in by the long distance commuting (LDC) arrangement, the multiplier is very small. The economic contribution to mining area is small for the reason that mine workers are likely to spend their earnings outside of the mining area. However, McMahon and Remy (2002) pointed out that multipliers may vary from region to region. Naturally, the multiplier rises with the increasing presence and spending of the workforce on site.

Benefits to the national economy from mining mainly originate from taxes and royalties. These may be huge, but the inability to reinvest in the region of generation can jeopardize local and regional development (Lange & Wright, 2002; Lange, 2003). Despite national moves towards political decentralization following independence in Namibia, the majority of taxes paid by mining companies bypasses the local level and

goes straight to the central administration (DiBoscio, 2010). Robertson *et al.* (1998) support the need for informed understanding on how the public benefits from a profitable operation and why it is in the community's interest to own responsibility and find economic solutions for a sustainable future after mine closure.

2.6 Sustainability of mining settlements

The concept of conserving mineral resources for future generations is frequently expounded by conservationists and environmentalists. The resource depletion philosophy echoes the judgement of the Club of Rome in the 1960s. It reflects the Malthusian thesis of the 18th century by uttering concern that resource exhaustion and price escalation would limit global economic growth. Until today, opponents, e.g., Joyce & MacFarlane (2002), White (2003) and Barker & McLemore (2005) pointed out that no such evidence has emerged yet. Mines do have a finite life cycle but there is also the possibility to discover new or additional resources, or to recover metals from lower ore grades, or to recycle. Along these lines, White (2003) emphasized that material substitution should not be overlooked as a factor in an effort to secure the needs of the present generation. He argued it would be more progressive and positive if sustainable development were defined as meeting the needs of this generation while ensuring the ability of future generations to meet theirs. To ensure the ability of future generations to meet their needs, it is assumed that current skills and resources will be used wisely to lay the foundation for human generations to prolong their material and natural means of reproduction. Natural resources exploited today may provide the stepping stone to facilitate future technological and material inventions required for sustainable development.

White (2003) and Barker & McLemore (2005) concurred that preventing the current generation from utilizing the natural resources of today may be counterproductive and could adversely influence and even doom the socio-economic growth and development of future generations. Within this paradigm is assumed that industries, services, people and skills will remain to benefit future generations, even when mineral-based activities decline or cease to exist. Allan (1995) is convinced that sustainable mining can exist if the rate of use of minerals does not exceed the capacity to detect new resources.

Critics of this paradigm are dissatisfied with this kind of reasoning and claim that the extraction of non-renewable resources can never be sustainable, in line with the definition, “mining is a problem and as such should be treated” (World Rainforest Movement, 2004, p. 13). The finite nature of minerals puzzles promoters of sustainable development (Fitzpatrick, Fonseca & McAllister, 2011). Respectively, questions arise concerning the definition of ‘sustainable development’ and its meaning in the mining sector. Anderson (2003) highlighted that over 300 definitions of sustainable development are available, depending on specific application fields. Similarly, Nuong *et al.* 2011 noted that ‘sustainable development’ may be referred as sustainable growth, sustainable economies, sustainable communities, sustainable mining. The most frequently quoted definition is derived from the Brundtland’s *Report Our Common Future*, where sustainable development is the “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 41). This requires the integration of a variety of disciplines,

but still lacks evidence if the term ‘sustainability’ in mines is applicable (Hodge, 2004).

The concept of sustainable development gained momentum as early as the 1970s, forcing the review of the mining industry’s contribution to development. A platform of suggestions exists on how to achieve sustainability in mining; by covering aspects of environment, economic development, and community. Early publications on sustainability in mining are dominated by solution-oriented research on rehabilitation of mine sites, and environmental concerns during the life of a mine and after closure. A more recent approach towards sustainability of the mining industry includes socio-economic aspects and mining legacy. Laurence (2011) researching unplanned and premature closures of mines over the past 30 years, depicted the different aspects of sustainability and concludes that it may still take time until the mining industry embarks upon this concept.

Sustainability assessments in mining are sensitive to properties of mineral resources, namely ore grade, size and mode of extraction, all having a bearing on the environmental footprint of the mining industry. Publications by Mudd (2007) and Mudd & Diesendorf (2008) argued that the growing trend to extract lower-grade ores prompts greater environmental damage by the mining activity. In contrast, Von Below (1993) noted that sustainable development in mining can be achieved through continuous exploration, technological innovation, and environmental rehabilitation. He stated that low mineral prices prevent sustainable mining development by cutting short the life span of a mine, particularly in developing countries. Apparently, his idea

of reaching sustainability through stimulation of commodity price climbs does not consider the fact that higher prices will convince mining companies to extract ores with even lower grades, thereby compromising the environmental sustainability of the mining site as well as future prospects of the mining community to prosper. Azapagic (2004), Li, Zhao & Zhao (2008) and Worrall *et al.* (2009) represent the growing research trend which searches for the 'right formula' for measuring 'sustainability' with sustainability indicators. Still, it would be most crucial to investigate more widely how the process of reaching sustainable development goals in mining could be assessed in a meaningful way.

Since the concept of sustainable development gained momentum, resource economists have split into two opposing 'opinion camps', (i) Sach & Warner (1997), Authy (1998), Kuyek (2003), MiningWatch (2004) and Whitmore (2006) support the notion 'mining is bad', while (ii) Cuddington (1989), Yakubi & Akiyama (1996), Hoadley, Limpitlaw & Weaver (2002) and the World Bank Group's Mining Department (2002) represent the 'mining is good' camp. The 'mining is bad' conviction apparently evolved from commodity market pessimism after one of the worst commodity price slumps in the 1980s which left affected communities to struggle with the consequences of unexpected closures. This crisis triggered numerous publications on the Resource Curse⁴ theory, e.g., Auty (1993, 2001 and 2008), Sachs & Warner (1997, 2001), Auty & Mikesell (1998), Davis & Tilton (2005) and Michaels (2011). Civil dissatisfaction with the mining industry peaked at the United Nations' Rio Summit on Environment

⁴ The Resource Curse Theory applies to countries which are rich in finite natural resources, but fail to develop sectors other than mining. Economies of such countries tend to perform poorly or even decline.

and Development in 1992, where the interaction between environmental degradation, underdevelopment and inequality was exposed (Schandl & Darbas, 2008).

Mining continues to be perceived as a polluting and hazardous activity, and the industry's public relation campaigns still struggle to improve its negative image. DiBoscio (2010) highlighted that severe mistakes of the past have paved the way for implementing sustainable development in the mining industry. Social programs and community projects have started to feed into the design of corporate standards and procedures, thereby representing a radical shift in social responsibility. In a short period of time, this broadened sustainable model of mining and development has filtered down to every level of corporate decision making; inevitably the sustainable development is becoming part of the daily routine. However, Barker & McLemore (2005) pointed out that most such initiatives have been driven by large mining companies in order to classify the industry as sustainable, but the concept must be spread more widely and involve all sizes of mining operations.

The Cochilco Chilean Copper Commission (2002) and Tuck *et al.* (2005) pointed out the fact that multinational mining corporations are more preoccupied with protecting their reputation than small scale companies. A bad reputation would severely affect potential opportunities of large mining companies and increase the cost of entering other mining locations, whereas small scale single mine owners would likely cease to exist after a mine is decommissioned. Larger mining companies indeed usually tend to sell their mining assets to smaller companies whose reputation may not be at stake (DiBoscio, 2010). Consequently, the authors who doubt the 'sustainability' of the

mining industry firmly maintain that mining companies which implement a sustainability concept care more about their reputation than about the wellbeing of the community.

The concept of sustainable mining has been stepped up through promoting collaborative processes, international conferences, and extensive publishing. For example, the Mining, Minerals and Sustainable Development (MMSD) project⁵ amplifies efforts in knowledge dissemination by producing influential publications such as *Breaking New Ground* (2002), *Mining for the Future* (2002), *Finding Common Ground* (2003).

Certainly, the sustainability of the mining industry is still widely debated and presented controversially. Discussions on sustainability of mining settlements, however, are conducted much less frequently. Yet, the symbiotic relationship between mining settlements and mining industry is worth a review. Lermont (1997) and James (1999) agree that mining in general is a non-sustainable activity, particularly those activities which have a relatively short life expectancy. They state that there is little to no reason to expect a long term development from short term mining projects, and that sustainability can only be attained through mine life maximization. This would suggest that mining settlements located near mines with longer life-spans may have better chances to prosper and reach sustainability, compared to mining settlements developed

⁵ MMSD project aimed at research and consultation processes in the mining and minerals sector, trying to uncover the issues on how the mining and minerals sector could maximize its contribution to sustainable development at the global, national, regional and local level.

near small mines with short life-spans. Researches on sustainability of Namibian mining settlements are scarce. Littlewood (2014) is among the pioneers debating the sustainability of Namibian mining settlements, analysing them in context and practices of the corporate social responsibility (CSR). Further understanding of the mining industry's symbiosis with mining settlements therefore is of vital importance and requires ongoing investigation.

2.7 Methodological and conceptual aspects

Settlements have long been researched by geographers and economists. At first such publications were rather descriptive and only when the descriptive approach was complemented by the interpretation of location, the foundations for urban geography as a newly developing field study was laid (Carter, 1990). Historically, mining settlements were of no particular interest in urban geography as their development was limited and their life span was predetermined by that of the mine. Classic urban geography mainly focused on philosophy and theory. A significant limitation is that several classic theories have evolved in the 'developed world' and deal with parameters consistent with the capitalist system which has developed through the stages of industrial and social evolution, like e.g. Rostow's (1960) 'stages of economic growth'. Fair (1982) and Peet & Hartwick (2009) question the applicability of these methodologies for African countries. They argued that settlements in African countries reflect colonial origin and interests, whereas the current rapid urbanization is a recent phenomenon caused by urban primacy and structures of periodic and informal markets. For example, the common phenomenon of dual economies in many African countries challenges the applicability of the 'western' methodologies in a 'developing' world.

The classic western views concerned with urban geography have not produced any specific modifications, and the applicability of the theories within the Namibian context requires a review.

Economic concepts have frequently been used as a foundation for geographic theory (Rana, 2010). In the case of mining settlements evolving from mining activities, it may therefore seem appropriate to engage postulates of economics in geographic theory, in particular, the location theory concerned with the geographic location of economic activity. Out of many location theorists, the first major geographical contribution to Central Place theory was instigated by Walter Christaller in 1933, the architect of the Central Place theory. His aim was to find out whether a law existed which would determine the distribution patterns, number, and size of settlements. He provided a theoretical framework by which settlement location patterns can be studied and understood. It is assumed by Christaller (1933/1968) as well as by later researchers that each level in the central place hierarchy demands its own population size, and that each function requires a particular market to be able to operate. Sadly, publications which would debate the applicability of Christaller's Central Place theory for Namibian settlements are lacking.

Although every urban system is known to be unique, it must be noted that there are sufficient similarities between different urban systems to suggest that there is common ground in all this uniqueness and that urban systems are examples of what is known as 'ordered chaos' (Wong & Fortheringham, 1990). Spatial theories have captured the interest of both economists and geographers. Christaller (1933/1968), von Thünen

(1826/1966), Weber (1909/1929) and Lösch (1940) have engaged themselves in discovering the order in the apparent chaos. Economists are inclined to follow a deductive theoretical approach with relatively little empirical content, while geographers make use of case studies and a larger intuitive conceptual base.

Mining settlements often were ignored as they cannot be properly fitted in the Central Place concept, since mining towns do not have close linkages to their adjacent regions, but are mostly concerned with meeting the demands of people within the settlement. The mining company provides the residents with all necessities; goods and services are mostly imported. "The mine is a self-contained administrative unit, with its own elaborate internal organization" (Epstein, 1973, p. 14). Irrespective of that, such settlements may have a large population size, but may not automatically find a place in the hierarchy of central places. A mining settlement, particularly in its early stage of development, may have a large population size yet remains little more than a 'camp'. It is the scale of mining activities and the size of the required labour force which dictate the population size of a mining settlement. The population size of the mining settlement thus cannot serve as a suitable indicator to determine the rank of the settlement as a service centre (Rose, 1967; Daniel & Hopkinson, 1989) according to the Central Place concept. It can, however, not be denied that this may still change over time as the settlement develops, which would support the notion that the Central Place concept could be included in the research of mining settlements.

Studies of mining settlements highlight the lack of homogeneity among the settlement's community; they point out that the social interests of a mining community

may differ from those of the local community (Cohen, 1968) and that, accordingly, consumer patterns will also be different. The risks of not considering these differences may create resentment among the population groups in the settlement. Local people might feel excluded from the settlement's development, yet in the end when the mine closes and mining activities come to an end, these are the very people who will have to deal with the rising problems. Case studies indicate an out-migration of mine workers following the closure of mines; for example, in writings of Maude & Hugo (1992), Marchand (2005) and Queensland Government (2007). This suggests the urgent need for dual studies of population and migration, of both the local and the mining community.

Research on mining settlements took a turn in the 1970s which witnessed the 'renaissance' of analytical studies. Mining settlements were looked at and analysed through a pre-determined life-cycle model (e.g., Lucas, 1971; Riffel, 1975; Brealey & Newton, 1978; Bradbury, 1984, 1985, 1988) which explored different aspects of a mining settlement, starting from the origin and developments throughout the mining cycle. Characteristics of mining settlements such as population size, migration, and economics prompted research to explore issues on possibilities of diversifying the economic base in mining settlements. Previous empirical studies looked back to the mining settlements of the early 20th century when political and economic forces were dissimilar. The mining methods used in the 20th century differed widely as did the consequences and impacts. World economy and the local economic context have been changing constantly and so have mining operations, methods and concepts. The reliability of past information may be limited and successes of the last century may not

be accurate nor applicable to contemporary mining settlements. Still, problem areas which develop under particular economic or social pressures may remain the same.

The decline of mining settlements has been extensively studied and causes of decline evaluated. Armstrong and Taylor (1993) suggested that the isolation and remoteness of mining settlements could be among main obstacles that hinder future prospects for the settlement's growth. Originally, the model of declining intensity of land use with distance comes from Von Thünen's (1826) land use model. The focus of his study was on agricultural land and distance from the urban centre. His idea of decreasing economic intensity with increasing distance might be applicable to mining settlements too.

With the emerging concept of sustainable development in the 1980s, research methodology and approaches changed considerably. The previously ignored social dimension of mining settlements became important and was incorporated in the settlement studies (Uglow, 1998; O'Faircheallaigh, 1995; O'Faircheallaigh & Ali, 2008). This, in turn, saw the emergence of academic studies applying methodologies of Social Impact Assessment (SIA) in the research on mining settlements (e.g., Burdge & Vanclay, 1996; Gramling & Freudenburg, 1992). Kilian (2008) argued that the application of SIA by mining companies is often largely lacking, particularly in developing countries where the legal framework regulating the mining industry is still evolving.

Mining settlements continued to be researched in an increasingly wider context, capturing physical, social-demographic, and socio-economic aspects. As a response to the novel concept of SIA, investigations expanded in offering guidelines and tools for both mining industry and local governments to steer them through the transitional phase of mining settlements (e.g., Centre for Social Responsibility in Mining, 2005; ICMM, 2008). Social impact assessment often is regarded as a tool to identify impacts, but just as often fails to evaluate the benefits of mining. Ivanova, Rolfe, Lockie & Timmer (2007) argue that there is little integration or overlap of social and economic impact assessment techniques. This lack of integration and overlap limits the usefulness of the application and wrongly suggests that economic impact assessment may be separated from the interests of the community, with little direct input from the stakeholders concerned.

Ivanova *et al.* (2007) provided an alternative technique - the 'choice modelling technique'. The advantage of this method was that it involves the concerned community, it focuses attention on key issues or attributes of importance for people and, it provides some quantitative feedback about the relative importance of those issues and attributes. Ivanova *et al.* (2007) reasoned that this method gives respondents the option to choose between continuation of the current situation or alternatives described by a set of attributes. Variations in the level of each attribute, respectively, create differences in the choice of sets which are on offer. The method ensures that the opinion of the community is included and the regulatory framework will be understood and approved more readily. This echoes the 'scenario method' widely used in strategic planning within both commercial and non-commercial organizations to make flexible

long-term plans where the future is modelled by scenarios which interpret the current realities. This method was successfully used by Shell, a global group of energy and petrochemical companies, to be able to anticipate the oil-crisis of 1973, and to help address uncertainties. The success of Shell has triggered investigations on the applicability of the scenario method in researching the future, assuming that the scenario building method stimulates different perspectives and thus allows for better insight into possible future developments (Schwartz, 1991; Schoemaker, 1993; Van der Heijden, 1996; Fahey & Randall, 1998).

Scenarios can be looked at as coherent stories of the future in order to inform the public, current decision-makers or any other interested person. They include qualitative descriptors to capture cultural influences, values, behaviours, shocks, discontinuities, texture, richness, imagination and insight. Scenarios are supported by quantitative analysis to provide definiteness, explicitness, detail, consistency, technical rigor and scientific accuracy (Kemp-Benedict & Kartha, 2007), but are not predictive. Kemp-Benedict & Kartha (2007) highlighted the numerous benefits of the method, namely: scenarios can (i) expand the range of perspectives considered, (ii) share understanding and concerns, (iii) explore and explain competing approaches to problems, (iv) uncover assumptions and rigorously test them, (v) expose inconsistencies in thought and assumptions, (vi) provoke debate, (vii) identify options and make decisions, (viii) illuminate potential problems, and bring future problems into focus, (ix) explore alternative responses in the face of uncertainty, and test them against different possible future paths, (x) clarify and communicate complex

information and technical analysis, (xi) evaluate policies and help making decisions despite uncertain futures.

Understanding and managing a complex system like a mining settlement as a spatial unit requires simplification. Essential to its understanding is the construction of a simple picture with a limited set of relevant indicators (Turnhout, Hisschemöller & Eijsackers, 2005). Measuring sustainability by means of indicators is being increasingly recognized as an efficient tool for policy making and public communication, in order to convey information on a country's performance in different fields (Azapagic, 2004). Scenarios are also becoming a well-established instrument in resource sectors such as mining, forestry or fishing. The purpose of sustainability indicators is to assess the economic, environmental and social performance, and to provide information on how it contributes to sustainable development. Several papers explore the spectrum of indicators, e.g., environmental sustainability indicators (Segnestam, 2002), sustainable mining indicators (Franceschi & Kahn, 1999; Worrall *et al.*, 2009), and sustainable development of urban spaces (Atkisson, 1996). However, Weber (2005) maintained that sustainability in mining should rather be measured by tailor-made indicators which address specific stakeholder concerns, namely 'top-down', 'expert driven', bottom-up' or 'stakeholder scoped' approaches to sustainability performance. Also, the World Bank, United Nations, United States Interagency Working Party on Sustainability and European Union, have crafted development and sustainability indicators as a tool (EC, 2003).

The question posed by Weber, however, was, “How can we draw on the guidelines and principles set out by international agencies addressing sustainability, and most of all, on the principles and methodologies of the mining industry consensus, itself represented by MMSD⁶?” (Weber, 2005, p. 17). McAlpine & Birnie (2006) and Fitzpatrick *et al.* (2011) shared the same notion arguing that creating a set sustainability indicators does little more than establish a dominant view of sustainability presented by the writer. There are far too many methodologies, formal criteria, ‘sustainability indicators’, principles and expectations to be applied literally, and on top of it all, they must be in broad agreement and not only suited to the mining industry. However, there is also a common consensus that the establishing of sustainable indicators can indeed create a viable approach as it widens the understanding of, and views on, sustainable development. People, cultures and social classes have needs, tastes and desires, and as such different interpretations of what sustainability entails (Bell & Morse, 2003). The knowledge of these studies could contribute to a shared understanding of sustainable mining and settlements. When looking at the types of indicators on mining and communities, it is evident that the traditional indicators developed to measure progress towards a set goal (McAlpine & Birnie, 2006; Bell & Morse, 2001) are mainly quantitative and external. Qualitative indicators, on the other hand, are more often applied in publications on communities, presenting evaluation through the knowledge given by these communities. Combined, both quantitative and qualitative indicators have the capacity to fill the knowledge gaps from differing perspectives.

⁶ Mining, Minerals and Sustainable Development (MMSD) project.

The last few decades have witnessed intellectual changes and the moving away from trends in geographic development, which involves questioning of past approaches and looking at old problems with new eyes (Rana, 2010). The emergence of values such as 'cultural survival, indigenous rights, empowerment of the previously marginalized, eradication of poverty, and anti-globalization', poses serious new challenges (Joyce & MacFarlane, 2001; Barker, 2006). The formulation of new philosophies and methodologies is still ongoing. In absence of a comprehensive approach in studying mining settlements, this certainly justifies the testing of possible conceptual approaches towards the topic of this study.

3 CONCEPTUAL FRAMEWORK

The conceptual framework for this investigation attempts to connect all aspects of inquiry through five main concepts of the reviewed literature which help to identify the main problem areas of mining settlements, the factors that play a significant role in growth and decline, and the interrelationship of these main aspects. This conceptual framework serves as a guide as to which issues were to be included in the empirical investigation.

The concept was engineered to rest on five conceptual pillars, namely (i) the Central Place concept, introduced by Christaller (1933), and still developed further by economists and geographers, (ii) concepts of human migration, (iii) a mining settlement's life-cycle model evolved from Lucas' (1971) original mineral life-cycle model for resource towns, (iv) the local economic development (LED) concept and (v)

mining economics. Figure 3 illustrates the conceptual framework's elements and agents described in more detail in the following.

Starting from the centre of Figure 3, the concepts and models which build up the core of the framework are dynamic, adaptable, and adjustable to a particular situation.

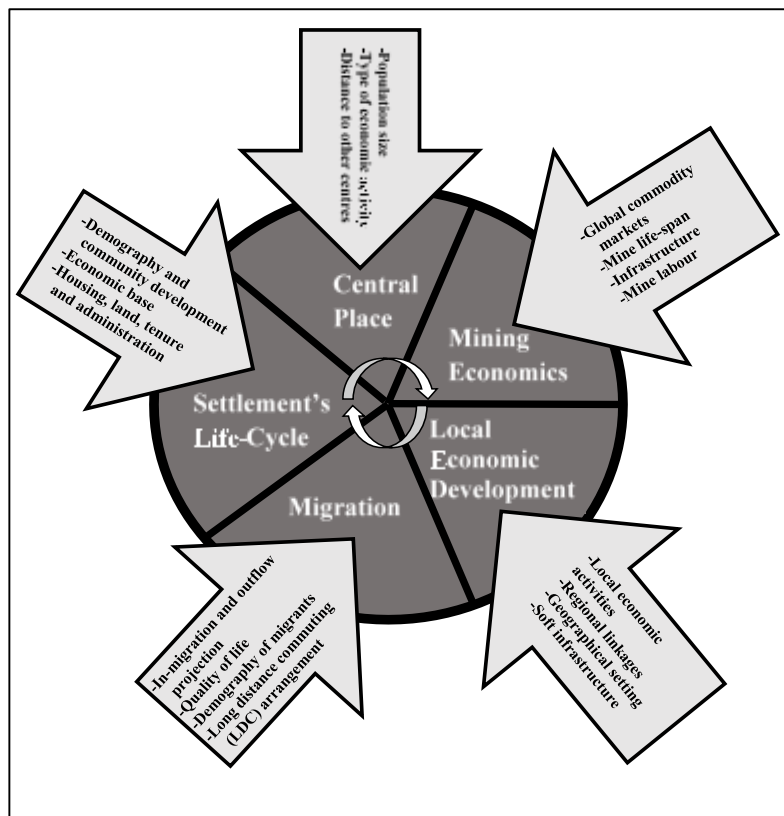


Figure 3. Conceptual framework of the investigation: Core elements and agents.

Dynamic interactions between the concepts involves numerous agents (see arrows in Figure 3) from the relevant theories. The agents are interchangeable over time and thus during the life span of the mining settlement.

The obvious goal for mining settlements is

their sustainability, and to achieve this, the variables from various concepts should be researched within a larger conceptual framework of sustainable development. The traditional focus on environmental impact therefore has to be complemented by other aspects of the long-term socio-economic development.

Clearly the laws of one single concept may not be entirely adaptable to, and mirrored in, the mining settlements in Namibia. Yet, a more complex approach and the use of key properties from selected concept will assist in unveiling the problem areas and prospects of mining settlements in Namibia. Elements and agents from all five conceptual philosophies therefore formed the base for the methodological framework of this research.

3.1 Central Place concept

One of the main concerns of urban geography is to identify and explain the distribution of settlements, their socio-economic and spatial similarities, contrasts that exist within, and linkages between them. The Central Place concept assumes that number, size and location of settlements are determined by a universal law and display fundamental regularities. Even though mining settlements neither evolve in gradual succession like other urban settlements nor form close relationships with their adjacent region in their early developmental stages, this does not deny that linkages with surrounding areas might develop. Mining settlements thus may exhibit increasing similarity with other urban settlements, and might be constrained by the same pressures and urban processes stipulated by Central Place concept. If the Central Place concept is able to explain why some central places function as small settlements, towns or cities, it should also be possible to explain properties of mining settlements through the action of certain agents and laws from Central Place concept.

A central place is a settlement which provides goods and services and can be of different sizes. Christaller (1933/1968) argued that each central place has a 'threshold

population' which is the minimum market necessary for commercial activity to survive, and a 'range' which is the average minimum distance people are willing to travel to acquire such services or goods. The settlements do not grow by themselves unless a certain threshold or range is satisfied. For this reason it is crucial to explore the population issues, evaluate the existing services and goods that are available in the mining settlement, and consider the distance and degree of isolation of the settlement if any future predictions of developmental trends after closure of the mine need to be made.

Population size on its own does not reflect a mining settlement's position in an urban hierarchy. The size of a mining settlement is often determined by the industry's needs for a labour force, reflecting the scale of mining operations. Size could further be influenced by other geographical aspects such as isolation and remoteness of the settlement from other urban centres. Applying Christaller's Central Place theory (1933/1968) to a mining settlement, the number of people in the settlement would suggest a market size and a minimum threshold for selling particular goods or services and for businesses to be operational. The concept cannot automatically be applied in active mining settlements, but it can become a valuable tool for prospect formulation, especially once a survey has established the residents' idea of their own future, how many are likely to leave or stay in the settlement when mining slows down or closes. This concept would set the scene and suggest the potential, particularly the upper limits beyond which development may not be possible, since certain businesses need a certain market size to survive and remain operational.

Christaller's Central Place theory (1933/1968) argued that the number of specialized services will be determined by the size of the population to make businesses profitable. The number of specialized services thus reflects the scale of diversification of the settlement and the type of this urban centre. In the context of this present study, a relevant research question would therefore be able to establish the settlement's dependency on mining operations. Mining settlements are often dependent on a single industry. The settlement might only exhibit vertical diversification, but the number of specialized services would point out the presence of a wider choice of goods and services, and to maintain this presence of higher-order goods would require a larger threshold of population from a possibly broader hinterland.

There are justifiable doubts that population size alone may not be an entirely reliable indicator in a country like Namibia where the Gini inequality coefficient⁷ is amongst the highest in the world. A settlement with a relatively large population size, but unevenly distributed wealth, where a small population segment falls within the country's highest income group while the vast majority belongs to a low income category, may distort the universal applicability of the Central Place concept. A larger population size may be misleading regarding the size, hierarchy, and sophistication/

⁷ The Gini Coefficient measures the inequality of income distribution as a value ranging from 0 to 1, with values increasing with inequality. The countries with more equal income distribution are the Scandinavian countries where the Gini coefficient is as low as 0.25. The sub-Saharan countries reflect the most unequal income distribution with the Gini coefficient over 0.5 (World Bank, 2013). The Namibia Household Income and Expenditure Survey (NHIES) of 2009/2010 states the Gini coefficient for Namibia to be 0.5971 (NSA 2012). This is a slight improvement since the NHIES of 2003/2004 when it was 0.6003 (Republic of Namibia, 2006).

diversification of the local economy. Therefore the size of the population should always be supplemented by information on population income. Poor people will not travel to their nearest high order settlements if they cannot afford its goods and services. They have no choice but to survive on extreme limitations.

3.2 Migration

Analysis of future potential and possible change in settlements cannot be understood without recognition of the specifics of migration and their outcomes (Cheng & Lin, 2010). Human migrations are regarded as the key factor underlying the demographic and socio-economic composition of the settlement and the region as a whole. The very origin and growth of mining settlements is linked to human migration. Mining settlements often are established on virgin land, holding a local community so insignificant in size that it cannot satisfy the mining industry's need for labour.

Development of commercial and industrial centres attracts employment-seeking population as well as service providers. Migration from the rural north and north-east of Namibia accelerates when mining experiences a boom time, particularly when ambitious plans of mining operators are highly publicized in the local media. Expectations and hope for employment opportunities may however be shattered when faced with reality. The influx of people, not all of which can be absorbed by the mining labour force or its servicing industries, contributes towards one of Namibia's major urban challenges - the growth of informal settlements on the fringe of mining settlements. Although mining acts as a pull factor for unemployed Namibians, job opportunities are limited and fundamentally specific, mostly attracting migration of

people from definite demographic strata. Mining settlements tend to have skewed demographic characteristics towards male domination and people of working age, with fewer young and elderly people in the settlement; a large number of unskilled work force, but with relatively high incomes for those who are employed. The evaluation of demographic characteristics of a mining community would expose the extent to which a mining settlement' relies on the mining industry, which would be crucial information in determining the settlement's prospects after the closure of mining activities. A settlement with unbalanced gender and age structures may cease to exist when the mine starts to deteriorate or approaches closure. A young population might have the apparent advantage to constitute a major driving force for economic development, but the settlement might still be at a disadvantage since younger, more affluent and skilled people are more mobile and thus more likely to leave the area to be reabsorbed into the economic mainstream (Laurence, 2006; Killian, 2008). Laurence (2006) argued that after having been employed in the mining industry they can easily move to a new mining project or accept other job opportunity elsewhere. Youth out-migrations are usually permanent if a community cannot compete with other, or larger, urban centres where more attractive job opportunities, better economic capacities and social amenities are concentrated. Mining settlements are threatened by losing their most potent population group. Older populations and settled communities are sustained by a sense of belonging. A larger percentage of middle-aged and senior citizens in a mining settlement might prevent or slow down depopulation after mine closure.

The distorted gender structure towards male dominance in mining settlements is indicative of the limited diversification of the settlement with very few job

opportunities for females. Lack of appropriate family housing, neglected welfare for women and children, and an unsatisfactory social infrastructure do not encourage women and families with children to stay in the settlement. Consequently such mining settlements are likely to suffer large out-migrations to other larger urban centres with better education and age-care services. Out-migration from the settlement will set in once miners start to face the impending closure of the mine. In some cases they do not even wait until mine closure, but start to look for new job opportunities elsewhere long before the mine has closed (Neil, Bradbury & Tykkyläinen, 1992).

The mass migrations triggered by rapid urbanization result in large concentrations of transient population in urban areas. Residents who were born in a settlement or long-term residents (i.e. those living there for twenty years or longer) are proven to be steadier and more attached to the settlement than recent migrants. The size of this population stratum may therefore give an indication of how many are likely to stay in the event of downscaling or mine closure. A survey of the community's views and intentions whether to leave or stay after closure would further delineate the size of the transient population in the settlement. Settlements with a large proportion of transient population⁸ are faced with major planning challenges. Transient population segments are very mobile, and as soon as they fail to find jobs in the mining settlement they move to other urban centres. People who do not intend to stay for long or do not grow attached through settling permanently do not contribute to the local economic development as they are unlikely to spend much of their income in such settlements.

⁸ Transient population refers to a population that is temporary or staying for a short period of time.

Incomes generated often are saved and/or sent back to the rural areas of their origin, which are regarded as 'home', mainly because most of the nuclear family continues to reside there (Tvedten & Mupotola, 1995; Stark, 1991). The fact that income is not spent where it is generated does not only have implications for the social organization of the community and the quality of life of the settlement, but also negatively influences people's willingness to invest in the settlement and contribute towards its development. The transient workers may earn the income while they live in obscure poverty without any intention to improve their interim living conditions. Should employment prospects or other indirect benefits from the mining dry up, the size of the population would diminish, which ultimately will lead to the collapse of the settlement and development of 'pockets of poverty' or yet another ghost town (Vias & Collins, 2003). The initial attraction of migration to the mining settlement are the potential job opportunities with higher income levels than in the place of the migrant's origin. Should conditions change after either a temporary or permanent mine closure, the same process will likely happen, albeit in a reverse direction.

3.3 The life-cycle of a mining settlement

The cyclic nature of mineral exploitation prevents the direct application of variables from central place and migration concepts for mining settlements. Such settlements do not undergo continuous growth, and their characteristics may have different intensity and varying values at different stages which reflect the spatial development of the settlements themselves and the region at large. The selection and analysis of variables therefore must relate to the stage of a mining settlement's life-cycle. This is especially relevant because the life-cycle concept of a mining settlement implies that there are

limits in time, space, and number of aspects, and that the passage of the cycle may be extremely erratic.

Inspiration for a mining settlement's life-cycle model is drawn from Lucas' (1971) original mineral life-cycle model for resource towns that was further modified and enhanced by others, e.g. Bradbury and St. Martins (1983), Bradbury (1984) and Bone (1998). The life-cycle model represents the features and sequences of a mining settlement's life-cycle, starting from construction of the mine; arrival of the workforce and additional inflow of people following the company's announcement to build a mine; the settlement's administration by the mining company; thereafter the peak development during the mineral exploitation phase; eventually the company's decision to scale down or close its operations; and the final but critical transition phase from a company administered town to a different form of settlement administration; and the new settlement's growth or decline.

Land ownership, town management, housing, and service provision are additional but crucial variables not to be ignored during the life-cycle of mine and settlement development. Different preferences and external pressures on a mining company over time, its acquisition of labour, its management of the settlement are all reflected in the spatial pattern of a mining settlement. Mining companies tend to place their workforce close to the mine site by building a separate settlement owned and operated by the mining company, which, consequently is discarded after mine closure. Often this type of development is not self-sufficient and may even prove detrimental to existing local communities, while not contributing to regional development itself. In the last decades,

new long distance commuting (LDC) arrangements have evolved worldwide where workers are brought in to the mine site for shifts of a few weeks. It is argued that such an arrangement allows for the distribution of economic benefits from mining over a wider area instead of being concentrated in, and on, one temporary settlement. These benefits as opposed to disadvantages of such a long distance commuting system are still being debated. Often, mining operators merely choose the most convenient and cost saving option for the company, which may not necessarily be beneficial to local and regional development. In such cases, opportunities and costs, both for the company and the affected mining settlements, need to be carefully weighed and evaluated (Veiga, Scolbe, & McAllister, 2001). Tuck *et al.* (2005) argued that the current trend towards these LDC arrangements in mining operations has fundamentally changed the dynamics of modern mining policies, so much so that the development of new company owned mining towns is rarely considered as an option. The use of LDC reflects the technological and social change within the industry. The biggest impact probably is on the much reduced labour requirement of the industry due to technological changes which require lower numbers of more highly trained personnel (Tuck *et al.*, 2005).

The policy of a mining company on how they source their workers may greatly influence the physical layout of the settlement. The infrastructure developed by mining operators is primarily motivated by the needs of the mine and often provides little extra benefit to the broader community (Eggert, 2001). Infrastructure is solely designed to address their operational requirements. The settlement develops distinct residential areas for the mining and the local non-mining community. The distinction often is

obvious in the settlement's management and administration, with the latter being neglected. While residential areas for miners are generally well taken care of, the local community may live in high density areas with basic services, if any. As a consequence, residents experience diminished quality of life, and the social tension between local community and mining community intensifies (Petkova, Lockie, Rolfe & Ivanova, 2009). The social and spatial division may further be exacerbated if the mining company purposely builds accommodation for workers in lower positions in one area, while those employed in higher positions are accommodated separately.

Lastly, immovable property prices in mining-dependent settlements typically experience rise and fall, along with the mining cycles. When operations are booming and the settlement experiences upsurge of the inhabitants, property prices are high, but as soon as mining downsizes its labour force and the population in the settlement dwindles, property prices plummet and services decline due to lower investments from the mining companies. A few settlements in the history of mining have completed their full life-cycle, collapsed and turned into ghost towns. Others have declined to a lower scale of existence while still mining, or at least attempting to attract mining if resources in the area are not depleted. Termed as boost and bust mining settlements, they are revived every time the mineral prices increase or additional reserves are found, and will undergo several smaller cycles of growth and decline. Such settlements may exist until the resource in the area is completely exhausted. Only some succeed to emerge stronger after each consecutive decline, developing long-term strategies to cope with the transition.

3.4 Local economic development (LED)

During its life-cycle a mining settlement may persist as a single-industry town posing a great danger to local and regional development, particularly in settlements where the population base has grown swiftly, but economic diversification has not occurred. Pedersen (1997) pointed out that development based on local independent enterprises, particularly large and medium size enterprises, tends to be more stable, as independent enterprises are better integrated into the local economy and thus have a more positive effect on development. Benefits attached to both profit and technological capacity development during production promote higher spatial stability and perseverance.

Medium and large scale local enterprises should not be confused with international branches or franchises as they convey a very different contribution to the local economy. In the short term, a branch may be more stable than the local enterprise because it can rely on greater financial support and secure funds from the mother company to outlast cyclical swings of the mining industry. In the long run, however, a branch has the disadvantage of being unexpectedly closed if the mother company, which is not locally based, does not succeed. Such enterprises have little stabilizing impact (Pedersen, 1997) and may only be a temporary fix for the local economy. The number and type of small and large scale enterprises in mining settlements would hint on the settlements' overall dependency on the mining sector. This information would allow the forecasting of potential economic trends, particularly those crucial for the transitional stage and the settlements' development after the closure of mining.

When linking Pederson's (1997) observation to the Namibian context, one needs to recall that a comprehensive definition of small, medium, or large scale enterprises in Namibia is currently absent. The common criteria used to fit the local context include the number of employees and the turnover of the company (NEPRU, 2002; Nzitunga, 2009; Tonin *et al.*, 1998; Erastus-Sacharia *et al.*, 2004). The manufacturing sector is presumed small when the number of employees does not exceed 10 people and/or the turnover of the company is between N\$1,000,000 and N\$500,000, as compared to other sectors where in a small enterprise the number of employees shall not exceed five and/or the turnover of the company shall not be larger than N\$250,000 and N\$100,000. Based on this taxonomy, enterprises larger than those referred to as SMEs are classified as medium to large scale enterprises. These would be of particular interest when researching mining settlements.

It is argued that the presence of more local medium and large scale enterprises in a mining settlement will contribute more to the diversification and stabilization of the local economy than smaller scale enterprises, thus making the settlement less dependent on the mining industry. Small economic activities are considered extremely volatile and may not be able to survive along large scale mining projects. The monopolistic nature of the mining industry tends to organize the settlement's economy for the industry's own needs, providing the settlement with all necessities through the import of most goods and services from other areas and via large suppliers. Small scale businesses and industries which existed in the area before the mine opened are likely to be disrupted once the mining industry evolves, even to the extent that the local traditional way of survival may cease to exist and knowledge become lost. For

example, rural people may give up on agricultural activities to work for mining operations. As cash incomes starts to flow into a community, they often begin to import part of their food supply, consequently reducing their own food security and self-sufficiency (World Bank & IFC, 2002a). For small scale enterprises it is difficult to reach non-local markets, except as subcontractors to the mining industry itself, which may cause a dangerous dependency. However, small enterprises must not be overlooked as they still may carry the potential of becoming growth nodes if such businesses can form a compound large enough to have greater influence on the economic base of the settlement, hereby alleviating the settlement's dependency on the mining industry. Skills development is crucial, but training programs offered by mining companies, or efforts aiming at expanding the local supply chain, certainly is less of a philanthropic effort but rather a business-driven strategy (DiBoscio, 2010). Attempting to diversify, the local economy may focus on vertical diversification, but dependent single industry settlements require horizontal diversification for survival, through crucial supply and service enhancement. It seems that local enterprises would certainly benefit and even the relationship with the mining industry could improve from diversification. Storper (1997) analyzing economic diversification in vertical scale, however, concluded that such an approach may not be suitable for mining settlements.

Linkages between large manufacturing companies with continuous output on the one hand and local suppliers on the other hand are often limited and asymmetric. Focussing on local and regional economies, Ross (2001) and DiBoscio (2010) observed that linkage promoting sectors are more profitable development choices than mining itself.

The mining company's decision to source locally depends on the cost, quality and, most importantly, reliability and flexibility of local suppliers. An efficient network of suppliers allows mining companies to reduce the risk of interruption from unreliable input supply. Thus, the highly specialized mining industry needs to secure supply networks with reliable local subcontractors in developing regions; a conundrum which DiBoscio (2010) considered to be a challenge of its own.

The remoteness and isolation of mining settlements may act as a barrier for regional investment flows and dynamic growth. Sach (cited in Yusuf, & Nabeshima, 2003, p. 10-11) stated that the remoteness and the external orientation of mining industries with a weak "spillover" from mining may predetermine that mining settlements will struggle to develop into a regional growth node. A mine is mostly concerned with meeting the demands of mine residents and providing them with consumer goods and municipal services (Rose, 1967), all of which are generated through the mine's income. This results in the inability of settlements to establish independent backward and forward linkages with their hinterland (a notion which would be very much in line with the Central Place concept). This, in turn, hardly stimulates the diversification of regional economy. Backward linkages remain weak, although they might be of particular significance for developing economies if they provide opportunities for production and employment. DiBoscio (2010) pointed out that backward linkages might channel the knowledge diffusion which could assist in upgrading domestic suppliers. Thus would then generate the desired spill-over effects very much to the benefit of local enterprises which need to catch up with internationally competitive practices.

Unclear property rights and lack of access to capital may form additional barriers (Cunningham & Meyer-Stamer, 2005). Land owned by mining companies dampens public interest to invest in the settlement, so that a sustainable diversification of the local economy becomes almost impossible. In such cases the proclamation of the settlement would allow for private ownership with a title deed. Residents' ownership of housing would motivate people to invest in, and integrate themselves into, the settlement (Sustainable Planning Division, 2007). In this way, home ownership would contribute significantly to the permanence and survival of the community.

Mine operators may develop facilities for their employees by portraying the image of a caring employer, thereby equipping the settlement with new educational and health care facilities or providing additional funding to existing schools to accommodate their workers' children. Despite, they often ignore the needs of local people who live in the settlement, or the migrants who arrived because of the mining development. Although the social infrastructure gets a boost from such facilities, growth may only last as long as the mining company is present in the area. It is not sufficient to only build and maintain the social infrastructure to make a positive impact on the mining settlement. The key to sustainability is service provision to people beyond the closure of mining activities when settlements enter a new phase in their life-cycle. Settlements whose services entirely depend on the mining company for funds or operational capacity are likely to experience massive deterioration and may disappear upon closure or withdrawal of the mining company. The infrastructure will become underused and dilapidated. This scenario renders the settlement vulnerable and dependent on the success or failure of a mining company. A settlement without good infrastructure and

service provisions stands little chance to attract more investment and diversify its economic base during the operational phase of mining activities.

The LED approach shows the potential to address failures associated with local economic growth. 'Local' refers here to the valuing of endogenous potential, or making optimal use of already existing local capacities. 'Economic' is directed towards the identification of investment opportunities, supporting entrepreneurial activities and facilitating the access to (new) markets. 'Development' addresses the process which aims to promote an improvement in the living and working conditions of community through job creation, retention of existing jobs, and generation of income (Urban Institute, 2008). Analysis of the (i) geographical setting of the mining settlement, (ii) soft infrastructure, (iii) support to local enterprises, (iv) skills development, and (v) attraction strategies for inward investment may unveil potential problem areas and blockages for local economic diversification.

3.5 Mining economics

Mining will occur only in places where minerals are found. As any other industry, mining requires six components for its successful existence - raw materials, a market for the minerals to be extracted, labour (management, skilled and unskilled workers), power, capital, and a transportation network (Renner, 1976). If all these prerequisites are available and the mining company can secure a profit, the company will most likely proceed to develop the mining project.

It is not only mining economics that determines the viability of the mining projects, but also other key factors such as ore body grade, size, shape and depth, topographical setting, climate, global commodity market conditions, appropriate technology to extract the ore and environmental, and social issues at the proposed mining site. These factors must be analysed and expenditure weighed against profit, to determine whether a project can go ahead, whether it may be viable, and what the life span of the mining project might be (Eggert, 2001). DiBoscio (2010) added that intangibles such as risks of expropriation and political and social turmoil are of decisive importance for large and long-term mines. Another important aspect during evaluation of the viability of a mining project is infrastructure, particularly hard infrastructure such as roads, railways, airports, and harbours. If the mine is located in a very remote area and the company's cost analysis of construction of heavy infrastructure outweighs the profitability, the development of mine may not go ahead.

Aspects of mining economics which may especially affect a settlement's development and future prospects are (i) the size and mineralogical characteristics of the mining deposit which determine the life span and scale of mining activities; (ii) commodity market prospects, (iii) employment policies, (iv) size of its workforce, and (v) the envisaged scale of operations. Any mineral deposit has a finite life, and any assessment of the costs and benefits of a mining proposal must acknowledge the inevitability of closure as a last phase of mining. While some deposits are very large and may generate a mine lifespan of 50 years or more, other deposits may only produce a mine life of a few years. No-one knows when a mining operation commences, how long it will last, or whether all the desirable ore bodies will be as estimated (Macdonald *et al.*, 2006).

As market prices for mineral and metal commodities fluctuate, mining companies go through periods of economic downturn which challenge their viability and the viability of the whole mining settlement. Mines built during periods of high commodity prices may decline and close with the onset of market downturns (Veiga *et al.*, 2001). The planning at the peak of promising commodity markets may carry quite a risk not only for the mining operator, but also for the settlement which was developed under great costs. Mineral development generates several opportunities, including jobs and transfer of skills; however, job opportunities in the mining industry may be skewed in favour of hi-tech or import of labour force from outside of the community because the necessary skills are locally not available.

The analysis of the different variables from these five conceptual pillars allows for the inclusion of all contemporary processes and characteristics of mining settlements. This approach will enable the author to shine light on potential development trends and outline planning needs which must be considered when looking into the prospects of development of the mining settlements in Namibia. Their unique economic role and structure, socio-demographic features and instability of development render mining settlements important objects of study (Maude & Hugo, 1992).

4 METHODOLOGY

The research methodology was guided by the conceptual framework which provided a rationale for data collection and analysis, facilitating formation of linkages between the reviewed literature and the empirical study. It integrated the process of acquiring

answers to the problem formations through description of the research procedure, how the data was collected and issues of primary methods used for researching selected mining settlements in Namibia in order to obtain insights into their prospects. This chapter outlines the research design, the methods applied for the investigations and how the data was analysed.

4.1 Research design and data requirement

The structure of this study is reflected in the research design which gives direction on how the study was organised. It shows in what way the major parts of the research collaborated to address the objective of the study that is examining the different problem formations of mining settlements in Namibia. This was achieved in six phases (see Figure 4) composing the investigation.

The structure of enquiry started with the identification and justification of the selected research problem, the background analysis of mining settlements in Namibia, review and analysis of previous publications associated with the research topic. Phase I relied explicitly on existing literature and collection of secondary data, analysing the background information of problem formations, linking its context to three case studies - Rosh Pinah, Klein Aub and Tsumeb. It was important to determine what is known about the mining settlements worldwide, and what has been researched in Namibia. This involved the gathering, analysis and interpretation of secondary data, where in some instances the data was analysed and re-analysed to perceive and anticipate potential relationships between different variables that could be used researching the Namibian mining settlements. During the research process, statistics,

government documents, media reports, corporate publications and earlier studies on these settlements were examined.

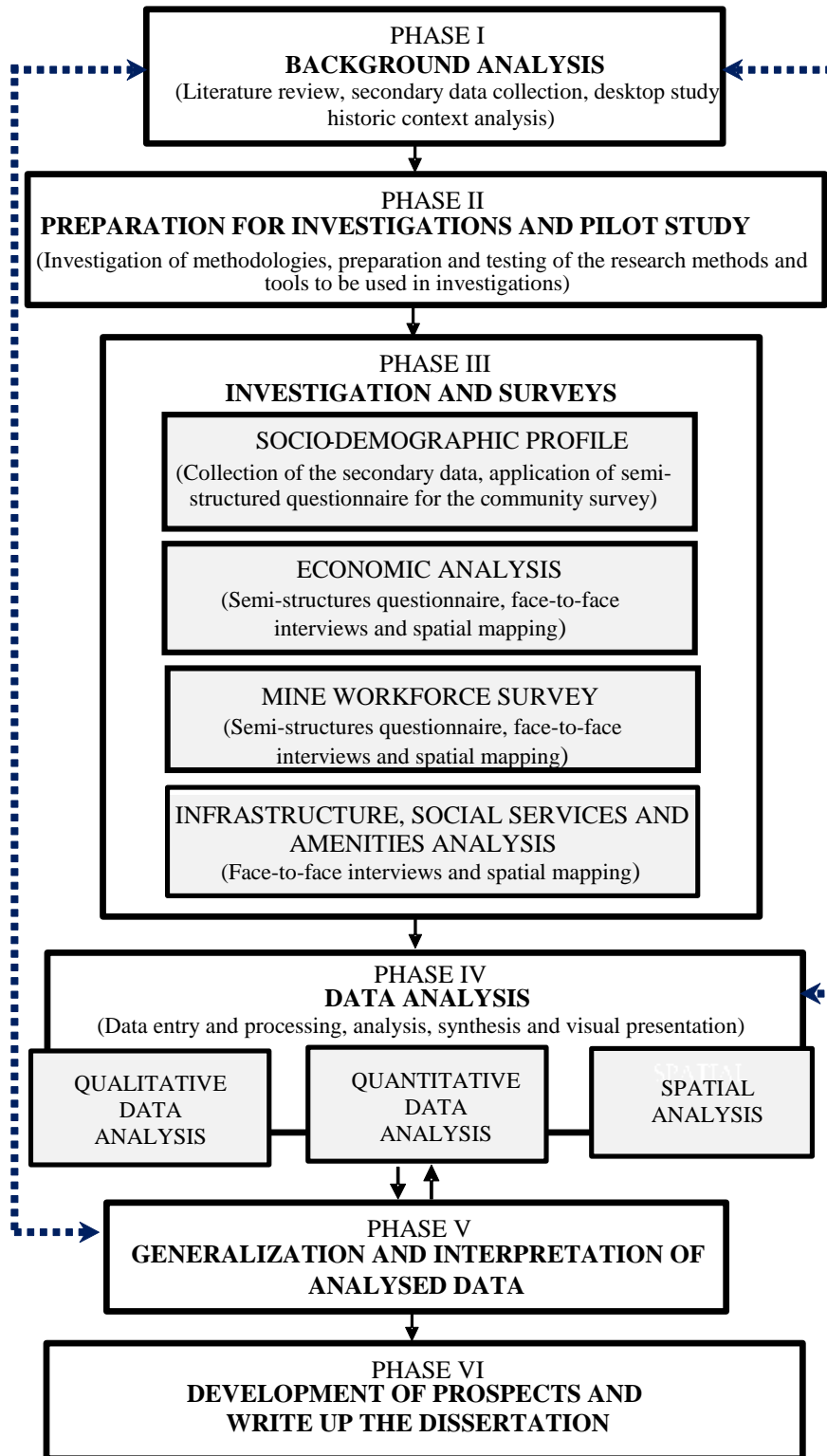


Figure 4. Six Phases of the research design.

The analysis of historic context was not ignored as it has the capacity to unravel historic perspectives and dimensions of the settlement's development, what the study area was in the past and how it is now, what the causes were for growth and stagnation through the history, and what were people's experiences and observations. The fate of mining settlements can be better understood if the past, present and future of people's expectations are known. History forms a part of the contextual background of the settlement (Clarc, 1997). The historic context analysis relied exclusively on qualitative secondary data from previous formally recorded histories and researches, archives, museum materials, photographs or quantitative secondary sources in the form of previous national census data, employment data, previous public survey data, tourism statistics, a mining company's economic indicators, scientific data sets and electronic journals. These studies sketched the evolution of the mining settlements as they struggled with its cyclic nature of development, which helped in understanding mining communities and the context of their interactions. The analysis of secondary data relied on piecing the partial clues together. The weakness of secondary data (and primary data too) lay in that it is a 'cultural' product, produced by authorities, organisations or individuals with different views and agendas, and it may be inflexible and the quality unverifiable (Clark, 1997). Several published materials were treated with caution, particularly those that were recorded prior to Namibia's Independence.

Phase II of the research involved broad preparations for investigations and pilot study. An extensive desktop research and background analysis of study areas was completed prior to the field investigations, providing a context for the primary data which were needed to collect material for further investigations. This phase was concerned with

choosing the appropriate methods and instruments for data collation in Phase III of Investigation and Surveys which consisted of multiple profiles and analyses. The Phase II also included the piloting of the community survey questionnaire to be used in Phase III. The aim of the pilot study was to test the validity and reliability of the instrument, obtain information about the expected response rate and comprehensibility of the questionnaire. The pilot study led to several amendments of questions that seemed too confusing, overambitious and not clearly understood by respondents (see Appendix 9).

The subsequent Investigation and Survey, Phase IV, involved data collection within the framework of four different investigations, namely: i) investigation of socio-demographic profile, ii) mining workforce survey, iii) economic analysis, and iv) infrastructure, social services and amenities analysis; where both secondary and primary data were used. The socio-demographic profile involved a statistical analysis of secondary data. The primary data was collected by the community survey. The profile included the basic information on population groups of each case study areas and involved collection of basic demographic information, for example, on age, gender, occupation, education and social characteristics, providing data on a variety of different spatial scales. The demographic profile sketched a statistical picture of the area (Kemp, Clark & Zhang, 2007; Hoggard, 2002). It shall not be considered to be a detailed thematic investigation, but rather an overview of the demographic situation of the selected mining settlements. This type of data gave the 'feel' for the community before starting the field research observations.

Additional surveys carried out during this phase comprised economic analysis, mine workforce survey and infrastructure, social services and amenities analysis. The variety of data that was required for different investigations determined the choice of a 'mixed-method approach'. The two data generation methods, namely quantitative and qualitative, are not mutually exclusive. The usage of mixed methods created a better understanding of the research problem and supported deeper insight into the problem formations on mining settlements. The data collected with mixed methods may highlight different aspects of a research problem, providing greater cross-validation in research interpretation (Hoggard, 2002; Yin, 1994). The primary data collection with questionnaire surveys and face-to-face interviews were undertaken in 2010.

The collected data from Phase III was analysed in Phase IV. The mixed-method approach required different techniques for processing, analysing, and synthesizing qualitative and quantitative data. While quantitative data quantified the extent of the problem, and measured the fundamental properties of the problems in the mining settlements, qualitative data explained the nature of a problem, defined the variations of situations, attitudes, and conditions and accounted for the opinions of different people. This was particularly important as mining settlements are not exclusively homogeneous communities. The quantitative data alone could not assist in understanding social behaviour and response, and the fabric of social interactions and social well-being can only be measured or evaluated through qualitative methods (Joyce & MacFarlein, 2002).

Both types of data were inspected, transcribed and analysed with a purpose to obtain useful information to be used in the succeeding Phase V - Data generalisation and interpretation. In this phase the analysed data were used to explain the patterns and trends of problem formations in mining settlements. The data were related to existing scientific ideas with multiple facets and approaches. Phase V encompassed all background knowledge, experience and skills that bear on the research topic, constantly referring to the background analysis of Phase I and Phase IV. The analysed and interpreted data were used in prospects formation for the final Phase VI and required new forms of deliberate and strategic thinking. The Phase VI also included prewriting, composing, revising and editing the dissertation.

4.2 Case studies

It was important to observe the identified problem formations of mining settlements in different geographic perspectives – former and present mining settlements, to discover the similarities and differences among them and clear the factors for success and failures, learn about their history and evolution over the years. The locations of mining settlements follow the minerals. Namibia has several dormant and active mines, but not all of the mining activities resulted in development of mining settlements. At present Namibia has seven mining settlements (see Figure 5) with different histories and dissimilar present circumstances.

Mining settlements are more alike than others. For example, the mining settlements located near active mines, such as Rosh Pinah, Oranjemund and Arandis mining towns are different from the mining settlements (e.g., Klein Aub and Uis) where the mining

has ceased years or decades ago. The settlements that persist due to the active mining activities also differ by their administrative status, which immensely influences their further development. For example, while Oranjemund is proclaimed as a local authority, but Rosh Pinah is a company town that is aimed at becoming a local authority in future. The size of the mining settlement does not reflect the maturity of the settlement, but rather is pre-determined by the size of mining operations, particularly in its initial stages, and often changes during the life-cycle of the settlement.

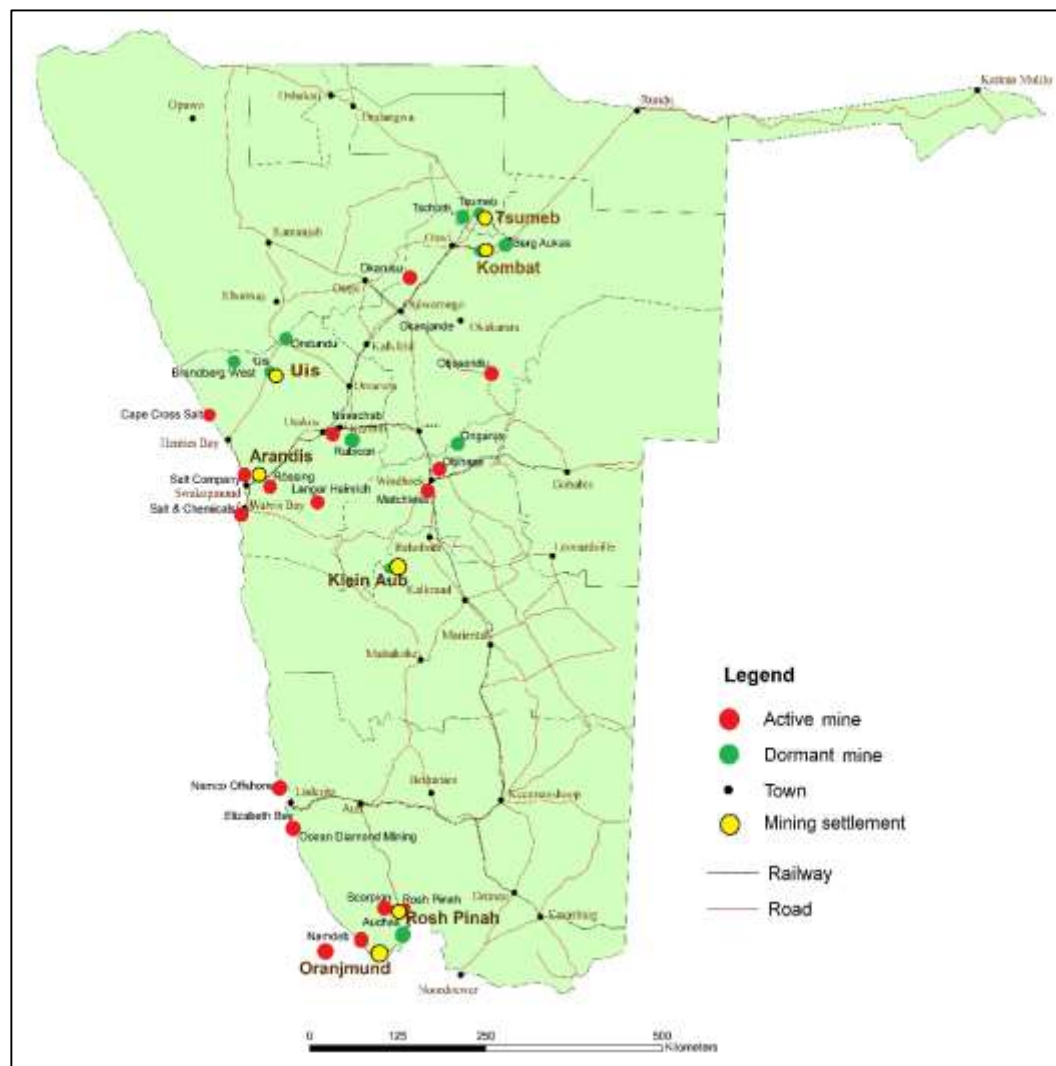


Figure 5. Location of mines and mining settlements in Namibia (2010).

However, the population size has capacity to reveal the potentials for the future as it carries concealed information on its likely destiny in subsequent developmental stages. Mining settlements are unique, they have similarities, if placed in similar settings, namely: settlement's place within the mining cycle, administrative status of the settlement and the population size.

For this research, the approach with three cases settlements was chosen to be able to obtain a distinct understanding of specific problem formations of mining settlements in Namibia. Each mining settlement represented a purposefully selected case to facilitate inter-settlement comparisons rather than generalization. The investigation allowed a more comprehensive, holistic and in-depth focus on different variables. In line with Feagin, Orum, & Sjoberg (1991) and Johansson (2003), selecting on the case studies was conducted with the replication approach, which is found appropriate for multiple case studies when each presents distinct settings. In avoidance of similar properties, four variances forming the platform for selecting the mining settlements were based on their different backgrounds, their individual status within the hierarchy of urban settlements (see Table 1), and their position within the mining cycle and developmental stage (see Figure 6). Against their procedural backdrop, Rosh Pinah, Klein Aub and Tsumeb were selected as case studies (see Figure 7).

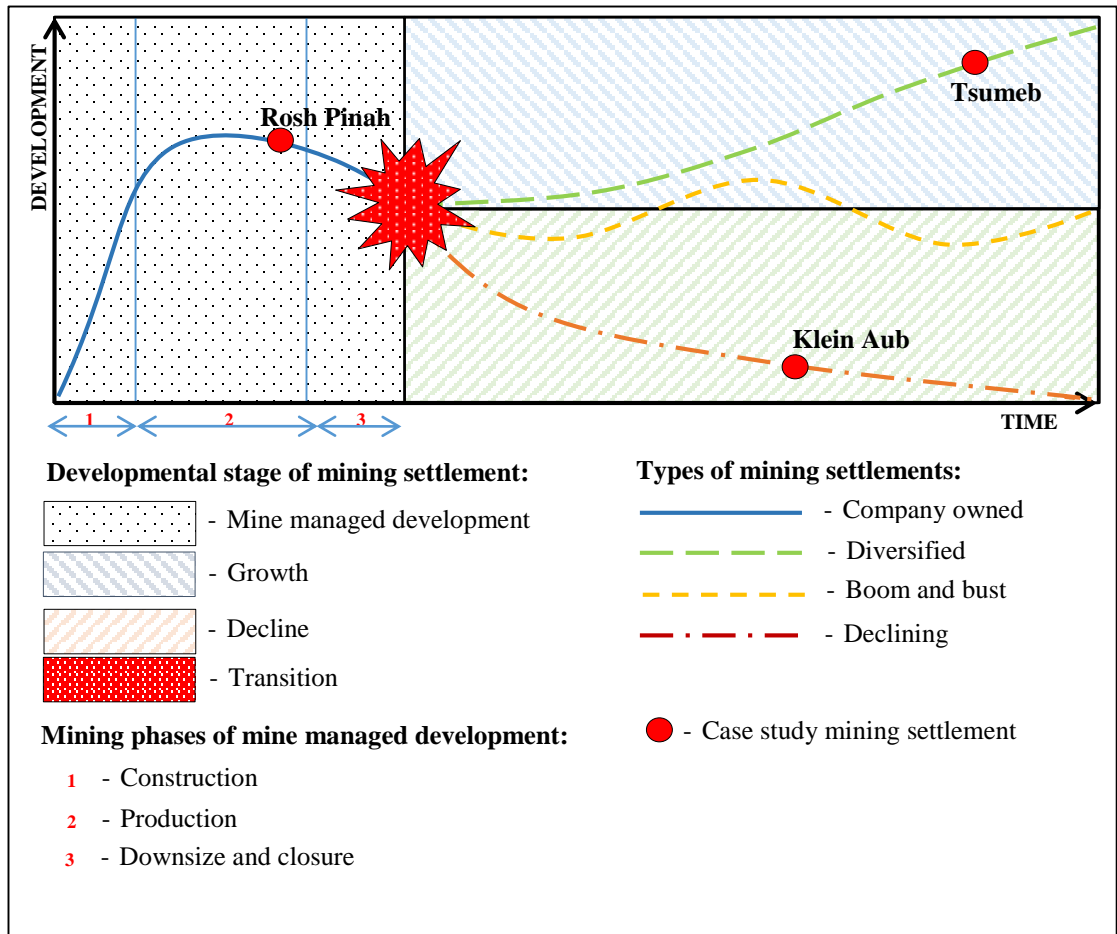


Figure 6. Case study settlements within their developmental stage.

Table 1
 Characteristics of selected case studies

Mining settlement	Foundation date	Life-estimate of the mining activities	Settlement's stage of development	Administrative status	Population size
Tsumeb	1893	Mines are closed. Smelter from 1962 until present	Growth	Municipality	19 500
Rosh Pinah	1968	Skorpion Zinc until 2016/2017; Rosh Pinah until 2020	Mine managed development	In process of proclamation	~15 000
Klein Aub	1966	1966 - 1987	Decline	Settlement	~500

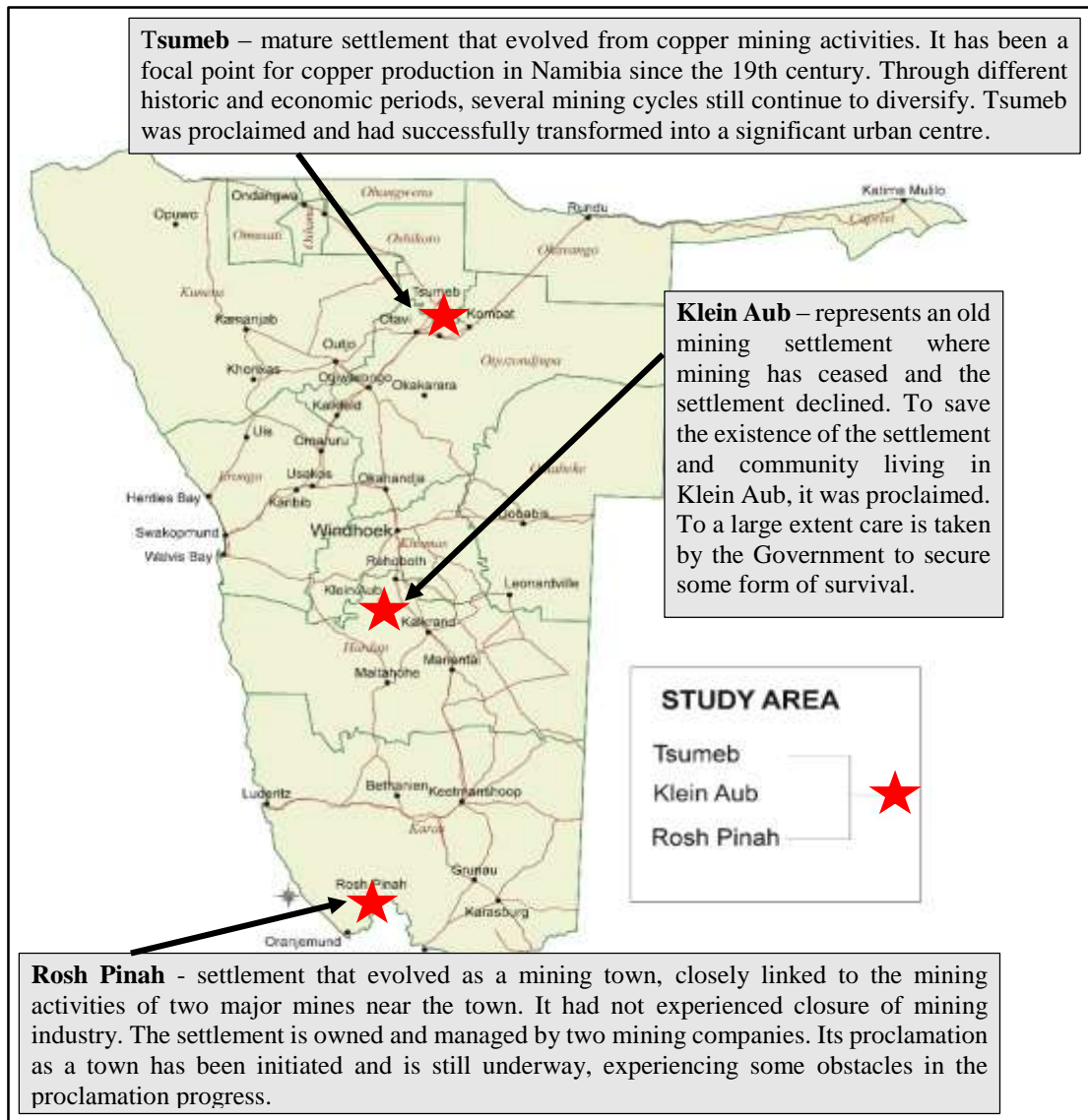


Figure 7. Location and brief description of Tsumeb, Klein Aub and Rosh Pinah case study areas (2010).

The case studies are evenly distributed within Namibia. Their selection did not follow a particular geographical distribution outline. Mining settlements do not follow a predetermined geographical pattern. They originate where mineral resources are found, the areas with geologically promising prospection settings (see Appendix 4). The methodology applied to the investigations was replicated in each of the settlements under study and is outlines in the following.

4.3 Generation of primary data sets

Primary data was collected for the selected three mining settlements and involved surveying and interviewing key informants, residents of the mining settlements, mine operators, current or former mine workers, service providers and the business community over the period of April-June, 2010. The spacing between surveys in different towns was as close as possible to avoid biases and to increase comparability of the data, particularly that of a volatile nature to the global or national economic change and commodity markets.

Surveys were used for the collection of primary data for descriptive, explanatory and exploratory purposes. The survey research is reputed to be the best method for collecting original data for describing a population too large to be observed directly, and allowing to measure attitudes and orientations in a large population (Babbie, 1995). The surveys gathered data from random samples based on the whole population. The main interest was to assess the characteristics of a whole population of a mining settlement where samples would define this population.

Three distinct methods were employed in primary data generation: i) structured surveys by way of questionnaires with structured and subsequent questions asked directly through personal contact, ii) semi-structured face-to-face interviews where questions were predetermined, but very flexible, allowing to unravel the depth of the problem formations, and iii) spatial mapping. Variables used in primary data collection were aligned with five focus areas of the conceptual framework.

4.3.1 Questionnaire surveys

Questionnaire method was used in three different surveys: i) the community surveys, ii) the mine workforce surveys, and iii) supplementary for the economic analysis in all three case studies. While the community survey and the mine workforce survey primarily relied on questionnaire surveys, the economic analysis of the mining settlement entailed additional face-to-face interviews and spatial mapping of business entities.

The questionnaire content considered the research objective and questions were guided by the conceptual framework of this study. This included the variables such as period of residence, place of origin, reasons for migrating to the area, intentions to stay or leave the settlement, preferences for relocation and factors that drive location choices underpinning different migration factors; questions on what type of goods and services a community is obtaining locally and which they acquire from other localities, what goods and services they would like to see more in their settlements unravels information on how the settlement fits within the philosophies flowing from the Central Place concept; questions on local job opportunities and locally available skills, the residents' employment particulars and preferred training if offered, the community's access and satisfaction with varied soft infrastructure in the settlement has potential to uncover the concerns related to the thoughts of the local economic development (LED) approach; and the questions on people's housing features and variables, whether they own housing in the settlement, the perceptions about the quality of life in the settlement and previous experiences; attitudes towards some environmental issues and views on potential development of the settlement expose

some of the mining settlement's experiences through different life-cycles. The questionnaire of the community survey is attached in Appendix 5. In the business surveys, the settlements' life-cycles were studied in more detail, asking respondents on their current and previous experiences, how these different cycles have affected their businesses and consequences thereto and, how they foresee the future of their respective businesses. The business community survey was carried out with the questionnaire attached in Appendix 6.

Mine workers are part of the mining settlement's community, but at the same time they deserved special attention since a settlement's future will largely depend on the decisions made by them. Will they stay or leave when the mines close? The workers' views and satisfaction with the quality of life in the settlement can unwrap many questions regarding their present living arrangements, working environment, relationships between management and employees, whether they live with families in the settlement or perceive the latter as a workplace only. How much do they invest into the settlement by way of spending choices, do they spend locally or are all the earnings saved and spent elsewhere? What do they think about the future of the mining settlement, how informed are they about the life span of the mining operations, do they intend to leave or stay after work has finished, and what are the health concerns related to mining? These are some of extremely important questions to ask and help foresee the future processes and developments as they have the potential to unravel problem foundations about the mining settlements. The mine and its workers were the reasons why the settlement was developed and the way it was developed, the interactions between them may sketch the past and present interfaces and prospective future. Since

the case studies for this investigation differ in terms of their situation within the mining cycle (settlements with active mining activities and settlements with ceased mining activities) different methods were used where the questionnaire survey was applied to present mine workforce in settlements with mining activities still occurring (see Appendix 7). The questionnaire was applied also to the former mine workers in settlements where mining activities were closed or dormant. The questionnaire surveying former mine workers is attached in Appendix 8. They were further interviewed in more detail to investigate their distinctiveness as the cases are unique from mine to mine.

All questionnaire surveys consisted of both types of questions, close-ended and open-ended. In this way it was possible to obtain information that can be quantified (e.g., demographic information about the respondent) and qualitative information that gave the opinions and attitudes of residents of mining settlements and mine workers. Closed-ended questions provided respondents with a fixed number of responses from which to choose an answer. The data obtained from open-ended questions was in most cases analysed qualitatively.

The challenge lay in structuring the responses in such way that they do not overlook any of the important responses. This was alleviated by inclusion of a category “Other (please specify: _____)”, ensuring coverage of not only all possible responses, but also of questions being mutually exclusive avoiding that respondents would not feel compelled to select one particular response should the question not entirely correspond to his or her situation or opinion. The skip pattern technique was applied to questions

that may be relevant to some, but irrelevant to others. For example, a question about employment status and income was relevant to some, but irrelevant to those unemployed. The questionnaire had clear instructions how to proceed should a particular question not apply to a respondent (e.g., 'yes go to Q5'). This made it possible to filter responses of a particular group of respondents, and, for example, analyse the responses of those who are employed and of those who are unemployed.

The questionnaire contained several matrix questions with the same set of answer categories. The technique had advantages for a respondent and researcher. It was easier and faster for a respondent to complete the questionnaire as the questions appeared more organized. This format increased the comparability of responses given to different questions, because respondents could quickly review their answers and compare them to earlier items in the set. The use of Likert scale responses was discouraged to avoid responses that could foster a response-set pattern among respondents where they develop a pattern of agreeing with all the statements or where the difference between "strongly agree" and "agree" might be very vague.

Additionally, the questionnaires contained also open-ended questions where the respondent was not given a set of possible answers, but was asked to provide his or her own answer to the question. The main advantage of open-ended questions is that they permit spontaneous responses, and thus are less biased (Parfitt, 1997). The disadvantages were that these types of questions took longer to complete and demanded more from the respondent; their number was therefore limited to a minimum, without compromising the quality of the required data.

The order of questions in the questionnaires were thoughtfully arranged not to influence answers given to later questions. This was particularly important when working on the community survey where a large share of the population might have relatively low levels of education as suggested in reviewed literature about mining settlements. The less educated respondents could be more influenced by the order of questionnaire items than those with higher education. Therefore the organization of the questions was particularly thoughtful so as to keep the respondent focused on the topic. Random questions can be difficult for a respondent to answer since they continually have to switch their attention from one topic to another. Therefore the questions were organized in a logical order, starting from more easy and quick questions to more meaningful ones that require the respondents' thoughts on a particular subject.

The first part of the questionnaire recorded some factual data about the respondents, how long they have lived in the settlement, some demographic and socio-economic data about the respondents, followed by the main sections of the questionnaires dealing with the respondent's factual quality of life in the settlement, and his or her desire for improvements. The questions that require the respondent's own opinion about the present and future were kept towards the end of the questionnaire in order to minimize loss of information should the respondent refuse to continue (Kitchen & Tate, 2000; Parfitt, 1997).

Several classification questions were used (e.g., 'how old are you, what is your income?'); questions normally to be avoided, but for this research it was crucial to

obtain such information in order to be able to filter responses by different social, age or gender groups. The responses to these questions were categories and the respondent could choose amongst the offered answers the most suitable to his or her case. This approach minimized the non-response rate. The respondents felt more comfortable and did not mind to be asked such questions.

To produce a representative sample for the community survey, sampling reflected the generalized larger population of the mining settlement and ensured that the population sample includes members from different population groups. The investigation was not intended to be an exhaustive survey where the entire population needs to be surveyed, but the sample had to be free of bias and as representative of the larger population as possible. This meant that the sample had to represent opinions of three population groups: i) community of miners, consisting of the mine labour force or former mine workers, ii) residential community, consisting of people and families who came to the settlement as a result of the mining operations, but who are not directly employed in the mining operations, nor have any ancestral attachment to the area, and iii) indigenous community, consisting of people who were either born in the area or have lived there even before the mineral deposit was discovered and have ancestral attachment to the area. The number of people in the latter category was negligible as all three settlements evolved on a site previously unpopulated or scarcely populated.

Using prior information about the population and their possible geographic distribution, the questionnaires were carried out in different parts of the settlements (e.g., formal residential areas, informal residential areas, residential areas for mine

labor force, central business district) ensuring the participation of a population with different variables. The number of individuals to be surveyed in each area was not determined and the selection of individuals to be interviewed was at random. Individuals were approached in the streets, near their houses, in shopping malls, recreational areas and asked if they are willing to participate in the survey. The receptive individuals were interviewed. To warrant that there is not any unintentional stratification, the surveys were executed on different days (working days and weekends) and at different times of the day to guarantee the research does not capture only those who are not working and at home most of the day.

The mine workforce survey sample consisted solely of mine workers. Their distribution within the mining settlement is more localized (mine workers residential areas, accommodation compounds, and the bus stops for the mine workers). In Rosh Pinah, where two mine operators were present in the settlement, it was ensured that the sample was drawn from mine workers of both mine operators (Skorpion Zinc and Rosh Pinah Zinc Corporation). The sampling was random. Mine workers were approached. After the establishment of their relation with the mining industry, they were individually asked if s/he was willing to participate in the survey. None of the approached mine worker declined participation. To avoid unintentional stratification, the surveys were executed at different times of the day (early morning, day and late evening) and different days (working days and weekends) to capture the information from people working in different mining shifts.

In case of the business community survey, the business owner or a senior management staff of the business entity as approached and asked whether they were willing to participate. Questions for this survey contained information about the type of business, economic contribution in terms of employment, duration of operations in the settlement, clients' base, financial wellbeing, level of dependency on mining activities, plans for the future, obstacles and advantages of doing business in the mining settlement, and perceptions of the future for the settlement. Specimens for the economic analysis with the questionnaire survey were drawn randomly, covering both formal and informal businesses without any preconception to its geographical location within the settlement. For the business analysis the questionnaire survey was supplemented by face-to-face interviews. This allowed to obtain more detailed insights on the business community of the case study. All questionnaire surveys were based on random samples and their sizes are reflected in Table 2.

The data collection procedure was to administer questionnaires in person face-to-face with respondents; answers to questions were filled in by the researcher. Despite the fact that it was a time-consuming exercise, the advantage consisted of personal contact and being able to ensure that the questions are properly understood and the response format followed correctly. In some instances the business community survey questionnaire was left with the respondent and collected the next day, checked with the respondent that all questions were completed and correctly understood. This ensured a high response rate. Non-response errors where the respondent did not answer a question, did not understand it or provided answers in a format that was not correct (e.g., where one response was supposed to be marked, the respondent marked two or

more) were negligible and not included in the later stage of data analysis. Errors that evolved from the questionnaire surveys were more due to the individual's ignorance or the low level of education.

Table 2

Details on sample size of the questionnaire surveys (2010)

	Rosh Pinah	Klein Aub	Tsumeb	Total
Community survey	81	42	124	247
Mine workforce survey	42	n/a ⁹	n/a ¹⁰	42
Business community survey	33	7	33	73
Total	156	49	157	362

During the field investigations it was observed that the larger the settlement, the less people were willing to cooperate and participate in the surveys. It was observed that the main cause for an unwillingness to participate could be that people felt there were too many researches done in their settlement, but that nothing had changed in the community. This was particularly evident in Tsumeb where many people asked if this was the same survey that was done earlier. In contrast, in a small settlement like Klein Aub, people were genuinely happy being surveyed and, in some instances, expressed their willingness to be involved in the survey.

The phrasing of questions was as concise and clear as possible to avoid misinterpretation. Sometimes it is not easy for the researcher to identify redundancy or omission in her/his own questionnaire, which makes it important to test the questionnaires in a pilot survey to minimize potential problems with response errors, in case questions asked are not understood by respondents. Piloting established whether or not there was a mismatch between the respondent's and the researcher's

⁹ No mining activities in Klein Aub at the time of survey in 2010.

¹⁰ At the time of the survey (2010), Tsumeb mine was closed.

interpretation of the questions and whether they produce the data that was required for the research. The pilot survey also checked the credibility of the chosen instrument with the intention to make adjustments where necessary, and in this way achieve better outcomes.

The pilot study was executed in the form of a smaller version of the survey procedure with the same instruments and same sampling methods. The questionnaires for the research were piloted in Tsumeb in March 2010 with the sample size of sixty eight for the community survey questionnaire, four business community survey questionnaires and two mine workforce surveys performed with smelter workers, as the mining activities in Tsumeb were closed at the time of this research. The pilot procedure fine-tuned the questions, reformulated the wording and terminology to ensure that questions were understood by all respondents and that the wording was simple and kept in logical order. Appendix 9 reflects the properties that evolved from the pilot survey and the resulting adjustments in the questionnaires. The questionnaire for the mine work force survey was adjusted accordingly and only questions that were the same as in the community survey questionnaire were adjusted. None of the questions needed adjustment for the business community survey. The two data generation methods were not mutually exclusive and in the surveys the discussion style open questions were mixed with more rigid closed questions.

4.3.2 Interview method

Analysis of peoples' experiences, opinions and attitudes required qualitative data collection techniques and the interviews served the purpose. It allowed for producing

data in a less formal setting. “Interview is not just a passive means of gathering information but is also a social encounter” (Kitchener & Tate, 2000, p. 215). Several key informants were interviewed in each settlement (see Table 3) to acquire data for the economic analysis, former mine workforce survey and for the infrastructure, social services and amenities analysis. The sample was chosen using a non-probability sampling method. Interviews of former mine workers and discussion representatives of local authorities and service providers gave valuable insight into the processes and history of the mining settlement and its transformation, including the future outlook from the interviewees’ point of views. Decision makers may be located far away with little understanding of local issues. Therefore, the local informants were the most valuable in furnishing information about the conditions and processes on the ground.

Table 3
Details on sample size of the interviews (2010)

	Rosh Pinah	Klein Aub	Tsumeb	Total
Key informants for economic analysis and infrastructure, social services and amenities analysis	16	6	14	36
Former mine workers	n/a ¹¹	2	7	9
Total	16	8	21	45

The analysis of data from the local community on social and health services provided an assessment of the actual use of these services by both mining and non-mining communities, presenting a factual representation of the usage of these services in the settlements. The individuals interviewed during investigations and the schedule of the meetings is presented in Appendix 10. People that were interviewed were chosen from

¹¹ Rosh Pinah is an active mining town. Sample size for the mine workforce survey is recorded in the Table 2.

a cross selection of stakeholders within each case study area and interviewed face-to-face following a semi-structured format.

The topics covered in the interview were specified in advance in an outline form, but it allowed for varying the wording of the questions and the order in which the questions were asked. The interview guide approach proved to be beneficial in keeping the focus on the topic without compelling the researcher to keep to a particular format. Since semi-structured interviews are more flexible, questions were tailored to suit a particular topic, the interviewed person and context of the interview, to gain deeper insight into the topic and to fill the knowledge gaps. An official letter from the University of Namibia stating the researcher's student status and the research topic boosted the respondents' confidence and made them feel comfortable knowing the background of the interviewer. Through the interviews with key informants, information on respondents' attitudes towards mines, the actual situation in their respective fields, opinions on the future of the settlement and perceived solutions to the problems were gathered. The information is comparable within different surveys as some particular questions were asked to different survey participants. This allowed the comparison of the perceptions, opinions and attitudes of different population groups, and how the same problems were perceived by the community, the authorities or other institutions.

Surveys with former mine workers were performed in a similar manner with the face-to-face interviews to unravel the experiences of employment from the past, and how they affected the former miners' present life. It was more challenging to find former

mine workers in case study areas where mining was closed and the workers had left the settlement.

Comprehensive notes were taken to record the interviews. A dictaphone was not used as people felt uncomfortable or did not like to be recorded. In such cases respondents may not honestly express how they feel about the topic. Voice-recording was tried in the piloting survey, but considered an unhelpful tool and was discontinued for the investigations. Interviews with discussion notes, key words and phrases were recorded to keep account of what was said and what still needed to be covered. A daily routine of reflecting on interviews was practiced, adding some extra key comments felt to be important and to be remembered and to ensure that the notes would still make sense and be useful during the data analysis phase. Methods like mapping, field recording and photography complemented the field investigations.

4.3.3 Alternative methods of data collection

During the field investigation the town plans and additional cartographical information seconded the mapping exercise. Mapping was a part of the economic analysis of the mining settlement, gathering primary data on land-uses, economic activities, infrastructure and services in both formal and informal areas of the settlements. Secondary data sources from Google Earth facilitated background information prior and during the field work.

Assessment of the demand of services surfaced additional information which assisted in the economic analysis of the settlements. The weakness of the mapping was that it

did not take the size of the business entity into account. Such information was obtained from the questionnaire survey.

Any relevant field observation and experiences were recorded in a field notebook and entries were made within twenty-four hours while still fresh in the memory. This strategy allowed investigating and, in some cases, confirming, what people actually did as opposed to their responses in interviews or questionnaires. Descriptions of the settlement's physical state, people's behaviour or other details observed provided supplementary qualitative information for the analysis of the mining settlement.

Photographs were taken and geo-referenced on the town plan, coded and described in the field notebook. Photographs constituted the pool of factual evidences of what was seen and experienced during the field investigations. They were not just beneficial for recording the present; they were valuable indicators of how a landscape has changed (Emmison & Smith, 2000). In case of mining settlements the photography in some cases captured the transformations imposed by prevailing economic conditions at the time. The photography was done during the pilot surveys and the actual field investigation within the period of one year and evidenced some factual changes that occurred during that period. The photographs presented the actual physical environment of the settlement through the lens of a camera. For example, the same retail outlets that were photographed in 2009 and 2010 in many cases evidenced the economic transformations that occurred during the short period of time.

4.4 Analysis of data

Data collected from the field investigations or secondary data sources were analysed to obtain beneficial information to build up the prospects. A computer-based analysis was performed on all primary data requiring careful and thoughtful classification of the data, design of the database to store it and the appropriate software. The data collected through questionnaires generated responses in the form of nominal, ordinal and ratio data and could be analysed with the help of statistical methods.

The majority of data collected by the questionnaire was in categorical form, such as the number of female or male respondents, or how many people originated from the particular area and how many migrated to the settlement, and less in ordinal form where 'yes' and 'no' responses were requested. This type of data was entered into the Microsoft Excel 2010 spread-sheet data base and then coded to ensure that it can be analysed in a comparative manner. Each response was provided with a particular code and entered in a separate column. With the assistance of the filtering and sorting options of the Excel software it was possible to sort the data in groups and determine how many respondents fell into the particular category, except for the ratio data (e.g., number of dependents, number of people per household) which could not be coded and was entered as is and analysed by parametric statistical techniques. It is perceived that the spread-sheet packages cannot distinguish category codes or ranks from ratio data, but a well-designed database in the form of a contingency matrix served the purpose. The latter allowed performing filtering functions over the data and analysing respondents with different socio-demographical characteristics. The Microsoft Excel was furthermore valuable in different manipulations by arranging and displaying data,

making it easier to analyse, interpret and present in a visual form. The Microsoft Excel software formed a base of the exploratory analysis and allowed the data to be presented in visual formats such as bar charts and radar diagrams.

The analysis of qualitative data differs and required thoughtful planning for the time consuming analysis. The first step was to enter the data into a presentable and readable form. Thus, all qualitative data from the questionnaires which represented responses from the open-ended questions was entered into the database where other data from the same questionnaire was stored. Interviews were transcribed and essential reported issues were annotated. Data from each interview were digitized and stored separately.

Entered data were revised and coded. Each time a respondent used a particular explanation of an event, it was given a separate code. Then data were grouped in similar segments, forming a group. In such a way the meaningful themes were identified and the technique allowed for comparing information of a qualitative nature. The coding of data was not of the main interest, but rather the organizational tool, despite the fact that it offered supplementary information about how often a particular data set with similar properties occurred. More important was to acquire information on properties of the data set and coding made it easier to make sense out of the mass of information. The categorization of qualitative data helped to organize the materials and made it possible to distinguish interesting relationships between the data. It is not always possible to pre-design the codes and therefore the codes were created during the process of working on the data sets and based on knowledge acquired through the research and literature review. Qualitative data required a content analysis.

Spatial data were collected by mapping which required further spatial analysis. For this, research maps assisted to visually represent and communicate spatial relations in the form of 'visual text'. Multi-criteria evaluation was used for visualizing future prospects for the mining settlements. Maps were created based on the existing layer and supplemented with spatial information that was obtained through digitizing information from field investigations and other cartographic information that was obtained from the internet, particularly from the Google Earth and the Google Map both of which have a wide selection of reputable topographical maps, 3D maps and satellite images. Spatial analysis employed both types of cartographic generalizations. Semantic generalization was needed for selecting settlements, other urban centres or the whole region or where a particular area of the urban centre was to be included on the map while geometric generalization was used to highlight particular features, and to make features stand out on the map (e.g., exaggerated circles for mining settlements under investigation). Cartographic generalization made features stand out in the maps, involving the selection and symbolism of a cartographic object.

4.5 Interpretation of processed data

Data interpretation followed the phase of data analysis and involved explanation of patterns and trends that were obtained from data analysis. The interpretation process was guided by the conceptual framework involving further investigations and interpretation of acquired data analysis. The interpretation of processed data involved the synthesizing of theoretical deliberations from a conceptual framework (see Chapter 3), testing and validating selected theoretical aspects. The data interpretation followed pre-designed sequences of actions from the use of indicators for the extent of the

settlement's dependency on the mining industry (or other form of dependency), uncovering early warning signs in a mining settlement's developmental path for the design of possible prospects for hypothetical scenarios that may result from settlement planning actions taken (or not taken) in future planning.

From the conceptual framework a set of distinct characteristics of mining settlements was chosen and further used as indicators in recognition of a mining settlement's potentials and warning signs of undesirable development, identifying the extent of a settlement's dependency on the mining industry and its viability without the mining industry. A settlement's viability which is its capability to persist without mining was looked at within a larger framework of sustainable development. Whilst most of the mining settlements share some characteristics considered more likely to contribute to decline and dependency on the mining industry, most of these settlements may achieve significant viability with some early intervention and planning. The research analysed a set of indicators in pursuit of recognizing potentials and warning signs for the mining settlements. A single industry tends to display its presence in several socio-demographic, economic and physical features where a close relationship with the mining industry is possible to define with a set of indicators, presented in Figure 8. The indicators are tightly linked and may alter aspects under different conditions.

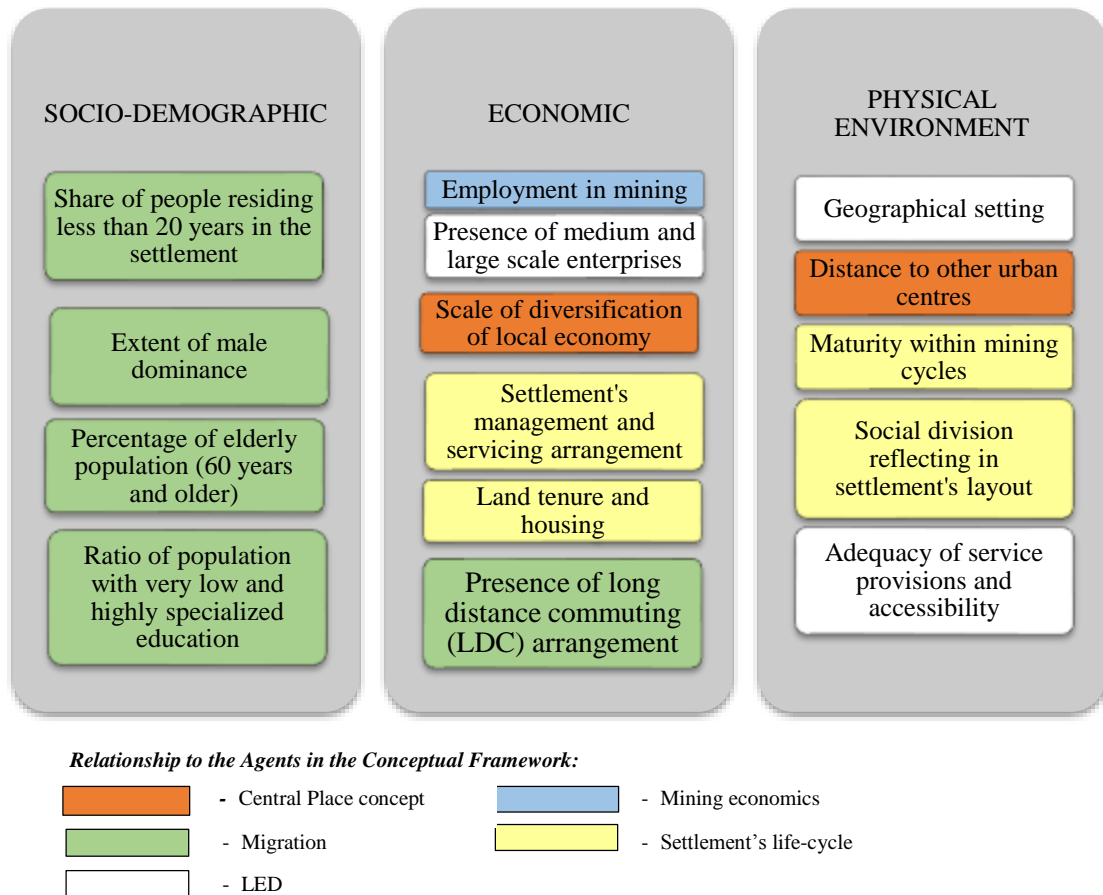


Figure 8. Indicators determining mining settlement's reliance on mining industry.

The series of indicators chosen to represent criteria for different aspects of dependency were measured within a scale of 1 to 3, carrying different magnitudes of the phenomenon. The description of the magnitude of each indicator is explained in Table 4. The numeral of the scale corresponds to the score. A maximum score of 44 would indicate a settlement's strong reliance on the mining industry and its very low potential for long-term viability. Such a settlement faces a sombre likelihood of severe decline after closure of mining activities if the magnitudes of the indicators are not improved. Reliance on mining industry is linked to the inability to sustain after mine closure. The long-term viability is not possible unless the settlement has diversified its economic base and does not rely on a single industry for its functionality, the demographics of

the settlement are more balanced and environment is taken care of. A minimum score of 15 would suggest that the settlement resembles a matured urban centre and that dependency on mining is not existent or does not negatively influence progressive development.

Table 4

Description of indicators used for determining a settlement's reliance on the mining industry

Indicator and its taxonomy of magnitude	Explanation of the taxonomy of magnitude
SOCIAL	
Percentage of people living less than 20 years in the settlement. 3 - 35% 2 - 20% 1 - 0 to 5%	Larger share of long term residents contributes to settlement's permanency. Percentage indicates the share of people living less than 20 years in the settlement. Smaller scale indicates better chance to reach the settlement's permanency.
Male dominance. 3 - 55% 2 - 50% 1 - 45%	Larger share of male population indicates possibly larger dependency on mining industry. Percentage indicates the share of male population among the surveyed community. Lower scale indicates more balanced gender composition and reduced dependency on single industry.
Absence of elderly population (60 years and older). 3 - 0 to 1% 2 - 2 to 4% 1 - 5% and more	Elderly population in mining settlements is negligible or absent. Percentage indicates the share of elderly population among the surveyed community. Lower scale indicates more balanced age composition and reduced dependency on single industry.
Fraction of people with education of Grade 10 and below (A), and share of people with highly specialized skill or tertiary education (B). 3 - (A) 61 to 80% / (B) 2 to 10% 2 - (A) 40 to 60% / (B) 2 to 10% 1 - any other combination	Mining settlements have distinct population with large share of unskilled people without formal high school education and very small share of highly specialized or educated population. The presence of both is required where highly specialized population constitute 2 to 10% of total population. The share between population with education of Grade 10 and below (A) and population with highly specialized skills or tertiary education (B) determines likelihood of population dependency on mining industry. Larger scale indicates high probability of dependency on mining industry.
Sub-Score (Minimum - 4, Maximum - 12)	

Indicator and its taxonomy of magnitude	Explanation of the taxonomy of magnitude
ECONOMIC	
Employed in mining industry 3 - 20% and more 2 - 5 to 20% 1 - 0 to 5%	Mining industry is the largest employer in the settlement depending on mining. Percentage indicates the share of employed in mining. Lower scale indicates less dependent community and likely more diversified local economy.
Presence of medium and large scale enterprise 3 - more than 10 2 - 5 to 10 1 - less than 5	Medium and large scale enterprises are more stable. Higher scale indicates more stable local economy, less dependent on mining industry.
Scale of diversification of local economy (scale is determined based on number and quantity of high order goods and services available in the settlement) 3 - very limited 2 - diverse, but not in quantities 1 - diverse	More diversified local economy is less dependent on one sector. Higher scale means local economy is not diversified only lower order goods and services available in the settlement. Development of local economy is constrained due to dependency on single industry.
Settlement is serviced and managed by mining company/s 3 - yes 2 - partially 1 - no	Settlement dependent on mining company for services risks severe decline. Higher scale indicates dependency by mining company for services and management of the settlement. Settlement presents strong dependency on mining industry.
Ownership, land tenure and formal housing by mine 3 - fully owned and managed by mine 2 - partially owned and/or managed by mine 1 - is not owned or managed by mine	Non-existence of title deeds severely cripples investment flow to the settlement. Higher scale indicates settlement's ownership by the mine. Dependency on mining industry is profound.
Existence of long distance commuting (LDC) employment policy 3 - LDC in place 2 - a segment of LDC 1 - LDC does not exist	LDS employment policy limits potential outlays from mining industry. Higher scale indicates presence of such employment policy. Viability of settlement is reduced due to absence of contribution to the local economy from mining industry.
Sub-Score (Minimum – 6, Maximum – 18)	

Indicator and its taxonomy of magnitude	Explanation of the taxonomy of magnitude
ENVIRONMENTAL	
Established by industry on virgin site 2 - yes 1 - no	The settlement established on virgin site is artificially created with no linkages to other areas or centres and does not have permanent community. Higher scale indicates the settlement was founded by mining industry in desolate area having potentially greater dependency on mining industry.
Degree of isolation of settlement 3 - very isolated 2 - isolated, but good connectivity 1 - not isolated	Development of isolated settlement is severely constrained by poor accessibility. Lower scale indicates lower degree of isolation and thus the settlement's viability to be less dependent on mining industry.
Maturity within mining cycles 3 - still in operational stage, has not experienced closure 2 - full mining cycle and closed 1 - one or more full mining cycles and is still functional	Mining settlements that experienced more than one full mining cycle are matured and have developed better mechanism to cope with financial pressures. Higher scale indicates the settlement's maturity within mining life-cycle in comparison to the mining settlement that has not experienced considerable decline and closure of mining.
Separation of mine labour force from the community in settlement's layout 3 - yes 2 - partially 1 - no	Separation between local and mining communities strains social environment. Higher scale indicates larger division in the community. The settlement is less homogeneous with clear separation of mining community from others.
Service provisions adequate and accessible to all 3 - only for mining community 2 - adequate for mining, less general public 1 - no access for general public	Disparity of service provision between mine and non-mining residents increase the strain in the community. Higher scale indicates higher level of disparity and consequently lower viability potential.
Sub-Score (Minimum – 5, Maximum – 14)	
TOTAL SCORE: 15 - minimum score suggesting characteristics of dependent settlement, 44 - maximum score suggesting characteristics of a regular urban centre	

The sub-scores of the social, economic and physical environment have the capability to expose the warning signs within these respective areas. Higher sub-scores suggest that the settlement needs to urgently attend to a particular aspect in pursuit of its long term sustainable development.

The indicators have the capacity to present the first warning signs, but the visual interpretation of indicators allowed for a better understanding of the intensity of the problem. Therefore the indicators were further refined, model data compared with baseline data and priority indicators chosen for viability modelling. For this investigation, the indicators were visualized in a radar diagram (see Figure 9).

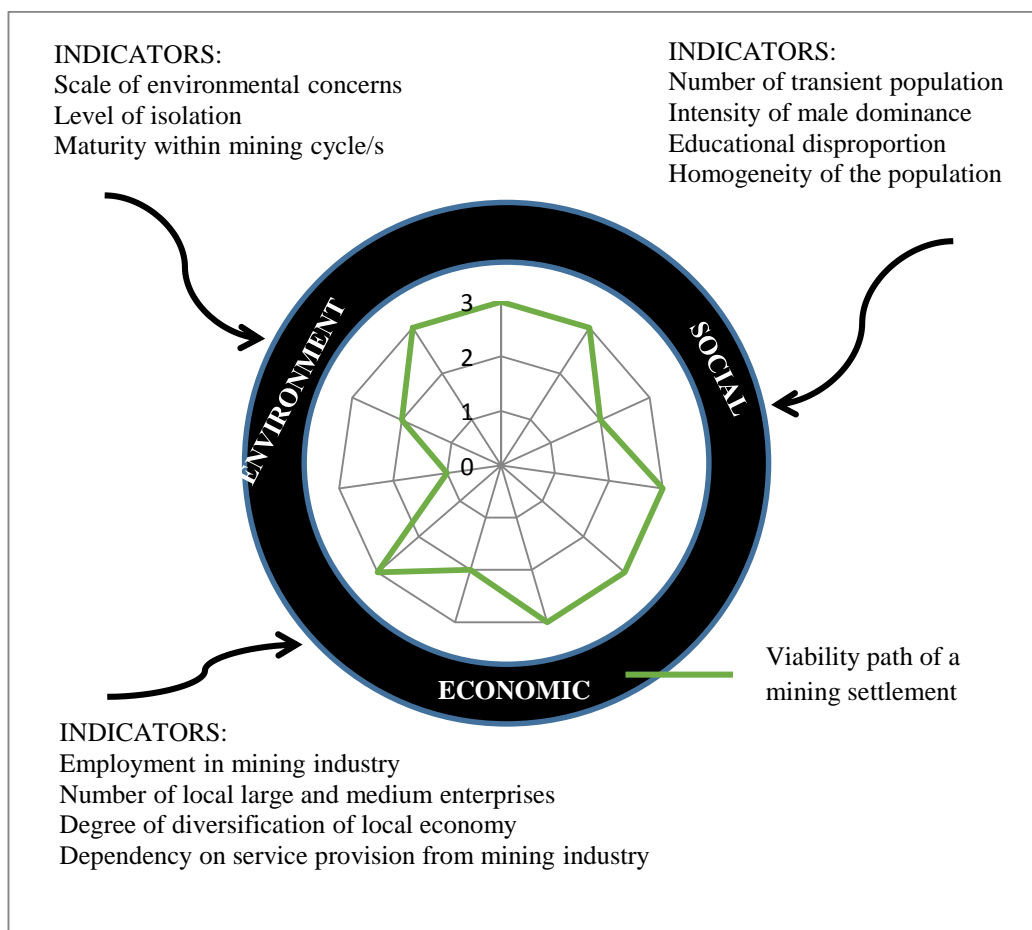


Figure 9. Illustration of radar diagram and indicators used in viability modelling.

The viability line in the centre of the radar graph reflects the current state of the settlement towards its viability. The pointers 1, 2 and 3 are viability boundaries, grading the settlement's chances of viability with pointer one representing the sturdiest and three the weakest potentials towards the settlement's viability. In other words, the more condense the viability line towards the core of the radar shape, the better are the chances of the mining settlement to reach its viability through the transition and develop into an independent rural or urban centre within Namibia's settlement framework. Examining the shape of the viability path made it possible to determine aspects of blockages and their intensity. The tool has capacity to display the scope of pressing problem areas in the assessment of mining settlements.

The pointers in the radar graph are set within the sustainable development framework of three preoccupations - social, economic and environmental. With reference to Figure 9, the viability path may reveal risks of decline and the settlement's diminished capacity to persist by marking the problem areas. Analysis and visual modelling of indicators make aware of a settlement's problem formations as well as likely causes and effects. This technique establishes a sound platform for the elaboration of prospects captured in scenarios, which in turn interpret and deal with present and forthcoming changes and threats.

The formation of prospects followed the analysis of a settlement's dependency on the mining industry and assessment of the settlement's viability. The starting point for building up a prospect was present, and the current context of the mining settlement together with decisions taken today which in turn will form future. The prospects in

this research were understood to serve as outlook into the future and were based on knowledge obtained from the theoretical research of other mining settlements, supplemented by facts from the empirical studies, analysis considering the settlement's viability, existing potentials in the area and the settlement's regional linkages with other urban centres.

Results of both formed the platform for formulating prospects with two scenarios depending on the settlement's guidance. The scenario building considered the actual risks of the mining industry's withdrawal and its impacts on the settlement. It highlights potential outcomes, effectiveness of mitigation measures and planning processes that were accepted or not attended to, and likely risks for each scenario. With the scenario method the research attempted to predict a range of future developments. The scenarios were presented in the form of a 'story' of events that happened with the mining settlement, written as an outlook from some point in the future, but looking backwards onto unfolding events. Despite the usage of the prognostic statements, it should be noted that scenarios are not to be assumed as forecasts. They have the advantage to be able to represent the complexity of the processes of a settlement's development as compared to the simple prognosis (Ginzel & Weidner, 2007). Scenarios reflect a sequence of events that can be changed if so required. Scenario development is therefore well suited to envisage the future related to sustainable development (CSMI, 2010a).

Two different scenarios are offered. Scenario 1 reflects the projected sequence of events where the appropriate and practical guidance of the settlement's development

did not take place. Scenario 2 presents an abstract sequence of events in the case of targeted and planned interventions. The cognitive scenario method enhances strategic decisions in unpredictable environments and could be considered as a useful tool in the delineation of prospects for mining settlements. The most pressing issues that were exposed by this investigation are presented in Chapter 7. It discusses measures and offers recommendations in search of finding to answer questions, what could be done to reduce the inherent risk of the identified impacts in Scenarios 1.

5 RESEARCH RESULTS

This chapter presents results and findings of the primary research collected from the qualitative and quantitative interviews and secondary data sources during the Phase III (Investigations and Surveys) of this study (see Figure 4). The results reflect a kaleidoscope of problem formations, processes, challenges and lessons learnt from the past and contemporary developments as the settlements adapt to changing conditions. The case studies are presented separately to demonstrate their individual uniqueness.

5.1 Rosh Pinah

The mining settlement of Rosh Pinah is located in the southern part of Namibia, some twenty kilometres north of the Orange River, 165 kilometres south from Aus and 260 kilometres south from Keetmanshoop. It is nestled in a scenic area between two National Parks; the Sperrgebiet National Park to the west and the /Ai-/Ais-Richtersveld Transfrontier Park to the east (see Figure 10).

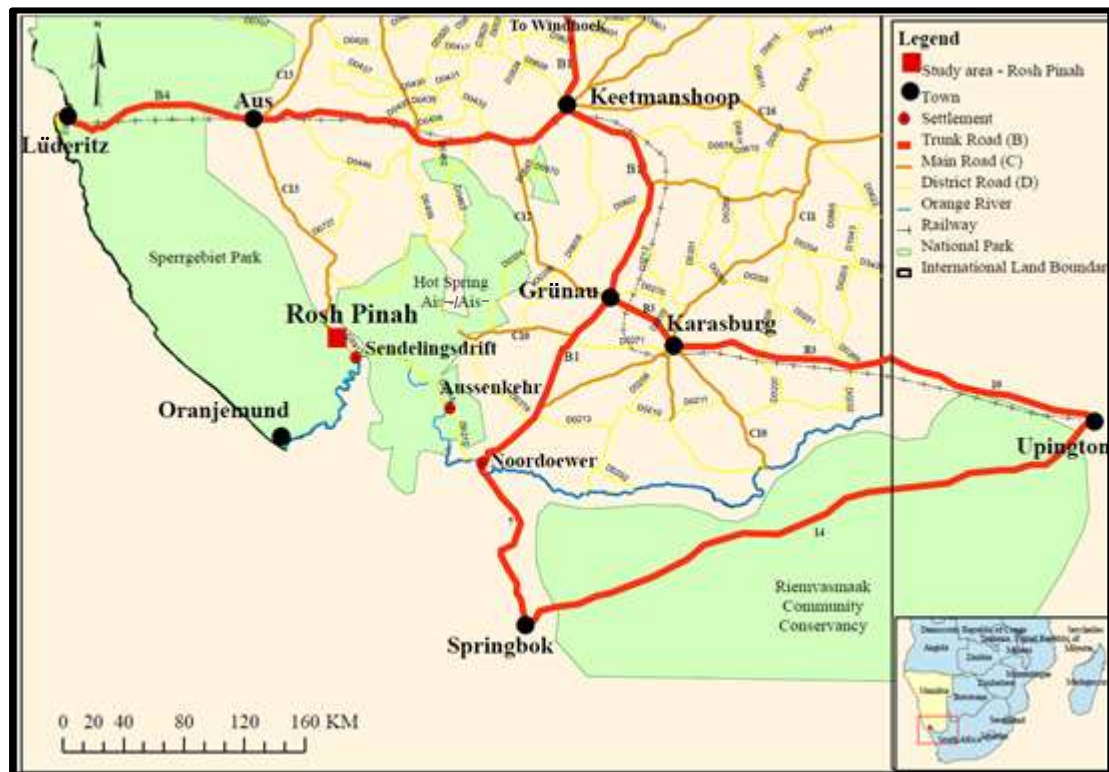


Figure 10. Geographical location of Rosh Pinah, Namibia (2010).

The climate of this distant part of Namibia is extremely arid with an annual median rainfall of less than 100 mm (Mendelson, Jarvis, Roberts & Robertson, 2002). Low annual precipitation and high evaporation lead to very poor soils which cannot support large vegetation; only smaller plants like grasses, shrubs and small trees managed to adapt to such an environment. Areas around Rosh Pinah may be defined as very sensitive to soil degradation if the land is used inappropriately.

The vicinity of Rosh Pinah, due to insignificant availability of water and very little grazing potential, had only been sporadically populated since pre-historic times. At the time of research in 2010, the area was still sparsely populated, with vast open rural areas which were mainly private farms. Rosh Pinah is remote and isolated and was very unattractive for settlement until the discovery of zinc and lead in 1968. Discovery

of mineral resources changed the peaceful path of development and the mining settlement established itself quickly, bypassing the pioneer stage of a settlement's development. With tarring the road connecting Aus and Rosh Pinah, opening the Sendelingsdrift border post with South Africa, opening the previously restricted Sperrgebiet National Park to the general public, proclaiming Oranjemund town and the road between Oranjemund and Rosh Pinah, people gained new freedom of movement in the area which changed the dynamics of the development for the whole region. The Rosh Pinah at the time of the research in 2010 was remote, but it was well connected by a road network and therefore easily accessible. It was well organized settlement and managed by two mining companies. The economy was seemingly vibrant and capable of providing all necessary goods and services to its people. Rosh Pinah is under the Oranjemund constituency of the Karas Region.

5.1.1 Historic overview of Rosh Pinah development

The southern and south western part of Namibia, the areas where present-day Rosh Pinah is located, has been populated by the San people for hundreds of thousands of years (Pallett, 1995). They were hunter-gatherers, living in areas with enough water to support their livelihoods and were always mobile and carried all they possessed as they moved. With arrival of the Khoekhoe, particularly the Namas, the social organization of people living in Rosh Pinah surroundings also changed. Namas introduced hitherto unknown means of wealth and power - domestic livestock, mainly goats, sheep and cattle (Kostka, n.d; Campbell, 1988). Their life of the semi-nomadic pastorals was undisturbed until the first European explorers visited the area around 1400s, paving the way for a new group of nomads of Dutch origin invading the south and south-

western parts of Namibia in 1652. With the help of weapons and the effect of foreign disease, the Nama populated areas were conquered by white settlers and the colonial expansion that followed destroyed the Namas' social organization, seized the land and enslaved people or used them as labourers on the white farmers' land. At this point many Namas became farm workers and lost their original way of life by migrating with their stock (Kostka, n.d.). The region's social and economic dynamics were changed (Pallet, 1995) forever. The large sparsely populated areas attracted white settlers from South Africa and Europe envisioning on commercial farming and mining.

Interest in potential mineral wealth during the 18th and 19th centuries led to exploration activities in large areas of Namaqualand¹² around the Orange River, mostly looking for copper. Although some discoveries were made at the time, the remoteness and wilderness of the area, and particularly transportation difficulties, were discouraging. The land carriage expenses without smelting ore were estimated to be too high (Smalberg, 1975; Kostka, n.d.) and did not make it economically viable to open a mine. The Orange River has many reefs and a proper site for a harbour was not found and therefore the Orange River was assumed to be unsuitable for transportation of ore.

During the 1920s the global metal prices went up and mineral prospecting and exploration activities revived in Rosh Pinah surroundings. The first successful discovery of copper was reported by a Prussian Jew, Mose Eli Kahan, who had fled

¹² Namaqualand is a region of southern Namibia and northwest South Africa, covering some 440 000 square kilometres. The area is divided into Little Namaqualand to the south of the Orange River and is a part of the Northern Cape Province in South Africa and Great Namaqualand to the north of the Orange River, including Rosh Pinah's vicinity forming a part of the Karas Region in Namibia. Namaqualand is known for its colourful flora with a broad diversity of wildflowers blossoming after the winter rainfalls.

Europe to escape Nazi persecution to become a prospector in the southern part of Namibia. The deposit was situated in a remote and extremely difficult terrain. In the 1920s Kahan tried to work the deposit, only to abandon it soon after when the copper prices plummeted in the 1930s (Bulpin, 2001). By that time Rosh Pinah's vicinity was populated by a small, but thriving farming community which changed in 1950s. The nomadic lifestyle of the 'trekboere' came to an end when private ownership of land was introduced by allocating a large farmland in parcels of 12000 to 15000 hectare (Development Planning and Research, 1998). A new form of agriculture was based on stock farming, Karakul sheep farming was the major economic activity of the area until discovery of zinc and lead sulphides by MD McMillan in 1963 (RPZC, 2003; McMillan, 2005; RPZC, 2010). This was a major breakthrough in prospecting and the deposit was confirmed and proved to be sufficient to develop a mine in vicinity of the present-day Rosh Pinah.

Preparatory work and mine development commenced in 1967, which included the establishment of a base for the accommodation of a mine labour force. By 1969, the mining settlement of Rosh Pinah was well established community with an economy and social structure tied to the Rosh Pinah lead and zinc mine. Even though the production of mine commenced in 1969, the mine officially opened only in 1970. Rosh Pinah mining settlement was built as a company town. Initially all buildings and supporting infrastructure were owned and managed by the mine operator. The physical and geographical isolation defined the community's very little contact with the outside world, the residents could not easily commute or shop elsewhere. Once the mining community took hold, parallel to an organized mining settlement, a small informal

settlement at the foot of the mining waste rock dump site started to emerge in 1971 and 1972. The residents named it Sand Hotel and the settlement was occupied mainly by the Rosh Pinah mine workers and their wives. In a short time the area was covered with numerous corrugated iron shacks, several cuca shops¹³ and shebeens¹⁴ that operated to serve mine workers and informal settlers. In most cases these establishments were run by the spouses of the mine workers.

The opening of Rosh Pinah mine elevated interest for further prospecting in the vicinity of Rosh Pinah and a promising zinc ore body was discovered some 25 kilometres north from Rosh Pinah. Explorations of this new discovery were done between 1976 and 1982, but it was concluded that the deposit was ‘unconventional’ and could not be processed due to metallurgical problems associated with the treatment of this unconventional ore. The mineral deposit was considered too small to be economically viable and further development of the project was archived (Skorpion Zinc, 2009). The Rosh Pinah settlement did not get the expected boost and continued to develop along the achievements of the Rosh Pinah. All people living in the formal part of Rosh Pinah and the majority of those living in the informal Sand Hotel were directly or indirectly related to the mining company. The size of settlement fluctuated along the performance of the mining company.

In the early 1980s, the agriculture in southern Namibia that was mainly of Karakul sheep farming suffered a sharp decline causing a disastrous effect on the economic

¹³ Small informal retail outlet selling daily necessities.

¹⁴ Informal recreational outlet serving alcohol.

viability of the area. Lots of farmers in the surrounding areas of Rosh Pinah went bankrupt and were forced to sell or abandon their farms and take up other forms of employment to survive (Development Planning and Research, 1998; Skorpion Zinc, 2008). It was particularly devastating for farm workers undergoing mass retrenchments. Generations of farm workers living on the farms of white owners had to leave, but they had no place to go to as it was the only home they had known all of their lives. Refuge was sought in nearby urban centres, residing in informal parts of the settlement. The collapse of the Karakul sheep markets in the early 1980s was an important factor underpinning the expansion of informal settlement not only in Rosh Pinah, but in the whole of the Karas and Khomas Regions (Development Planning and Research, 1998). The Rosh Pinah's Sand Hotel experienced a considerable wave of influx, mainly very poor and devastated people without any job or skill that could be applied in their new home. Less than a decade later, a new wave of migration followed when Namibia attained its Independence in 1990. This migration was triggered by the newly acquired right of movement within Namibia. People from underdeveloped rural areas migrated to Rosh Pinah in search of job opportunities. Restricted population movement in its formal part led to an influx settling in informal part of Rosh Pinah.

Despite the development of an informal settlement, the formal parts of Rosh Pinah owned and managed by the mine was growing steadily, very little influenced by the other economic and political processes transpiring in the country. Only in 1995 uncertainty hit the Rosh Pinah mining settlement when it was shaken by the very low global commodity markets and declining economies. The owner of Rosh Pinah mine, Iscor (Pty) Ltd, went into liquidation. The settlement was surrounded by the gloom

and uncertainties, several mine workers left, while others remained, awaiting further developments. The slump in global commodity markets affected not only Rosh Pinah, but echoed around Namibia. The year 1996 marked massive disputes and ensuing layoffs in the Tsumeb mines. The struggling Rosh Pinah settlement experienced another influx of mine workers from Tsumeb, mainly occupying the informal Sand Hotel, but when failing to find jobs, some had to move to other urban centres while others returned to their places of origin. The doubt for the future was aggravated by continuous change of ownership of Rosh Pinah mine, change of the shareholders, restructuring of the mining company and change of company names during the period of 1995 to 1999. While the mining company was undergoing major ownership transactions uncertainties affected Rosh Pinah's development, economic activities were on the decrease with reduced flows of goods and services while the hard and soft infrastructure suffered serious dilapidation.

In 1997, the depressed Rosh Pinah received striking news: the zinc deposit, 25 km north of Rosh Pinah, previously assumed to be 'unconventional' and not economically feasible, received recognition of being viable and development of the new Skorpion Zinc Project was announced (RPZC, 2003). That included opening of the pit mining and on site refinery to produce 150 000 tons of high grade zinc per year over a fifteen year life span. In 1998, the management of the Skorpion Zinc Project made an agreement with the Rosh Pinah Zinc Corporation (RPZC) to house their employees at the Rosh Pinah mining settlement and to expand the infrastructure of the existing settlement (RPZC, 2003). The settlement that since its beginning was owned and managed by one mining company was going to be under administration of two mining

companies and growth of the settlement was imminent. This marked the beginning of a new period in Rosh Pinah's development.

The two mining companies in Rosh Pinah embarked on a new venture with the purpose to manage the settlement and its infrastructure. The joint venture was created and named RoshSkor. The RoshSkor further intended to lead and manage the proclamation process of Rosh Pinah as a local authority (RPZC, 2003). Both mining operators considered this to be the natural direction of the settlement. Other large scale new developmental projects unravelled in 2000, and the future for Rosh Pinah looked bright. Over 290 new houses were built in the settlement to accommodate the Skorpion Zinc mine workers, additional accommodation for the Rosh Pinah Zinc Corporation (RPZC) mine workers and with expansion of the infrastructure and services, additional houses were built for the personnel of service providers such as NamPower and NamWater. The establishment of the Skorpion Zinc mine and refinery resulted in a considerably larger Rosh Pinah community (SAIE, n.d.), the size of the settlement almost doubled (see Figure 11).

Excitement about the new large developments and potential economic growth of the settlement outshone the additional pressures experienced by the settlement's long-term residents. Several RPZC mine workers who were living in the settlement since its beginning or at least for more than twenty years considered themselves as locals. Suddenly, with the arrival of new people they felt invaded and the community became divided into the old Rosh Pinah residents, mainly mine workers of the Rosh Pinah Zinc Corporation mine and the Skorpion Zinc employees. The growth occurred in both the

formal and informal parts of Rosh Pinah. Announcement of the Skorpion Zinc project go-ahead in the national media created a buzz around and caused the fresh influx of people to Rosh Pinah, particularly when mine construction work commenced in 2001.

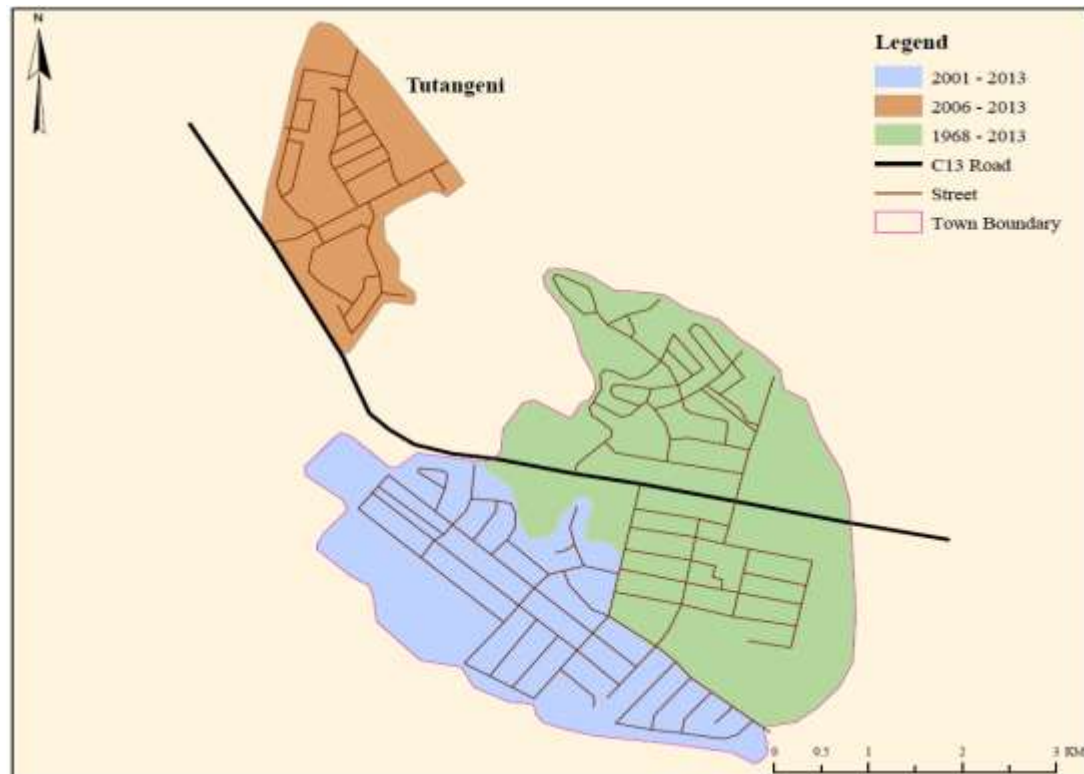


Figure 11. Development phases of Rosh Pinah, Namibia (2010).

Rosh Pinah was developing fast reaching the peak of its development which coincides with the premier of the production stage of the mines. At the peak of mining production and the booming socio-economic life of the settlement nothing indicated any looming decline. Only with onset of robust commodity price fluctuations, particularly when record high commodity prices for zinc and lead in 2006 and 2007 followed by a significant drop in 2008, the base metal business endured financial pressures in 2009 and 2010 (Exxaro, n.d.). Production of zinc concentrate at the Rosh Pinah mine also slowed down and the unstable electrical supply at the time considerably affected the mining operations. The output of zinc in 2009 was just sufficient to maintain the

operations with negligible profits. The global financial crisis and low commodity prices significantly affected company profits and reduced capital expenditures, but the workers were not laid off. With the reduced funding from the both mines Rosh Pinah came under pressure as no new developments and investments went into its infrastructure. The businesses slowed down. The size of the population remained the same without considerable out-migration. The mining slowdown was global and the workers did not have alternative options to go for and had to remain in Rosh Pinah hoping for a swift recovery of the mining industry.

The deepening of the depressed global commodity markets, industry's low margins, exchange rate volatility and higher electricity prices in 2010 led to the Skorpion Zinc mine to put their assets on sale. This created a certain level of uncertainty among the residents of Rosh Pinah and fear of job losses. The mine operator called on the workers to stay calm and promised a smooth transition of the ownership without pressures on the labour force. Eventually Skorpion Zinc assets were sold in early 2011 and bought by the metals and mining group Vedanta Resources Plc. As soon as the settlement was feeling slight relief and more confident about its future, another hit for the mining community followed in 2011 when Exxaro announced their intent to sell their shareholding in the Rosh Pinah Zinc Corporation (RPZC) which was consequently bought by Glencore International which acquired a majority share in the Rosh Pinah mine. The worst fears of Rosh Pinah about the future of the mining industry and potential harm to the settlement did not realize. The transition of ownership for both mines went through smoothly without significant adverse impacts on the settlement. On the other hand, the future of mining settlement is uncertain. Vedanta has been

vague on the future of Skorpion mine, which will run out of commercially mineable ore by around 2016/17 and the latest life of mine estimates for Rosh Pinah mine is 2020. The approaching the end of the mine life-span for both mines and accompanied with unresolved dispute over the undeveloped Gergarub zinc sulphide deposit which has potential to prolong the presence of mining industry in Rosh Pinah for around ten years, is clouding the settlement in uncertainties over its future.

5.1.2 Socio-demographic profile of Rosh Pinah community

Development of the community

Rosh Pinah grew and developed in the remote and isolated southern part of Namibia. It emerged instantly, from a sparsely populated rural area to a small mining centre. There were no statistics available on the early population growth, but due to the strict apartheid migrant labour laws that existed at the time when Rosh Pinah developed did not permit black migrant workers to settle in Rosh Pinah and most of the work force was constantly on the move. All inhabitants were directly or indirectly employed in the mining industry. The population size of the early days of Rosh Pinah fluctuated according to the financial performance of the mining industry and its needs for employment. The settlement was a temporary home to people from across Namibia and some from abroad, with different cultures, different value systems and lifestyles living together on a small mine organized piece of land. There was no thought in people's mind about their future in Rosh Pinah. The mine workers came on contract and left once it had expired. The first major change occurred in the 1970s after migrant labour laws in Namibia were relaxed and the growth of Rosh Pinah occurred in a small area of Ehafo hostel that was meant for the mine's black labour force. Enforced by

racial segregation of land at the time, the black male migrant workers were strictly forbidden from living in the central part of Rosh Pinah that was designated for the white mine workers and their families. The overall population growth was negligible and the settlement did not exceed 1000 people during the first twenty years of its existence.

The dynamics changed following the attainment of independence in Namibia and liberated rights of movement. The settlement enjoyed constant exposure to the movement of people through in and out migrations, but the population growth occurred mainly in the informal part of the settlement as an outcome of strict control in the formal part of Rosh Pinah which was privately owned by the mining company. Until the time of the research in 2010, settling in the formal part of Rosh Pinah was strictly controlled and required consent from the mine operators.

By 1998, the population of the informal part of Rosh Pinah exceeded the size of the formal part of the settlement and disparity continued to grow (see Figure 12). Development of the Skorpion Zinc mine in the early 2000s brought another wave of informal influx to Rosh Pinah caused by the expectation of being employed in the mine. By the time the Skorpion Zinc mine was completed in 2003, the Sand Hotel informal settlement was overcrowded, reaching the mark of approximately 4000 people. The population living in the informal part of Rosh Pinah amounted to a half of the total population of Rosh Pinah and rose further by 60% in 2009.

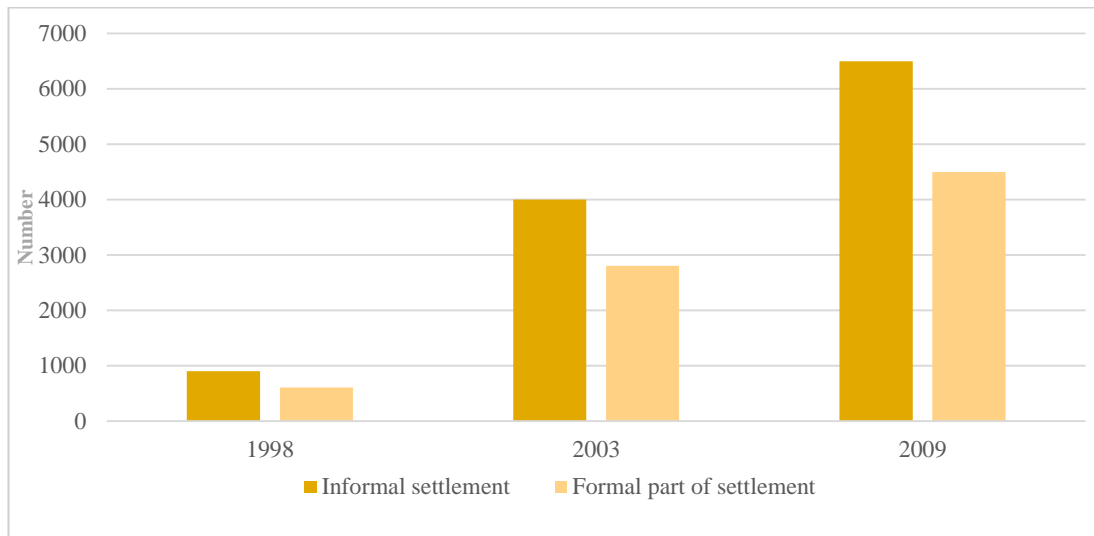


Figure 12. Population in formal and informal parts of Rosh Pinah, Namibia (1998-2009)
 (Source: Development, Planning and Research (1998) and the RoshSkor data).

In 2010, the RoshSkor estimated 11 000 people to be living in Rosh Pinah, approximately 6500 of whom were living in the Tutangeni informal settlement. However, according to the 2011 Census data, Rosh Pinah has an urban population of only 2 835. There was a high discrepancy between the two sources. The explanation for the discrepancy could be in the methodology of the data collection procedure where the RoshSkor statistics included the non-resident workers in their estimates, whereas they were not included in the Census data. Objective data could therefore be skewed.

The settlements like Rosh Pinah with a large temporary population that did not reflect in the national Census data were disadvantaged; their needs for improved infrastructure, facilities and services could be overlooked. This could become particularly critical should Rosh Pinah be proclaimed from a privately owned mining settlement to a local authority and funding for the settlement's administration and management be negatively affected. Discrepancies in data collection measures on population size may hinder fair distribution of regional funding for this community.

Rosh Pinah was not a proclaimed local authority and for the purpose of this research the RoshSkor estimates were used as currently this was the only statistical data officially used for all planning purposes in Rosh Pinah settlement.

Emerging in a remote scarcely populated area impeded Rosh Pinah's chances on durability. Rosh Pinah does not have a significant share of residents with ancestral roots and cultures attached to the locality. The majority of the community consisted of a migrant population such as mine workers, migrant job seekers and people who came to Rosh Pinah with or without their families as a result of mining operations. The maturity of Rosh Pinah's population base was challenged by a brisk turnover of its population.

The community survey revealed that none of the adult residents was born in the settlement. Ninety percent of the community lived there less than ten years, pointed to a considerable presence of transient population who came to Rosh Pinah only on a short-term basis without any intentions to settle permanently. Fifty-nine percent of the people lived in Rosh Pinah between three to nine years and one-third of the population were recent arrivals (see Figure 13). Only 8% of Rosh Pinah's residents lived there for more than 10, but less than 20 years. This population group was considered the local residents of Rosh Pinah, and comprised mainly of the Rosh Pinah Zinc Corporation mine long-term mine workers or those who supplied goods or services to the mine and settlement for a period of over 10 years. Potentially these long-term residents formed the base for permanent residents of Rosh Pinah as they had developed a better sense of community.

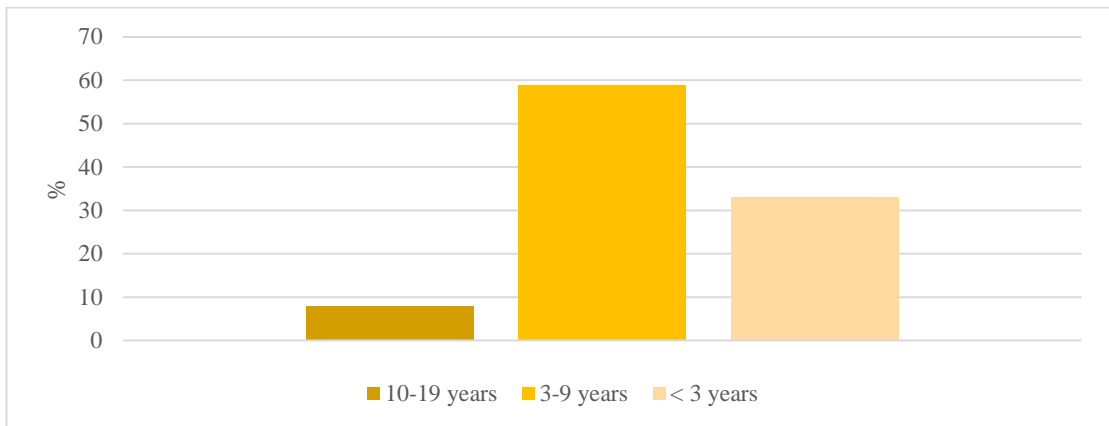


Figure 13. Residents' length of stay in Rosh Pinah, Namibia (2010).

The mainstream of Rosh Pinah's community consisted of people coming from the north and north eastern parts of Namibia, predominantly people from the northern parts of Namibia - the Omusati, Oshana, Oshikoto and Kavango Regions (see Figure 14).

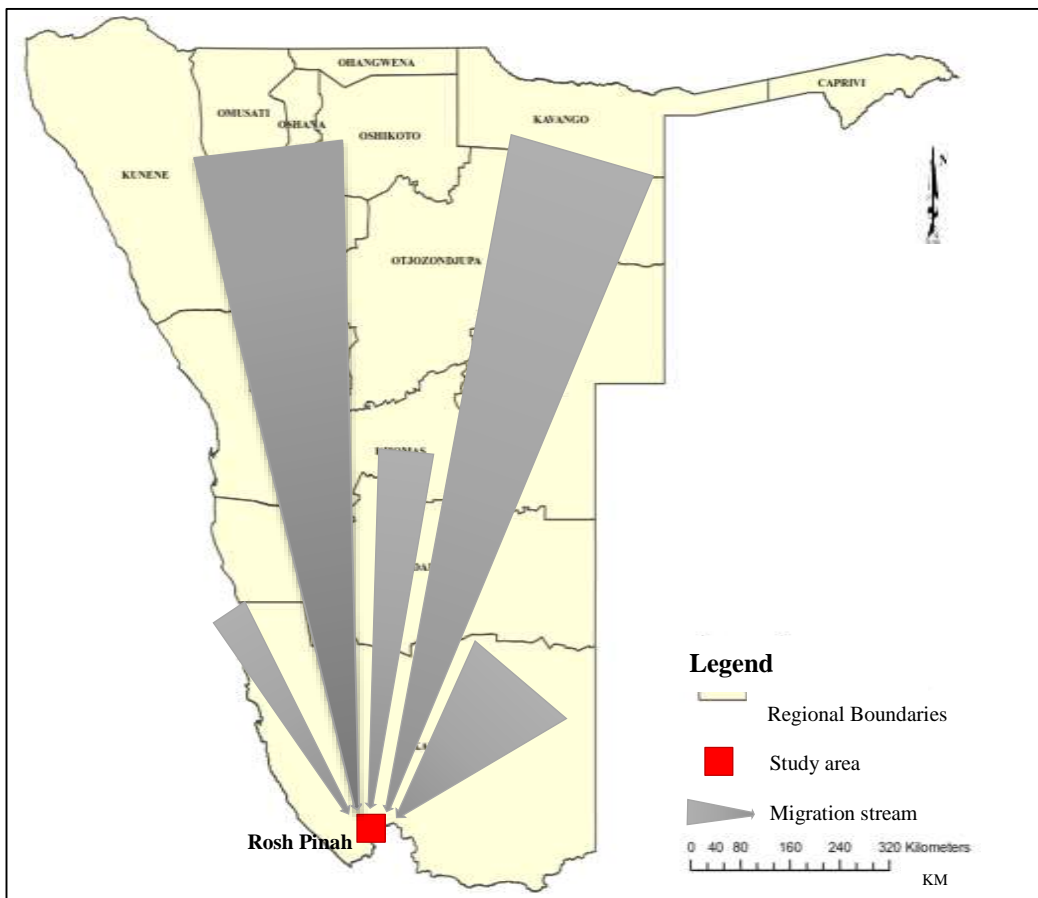


Figure 14. Origin of Rosh Pinah's residents, Namibia (2010).

Traditionally, prior to Namibia's independence, these areas were presumed to be source areas for migrant workers, and job seeking migration still persisted, however since independence, migration flows attuned in favour of increased local and regional migration. At the time of the research in 2010, 20% of Rosh Pinah's residents had their origin from farms in the Karas Region or Keetmanshoop urban area. The share was still small, but the trend of increased local migration over national migration was observed.

Sixty-three percent of people arriving at the settlement were those who came to search for better job opportunities and 33% moved because of employment (see Figure 15), suggesting that one-third of the population was directly or indirectly related to the mining industry.

Four percent moved to Rosh Pinah to be close to their families. The majority in this group entailed family members of Rosh Pinah Zinc Corporation and Skorpion Zinc mine workers, family members of service providers in the settlement and people related to the Namdeb diamond mine workers who lived in Oranjemund. Due to the highly restricted access until 2011 to Oranjemund that was 100 km away, the wives and family members resided in Rosh Pinah's informal settlement to be closer to their working family member and being able to see them when the diamond mine worker was off duty. However, the share of the family members of Namdeb mine workers had significantly decreased over the last ten years (prior 2010) as a result of Namdeb offering family accommodation to their workers and with Oranjemund being proclaimed in 2011 and becoming accessible to the general public, such arrangements, if any, were foreseen to dissolve. Among those who moved to be close to their families

were mainly women. Male migrations had occurred only due to secured employment (33% of male respondents) or the search for better job opportunities (67% of male respondents).

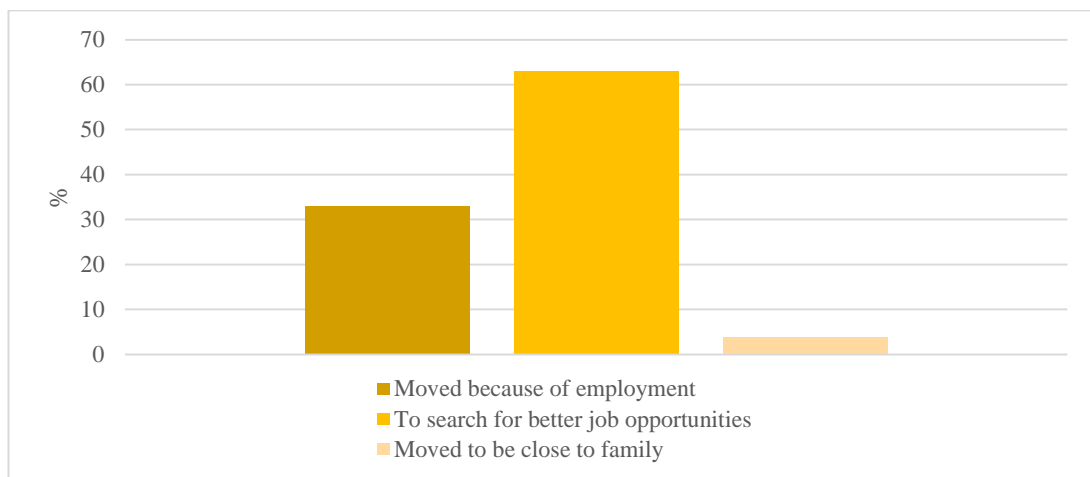


Figure 15. Residents' reasons for moving to Rosh Pinah, Namibia (2010).

The above trend revealed that there were more people moving to Rosh Pinah in the hope of finding a job, than those who have already secured employment. Therefore the population growth is more on account of young unemployed males settling in the informal part of Rosh Pinah. The population growth in the formal part of Rosh Pinah reflected the outcomes of operational policies of both mining companies where the arrival of new residents was strictly controlled.

The transient nature of Rosh Pinah's population was confirmed by the community survey. Eighty-three percent of people did not consider their future in Rosh Pinah and were planning to move out of the settlement. The time frame of those who were planning to move out in most of cases depended on contractual obligations. Sixty-one percent of Rosh Pinah residents were planning to move out sometime in future, but only after five years or more from the date of research in 2010 (see Figure 16). This

coincided with the official life span of the Skorpion Zinc mine coming to an end in 2016/2017. Twenty-two percent of the community expressed intentions to move out already before the forecast closure of the mine.

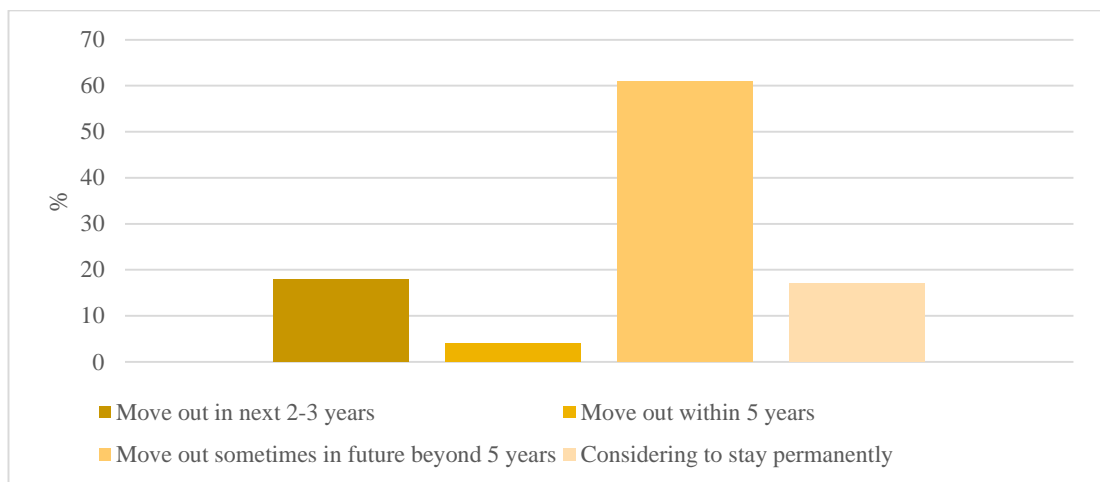


Figure 16. Respondents' intentions to stay or move out of Rosh Pinah, Namibia (2010).

There was no spatial difference between the formal and informal part of the settlement in terms of willingness to stay or leave Rosh Pinah. The residents with higher education (e.g., Grade 12 and up) were more likely to leave. This pointed out to the likely scale of out-migration, and capacities and skills of people who were likely to remain. At the current stage, there was clear indication that large scale out migrations could be expected, particularly among the more educated people from the formal part of Rosh Pinah. Only 15% of the community were willing to stay in the settlement and the majority of those were with poor skills and education. This could affect the demand and supply of services in the community and the capability to maintain existing services. The likely destinations of those people who consider moving out of Rosh Pinah were Windhoek and other northern areas of Namibia. This suggested that they were likely to go back to their places of origin, the place they refer to as home or the capital city for better job opportunities (see Figure 17). The cumulative migration for

Demographic characteristics

The youthfulness of Rosh Pinah residents was evident. In 2010, the settlement was bustling with young adults and particularly people in their prime-age of 21 to 30 years. This demographic group accounted for 62% of the total adult population (see Figure 18). Characteristically to mining settlements, Rosh Pinah had a clear absence of an elderly population group. None of the community survey participants was older than sixty years, suggesting that the proportion of elderly residents who were of retirement age and older was negligible. Taking into account that the accommodation in the formal part of Rosh Pinah belonged to and was managed by the mining companies, it was clear that there was no option or provisions for retirement in the formal part of Rosh Pinah, unless they were in the Tutangeni informal settlement. If there was any retired person living in the formal part of Rosh Pinah it was likely to be a dependent of an employee of the mining and mine servicing industry.

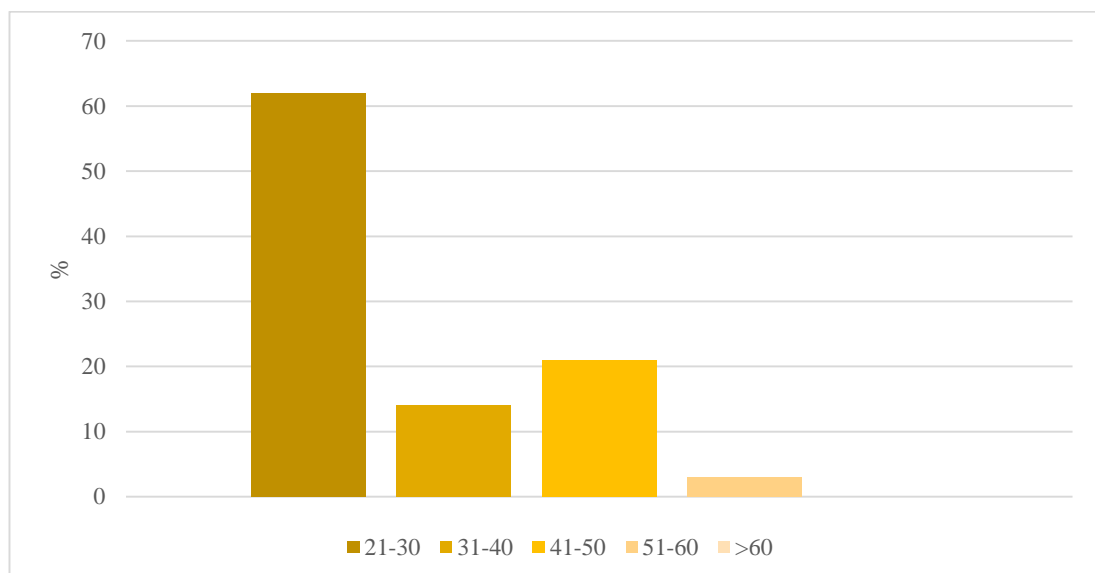


Figure 18. Age of respondents in Rosh Pinah, Namibia (2010).

In settlements like Rosh Pinah where mining was the single largest employer, it created gender imbalance among its population. Rosh Pinah had 67% male and 33% female

residents, exhibiting the typical characteristics of a mining town with male dominance. According to RoshSkor data, 51% of the total Rosh Pinah population was female and 49% was male (Skorpion Zinc, 2009). These figures included the population group below eighteen years.

Spatially gender ratios of the Tutangeni informal settlement were more balanced than those of the formal part of Rosh Pinah, with a slight female dominance. This could be attributed to the presence of spouses of non-residing mine workers who were two weeks on duty and two weeks off. To ease their daily arrangements with traveling, a few had brought their families and settled in the Tutangeni informal settlement. When they were on duty they stayed in the compound with a hostel type of accommodation in the formal part of Rosh Pinah. There was a small share of females in the informal settlement of Rosh Pinah who were related to the Namdeb mine workers in Oranjemund, a hundred kilometres away, but due to restricted access to the Oranjemund diamond mining town they resided in Tutangeni informal settlement. The trend was likely to change with the proclamation of Oranjemund in 2011 when access to and settling in Oranjemund will be eased.

Seventy-four percent of the adult population that participated in the community survey were single. One would assume that these were mostly single male workers, but the proportion of single women was higher than that of single men, 78% and 72% respectively. A similar tendency in the Karas Region of a growing number of women not marrying was detected already in 1998 by the Development Planning and Research as part of the social impact assessment procedure for the then proposed Skorpion Zinc

mine (Development Planning and Research, 1998). The numbers of unmarried women were on the increase. The above mentioned study of 1998 argued that the modern trend contradicted a previous belief that in the south of Namibia couples typically did not separate and male workers took their families with them when left to find waged work on the mine. Seemingly this was not the case in Rosh Pinah. However, this could not be conclusively applied to all of Rosh Pinah's community as the settlement consisted of people from different parts of Namibia and only 20% of the Rosh Pinah community was from the southern parts of Namibia. The youthfulness of the Rosh Pinah community should also be considered as 67% of the people were in the age group of 21 to 30 years, meaning that they recently graduated from school and could not be willing to settle down yet and start a family.

The literature on other mining settlements suggests low levels of education and a certain proportion of people with highly specialized skills. This was not observed in the case of Rosh Pinah. The education level of Rosh Pinah community could not be presumed low as compared to the national average. Among the surveyed community Rosh Pinah had 52% people with Grade 12 and 29% people with Grade 10 education. Rosh Pinah had a relatively high proportion of population with more progressive education of having at least a Grade 12 certificate, and a rather small share of population with education less than Grade 10, which was 14% of the total population (see Figure 19).

The level of education of Rosh Pinah's residents mirrored the labour employment policies for the mines. In 2010 the Skorpion Zinc mine did not employ people with

less than a Grade 10 education and the criteria for many employment vacancies were at least a Grade 12 certificate.

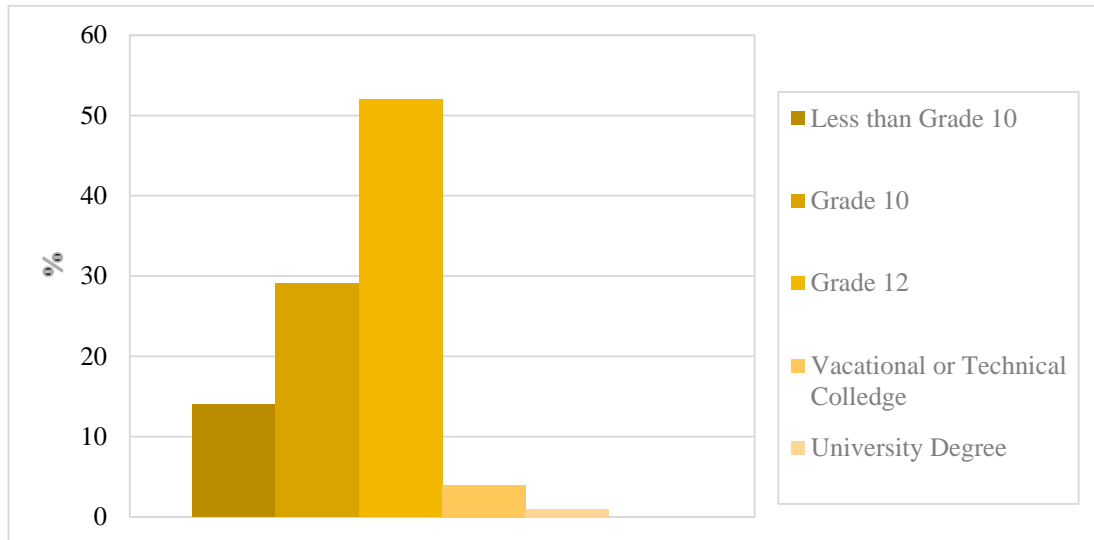


Figure 19. Education level of residents in Rosh Pinah, Namibia (2010).

There was an obvious disparity between residents of Tutangeni and residents of the formal part of Rosh Pinah with the latter having a higher level of education, confirming that an employment policy was observed among the employed residents in the mining sector. There was no obvious difference between the education levels of males and females. A minor proportion of residents of Rosh Pinah were people with highly specialized skills, the majority of those were however expatriate employees of the mining companies and were accommodated in the formal part of Rosh Pinah.

Employment and incomes

The proportion of employed residents in Rosh Pinah was high in comparison with the national average, but most of them were concentrated in the formal part of Rosh Pinah. Among the surveyed population in Rosh Pinah, only 22% were unemployed and 67% employed. Half of those employed (50%) worked full time for an employer, and nine

percent worked on a part-time basis for an employer. Fifteen percent of respondents were self-employed, pointing to a high reliance on wage employment.

Unemployment rates in the Oranjemund constituency where Rosh Pinah is located were among the lowest in the whole Karas Region, particularly for males where unemployment figures were below 10%. Female unemployment was just above 20% which was also relatively low in comparison with the rest of the Karas Region (Skorpion Zinc, 2009). Due to low population densities in the rural part of Oranjemund Constituency, it is safe to say that the low unemployment figures were the result of high employment in the two mining settlement of the region - Oranjemund and Rosh Pinah.

Among the 22% of the unemployed, most were men in the age group of 22 to 37 years old. These were single men who came to Rosh Pinah in search for job opportunities or who were previously employed at one of the mines. The survey revealed that the origin of these men was mainly from the northern parts of Namibia; particularly big proportions of unemployed males in Rosh Pinah were from the Kavango Region followed by Oshakati, Outapi and Grootfontein. Eighty-three percent of them have been trying to find a job or any alternative source of income, but to no avail. While mining was still present in the area they remained determined in finding jobs in the settlement. Seventy percent of these unemployed stayed with their family or friends, but the rest rented space with the help of another person or shared the rent with an individual from his or her household. All unemployed residents expressed their

willingness to move out of Rosh Pinah, particularly if jobs could be secured and with preferred destinations being Windhoek and Rundu.

Despite the fact that employment options for women in Rosh Pinah were relatively limited to shop assistants, teachers, nurses, cleaners, hostel workers, staff for lodges, domestic workers and community workers, the unemployment figures for women were slightly lower than for men. This could result from the number of women being less in the formal part of Rosh Pinah and more in the Tutangeni informal settlement where more women undertook self-employed activities such as selling food and other daily goods, offering child care services, and washing and cleaning services to others. Overall the community's impression of job opportunities was depressing with 89% of the Rosh Pinah community believed that there were no job opportunities in Rosh Pinah for school graduates and young people were leaving the settlement in favour of larger urban centres.

The large proportion of the employed people in Rosh Pinah secured relatively high incomes within the community. The monthly income for the majority of Rosh Pinah residents was in the range of N\$ 1001 to 5000 per month which was well above the national average in 2010. However, about one-quarter of the residents had to survive on less than N\$ 1000 a month (see Figure 20). Nine percent of Rosh Pinah residents received more than N\$ 5000 per month. The income distribution among the residents indicated a moderate buying power¹⁵ in the Rosh Pinah community.

¹⁵ The buying power for this research refers to the amount of money available for the individual to purchase products and services. A larger buying power indicates higher incomes at the community level and better ability to boost a local market.

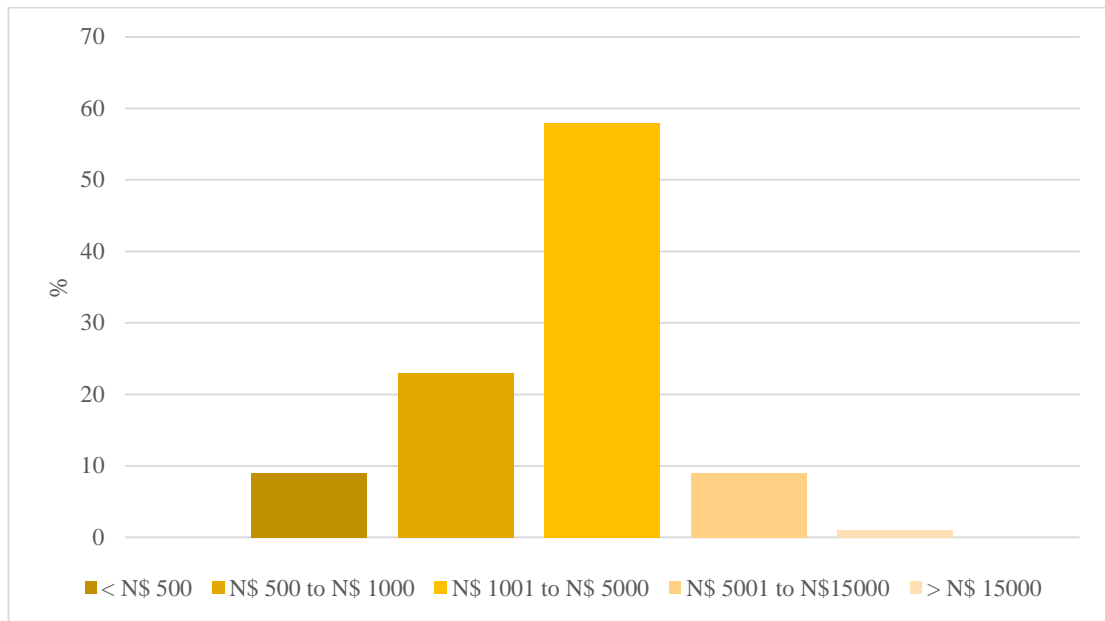


Figure 20. Monthly incomes of Rosh Pinah residents, Namibia (2010).

There was however an obvious income disparity between the residents of the formal part of Rosh Pinah and those living in the informal settlement with the latter earning less than N\$ 500 per month. The main source of income among the Tutangeni residents was seasonal or casual work. Contrary to expectations, the survey detected a small share of people in the informal settlement earning more than N\$5000 per month. These referred to a few self-employed residents having small successful businesses.

Further analysis showed that people from the formal part of Rosh Pinah were more dependent on salaries and wages despite their higher incomes, while people from the informal settlement were more creative with self-employment and less dependent on formal wages and salaries. The relationship between the income levels and the education levels of individuals was obvious where lower incomes were linked to lower education. People in lower income groups and with lower education expressed their willingness to receive some skills training and upgrading, but struggled to define

exactly what kind of training they would be interested in. The preferred training of all respondent groups was auto-mechanic and engineering courses, electrical work, bookkeeping, and office administration and computer courses. The female respondents were less sure about the courses they would prefer.

Household composition and characteristics

The survey found that the average household size in Rosh Pinah was 4.6 people, but there were marked differences between the formal and informal parts of Rosh Pinah, with 3.4 and 5.7 people per household respectively. Thirty-seven percent of households in Rosh Pinah did not have children, but those who had on average 3.7 children per household. There was no spatial distinction between households with and those without children. The research did not suggest that the formal or informal part of Rosh Pinah had more households with children, but there were considerably more children living in the Tutangeni informal settlement than in the formal part of Rosh Pinah, which was around 66% of all people in the age group 0 to 21 years. The survey detected the demographical gap of young adults who were still minors in the age group of 18 to 21 who were virtually absent in Rosh Pinah. They constituted 12.5% of all minors (i.e. people below 21 years of age). This could be due to the fact that Rosh Pinah neither had a secondary school, nor any tertiary educational institution in the settlement.

The households that did not have children at all were those where respondents had relatively recently arrived in the settlement or lived less than ten years in Rosh Pinah.

Eighty percent of these were males, the majority being single and employed with an income of N\$ 1000 to N\$ 5000 per month.

The findings of the demographical assessment on the absence of an elderly population group were confirmed by the household assessment from the community survey. Among the surveyed informants there were none older than 65 years and none of them had an elderly person, older than 65 years, in their household.

5.1.3 Mine workforce survey

Development of miners' community

Development of the miners' community started with the origin of the Rosh Pinah settlement. All recruitments for the mine labour needs were sourced from the northern parts of Namibia. Hundreds of black African men left their families behind in the northern areas of Namibia to work in the Rosh Pinah mine for an extended period. The contract labour system was similar to South Africa's economic, political and social system. Besides meeting the demand for the labour needs of the white-controlled economy, the system controlled and prevented the migration of unemployed Africans (Hishongwa, 1992). Such a labour system minimized the capital costs for housing and other aspects of social infrastructure, since Africans were not allowed to bring their families with them. While in Rosh Pinah, the black contract worker was lodged in the Ehafo hostel compound near the mine, which later developed into the Sand Hotel informal settlement. Following a major strike at the Rosh Pinah mine in the early 1970s, many workers from the northern regions of Namibia were dismissed, and the

mine changed its recruitment policy and began recruiting more workers from the south and central regions.

In 2010, more than forty years after the establishment of the Rosh Pinah mining settlement, none of the present mine workers were born in Rosh Pinah. More than half of the surveyed mine workers were recruited from the southern part of Namibia (see Table 5), particularly from the nearby farms and urban areas in the Karas Region.

Table 5
Place of origin of the mine workers in Rosh Pinah, Namibia (2010)

Area of origin	Workers in both mines (%) from the area	Workers in Rosh Pinah mine (%) from the area	Workers in Skorpion Zinc mine (%) from the area
Northern Regions (excl. Tsumeb and Kavango)	11.9	6.6	14.8
Tsumeb	2.3	0	3.7
Kavango Region	11.9	26.6	3.7
Central Regions	19	6.6	25.9
Eastern Regions	2.3	0	3.7
Karas Region	52.3	60	48.1

In 2010, the two mining companies operating in Rosh Pinah had different approaches to sourcing their labour needs. Rosh Pinah mine employed almost 60% of the workers from the region and slightly more than a quarter from the Kavango region, while Skorpion Zinc mine had more balanced numbers of people from different regions, with the majority from within the Karas Region or central regions in Namibia, particularly from Windhoek.

The mine workforce survey revealed that the mine labour force does not stay stagnant, it is in constant change. Forty-six percent of the respondent mine workers resided in

Rosh Pinah between three to nine years and 37% less than three years (see Figure 21), signifying the high turnover of the workforce in a relatively short time. Only 7% of the mine workers population stayed in the settlement longer than twenty years and most of those were employees of the Rosh Pinah Zinc Corporation mine, which was the oldest mine in the area.

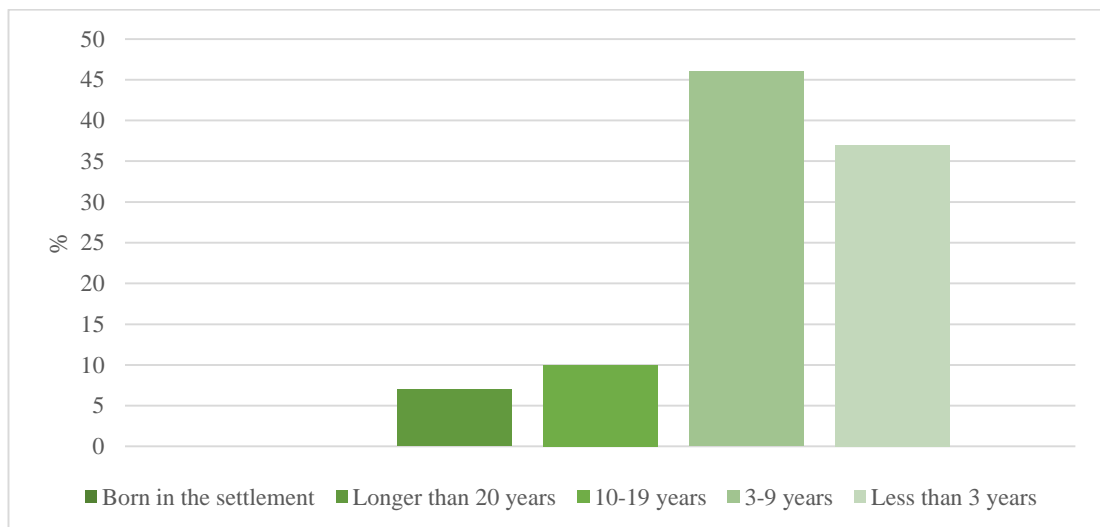


Figure 21. Mine workers' length of stay in Rosh Pinah, Namibia (2010).

According to the Survey, it seemed that the mining industry had absorbed several influxes to Rosh Pinah. While 60% of the mine workers came to Rosh Pinah for their contractual employment in mining, a large share of mine employees (31%) arrived in Rosh Pinah as job seekers, and eventually found employment in the mining industry.

The share of expatriates among the mine work force did not exceed 10% of the total employment figures (see Table 6) and most of them were workers with some highly specialized or specific skill needed in the mining industry, including the general managers of the both mines. The Skorpion Zinc mine and refinery had a slightly higher number of expatriates in their work force than the Rosh Pinah Zinc Corporation. The

origin of expatriates was predominantly from South Africa and Zimbabwe (Source: interview with PR009 on 27.04.2010 and PR011 on 28.04.2010).

The number of workers employed in the mining industry fluctuated from year to year depending on the size of operations of the mining company. The total number of the mining community of Rosh Pinah in 2010 was 1257 mine workers which was 28% of the whole population in the formal part of Rosh Pinah and made up 11.5% of the total formal and informal population in Rosh Pinah. The mine workers community was large and their opinions on Rosh Pinah's future could not be ignored.

Table 6

Number of expatriates and locals employed in the both mines of Rosh Pinah, Namibia (Source: data from the Chamber of Mines Annual Reports, 2007-2010)

Year	Expatriates in Skorpion Zinc	Locals in Skorpion Zinc mine	% of locals in Skorpion Zinc	Expatriates in the RPZC	Locals in the RPZC	% of locals in the RPZC	Total of expatriates in both mines	Total mine workers	% of locals for both mines in Rosh Pinah
2007	38	669	94.6	7	556	98.7	45	1225	96.5
2008	49	690	93.4	31	523	94.4	80	1213	93.8
2009	47	674	93.5	15	593	97.5	62	1267	95.3
2010	36	682	95.0	13	575	97.8	49	1257	96.2

Until the development of the Skorpion Zinc mine, the mining community of Rosh Pinah was below 600 people, but, on the other hand, the settlement was also much smaller than what it was in 2010. With the opening of the Skorpion Zinc mine, the mine workers community doubled within one year between 2001 and 2002 (see Figure 22). In 2001, there were only 491 people employed in mining and a year later, in 2002, the number escalated to 1018 mine workers in the settlement. A decade later the

mining community was still on a slow increase, fluctuating from year to year and reflecting the ups and downs of the mining industry.

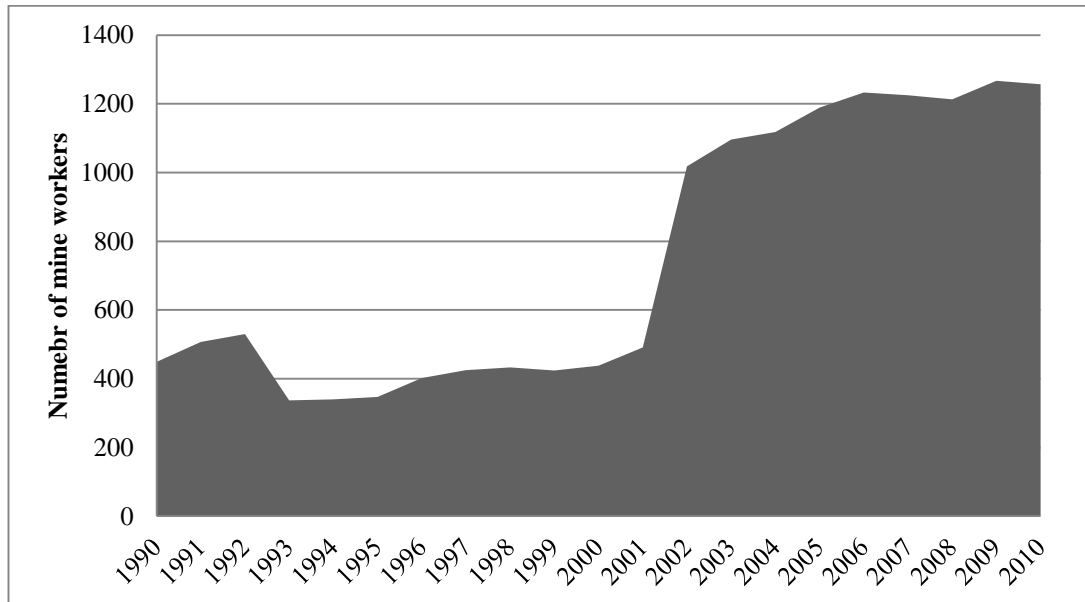


Figure 22. Employment in the mining sector in Rosh Pinah, Namibia (Source: data from the Chamber of Mines Annual Report, 2010).

This implied that in 2010 at least 1257 people and their families directly depended on the mining industry in Rosh Pinah. Of an estimated population of 5200, according to the Central Statistic Census data of 2011, the proportion of mine workers in the Rosh Pinah mining settlement was 24.2%. According to estimates of the RoshSkor statistics of 11 000 residents of Rosh Pinah, the proportion of mine workers was 11.4%. These figures excluded the contractors supplying services to both mines, but it needed to be noted that due to the shift work arrangements for both mines, the number of mine workers living in the settlement was slightly smaller, but the difference was not considerable. With the relatively high proportion of mine workers in the settlement, Rosh Pinah could be considered as a single industry settlement where a large proportion of employment is captured by the mining industry.

With the arrival of Skorpion Zinc mine, the homogeneity of Rosh Pinah's mining community was fading. The recent trend of a long distance commuting (LDC) employment policy becoming increasingly popular in the world also gained ground in the Skorpion Zinc mine. The policy became particularly popular in the mining industry as it saved on the housing of mine workers in the settlement, avoiding large expenses of servicing the settlement. The workers were driven in on a roster of seven days in and seven days out and accommodated in a hostel type of accommodation. Most of the shift workers working for the Skorpion Zinc mine were originally from areas such as Lüderitz, Keetmanshoop and Windhoek. Special bussing arrangements were in place to bring workers to work and back. The Rosh Pinah Zinc Corporation had a slightly different employment policy, mostly accommodating all of their mining work force in the settlement depending on their job and family status. Such an arrangement allowed the mining company to employ people from more distant regions which could be the explanation why the RPZC had a relatively large share of employees from the Kavango region.

Previous experiences with the migrant labour system in Namibia proved a negative and disruptive impact on families of the mine workers (Moorson, 1997). The long distance commuting resembled the old migrant labour system, but the duration of being away from family and reunion with it differed. The negative side of such a system was the worker's constant and recurrent absence from home. It impacted negatively on employees' capability to maintain normal family relations. There was a higher risk of infidelity, which puts pressure on family life and could contribute to the spread of sexually transmitted diseases (STDs) and HIV/AIDS. It could also

encourage drinking and other antisocial behaviour, particularly for those commuters who decided to stay in town for their seven days off (Development, Planning and Research, 2000; Rukambe, 2010), in which case they usually found some accommodation in the Tutangeni informal settlement.

From the mine workers' survey it was apparent that half of the mine workers were new to the mining industry in Rosh Pinah, working less than five years at the mine while the other half had worked for over five years in one of the mines in Rosh Pinah (see Figure 23). The statistics obtained from the Skorpion Zinc mine confirmed the findings. According to the estimates provided by the mine management there were 11.6% of their workers residing less than one year in Rosh Pinah, 43.9% who lived in the settlement for between one and five years and 44.5% who lived for over five years in Rosh Pinah (see Table 7).

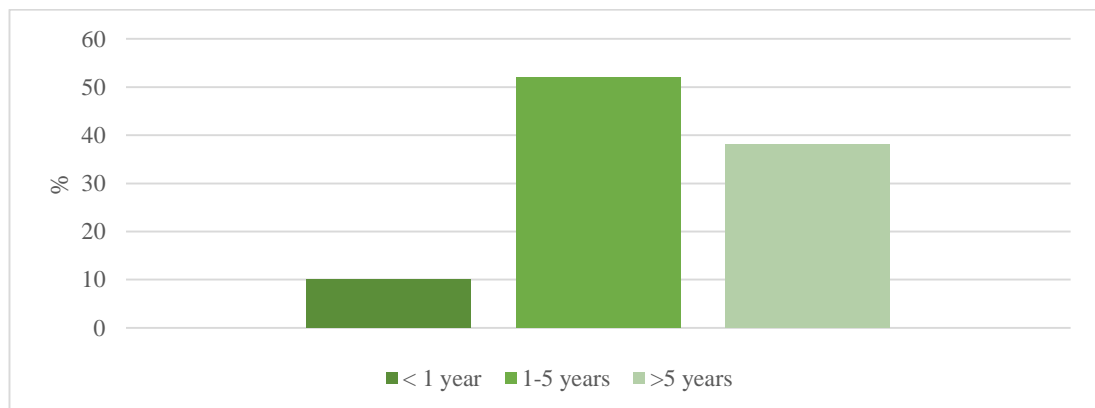


Figure 23. Number of years mine workers worked at the mine in Rosh Pinah, Namibia (2010).

Table 7

Number of years of mine workers' employment at the Skorpion Zinc Mine, Rosh Pinah, Namibia (Source: interview with PR009, 2010)

Length of employment	Number of employees	Percentage (%) of total
under 1 year	83	11.6
between 1 and 5 years	313	43.9
over 5 years	317	44.5

Demographic characteristics of workforce

The demographic characteristics of the mine workforce employed in both Rosh Pinah's mines reflected the classic characteristics of the mining community discussed in the literature review (see Chapter 2.2). The work force of both mines consisted mainly of young adults in economically active age group. The survey confirmed that the majority of the mining community in Rosh Pinah were young adults in the prime age of 21 to 30 years (52% of respondents) and 41% in the age group of 31 to 40 years (see Figure 24). There was no difference if the workers were sourced locally or brought in through a long distance commuting arrangement.

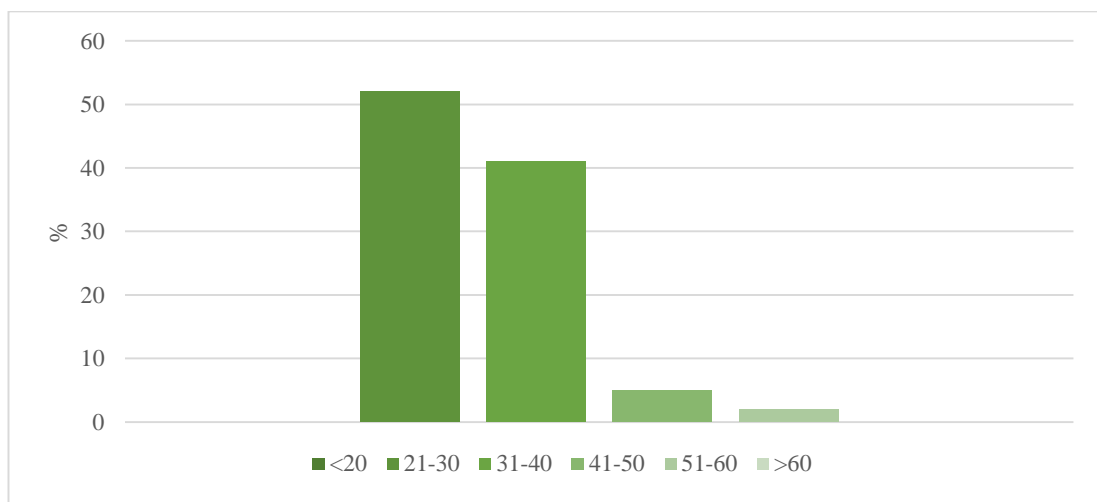


Figure 24. Age of mine workers in Rosh Pinah, Namibia (2010).

However, the age composition within the economically active age group was not similar between the two mines. It was evident that the Rosh Pinah Zinc Corporation mine that operated longer in the area than the Skorpion Zinc had a larger pool of older males, particularly men around forty years of age and older. The Skorpion Zinc employees were in a much younger age category, the majority were 20 to 30 years old and predominantly male. Skorpion Zinc mine had also absorbed a large share of the recent school graduates from the Karas Region and the other parts of Namibia. Most

of them were recent migrants who came to Rosh Pinah in search of jobs and temporarily settled in the Tutangeni informal settlement. Therefore when they were employed by the mine operator they were presumed as being local.

Despite both mines had policies for women empowerment and were distinctly committed to increase the number of women in their workforce, women rarely featured in mining as artisans and underground operators. Only few females found employment in the mining sector appealing and were mainly employed as clerical, administrative or cleaning staff or as professionals such as teachers and nurses. According to the statistics from both mines, in 2010 the Skorpion Zinc employed 18% females while the Rosh Pinah Zinc Corporation had 13% females in their total permanent workforce. None of the mines employed women in a supervisory capacity in the mining or plant operations, and no woman was represented at top management level.

Among the obstacles in attracting and retaining women in the Namibian mining industry were the remoteness of Rosh Pinah and the impact of continuous shift operations during pregnancy, particularly at the Skorpion Zinc mine where a large share of their employment needs were sourced through long-distance commuting arrangements. The Skorpion Zinc mine was trying to address the unique issues that women faced in the mining section through the establishment of the Women in Mining Committee. The ambition of the mine operator was to retain and attract more women to mining at all levels with the hope to achieve a 20% target by the end of 2010. Skorpion Zinc had also implemented various measures to provide for women's needs

at the mine, with regard to working environment, health, facilities and a workplace culture in which women were treated with respect and consideration.

The investigation on mutuality of the mining community revealed that 76% of the mine workforce were single and subsequently only 24% were married or in a permanent relationship. The unbalanced sex ratios determined by the industry, long-distance commuting employment policy, lack of residential independence for the family life, and lack of job opportunities for women in Rosh Pinah could all be reasons behind the low rates of marriage in the mining community.

In 2010, the miners' community in Rosh Pinah was racially and ethnically diverse. However, the research observed the sentiment of racial division and miners grouping themselves along the tribal or regional belonging that often was in line with the grading of jobs. Several lower shift workers felt unfairly treated and discriminated against. The statistics from Skorpion Zinc mine of the racial composition of employees may have unravelled the cause of this notion by displaying a very small share of the previously racially disadvantaged occupying management positions (see Table 8).

Table 8

Racial composition of Skorpion Zinc mine workers in Rosh Pinah, Namibia (Source of data: Skorpion Zinc, 2009)

Skorpion Zinc employment equity statistics (Dec' 2008)	Racially disadvantaged	Racially advantaged	Non-Namibians
Executive Director	0	0	1
Senior Management	0	1	4
Middle Management	13	20	21
Specialised / Skilled Senior Supervisory	45	42	18
Skilled Technical	51	24	4
Semi-Skilled Clerical	395	4	0
Total Permanent	545	96	48



- the increase of proportion from total employed in particular category

The outline suggests that the racially advantaged and non-Namibians occupied most positions in upper management, while racially disadvantaged people were employed in semi-skilled clerical positions. This could have a further consequence where employees in higher employment categories with better employment packages that included provision of better accommodation could become a cause of friction and create the sentiment among the rest of being unfairly treated. This characteristic of mining settlements often fuel resentment and conflict where unskilled and semi-skilled mine workers were the majority and eager to earn more money and occupy better housing like those of skilled and professional workers (Petkova *et al.*, 2009).

The mining community of Rosh Pinah contain a large share of unskilled and semi-skilled people. The mine workers survey established that on average both mines employed 60% of workers with Grade 12 education (see Figure 25), 17% with Grade 10 and 12% with an education below Grade 10, although there was a big difference in education level of the mine workers of the Skorpion Zinc and the Rosh Pinah mines. The Skorpion Zinc mine workforce was not only more youthful, but also of a higher level of education and a more progressive workforce as a result of the company policy not to employ people with a lower than Grade 10 education. In contrast, more than 33% of the respondents of the Rosh Pinah mine workforce had education lower than Grade 10, another 33% have Grade 10, leaving only 33 to 34% with a Grade 12 certificate or higher. Among the Skorpion Zinc mine employees 80% had at least a Grade 12 certificate. The share of skilled technical staff was present, but extremely limited.

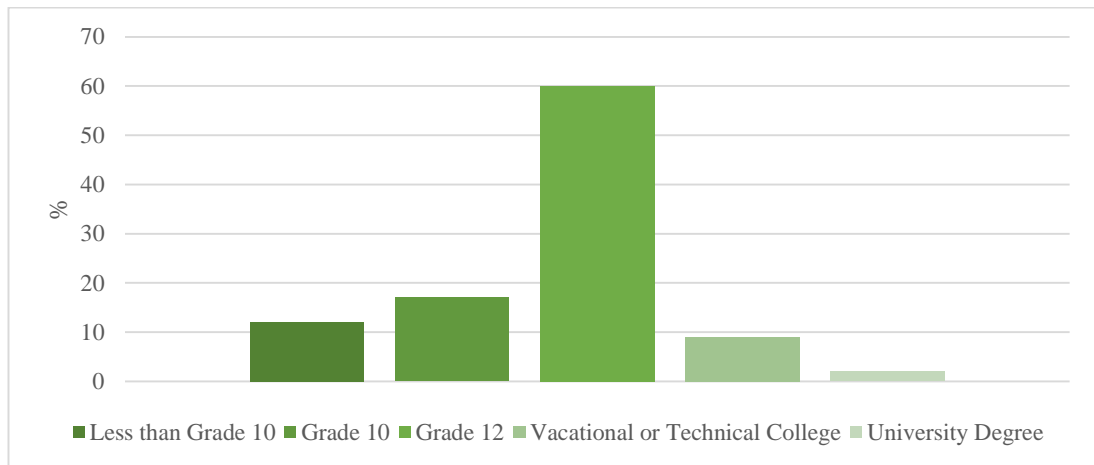


Figure 25. Education level of mine workers in Rosh Pinah, Namibia (2010).

Both mines provided their employees with education and training programmes and support for specialist studies, extensive training programmes and individual development plans, but the survey found that miners were not aware of this and have received only on job training, operational training and safety training. This pointed out that the mine workers were not well informed about the other possibilities to enhance their education and skills or there could be other underlying conditions or obstacles not mentioned by respondents.

Incomes and expenditures of mine workers

Approximately half of the surveyed mine workers' income was in the range of N\$1000 to N\$5000, while 38% of the mine workers earned more than N\$5000. In comparison with the general community of Rosh Pinah (Figure 20), the incomes of mine employees (see Figure 26) were significantly higher. The finding supports an assumption that mine workers earn higher salaries than those employed in other professions and sectors of the economy. Despite mine workers' earnings were above the average income

levels, salaries were quoted among the most desired improvements the mine workers liked to see at their work place, cited salaries being too low for the work they did.

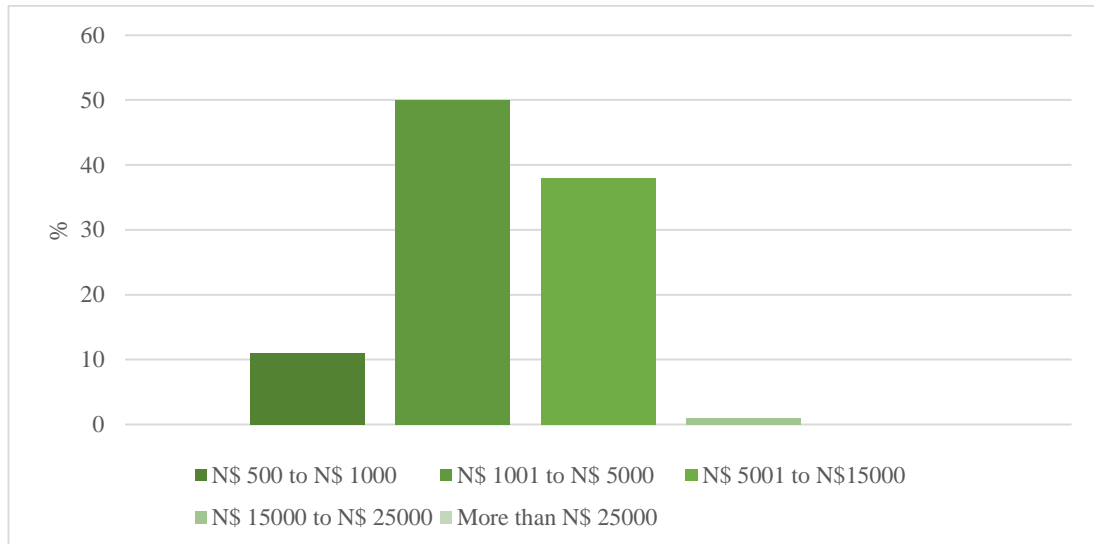


Figure 26. Monthly incomes of mine workers in Rosh Pinah, Namibia (2010).

In 2010, both mines together spent N\$ 357.6 million on salaries and wages for their employees with the average salary per employee doubling since 2004 (see Table 9).

Table 9

Wages and salaries of mine workers in Rosh Pinah, Namibia, during the period of 2004-2010
(Source of data: Chamber of Mines Annual Reports 2004-2010)

Year	Skorpion (million, N\$)	RPZC (million, N\$)	Total by both mines (million, N\$)	No. of permanent employees	Salary per employee (annually, N\$)	Salary increase (N\$)
2004	85	67.3	152.3	1118	136225	
2005	104	82	186	1189	156434	20209
2006			No data available	1233		
2007	147.8	99	246.8	1225	201469	
2008	163.1	113.6	276.7	1213	228112	26643
2009	217.0	133.2	350.2	1267	276401	48289
2010	209.2	148.4	357.6	1257	284487	8086

The figures for 2010 indicated a slight reduction of the work force and stagnation in the salary increment. This evidenced the impact of global economic slowdown and lowered commodity prices at the time affecting the mining industry in Rosh Pinah.

According to the mine management staff, the global financial crisis and low commodity prices during the previous two years affected the mines “*only in terms of finances- no layoffs, but profit and capital expenditures severely reduced*” (Source: interview with PR009 on 27.04.2010). The low profits resulted in reduced capital expenditures and the absence of a notable increment on salaries and wages.

Forty-three percent of the mine workers spent less than a quarter of their earnings in Rosh Pinah (see Figure 27). This significantly evidenced that a large number of mine workers’ earnings did not stay in Rosh Pinah, but was redirected to other rural or urban centres in Namibia or beyond the national borders.

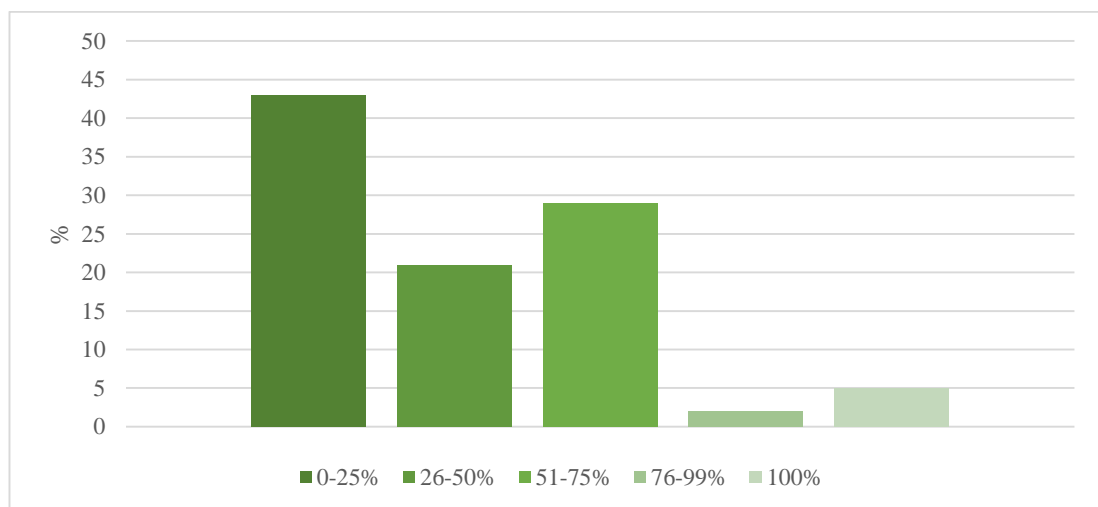


Figure 27. Percentage of mine workers’ incomes spent in Rosh Pinah, Namibia (2010).

The contribution from mine workers towards Rosh Pinah’s development was exceptionally limited. The insignificant share of local spending indicated the mine workers’ unwillingness to reside permanently in Rosh Pinah and their sense of impermanence; the settlement was regarded as a place for work. Some openly revealed that they were in Rosh Pinah only to work, eat and sleep and then go back home to

have a life. This notion was common not only among the shift workers, but the same has been related by those who resided in Rosh Pinah in housing the company provided.

The investigation established that a large share of mine workers were essentially transient residents in Rosh Pinah who upon the closure of the mine will not form the pool of people to remain in the settlement and thus shall not be relied on for the settlement's future development. A large share of mine workers' earnings were saved and sent, and spent to support their families and livelihoods in rural areas or in other parts of Namibia where much of consumer spending takes place.

Mine workers who were accommodated in town spent relatively more of their earnings on goods and services in the settlement. However, the high food and clothing prices in Rosh Pinah as compared to other urban centres within reach made people reluctant to buy them locally. Consumer goods were brought from the place of their origin or they went shopping across the national border to South Africa. Springbok and Upington were preferred places for purchasing food, clothing and other daily supplies; such necessities could be bought cheaper and were of a wider variety in nearby South Africa. The workers were prepared to travel once in a while and buy their necessities in larger quantities to stock their provisions.

A considerable amount of incomes outflowed the settlement for supporting mine workers' dependents somewhere else. Eighty-eight percent of mine workers supported dependents in other areas of Namibia, only 17% of mine workers' dependents lived in Rosh Pinah (see Figure 28). This pattern meant that not only the consumer spending

was lost to other favoured rural or urban centres, but also that a proportion of the earnings was sent to support the dependents of mine workers who did not live in Rosh Pinah. Research established that geographically most dependents lived in the area of the mine worker's origin. Some mine workers had up to ten dependents to support, meaning he or she could be the only provider for the family. This was another reason why large sums of money did not spend locally, but saved to support the family that had not accompanied the mine worker to Rosh Pinah and that these mine workers were most likely to return to their families after closure of the mining industry in Rosh Pinah.

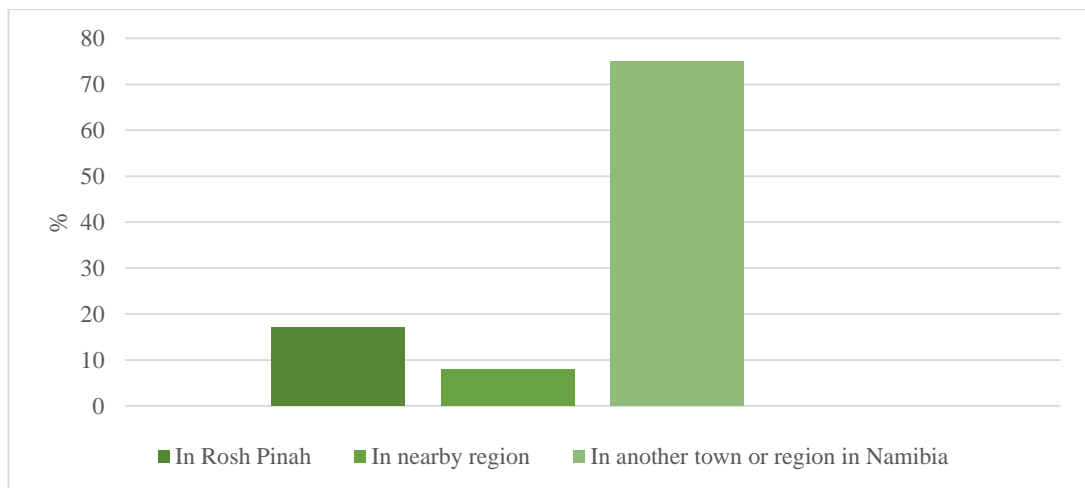


Figure 28. Location of Rosh Pinah mine workers' dependents, Namibia (2010).

Accommodation for miners

Mining companies in Rosh Pinah face a challenge to acquire their labour force, since the settlement was established in a distant and isolated area. Provision of housing became a problem for the mining company which meant they needed to cut on their capital costs in favour of housing. In Namibia this was previously achieved by using cheap migrant labour and accommodating workers in single quarters or compounds on the mine's property. In this way the mining company was in control and it was easier

to manage their workers and also keep them under control. The housing was very basic and workers lived in appalling conditions. The change occurred after independence in 1990 when the mining industry started to consider this social responsibility as being important for their reputation and future businesses. Family housing was increased and mining compounds faded away.

The employee's work and family status determined the type of accommodation for which he or she was eligible. The two mines in Rosh Pinah had slightly different housing policies, but both applied the job grading principle to determine the benefits. The Skorpion Zinc mine provided 335 of their employees with a company house. In 2010, this made up almost half of their 682 permanent workers being settled in the company house, where they could bring the family along. The housing consisted of a free standing house with a small yard and was provided with all electrical and plumbing connections.

The shift workers at the Skorpion Zinc were not eligible for housing, but were provided with housing allowances and stayed in the shift workers' village, a hostel type of accommodation that the mine owned. The management preferred to call it a hotel type of accommodation as it included services provided by modern hotels for guests, and perhaps to rebuff the bad image of the hostel type of accommodation during apartheid times. The General Manager of Skorpion Zinc mine stressed: "*We do not have single quarters or a hostel, but we do have hotel-type accommodation for the 378 who have housing allowances for when they are in town on shift*" (Source: interview with PR009 on 27.04.2010). The hostel type of accommodation for shift workers was modern and

well maintained in a very secure complex (see Figure 29) and it catered for mine workers' daily needs for accommodation and food. The shift workers stayed on the premises only for the duration of their seven days shift, where after that they were expected to return 'home' and come back only for his or her next shift.

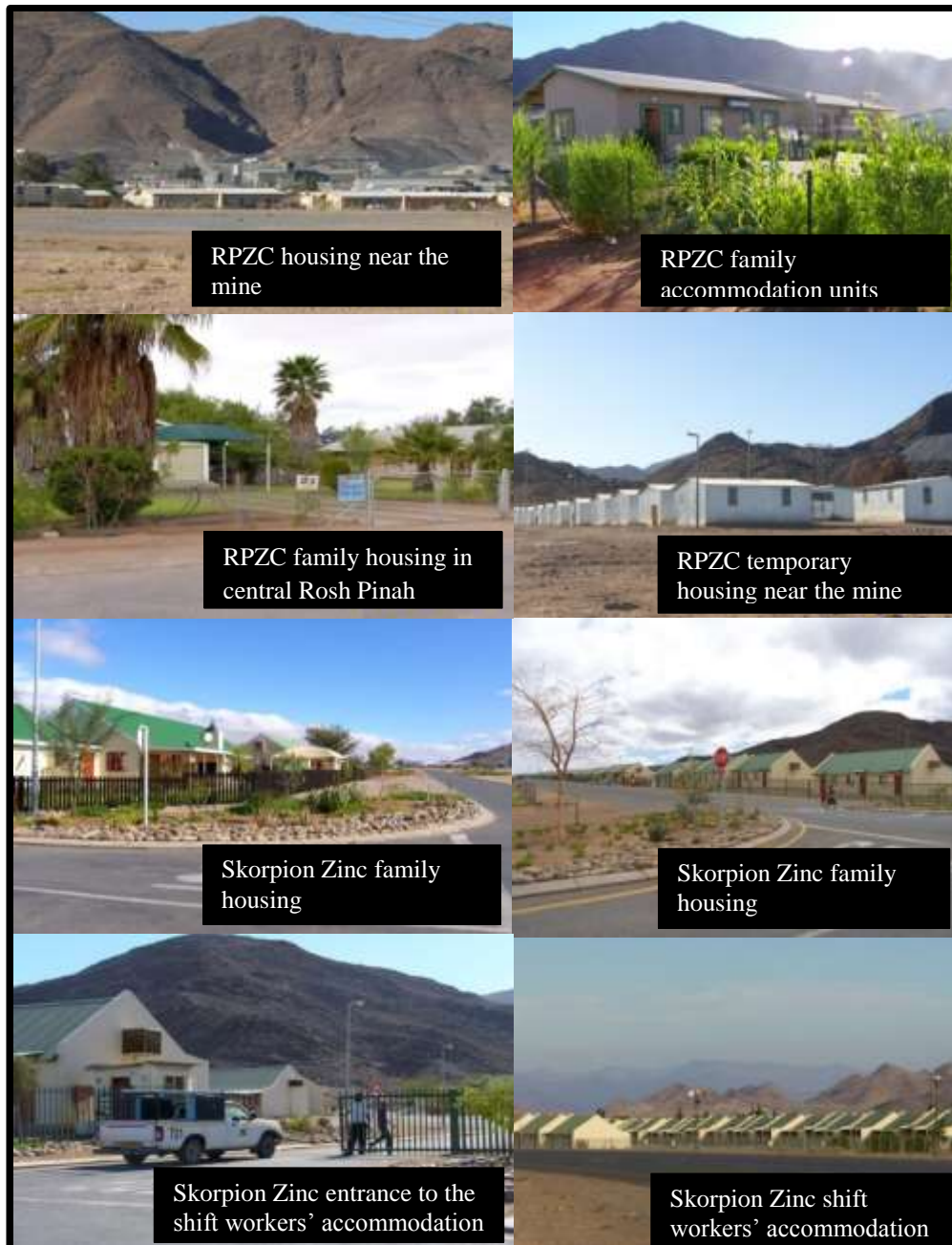


Figure 29. Illustration of mine workers' accommodation facilities in Rosh Pinah, Namibia (2008 & 2010).

Distribution of housing for the Rosh Pinah Zinc Corporation mine workers was similar to that of the Skorpion Zinc where full time employees received housing according to their status in the company, ranging from a simple hostel or single quarters accommodation to two bedroomed flats or three to four bedroom houses. The survey revealed that approximately 10% of the mine workers were offered a company house, while the majority stayed in a hostel type of accommodation still referred to as single quarter, the term originated from the former apartheid times and frequently used among the mine workers. The family housing in the central part of Rosh Pinah entailed a free standing house on a large plot nestled among the large trees (see Figure 29). These were allocated to more senior personnel while semi-skilled mine workers with families were accommodated in smaller family housing units closer to the mine.

The management of both mining companies agreed that there was a clear need for more family accommodation for all grades of employees, particularly for the larger pool of lower grade mine workers. Some of these workers had worked ten years in Rosh Pinah, but due to the lack of family housing for lower grade workers, their families had settled in the Tutangeni informal settlement. The living conditions of those staying in the RPZC hostel were very basic and residents did not receive the same amenities like those provided in the Skorpion Zinc mine hostel. This created division among the mining community in Rosh Pinah where the Skorpion Zinc mine employees were seen as more privileged.

The management of both mines also acknowledged the need for family accommodation for their lower grade employees, but saw the proclamation of Rosh

Pinah as the essential starting point, as mine workers will be able to own a house within a demarcated area. The mines were exploring ways to assist their employees to establish permanent housing in Rosh Pinah by using their pension funds as a collateral for housing loans (Development Planning and Research, 1998), but without proclamation the private ownership and title deeds are not possible in Rosh Pinah.

Working conditions and relationship with management

The mining industry was perceived as risky and dangerous. Widely reported instances of mine accidents and fatalities in the global media fuelled and maintained this perception for centuries. The previous political segregation and favouritism was also still echoing among the mining community of Rosh Pinah. In general mine workers in Rosh Pinah were satisfied with the working conditions, but the attitude towards the relationship between mine workers and management was detected to be neutral (see Figure 30). On various occasions a slight apathy was observed among the mine workers where some resented that there was nothing they could change.

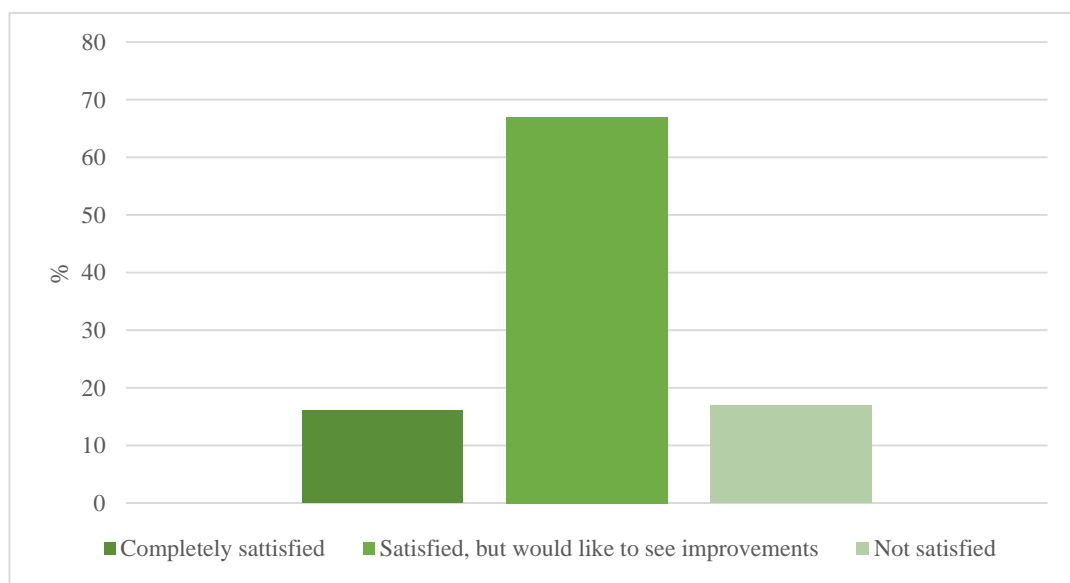


Figure 30. Mine workers' satisfaction with working conditions in Rosh Pinah, Namibia (2010).

A more outspoken 17% of mine workers expressed their dissatisfaction with working conditions, naming salaries to be too low, no potentials for promotion, no overtime payments, housing allowances unacceptably low and no career opportunities. There was a similarity observed between mine workers rating working conditions and relations between management and employees. Those who were least satisfied with the working conditions were among the mine workers who rated the relations between management and employees as very low, bad and very bad. Indirectly suggested that the relationship with management was partly responsible for unsatisfactory working conditions, workers left ignored and not heard.

Contrary to expectations, the workers with higher salaries and those who worked for the mine more than five years, were among those most dissatisfied. After closer examination of this group of the workers, all of workers who were not satisfied with working conditions and the relations between management and employees also expressed their wish to leave the settlement when their contractual obligations will expire. This finding underlined the importance of maintaining good relationships between management and employees to create a friendly atmosphere for employees to consider a future in the settlement.

The strong resentment and dissatisfaction of the mine workers could be an echo of the strike that took place in May 2008, concerning issues of salary and housing allowances, after which a relationship of trust between mine management and mine workers and trade unions was never rebuilt. Despite the calmness, the bitterness was acute and could be an indication of a new strike looming should the concerns not be

attended to. The mine workers' survey revealed that the relationship between management and workforce was presumed to be dispirited, with 38% claimed it to be neither good nor bad (see Figure 31).

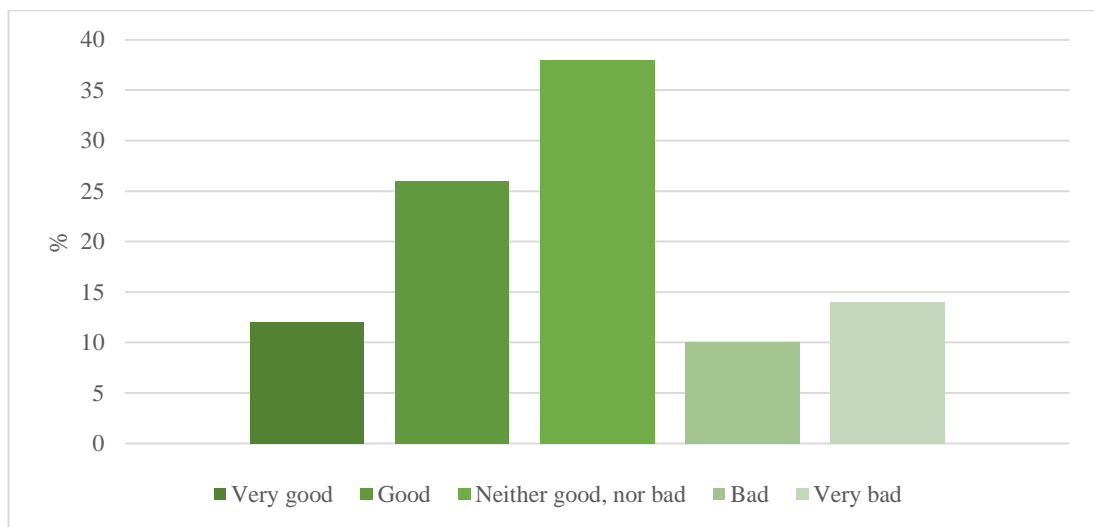


Figure 31. Mine workers' evaluation of relationships between miners and management in Rosh Pinah, Namibia (2010).

On the other hand, the mine management was of better opinion about their relationship with workers, described them as being good. The lack of teamwork between management and workers was revealed by insufficient channels of communication between both. Four percent of employees were not aware of their social guarantees and benefits they were entitled to. Younger members of the Rosh Pinah mining community had higher expectations towards the working conditions and benefits provided by the mine. Although both mine operators offered good social benefits to their workers in the form of a provident fund, medical aid, and housing or housing allowances, less than half, that was 37% of mine workers, knew that they were also covered by their medical aid for private purposes apart from the required occupational check-ups by the mine. This could not be exonerated by low levels of education of semi-skilled mine workers as the work force of the Skorpion Zinc mine were

predominantly young people with satisfactory education. The mine workers of the RPZC were not aware of the 3% of RPZC`s shares held in a trust as a collective benefit for all mine workers. In case of dividends the shares had to be distributed amongst employees of the mining company.

Mine workers' vision beyond the closure of mines

According to mine operators, employees were frequently consulted and updated about the mine operations and future plans. Skorpion Zinc had monthly Workplace Forum meetings where general issues were discussed with a member of senior management. Information was also channelled about the projected life span of the mine. The Rosh Pinah Zinc Corporation informed their employees in the same way. The assertion by management was reflected in the mining community where most mine employees were aware and informed about the life span of the mine. The contractual obligations of mine workers were bound to a specific date, usually in line with the life span of the mine. This confirmed the presence of awareness about the life span of the mine. Mine workers were aware of the fact that their work in mining was time-based. The positive media announcements about the further explorations in the area could have influenced 32% of the mining community who had faith in future mining activities, claiming that there was still a large potential, and refused to accept the looming end of its life span for the Skorpion Zinc mine in 2016/2017, and 2020 for the RPZC. Despite the Skorpion Zinc placed its mine on sale in 2010, the management of Skorpion Zinc rolled out extensive campaigns with public events and meetings with workers where management talked about the life of the mine and revealed their exiting news about the new discoveries and explorations that could potentially extend the life of mine.

Mine workers and the community at large were reassured that new buyers of the mine would respect existing policies and contracts and that commitments regarding the provision of education and schooling and housing will stay in place. The mine made a great effort to reduce uncertainties among the mine workers and tried to make transition of ownership as smooth as possible.

The permanency of the Rosh Pinah settlement might depend at large on the decisions made by the mine workers. In 2010, the prospects were not great. The General Manager of Skorpion Zinc mine revealed his opinion on future of the town: *“Rosh Pinah will not be sustainable without the mines. It is unlikely that something else will turn up that will be able to sustain the town at nearly the same size. The town needs to understand its future and plan accordingly”* (Source: interview with RP009 on 27.24.2010). Sixty-six percent of surveyed workers were certainly planning to leave the settlement after mining will be finished. This potentially indicated that the population scale down after closure of the mines could be considerable, particularly among those with skills and education. Mine workers constituted a relatively big consumer base for the Rosh Pinah settlement as they had regular earnings and a higher buying power. The loss of human capital may cripple the local economy and its potential to grow as the consumer base will be severely affected. Those who had not yet decided and those who preferred to stay were of an equal share of 17% (see Figure 32).

The more optimistic people who expressed their willingness to stay also exhibited more positive ratings in other sectors of the survey, such as their satisfaction with work

conditions and relations between themselves and management. None of them had shown resentment towards the management or about any unpleasant experiences with services provided by the mine operators. These were people with a very positive attitude and this reconfirmed how important it was that mine operators positively uplift their employees' confidence that could influence the processes beyond the life span of the mine.

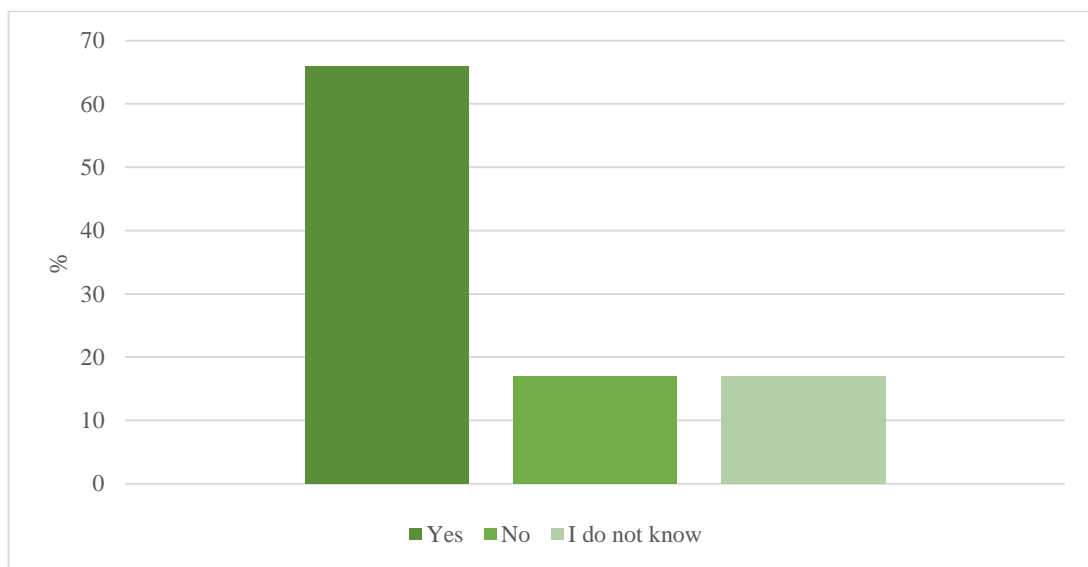


Figure 32. Percentage of mine workers considering to leave Rosh Pinah, Namibia, after closure of the mining (2010).

Although 17% were willing to remain in the settlement, none of them considered retiring in Rosh Pinah. They were prepared to stay only while they were in an active economic age group and with other job opportunities in the settlement. Their decisions to stay were based more on the positive outlook and current satisfaction; it could change under the pressures of decline of their private quality of life as well as decline in the settlement.

5.1.4 Economic analysis of Rosh Pinah

Mining industry's contribution

The primary economic base in Rosh Pinah is zinc and lead mining. The settlement exists almost entirely for mining, and housing and servicing employees from the Skorpion Zinc and RPZC mines which were among Namibia's most productive mines. The economic structure evolved to serve the needs and requirements of mining companies to perform their businesses. This resulted in vertical economic diversification where the enterprises specialized in their production and distribution to serve the mining industry and its work force, as well as sub-contracted businesses by the mining companies.

The mining sector is the largest employer in southern Namibia and economically most significant. A large share of the economically active employed population in the Karas Region is directly employed in mining. The sector includes zinc and lead mining at Rosh Pinah, diamond mining at Oranjemund and south of Lüderitz, and gemstones in smaller deposits throughout the region and there are many explorations for different metals and minerals. The areas around Rosh Pinah were overwhelmingly covered by different exclusive prospecting licenses (see Appendix 1). The most significant contribution of the mining industry to the local economy is employment creation in an otherwise depressed areas. Mines generate much needed and sought after opportunities for income and skills development. The mining industry in Rosh Pinah provided direct employment to people not only from the region, but from different parts of Namibia, offering competitive wages and a main source of income for a large number of families. In 2010, the two mines together spent about N\$357.6 million on

wages and salaries. The years preceding 2010 experienced economic deterioration not only in the mining industry resulting from deteriorating global commodity prices, but it also affected other economic sectors in Rosh Pinah and in the country. Despite the economic hardships, the mines operating in Rosh Pinah did not lay their workers off in contrast to a nearby mining town, Oranjemund, which during the economic slump in 2009 imposed production holidays for the Namdeb's diamond mine workers. The mines in Rosh Pinah suffered financial decline and smaller profits, but maintained their workforce and did not downscale employment contracts. In 2010, the mining industry in Rosh Pinah caused uncertainties among the residents of the settlements as both mining companies - Skorpion Zinc and the RPZC - were on sale. There are always some fear of job losses when mining companies change ownership. The Skorpion Zinc management made it clear that no employee would eventually be adversely affected with their current job status. The employment contracts after sale of Skorpion Zinc to Vedanta remained in place. It was business as usual for their workers and contractors. The most feared transition with change of ownership went smooth.

In 2010, mining accounted for a substantial amount of procurement of goods and services from local and regional suppliers, such as security, office cleaning, catering, construction, some engineering, plant cleaning, transportation and generating indirect employment by sub-contracting companies. There were 1161 service providers for the mining industry in Rosh Pinah. This included companies like the Catering Contracts Management (CCM), TransNamib, Kneumeyer, Grinker, GA, leading provider of security solutions in Namibia - G4S, M&H and Ondje Cleaning Services (Skorpion Zinc, 2009). More than 20% of Skorpion Zinc's purchases originated from Rosh Pinah.

The above mentioned directly benefitted from the mining industry, but there were many more who depended indirectly, such as smaller retail outlets, small scale businesses and schools for mine workers' children; all who catered and provided for mine workers living in the settlement. They opened their outlets to sell their goods, but it could not be claimed with certainty that they will still be present if the mines close and the mine workforce leaves the settlement. The survival of such businesses depended on mining cycles and the performance of mining companies. Better economic performance of mining companies could result in more business for depending service providers. In times of unfavourable economic conditions when mining companies scored low profits, the numbers of service contractors were reduced to a minimum to save on expenditure.

The year 2007 was a peak year in mining, followed by a sharp dip which resulted in the mining companies cutting down on service contractors in Rosh Pinah. The Scorpion Zinc mine was among the first that felt the effect of declining economic conditions, and falling profits for the company led to a drastic reduction of service providers in 2008 (see Figure 33). The RPZC mine was more gradual in downscaling their service providers, reaching its lowest in 2009. The impact on Rosh Pinah's business community was immense, and it only stabilized after 2009.

The decline of the service provision sector contributed to the decline and stagnation of other businesses. Figure 33 illustrates how a mining company's profitability could impact on the mining industry's decisions to outsource the local service providers. It demonstrated that within a year Rosh Pinah could remain not only without the main

industry, but severely impair other depending economic sectors crashing it into non-existence.

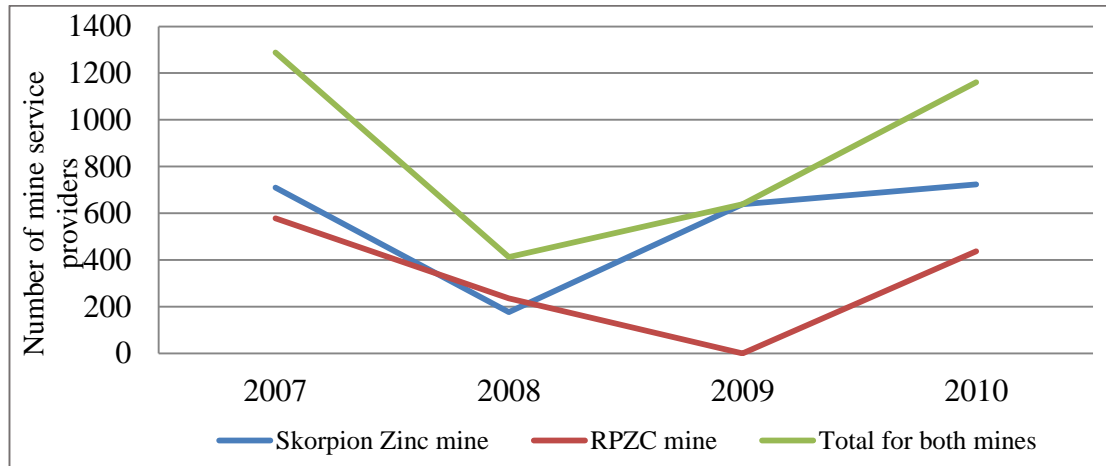


Figure 33. Number of mine service providers in Rosh Pinah, Namibia, during the period 2007 to 2010 (Source of data: Chamber of Mines Annual Reviews 2007-2010).

Non-mining economies

The present Rosh Pinah's economic base experienced unabated growth since the opening of Scorpion Zinc mine with the population increase reaching a considerably larger market size. However, the population increase did not translate into expansion of the businesses, and they remained localized. Most of the goods and services in Rosh Pinah were consumed within the settlement with very limited amounts leaving Rosh Pinah to other areas.

The variety of goods and services available in the settlement ranged, for example, from small micro-lenders, retail sellers, catering companies, outlets providing cleaning services, security services, tourism establishments and various small and medium scale enterprises (SMEs). Ninety-seven percent of surveyed businesses appeared to be new in Rosh Pinah with less than ten years of existence, with the largest group of businesses

operating for a period of one to three years comprised one-third of the surveyed business community (see Figure 34).

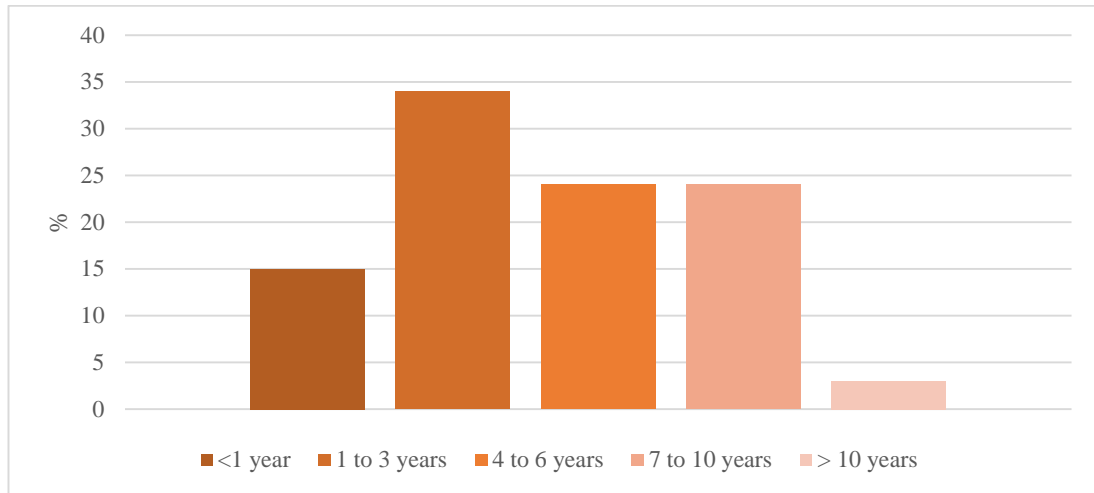


Figure 34. Number of years businesses operate in Rosh Pinah, Namibia (2010).

The time of the establishment of these businesses suggested the origin of such business venture started during the booming local economy when small and large businesses had a sufficient client base due to elevated buying power of local residents boosted by the prosperous mining industry. A few small scale businesses that started with little capital still persisted, despite the slowdown of the economy in 2008, a year after establishment, and until 2010 still managed to make profits, mainly due to a fast turnover. Another group of smaller businesses that overinvested into their operation during the peak times in 2007 suffered considerable financial pressure and capital shortage when the economy started to tighten up. This made several small-scale businesses extremely vulnerable to the declining economy and many of them disappeared. The third group of young businesses with below three years of operational experience, were still enduring the financial pressures with many making adjustments to their operational expenses. It seemed the previous experiences with the cyclic nature of economic development in the settlement served as a reason to hold on

and wait for better times, since the expectations for a better future for these businesses were high. It should be acknowledged that the chances to survive depended on the duration of the economic stagnation.

A surprisingly large share, 15% of the businesses, was new and operational for less than one year, evolved during the stagnant economic conditions in Rosh Pinah. Most of them were small scale or informal businesses with a tendency of speedy evolvement and quick decline if the desired profits were not made. Such businesses started operations as a trial for the market and experiencing non-performance closed quickly, or in some cases replaced existing businesses with a new different business. The small scale businesses of Rosh Pinah were very variable and adaptable to the economic conditions and the market requirements, but due to a limited capital they were vulnerable to economic successions.

Rosh Pinah had only few local medium and large scale enterprises and mainly owned by one prominent local businessman. Such a situation exposed the local market to the economic performance of companies owned by one businessman and decisions made by a single person. However, the years 2008 to 2010 had shown a positive trend with the establishment of other new medium enterprises in Rosh Pinah owned by different people. The advantage of the long-serving businesses over the younger enterprises was that they had matured and accumulated considerably more capital to sustain their operations during times of stagnant or declining economies. Rosh Pinah had approximately three percent of businesses operating in the settlement for over ten years period, prior to 2010.

The large pool of businesses was run and/or managed by young people. Forty-four percent of businesses was run and/or managed by local people in the age group of 31 to 40 years and 38% by people in the age group of 21 to 30 years. This matched the general demographic characteristics of the settlement with the majority of residents being in these particular age categories. None of the businesses was owned or managed by a person older than sixty years. The level of education of the mainstream of people owning or managing businesses in Rosh Pinah portrayed the general level of the community's education, particularly of those employed in small companies or of lower level staff of the larger branches. The education of business people was relatively low with the exception of management staff for larger companies which often were brought in from other parts of the country or from other branches of mother companies who were usually of a higher educational level. On average, those employed to manage small and medium scale enterprises had a Grade 12 education. Twenty percent of businesses were managed by people with varying vocational training and only a few were holders of university degrees. The younger entrepreneurs, particularly in the informal sector, had more limited education. Gender of the business community was balanced, with slightly more males, amounting to 58% of the total employed in Rosh Pinah businesses. This came as no surprise as the settlement had a larger male than female population.

Formal commercial establishments

The formal business sector was varied and represented by several retail stores, a supermarket, restaurants, take-aways and cafés, tourism accommodation establishments, a butchery, liquor stores, several different service undertakers,

individual professionals, banks, micro lenders, a petrol station and others (see Figure 35 and Appendix 11).



Figure 35. Illustration of different businesses in formal part of Rosh Pinah, Namibia (2008 & 2010).

The larger companies with branches elsewhere in Namibia or South Africa such as Waltons, Cymot, Lewis and Furnmart with their specialized goods had opened their businesses in Rosh Pinah and had sufficient clientele to sustain their operations and make profits while the mining activities were still present and the population base showed a positive growth. In a short time they created a lot of new employment, particularly for low and semi-skilled people in Rosh Pinah. The management for such chain shops was usually brought in from other parts of Namibia or from branches of the mother companies in South Africa because of the lack of management skills among the local people. Registered businesses in Rosh Pinah were located in the formal part of Rosh Pinah, forming a compact central business district (CBD) and a few exceptions of smaller outlets positioned on the other side of the C13 road, close to the RPZC lower grade mine workers' residential area (see Figure 36).

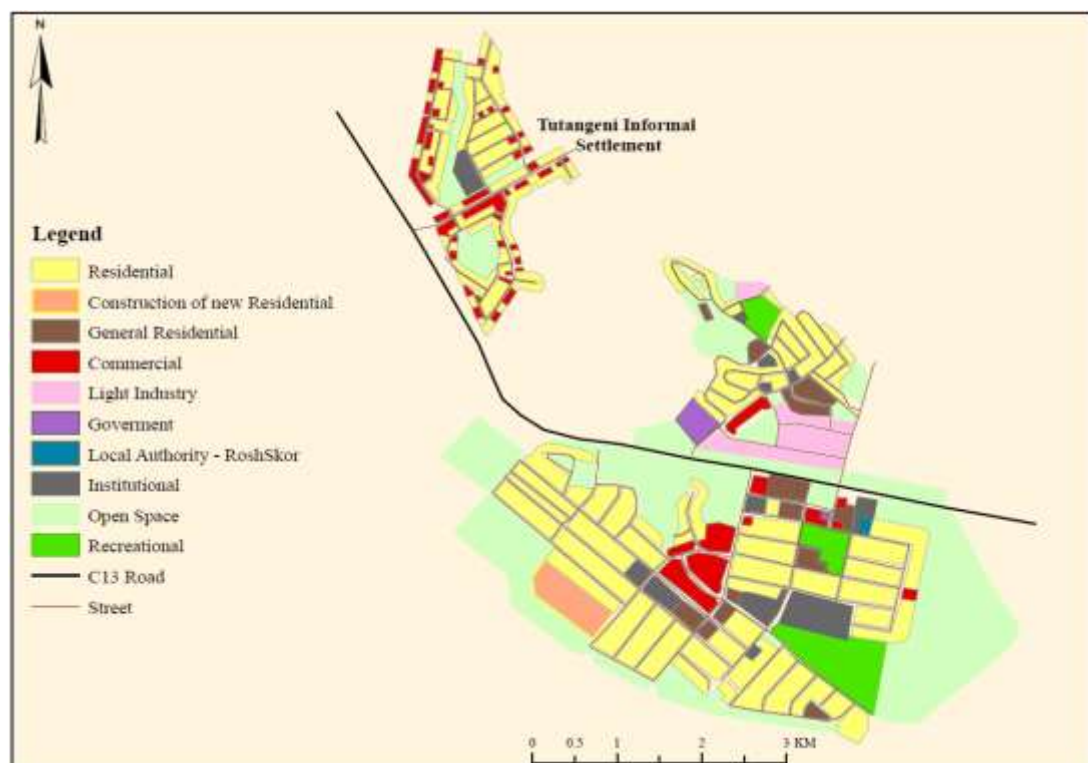


Figure 36. Land use zones in Rosh Pinah, Namibia (2010).

Banking services to the Rosh Pinah hinterland are guaranteed by two banks - the First National Bank (FNB) and the Standard Bank. Prior to opening the Skorpion Zinc mine, most of the businesses and residents' banking needs were serviced by the First National Bank and a small Standard Bank agency reporting to its Lüderitz branch in the late 1990s. After the opening of the Skorpion Zinc mine, the expanding population of Rosh Pinah attracted new businesses to the area and banks saw a golden opportunity for business, and Standard Bank opened a full branch and one automatic teller machine (ATM) in 2002. In 2010, Standard Bank's Rosh Pinah branch had 8000 account holders, including clients from Rosh Pinah and the foreland (Source: interview with PR004 on 27.04.2010). Approximately 95% were private accounts while businesses accounted for only 5%. This could indicate an insignificant number of formal businesses in the area. The banks offered most of the services through a branch, including personal loans, loans for purchasing a vehicle, but no housing loans. Rosh Pinah was not proclaimed local authority and the non-existence of title deeds did not make it practical for the bank to offer such loans. The stagnant local economic condition that prevailed in 2010 affected the banking sector with less banking transactions and less people applying for the loans. In 2010, the banking sector was on the lookout and did not have plans for new banking products in Rosh Pinah. On the other hand, the businesses for small micro-lenders were on the increase, enjoying a larger customer base. The weakening local economy had increased the quantity of small businesses often borrowing money on short-term from smaller financial institutions such as micro-lenders to cover up their operational costs, even though the interest rates were higher.

In 2010, Rosh Pinah residents had access to a wide range of goods and services. Despite the fact that the economic base had diversified more vertically, particularly for medium and larger scale businesses, there was also an evolving horizontal diversification. Rosh Pinah offered specialized goods and services, such as dry cleaners, laundry services, photography services, and jewellery shop and car rentals. These were mainly small scale local businesses catering primarily for the local market.

Forty-six percent of businesses sold their goods or services locally to residents of Rosh Pinah (see Figure 37), or to other local businesses, particularly supplied to several informal sector outlets and both mining companies which were their largest clients. Despite their contribution towards horizontal diversification and consequently improving the likelihood of the settlement to diversify into a diversified urban centre, the small businesses were the most vulnerable to economic and mining cycles. One-third of Rosh Pinah's business were medium and large scale enterprises, but most of them were internationally owned companies or branches. The main challenge faced by these enterprises was a decreased consumer base as the business grew larger. If the business did not expand to other areas, the development was limited by the low purchasing power of their main customers. Thirty-five percent of Rosh Pinah's businesses sold their goods or services to other parts in Namibia, but most of them were larger retail network stores or franchises with branches all around Namibia. In the case of the closure of the mines, these businesses could be the first to close down and relocate the staff to other branches within Namibia. Their operations did not depend on the clientele in Rosh Pinah or the hinterland. Six percent of the respondents

that indicated their markets being outside Namibia were big international companies, mainly from South Africa.

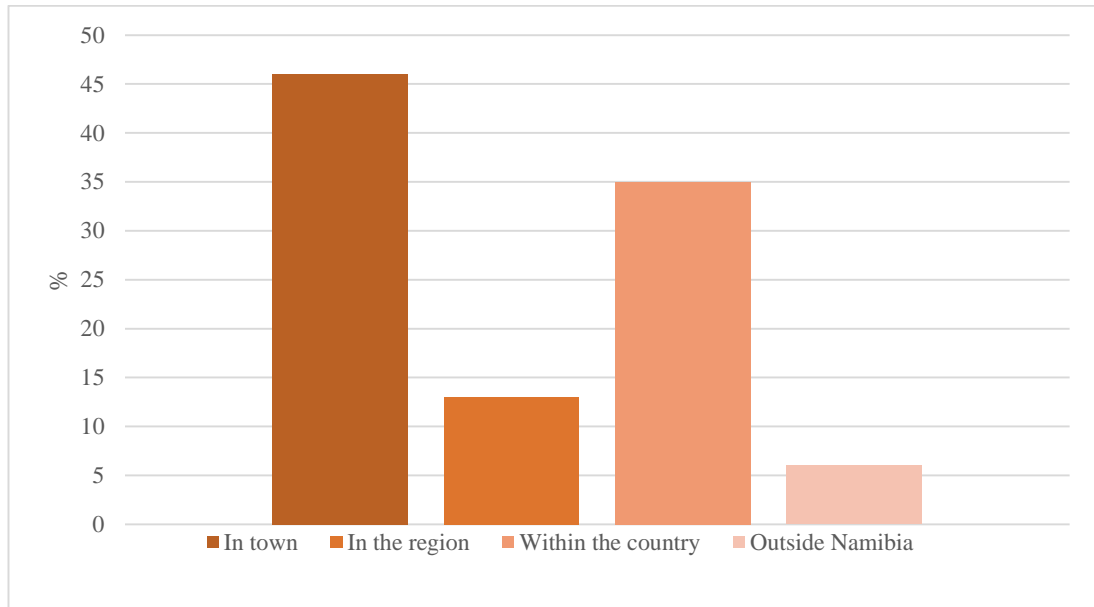


Figure 37. Markets to where Rosh Pinah's commercial establishments sell their goods and services (2010).

Once people move out of the settlement and their client base decreases, these commercial establishments could close their doors and move out of the settlement. Only 13% of the businesses sold their products and services exclusively to the local market with linkages to the region broadening Rosh Pinah's foreland's border. This was one of the most prospective categories of businesses where some of them had the potential to survive and progress beyond the lifespan of the mining industry in Rosh Pinah.

The proximity of larger urban centres in South Africa such as Springbok and Upington offering products at a relatively cheaper price and of a wider assortment than the nearest neighbouring urban centres in Namibia - Keetmanshoop and Lüderitz, had extended the hinterland border beyond the national border. A substantial amount of

daily supplies, groceries, fruits and vegetables were brought in from South Africa, with the exception of meat products. Middle income residents of Rosh Pinah preferred to travel to Springbok in South Africa, made it difficult for local businesses to compete. The possibilities to develop retail businesses in Rosh Pinah that would be beneficial to the Namibian economy were limited by the fact that most goods were sourced directly from South Africa, and only a small portion of products were brought from other larger urban centres in Namibia. Some selected and specific items for individual consumption were brought from the northern or north-eastern areas of Namibia, particularly traditional food and clothing items.

Residents of Rosh Pinah were satisfied with the variety of goods and services available in the settlement. The community survey established the areas of potential business opportunities where residents of Rosh Pinah liked to see more shopping centres, wider choice of shopping possibilities, more fast food outlets and restaurants. People in Rosh Pinah experienced a shortage of businesses such as vehicle repairs, legal service providers and estate agents and liked to see better choices for banking services. The most desired service that residents liked to obtain in Rosh Pinah was taxis. In 2010, there were no taxi services in the settlement and people found it difficult to get around, particularly those from the Tutangeni informal settlement as they had to walk two to four kilometres to get to the formal part of Rosh Pinah for their business, pay the bills and buy some food and groceries. The absence of taxi and public bus services particularly affected families with school children as all schools were located in the formal part of Rosh Pinah and children had to walk long distances to get to school in all weather.

Small and informal businesses

Tutangeni informal settlement was heaven for small and informal businesses; it is a small settlement on its own. In 2010, the population of this part of Rosh Pinah was larger than in formal Rosh Pinah and the continually growing population allowed for the businesses to expand and diversify. The years following the establishment of Tutangeni in 2006 had witnessed increased numbers of small scale enterprises, both formal and informal. In pursuit to generate some income people were creative and came up with different business ideas (see Appendix 12). The majority of establishments in Tutangeni were informal such as cuca shops selling daily necessities to the residents of informal settlement, shebeens operating as recreational and entertainment facilities, other informal outlets selling food, cigarettes and liquor, but the last years (2008 and 2009) following the unfortunate performance of the mining industry and deteriorating local economic situation in Rosh Pinah had seen a particular boost in the relocation and establishment of new formal and informal businesses in the Tutangeni informal settlement (see Figure 38). A few small scale entrepreneurs came to Rosh Pinah and initially tried to enter the market by opening their businesses in the informal sector. After succeeding and gaining the necessary confidence and customer base, some of them formalized their businesses by registering them with the Ministry of Trades and Industry. A large number of entrepreneurs did not make it beyond the first year of operations and they quietly withdrew. Some of those entrepreneurs returned to the comfort and security of formal employment.



Figure 38. Illustration of different businesses and retail outlets in Tutangeni informal settlement, Rosh Pinah, Namibia (2010).

The spatial distribution of small businesses was very scattered throughout the informal settlement; nested in-between the residential areas sharing the same premises with the owners' residence, but there was a growing trend of more organized spatial distribution by locating small businesses along the main street of Tutangeni or its smaller branching streets, forming a denser cluster with commercial outlets (see Figure 39).

The process of such structural arrangements started to resemble the spatial organization of a regular township with evolvement of a ‘central business district’.

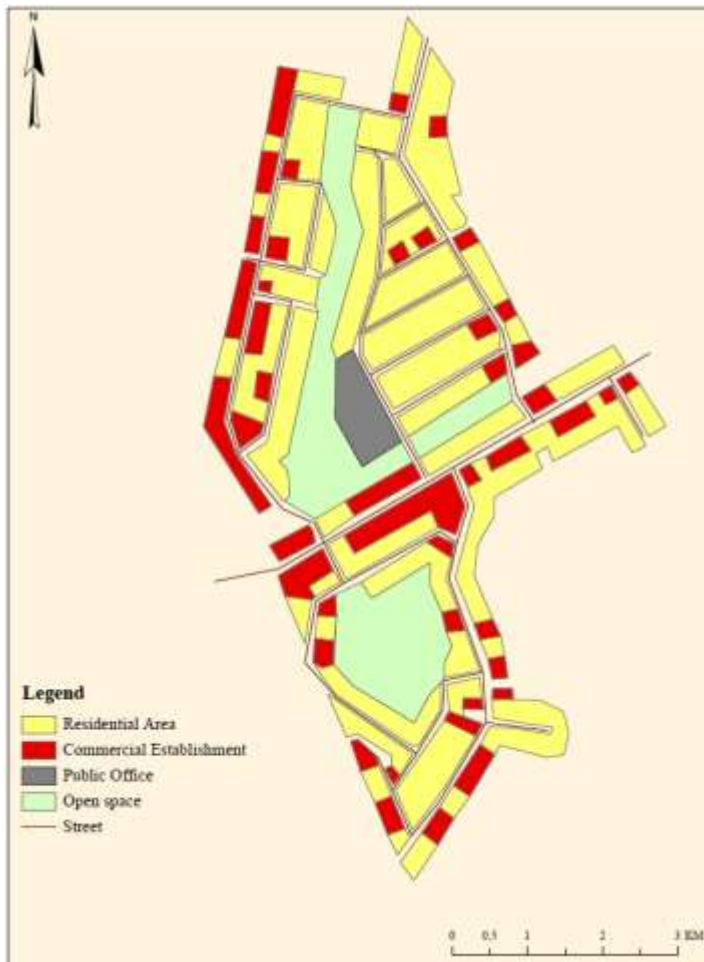


Figure 39. Location of informal businesses in Tutangeni, Rosh Pinah, Namibia (2010).

The non-existence of public transport in Rosh Pinah confined residents in Tutangeni and a lot of them did not go to the formal part of Rosh Pinah for extended periods of time. The shopping of daily necessities and vital services were sourced locally from small and less sophisticated formal and informal businesses. The majority of the small

formal and informal businesses were privately owned by a single individual or a family, some of them operated on a part-time basis and with very limited resources of their own, often seeking financial or labour support from the family members. Such enterprises of which the majority were small *cuca* shops and *shebeens* had limited chances to prosper and their long-term sustainability was unsure, causing business to cease, usually because of the lack of business skills, limited financial resources to grow and an inability to attract the necessary customer base. Small scale businesses in Rosh

Pinah tended to diversify into different sectors rather than to expand their core business activities to the formal part of Rosh Pinah or other non-local markets. The diversification occurred where the owner was able to oversee the businesses effectively and managed risk control. For example, a successful shebeen owner attempted to open a new cuca shop or other small retail outlet.

Tutangeni had a growing number of small formal businesses that had originated from informal economic activities of creative individuals who had received training and skills development from private or non-governmental initiatives. A few small local building and construction companies, caterers, upholsterers and woodworkers, hair dressers, a recycling company, electrical repairs, a bakery, clothing producers, laundry services and shoemakers had been assisted with some training and skills development. This enhanced the possibilities for local residents to transform from being job seekers to owners of their own small businesses, thus uplifted the quality of life for local people and diversified the local economy.

Rosh Pinah had a surplus of skills in the area, but the inability of these entrepreneurs to complete forms for tenders disadvantaged them in favour of larger service providers, often outsourced from South Africa. There were different opinions between small scale companies and larger enterprises where small informal businesses were of the opinion that both mines in Rosh Pinah did not want to use their services. The representative from the business community felt: "*Business with mines is not fair, lots of corruption, cheating and handshakes*" (Source: interview with PR014 on 29.04.2010). Yet, the lack of simple business skills to complete the tender documents

sidelined a few small local artisans. Both mines in Rosh Pinah tried to support small community projects and business ventures by outsourcing some small and simple services, for example, sewing overalls for the mine workers. These types of initiatives supported the local community in job creation, but they were not sustainable in the long-term due to dependency on the mines for the work. The representative from the Namibia Chamber of Commerce and Industry (NCCI) stressed that there is “*a need for more support from mines, give opportunity to provide services to them*” (Source: interview with PR014 on 29.04.2010). The initiatives rather resembled an effort towards social responsibility from the mining companies to gain the necessary positive publicity. The sustainability of such services to the mining companies was negligible and most of them could dissolve upon closure of the mines. On the other hand, the skills would remain with the people, but it was very difficult to predict if the people and thus the skills will remain in Rosh Pinah.

Another challenge for small formal and informal businesses in Tutangeni informal settlement was sourcing their goods and services, particularly the informal *cuca* shops and *shebeens* that purchased and stocked their outlets with goods from the formal part of Rosh Pinah. For example, liquor bought from a Rosh Pinah liquor store often was resold in Tutangeni with 100% profit. The distance to the formal part of Rosh Pinah and no taxi operating in the settlement made it more convenient for residents of Tutangeni informal settlement to purchase their daily supplies in Tutangeni, but at a higher price. This was the way how informal businesses survived, but they were fully dependent on businesses in the formal part of Rosh Pinah. If there was no stock in Rosh Pinah the consequences could be directly felt in such informal retail outlets in

Tutangeni. In the event of the collapse of the Rosh Pinah mining settlement, a large number of small businesses in Tutangeni will not be able to survive, thus challenging the sustainability of such businesses.

Economic situation of businesses in 2010

Rosh Pinah is a privately owned mining settlement and largely depending on the performance of both mining companies operating in the vicinity. The good years for mines translated into good years for the settlement and a good year for the mining company was determined by the profits it made from mineral extraction. The main prerequisite to earn good profits was favourable global zinc and lead prices. Years preceding the field investigations (2007 to 2010) for this research could be characterized by fluctuating global commodity markets. 2007 signified an extremely good year for zinc and lead mining operations with both Skorpion Zinc mine and the RPZC mine showed large production outputs and company profits. Global zinc and lead prices were reaching their highest levels in decades (see Figure 40). Mines were not only outsourcing an increased number of services and goods contributing directly to Rosh Pinah's economy, but their social responsibility towards the community was also increased. The training of small local entrepreneurs resulted in the skills being applied on the ground, leading to the establishment of new business ventures, indirectly contributing to the local economy. The business community in Rosh Pinah recalled the year 2007 as a very good business year. The economy was booming, residents' spending power augmented and for the most part the businesses in Rosh Pinah had only limited competition since the favourable economic conditions brought them enough clients.

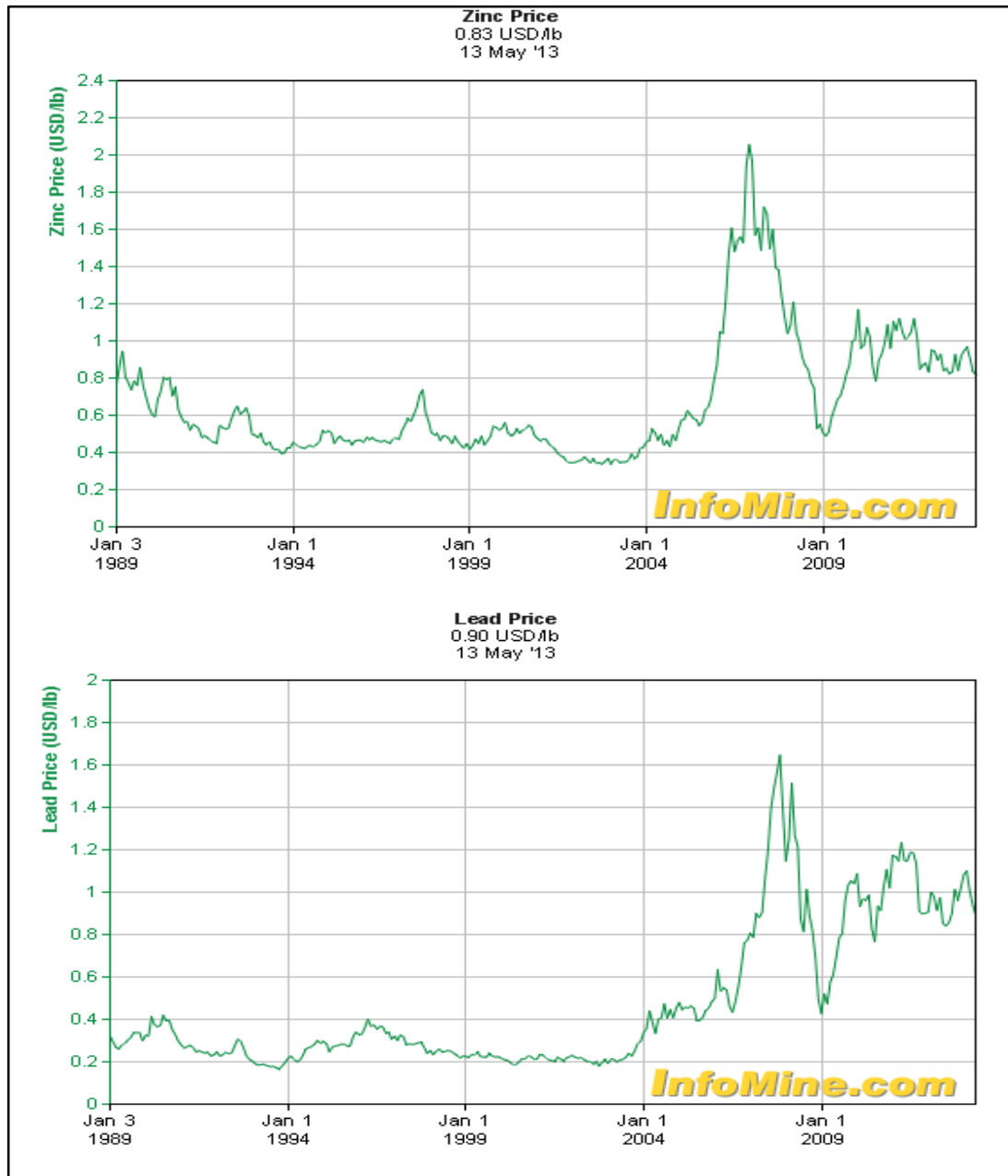


Figure 40. Global lead and zinc price charts, 1989-2010 (Source: Commodity and Metal Prices, n.d.).

The situation changed in 2008 and 2009 with many experiencing glooming economic pressures and sharp commodity declines, severely affecting the mining industry in Rosh Pinah. In 2010, it improved, but the business community in Rosh Pinah felt that the economy was stagnating rather than improving. The majority of surveyed businesses blamed their economic hardships on the global economic recession that

indirectly affected their operations, mainly because of the reduced buying power of their clients. Fifty-two percent of businesses were just maintaining their operations and did not make any significant profits; others suffered dormancy. The stagnant local market impacted on residents' buying power as the availability of jobs was on the decline and those employed in the mining industry did not receive increments on their salaries and wages like in years of better performance of the mining companies. The buying power of Rosh Pinah residents weakened considerably affecting local businesses in sectors both formal and informal, but the impact was harder felt in the formal sector with 12% reporting decline (see Figure 41).

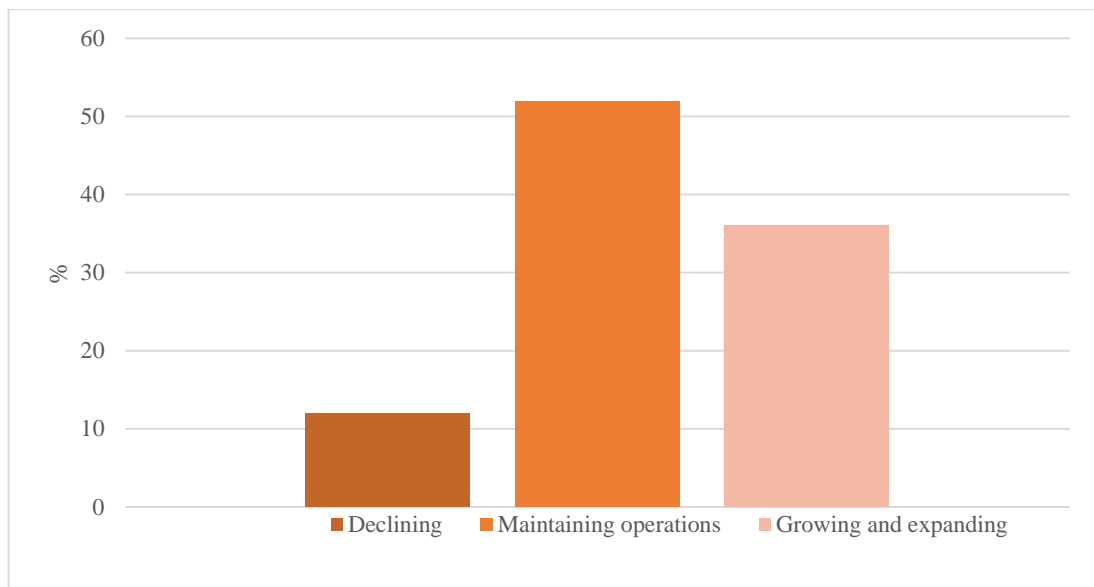


Figure 41. Self-assessment of businesses in Rosh Pinah, Namibia (2010).

Thirty-six percent of businesses that reported growth and expansion of their activities in 2010 were mainly branches of larger national and international companies that did not rely on Rosh Pinah's local market alone. Temporary economic decline could be tolerated and compensated for by profits somewhere else. Walton's Stationary shop closed its doors at the beginning of 2010 and relocated its operations and staff to

Keetmanshop. Employment for these branches was never a problem as they mostly used low and semi-skilled people and they moved to areas where they make better profits.

The most evident declines were experienced by companies and businesses in Rosh Pinah that provided services and goods directly to the mining companies. These included the tourism establishments that accommodated mine workers and contractors. A decrease in mining contractors resulted in lower occupancy rates for these establishments leading to smaller earnings (Source: interview with PR006 on 27.04.2010). The popular lodge in Rosh Pinah that usually had 80% occupancy, reported only 20% occupancy in 2010. The only reason for still being operational was their five year contractual obligations with the mine operator that assured some incomes for the near future, but not beyond five years. The research established that tourism establishments in Rosh Pinah did not get much business from the tourists visiting the area, but their survival was determined by the presence of mining companies and their contract to accommodate their contractual service providers and business acquaintances. Only one percent of their client base was tourists visiting nearby areas. However, the general outlook on tourism industry was positive. *“Future will be good, in six months we will recover”* (Source: interview with PR006 on 27.04.2010).

Small formal and informal businesses were among the most affected by the economic pressures of 2010; not being able to cope with financial pressures, many closed their doors or relocated from the formal to the informal part of Rosh Pinah. The candy shop

opened when Rosh Pinah was at its peak of economic growth in 2008, but ceased operations two years later in 2010 due to the financial pressures inflicted by the local economic decline and stagnation in the settlement. The curtain and fabric shop that made a success in 2007 almost closed in 2010, but a solution was found in relocating its business premises to Tutangeni (see Figure 42). The rental prices in the central retail complex of the formal Rosh Pinah skyrocketed and, together with a declining customer base, the shop was forced to either close or relocate its business.



Figure 42. Illustration of the curtain shop's relocation from the central part of Rosh Pinah to Tutangeni informal settlement, Namibia (2008 & 2010).

When this research was piloted in 2008 there were many business units in the shopping mall, but by the middle of 2010 the mall seemed to be empty with lots of space

available for lease (see Figure 43). A high proportion of unoccupied business and retail space indicated decline in Rosh Pinah's economic development.



Figure 43. Illustration of empty premises of the Rosh Pinah shopping mall, Namibia (2010).

The deteriorated global economic situation, weakened local market, and residents' lower buying power increased the competition between businesses trying to compete for the same clientele.

The main customer base for Rosh Pinah businesses were local residents, with 70% of businesses dependent on Rosh Pinah residents. During the boom the settlement was vibrant and businesses did not feel the competition as everybody was making profits. The relatively large population base and strong buying power at the time sufficed for the number of businesses in Rosh Pinah. In 2010, despite the economic stagnation, 97% of surveyed businesses were not considering closing their operations, and were prepared to struggle through the hardships in the hope of a better future. The older businesses in the settlement were particularly confident about a better future, the confidence gained from past experiences of the cyclic nature of the local economy. Only three percent of businesses were prepared to close their doors in the nearby

future. Fifty percent of those planning to close, did not afford the high rent and 25% of the closing businesses did not make the desired profits.

Challenges for economic growth

The obstacles for economic development in Rosh Pinah is rooted in the settlement's dependency on the mining industry. As the mines look to extending their life span and finding new ore deposits, the business community of Rosh Pinah is looking at every way to achieve economic development and the creation of new business activities. In 2010, the future of Rosh Pinah was unclear as the majority of business activities directly or indirectly depended on mining. Diversification of the economic base of Rosh Pinah was slow and lengthy and often obstructed by many hurdles such as limited employment opportunities. The prospect of finding a job in the mining industry was limited, but due to poor local diversification of the local economic base and limited number of medium and large scale enterprises, the chances to find a job in other sectors were weakened. People resorted to the last option to create employment for themselves, a positive step, but due to lack of skills and sufficient training in entrepreneurship only few succeeded to register their own small companies.

The main challenge recounted by the business community in Rosh Pinah was the non-existence of private ownership of the land, discouraging investment into the settlement. The Rosh Pinah settlement was located on unsurveyed state land with mining companies having rights over the land while they were still mining. This meant other businesses could not own the land; they could only rent it or sign a temporary lease agreement with the RoshSkor. The land tenure was a serious obstacle for

development and any future prospects. Inability to buy a property discouraged businesses not only from investing in the settlement, it also did not permit for the securing of financing from financial institutions due to absence of a collateral. It was widely believed that of the many constraints to the stability and growth of small scale businesses in Namibia, a lack of finance was the most crucial. In reality, the lack of a collateral, as well as difficulties in dealing with banking procedures and regulations were the main factors impeding the access of small entrepreneurs to formal credit. Relatives and friends were usually the only sources of finance for those who intend to start any kind of business (Tonin, 1998). While economic growth in Rosh Pinah was constrained by scarce cash flow of small and medium scale local businesses and lack of space for expansion, the larger national and international branches had better chances to expand as they had access to financing through their mother companies, but their willingness to make long-term investments in the settlement's sustainability was doubted. Lack of accommodation for employees and high rentals in the settlements discouraged businesses to set up operations in Rosh Pinah. It was difficult to venture into businesses in Rosh Pinah along a formal route. To open an outlet in the formal part of Rosh Pinah the entrepreneur needed permission from the mining companies and had to have a lease agreement with the RoshSkor.

The community and business surveys revealed additional challenges for successful development. The opinions of the public and the way they felt towards the settlement were not optimistic; the perceptions of Rosh Pinah's future were despondent. Despite acknowledgement of the mining industry's contribution to the development, and a particularly good and well maintained infrastructure in the settlement, residents and

the local business community in Rosh Pinah did not feel involved in decision making about the settlement's development and future; they feel sidelined. The community that was not involved in decision making for their own future felt hopeless and uninspired. They felt their voices were not heard and that the RoshSkor, the local company responsible for the settlement's management and town planning, will continue with development in the way that was favourable to mining companies that own the RoshSkor. "*Mines do not talk to us, RoshSkor's Head is never there*" (Source: from mine workforce survey on 29.04.2010). A significant share of Rosh Pinah residents had resigned themselves to what they consider inevitable and were in low spirits.

The RoshSkor was of the same opinion about the general public of the settlement, citing people were disinterested in being involved and rarely came to invited public meetings (Source: interview with PR001 on 27.04.2010). There was an evident communication problem between the population and the private local authority. The lack of involvement meant that the opportunities to discuss potentially important issues about the settlement's future were inadequate. The lack of confidence in the local authority impacted on people's decisions to devote themselves to the settlement's development. Residents had low faith in the RoshSkor feeling that their local authority took care of and safeguarded only the interests of the two mining companies in Rosh Pinah. Sixty-nine percent of the community was of the opinion that the local private businesses were more supportive in promoting local development than the RoshSkor.

5.1.5 Infrastructure and social service analysis

Provision of housing and land tenure in Rosh Pinah

That housing formed an integral part of urban settlement in Rosh Pinah is most visible to a first time visitor. Housing in Rosh Pinah reflects the mine operators' needs and was designed to provide shelter for the mine workforce and their service providers, and at the same time served as an investment for the mining company. To ensure a certain standard of housing and services provision to the residents the admission to reside was strictly controlled. There was no fence surrounding the settlement, but permission from the RoshSkor that manages and administers the settlement on the behalf of both residing mines in Rosh Pinah was needed to secure residence in the formal part of Rosh Pinah. In different mining cycles Rosh Pinah had experienced a surge and decline in property demands and the expansion of mining operations in the vicinity led to its growth. The land on which Rosh Pinah had developed belonged to the Government and was not proclaimed local authority. On temporary basis, Rosh Pinah was managed by two mining companies. While the mining was operational, the mining companies were the rightful custodians of the land. All demarcation of the areas for different uses, allocating plots for residential and commercial needs was entrusted to the RoshSkor and no commercial transaction in the form of selling any portion of land was possible.

Mine workers and service providers were provided with housing within the formal part of Rosh Pinah with each mining company provided housing in their respective allocated areas (see Figure 44).

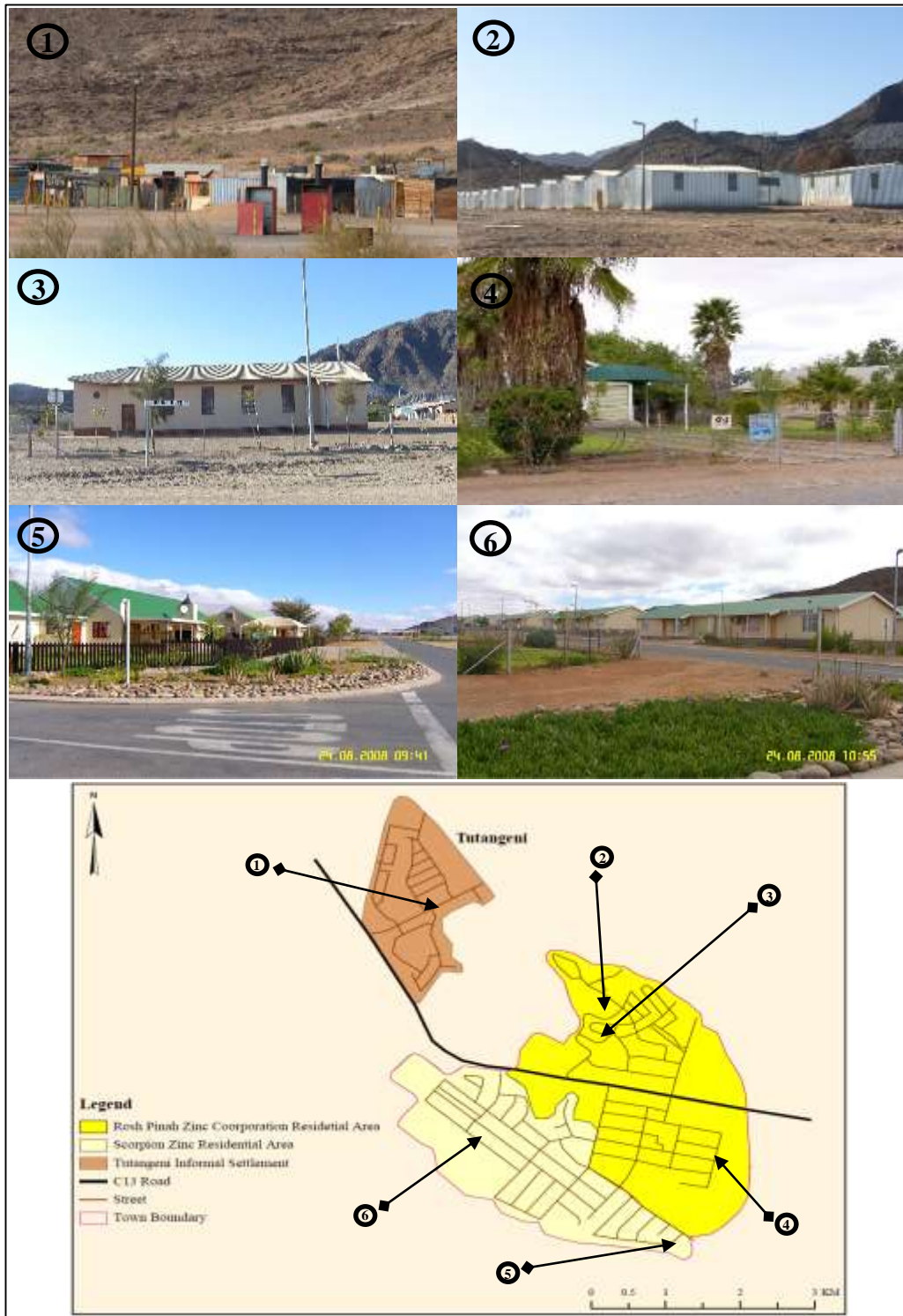


Figure 44. Illustration of different residential areas of Rosh Pinah, Namibia (2008 & 2010).

Separation of residential areas was the outcome of two different mineral cycles that divided the physical layout of Rosh Pinah in an older settlement belonging to the

RPZC mine and the recently established Skorpion Zinc residential area reflected in the physical layout and characteristics of Rosh Pinah. Spatial division within the two residential areas had contributed to the social division between the residents of the formal part of Rosh Pinah where the residents of the older part of the settlement felt the rightful owners of the place and treated more recent arrivals with suspicion.

In contrast, the inhabitants of the newer Skorpion Zinc residential areas considered themselves superior to the RPZC residents, their confidence boosted by better and more modern housing and services provided to them. Division was evident not only between the different residential areas belonging to different mines, but also within each of the areas. This was caused by the mining company's housing policies that use the grading of their workers to allocate housing, involuntary created a particular "social class" within their respective areas. There was noticeable difference in the type of housing for general management staff or a simple semi-skilled mine worker. The senior staff members were provided with a bigger size and better quality of housing in more superior locations, although not clearly separated.

Knowing the individual's residential address it was possible to judge on several private details of the person - type of employment, income levels and family status - with fair accuracy. Visibly dissimilar housing conditions and unequal access to the social infrastructure did not create social cohesion among the residents of the formal and informal parts of the settlement. In the case of a new or expanded existing mining project in Rosh Pinah, the challenge of social divide could still persist and conflicts could amplify as the mine workforce was likely to have different demographic

characteristics, interests and cultural background than the already established community.

While mines could oversee the growth and development of the formal part of Rosh Pinah they could not control the areas outside their jurisdiction. The informal settlement that grew on the outskirts of Rosh Pinah's formal part was spatially and socially segregated from the formal part of Rosh Pinah, but it could not be separated from Rosh Pinah in planning the settlement's future. The size of the informal settlement and the ever growing linkages between the two parts of Rosh Pinah made for a unique situation where the informal part of the settlement was larger than the formal settlement, created a challenge to manage and plan for the future of Rosh Pinah.

In terms of housing, segregation between the two parts of the settlement was immense. The housing in the informal settlement was basic, improvised, self-designed and constructed. The infrastructure of the Sand Hotel was poor, consisting of two streetlights, an ablution block and one tap for water (RPZC, 2003). The absence of sanitation posed a significant health risk. The growth of the informal settlement escalated with the arrival of the second mine and geophysical characteristics of the area limited the expansion possibilities. The crowding of people in this limited area with inadequate sanitation and access to water became a serious health and safety concern. The Sand Hotel informal settlement was considered dangerously close to the Rosh Pinah Zinc Corporation (RPZC)'s waste rock dumps and any further development was limited by the physical characteristics, and overcrowding of people was also considered dangerous. The settlement's managing company, RoshSkor, had

to consider the relocation of informal settlers to another safer locality. A suitable place was found 2 km westwards from the settlement near the C13 road. In joined efforts between the mines and the community of informal settlers, the informal settlement eventually was relocated in early 2006. The old Sand Hotel location was closed down and a new residential development was founded in Rosh Pinah. The new locality was named Tutangeni and despite being an informal settlement some kind of order was prompted with the assistance of RoshSkor. Relocation opened the potential to grow. Figure 45 depicts Tutangeni location before and after relocation and the scarce amount of housing structures in 2005 was in contrast to the densely built area of Tutangeni in 2010 with 1350 demarcated plots.

Since 2006, Tutangeni informal settlement underwent a certain level of planning and development. The growth of the informal settlement changed from being spontaneous to the guided. The establishment and the future growth of Tutangeni settlement was guided by the Tutangeni Township plan where each household was allocated a small size erf resembling the structures of the formal town. The plots could not be sold, but the residents were charged monthly fees for service delivery which was N\$45.00 a month. In 2008, RoshSkor spent N\$65 000 a month to render essential services to Tutangeni residents (Cloete, 2008).

The lease holders of these plots have rights to exchange them by completing an authorization form from the RoshSkor, but not to sell. The research revealed a misconception among the residents; close to one-third of Tutangeni residents did not understand the content of the agreement with the RoshSkor and considered themselves

being rightful private owners of the allocated plots for which they pay municipal rates to the RoshSkor. The sale of plots is illegal and only improvements to the plot such as structures built on the plot can be sold to another person, but it was not controlled by either the RoshSkor or the deeds office of land registration. The misunderstanding potentially could create confusion, particularly if Rosh Pinah is going to be proclaimed as a local authority.

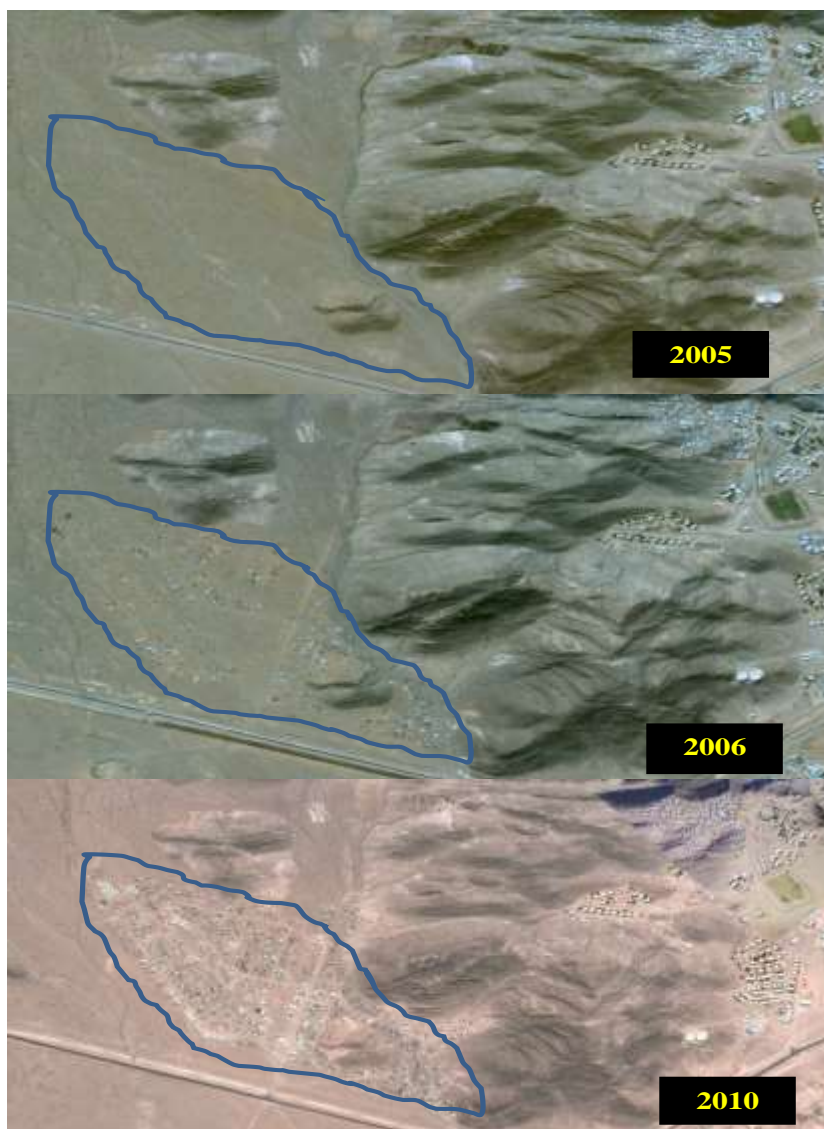


Figure 45. Illustration of growth of Tangeni informal settlement, Rosh Pinah, Namibia during the period of 2005 to 2010 (Source of data: Google Earth, 2010)

Municipal service provisions

Before the Skorpion Zinc mine was developed Rosh Pinah was managed by the Rosh Pinah mine alone. Since the arrival of the second mine, the management of the settlement was done jointly by both mines with RoshSkor being responsible for all infrastructure and service provision and maintenance in the settlement. The company recovered the costs that both mines invested in the infrastructure and municipal service delivery. Although highly subsidized by the mines, residents and businesses in the settlement were liable to pay for the basic municipal services provided to them by the RoshSkor. Access to municipal services depended on the location of the housing. In the formal part of Rosh Pinah every house had access to electricity, water, and flush toilets contrary to the informal area of Rosh Pinah where municipal services were basic.

Electricity with the capacity of 100 MW was supplied to Rosh Pinah by the NamPower Obib substation located just few kilometres outside of Rosh Pinah. According to the information provided by the Obib substation, 98% of the energy was used by the two mines, leaving two percent for the settlement's consumption. Electricity demand was increasing but not in noticeably large amounts and the capacity of the substation was sufficient, including an expected increased demand of an additional 10% to 15% for a new foreseen mine in the area. The survey revealed that both Rosh Pinah's general and business communities were misled about the imposed moratorium on the approval of new building plans, they were not informed correctly by the RoshSkor. The public was of opinion that the approval of new building plans stopped due to insufficient electricity and water supplies. NamPower assured that they had enough energy for the

expanding businesses in Rosh Pinah, but the cause of the problem lied in the size of the transformer for the Rosh Pinah settlement which was too small and nearly sufficient for the demand in 2010. Any increase, and thus the expansion of Rosh Pinah, was limited unless a larger transformer was purchased. The personal opinion of the NamPower manager of Obib substation, was that “*if mines close, it will also affect the Obib substation*” (Source: interview with PR013 on 28.04.2010).

All formal parts of Rosh Pinah were fully covered by electrical connection to each individual house. Until 2010, residents of Tutangeni relied on generators, battery lights, candles and wood for power, but a main breakthrough in service provision was reached after signing an agreement with NamPower to supply electricity to the informal part of Rosh Pinah. The long awaited development of electrification of Tutangeni informal settlement became a reality at last. At the time of the research in 2010, residents of Tutangeni purchased their pre-paid electricity from a vending machine stationed in the RoshSkor’s Tutangeni office. Electrification of Tutangeni significantly changed the life quality for informal residents, the school children were able to study at night and households had access to electricity for cooking and small scale businesses.

Water supply to the Rosh Pinah settlement was piped from the Orange River. Both the formal and informal parts of Rosh Pinah were serviced by an appropriate water infrastructure. While water to the residents of the formal part of Rosh Pinah was piped directly to their housing units, Tutangeni was also provided with a water infrastructure with twenty four communal water points (see Figure 46) evenly distributed within the

area. Approximately 60 000 000 litres water per month (2010) was used for domestic consumption in Rosh Pinah which was an extremely high consumption for the size of the settlement. The groundwater potential in the area was not profuse and water boreholes were often unsuitable for human consumption due to high concentrations of fluoride, nitrates and sulphates (Christelis & Stuckmeier, 2001).



Figure 46. Illustration of water supply infrastructure in Tutangeni informal settlement in Rosh Pinah, Namibia (2008).

A certain level of dissatisfaction about the water quality in the informal part of the settlement was recorded. Approximately 13% of Tutangeni residents (Skorpion Zinc, 2009) felt the access to clean water in their location was inadequate. The poor relations and lack of communication between the RoshSkor and the residents of the informal settlement could be blamed. The complaints could result from the violent dispute in 2008 that led some Tutangeni residents to vandalize water points, in protest against the high service fees. RoshSkor eventually resolved the dispute, but many of the damaged water points were never repaired (Skorpion Zinc, 2009).

Similar to water and electricity, waste collection and management was the responsibility of the RoshSkor which outsourced it to a private company - the Catering

Contracts Management (CCM). Each household and commercial establishment had a wheelie bin which was emptied on a regular basis. The Rosh Pinah settlement was subdivided in three collection areas in which the wheelie bins were emptied once per week. Any additional waste or black plastic bags next to bins were not removed by the waste removal service provider. For that reason RoshSkor had introduced a refuse collection skip that was located inside the yard of the community hall where residents could dump black plastic bags at a small fee. The town was clean and well managed. As early as 2003, the Skorpion Zinc mine initiated a successful recycling project in their residential area. The residents were provided with waste sorting bins to reduce waste (see Figure 47).



Figure 47. Illustration of waste collection facilities in Rosh Pinah, Namibia (2008).

There was another progressive initiative in Rosh Pinah where the waste from Skorpion Zinc and other sites around Rosh Pinah, including the garbage dump, was transformed into an alternative fuel source which the community at Tutangeni could use for cooking. Engineers at the Skorpion Zinc have created the stoves from discarded steel that were meant to burn paper pellets at a rate of one every few hours while distributing heat efficiently. Seven energetic entrepreneurs and employees from the Skorpion Zinc mine were behind this initiative. Several stoves were donated to some Tutangeni residents and the response received demonstrated a high level of satisfaction among the users of this type of stove who indicated their willingness to make it part of their lifestyle. Ninety-two percent of all residents of Rosh Pinah, both formal and informal, cooked indoors, and only eight percent cooked outside, all of them in the Tutangeni area.

A structured sewage system was available to all residents and businesses in the formal part of Rosh Pinah, but excluded Tutangeni informal settlement. Tutangeni was provided with forty-eight 'enviro-loo' toilets for an estimated 6500 people living in the area which made for approximately one 'enviro-loo' toilet per 135 inhabitants. These toilets were maintained by RoshSkor who hired a company to empty them on a regular basis. Despite the efforts to provide services to residents of the formal and informal part of Rosh Pinah, the community's satisfaction with municipal services could be rated as very low as opposed to the opinion of RoshSkor that was convinced about a fair level of satisfaction among Rosh Pinah's residents. This clearly indicated that opinions of different parties did not match and that unresolved problems persisted, particularly between RoshSkor and Tutangeni informal settlement. Constant

dissatisfaction with RoshSkor's services among the residents of Tutangeni informal settlement had persisted for years, particularly dissatisfaction with the inadequate water supply, infrequent removal of garbage and toilet maintenance. People's grievances were ignored and continuous dispute with RoshSkor could erupt in an unrest. It was likely that RoshSkor did not feel responsible for the residents in Tutangeni and did it as a part of their social responsibility and to boost their social image. RoshSkor could further be of the opinion that residents of the informal settlement, the population size of which had surpassed the size of the formal part of Rosh Pinah, must be taken care of by the Government of Namibia.

At the time of the investigation in 2010, the level of service provision in Rosh Pinah was of acceptable quantities and quality, but it had reached the limit, particularly in terms of electricity, water supply and sewage management. The situation was considered as serious and the allocation of land was put on hold. According to the RoshSkor officials any further expansion of Rosh Pinah was not desirable at that stage in 2010 as it could put a lot of financial pressure on infrastructure and service delivery and maintenance. The settlement's expansion would require pumping more water and purchase of a larger transformer to be able to supply all electricity needs. It was unlikely that the mines will invest if additional mineral resource was not found.

Roads and streets infrastructure

Despite its remoteness, large areas covered by national parks, and long distances between urban centres in southern Namibia, Rosh Pinah is relatively well connected to other urban centres by a roads infrastructure. It has a high standard road network,

maintained by the Government of Namibia. Rosh Pinah is well connected with other rural and urban centres in Namibia, among the most vital is the C13 road linking the settlement to Lüderitz and Keetmanshoop via Aus (see Figure 48).

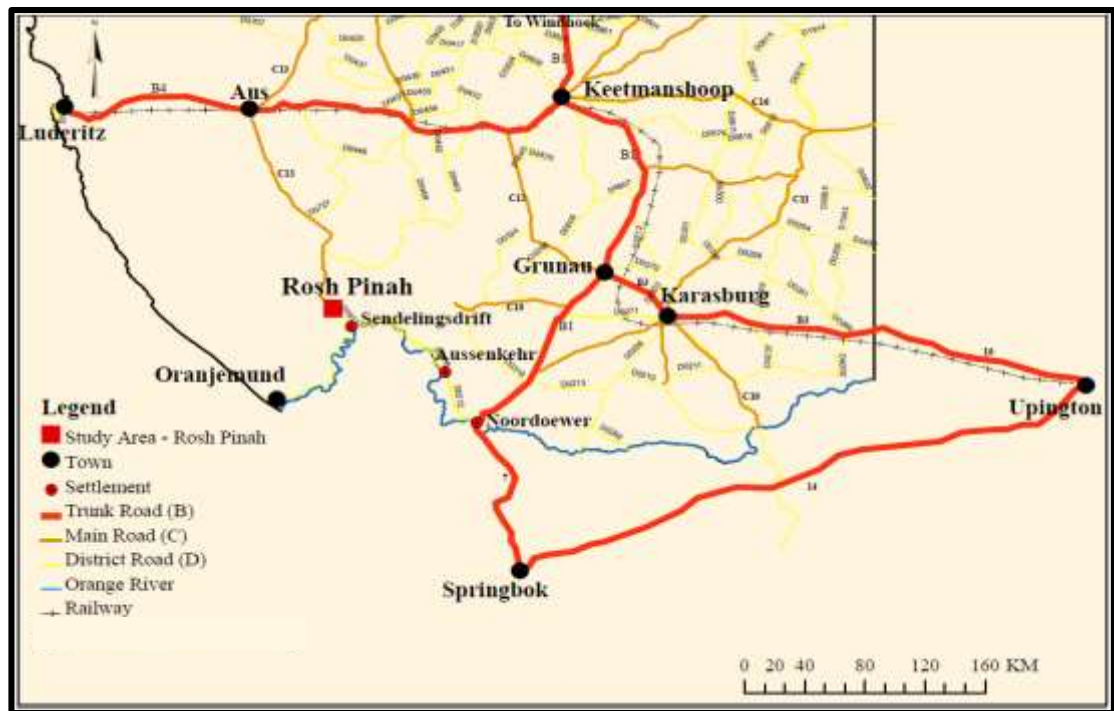


Figure 48. Roads infrastructure in the southern Namibia (2010).

After development of the Skorpion Zinc mine in 2001 the traffic of heavy trucks and mine machinery on the C13 road increased, negatively influencing the quality of the gravel road from Rosh Pinah to Aus. Consequently, a solution was sought in tarring the road. In 2003, the first eighteen kilometres from the Rosh Pinah settlement to Skorpion Zinc mine turn-off was provisionally tarred, and eventually the whole stretch of 165 kilometres from Rosh Pinah to Aus was completed by January 2007, which enhanced not only the quality and safety of the road, but considerably improved accessibility to Rosh Pinah and the surrounding region.

The closest neighbouring urban centre for Rosh Pinah is Oranjemund, a diamond mining town that is situated at the mouth of the Orange River and connected to Rosh Pinah by an approximately hundred kilometres long gravel road. Until 2011, access to Oranjemund was strictly controlled and the road was not frequently used, preventing establishment of any market-related linkages between the two settlements, both privately owned by different mining companies. The gravel road that connects them was also privately owned by the Namdeb diamond mining company and was for a long time a main obstacle for Oranjemund to be proclaimed. It was resolved only in 2011 with proclamation of the road and Oranjemund town. It is foreseen that opening Oranjemund town to the general public and proclamation of its access road will establish closer linkages between Rosh Pinah and Oranjemund and the rest of the country, stimulating growth of new market related linkages between the two urban centres.

The 160 kilometres gravel road stretching along the Orange River and linking Rosh Pinah with Noordoewer and the Vioolsdrif South African border post was proclaimed as a public district road in late 1996. The road became an increasingly popular route for tourists and suppliers from Springbok in South Africa and had considerably stimulated the growth of small scale business activities along the road, particularly farming activities. The main concern was the quality of the gravel road and environmental factors that limited the use of the road throughout the year. The road closed in April or May due to heavy seasonal rains that damaged the bridge and some parts of the road, and reopened only after the rain season and repair to damages. The seasonal dysfunction of the road hindered the growth and expansion of economic

activities in the area and was particularly harmful to the tourism and agriculture sectors.

In 2010, the pontoon at the Sendelingsdrift border post was also closed resulting in reduced tourism movement and inaccessibility to the Richtersveld Transfontier Park. With the pontoon and a section of the road closed, tourists chose to drive straight from Noordoewer to Keetmanshoop giving Rosh Pinah a miss. Namdeb was only willing to allow tourists to make use of their road through the Sperrgebiet, but it was barred to local residents of Rosh Pinah and contractors delivering services and goods to the settlement. The only way to reach Rosh Pinah from Noordoewer was via Aus and Keetmanshoop, a more than 500 kilometres detour while driving through Aussenkehr was about 160 kilometres (see Figure 48). The temporary alternative was not only inconvenient, but also damaging for the businesses in Rosh Pinah, often delayed delivery of goods and services to Rosh Pinah by two days. The efficiency of businesses was severely affected and reduced customer base; businesses suffered income losses. The goods and services on which they relied were delayed; incurring higher unplanned transportation costs. The road was also used by local people and during the time it was closed children attending schools in Upington or Springbok were bound to stay in South Africa, being deprived of visiting their families in Rosh Pinah over weekends.

Tarring the road along the Orange River could have the potential not only to improve the quality of life for local people, but to also attract more businesses and investments to the area. Grape farmers and other agricultural producers were likely to use this road for transportation of their produce. At the time of the research in 2010, the farmers

along the Orange River transported their harvest to the airport at Upington in South Africa. Tarring the road along the Orange River would encourage farmers to use a shorter route to Lüderitz where they could load and transport their products through the NamPort.

The transport system played a key role in the development of various industrial sectors of economic activity in the settlement and nearby regions. A good and well maintained road infrastructure could support and bring about development in the Rosh Pinah area. The street infrastructure of Rosh Pinah was of good quality. All streets in the formal part of Rosh Pinah were tarred, well maintained and looked after by the mining companies. The sandy gravel paths of Tutangeni informal settlement were not tarred and people were constantly exposed to the dust, but the streets were well planned and wide (see Figure 49).



Figure 49. Illustration of street infrastructure in Rosh Pinah, Namibia (2008 & 2010).

Rosh Pinah was accessible by air, its well-maintained tarred landing strip was located some fourteen kilometres north-west of the settlement, adjacent to the Sperrgebiet boundary fence.

Telecommunications infrastructure

Rosh Pinah had a good modern telecommunications infrastructure. The settlement enjoyed presence of the Telecom¹⁶ and the NamPost¹⁷ offices providing all basic communication services to Rosh Pinah residents and the hinterland.

Centrally located, the post office was slightly overloaded by an increased customer base resulting from a shortage of post boxes. Most of their clients for postal services were private and commercial residents of formal Rosh Pinah, while residents of the informal part of Rosh Pinah were frequent users of their money transfer services.

The Rosh Pinah community had access to broadcasting services, radios, television, internet, satellites, mobile telecommunications, fax, and telefax (see Figure 50). Coverage of a mobile network was good and people in all areas, formal and informal, could enjoy good service from the MTC.

¹⁶ National telecommunications operator, wholly owned by the Government of the Republic of Namibia.

¹⁷ Owned by the Government, Namibia's official postal service which offers financial and logistical solutions through its postal, banking, courier, philately, agency and money transfer services.



Figure 50. Illustration of telecommunications infrastructure in Rosh Pinah, Namibia (2008 & 2010).

Rosh Pinah had its own local magazine ‘ExxpreSZ’ which was a joint undertaking between the two mines and kept the residents of Rosh Pinah informed about their activities in the area, future plans and events organized by both mines.

The magazine was very informative and any community member could voice and express their

concern or advertise their services. It was a good tool that brought the community together. The ‘ExxpreSZ’ helped define the personality of the mining settlement. It also promoted and supported local businesses and networking among them.

Healthcare facilities

Good health is a prerequisite for well-being and access to these facilities determines the quality of life for people, particularly for remote communities like Rosh Pinah. The Oranjemund constituency where Rosh Pinah was located had the highest life expectancy rates, which were over seventy years and the lowest infant mortality rates

in the entire Karas Region. This could be explained by the high class medical infrastructure in both mining towns – Rosh Pinah and Oranjemund. Rosh Pinah settlement had two health facilities available to its residents. The first was a privately owned Sidadi clinic, which was established by the two mining companies to guarantee health care provision for their mine workers or other private individuals or legal entities. Another health service provider in Rosh Pinah was a small government clinic catering for the residents who could not afford private medical care, provided very limited services and was severely understaffed.

The private health clinic was established in 2006 and named Sidadi clinic, meaning “our clinic” in the local Nama language. Skorpion Zinc mine provided a building securing a 69% share in the company. The remaining 31% share was owned by the Rosh Pinah Zinc Corporation mine responsible for providing equipment to the clinic. The health care service in the clinic was subcontracted to the Rosh Care, a private health company hired by both mines, employing twenty two staff members that include two permanent doctors, six nurses, one qualified paramedic, one physiotherapist, one semi-permanent dentist, a visiting psychologist, and a few administrative and general workers. Separately they contracted visiting specialists coming from Windhoek for eighteen visits per annum. This was all available only to the mining community of Rosh Pinah and higher income residents with affiliation to some medical provident fund or those who could afford to pay cash for the services, made the facility inaccessible to the majority of the public. Monthly there were approximately 300 people visiting the clinic and ten to fifteen people per day who came to be tested for occupational health. All permanent mine workers and their dependents living with

them in Rosh Pinah were covered by the medical aid provided by the mining companies. An estimated 90% of the clinic's patients were mine workers and the remaining 10% were other private individuals or the Government workers residing in Rosh Pinah (Source: interview with PR003 on 27.04.2010).

Those who required hospitalization were treated in Oranjemund. There were special arrangements between the mining companies of Skorpion mine, Rosh Pinah Zinc Corporation and Namdeb that allowed patients to be treated in the hospital in Oranjemund that was also privately owned. In emergency cases the patients were airlifted to Oranjemund with the Namdeb's medical helicopter. Until 2011, Sidadi clinic had only one ambulance that was used for transporting patients in the settlement, but since 2011, there was a brand new ambulance with the purpose to improve emergency services at the Sidadi clinic. With the new ambulance patients were transported to Windhoek in case of such emergency and when flights were not available.

According to medical staff at the clinic, the most common illnesses treated at the Sidadi clinic were respiratory tract infections, followed by gastroenteritis type of infections. No serious occupational illnesses had been detected among the mine workers in the settlement. However, the IOM report (2010, p. 9) recognized several occupational illnesses' risks, such as pneumoconiosis, asbestosis, silicosis and tuberculosis (TB). Silicosis was a substantial risk factor for TB, as was HIV infection. The research described a multiplicative, rather than an additive effect of these three conditions (IFC, 2004). In 2009, Sidadi clinic had three TB cases. The mine workers

survey revealed that most mine employees were satisfied with the health care services provided by the Sidadi clinic with only one-third of workers expressing resentment of being unfairly treated at the clinic. The survey established that mines took adequate care of the medical needs of their employees and their family members that lived in Rosh Pinah. A different state prevailed among the non-mining community which formed the majority of Rosh Pinah residents, who experienced serious challenges with adequate health care.

The medical treatment of non-mine workers, often from the low or no income groups of population was possible only at the Rosh Pinah State clinic, located in the residential area in the formal part of Rosh Pinah. The clinic was small with personnel of two nurses, two community counsellors and three administrative support staff. Despite their limited capacities and staff, the clinic was visited by eighty to ninety people per day, the majority came for their anti-retroviral (ARV) treatment.

Since the middle of 2007, the clinic had a visiting doctors on a monthly basis from Keetmanshoop, 260 kilometres from Rosh Pinah. The majority of the state clinic customers were Tutangeni residents, despite the clinic was two kilometres away from the area. The next closest government clinics were about 160 kilometres away in Aus and Noordoewer and both were very basic. The nearest hospital was 100 kilometres away in Oranjemund, but that was a private hospital for mine workers and not available to people who could not pay for the services. Should they needed hospitalization, the nearest government hospital was over three hours' drive away, in Lüderitz and Keetmanshoop. The Rosh Pinah clinic did not own a vehicle and experienced

difficulties to fetch medications and equipment, making supply very unreliable and often sporadically available to the patients (IOM, 2010). Absence of a maternity ward in Rosh Pinah resulted in pregnant women approaching confinement to leave the settlement or some babies were born in the settlement without the presence of a registered health practitioner.

The quantity and quality of the healthcare at the private Sidadi clinic had the capacity to accommodate more patients and services which could make for more effective use and reduce costs. Negotiations between the mining companies and the Ministry of Health and Social Services were underway to have a corporation between both the privately owned Sidadi clinic and the Rosh Pinah State clinic in which case the patients from the Rosh Pinah state clinic could be referred to Sidadi for services such as x-rays, ultrasound scans and emergencies which all were available at the private clinic. At the time of the survey in 2010, the state patients were referred to Lüderitz hospital despite the required service being available in Rosh Pinah. The partnership between the private and government medical care providers would assure patients to be treated in faster manner without having to travel long distances. With increased volumes of patients Sidadi clinic could afford to have an onsite laboratory. Many essential tests could be performed in Rosh Pinah without sending them to South Africa or elsewhere, thus saving on time and cost for such analysis.

The illnesses and main complaints of the Rosh Pinah State clinic's patients were similar to those of the Sidadi clinic - respiratory tract illnesses and gastroenteritis type of infections that was often caused by poor sanitation. The health care services for non-

mine employees were not sufficient and of low quality. The community survey results displayed a strong community desire for health care services to be improved. The services offered to non-mine employees were regarded to be too limited, 64% having the impression that there was no access to a general practitioner at all. More than half of Rosh Pinah's residents were not satisfied with the health care service available to them, overcrowding being the main reason.

Residents of Rosh Pinah, and particularly mine employees had several factors that put them on higher risk to contract HIV/AIDS. HIV/AIDS infection rates in Rosh Pinah were slightly higher than the national average and higher among mine workers than among the general population (IOM, 2010; Rukambe, 2010). Specifics of the mining industry, with its large number of shift workers caused them to lead disrupted family lives. The way in which mines organized shift work and shared accommodation increased the vulnerability to HIV/AIDS. The long distance commuting arrangements for the Skorpion Zinc mine determined that shift workers stayed far away from their families for at least seven days. At times when they were not on shift, they had to vacate the hostel type of accommodation provided by the mine. Transport to Windhoek, stopping at other places along the route was available, but reportedly some preferred to stay in Rosh Pinah or somewhere else closer to Rosh Pinah. Alcohol abuse was reputed to be a significant problem in the settlement, particularly in Tutangeni informal settlement. Absence from home, lacking family support and increased alcohol abuse all led to casual relationships and unprotected sex.

After construction of the Skorpion Zinc mine and upgrading of the Aus road to Rosh Pinah, some researches cited an increase of commercial sex workers in Rosh Pinah (African Development Bank, 2002). This was denied by the Rosh Pinah police warrant officer and the community survey. Nevertheless 88% of surveyed mine workers confirmed that HIV/AIDS had an impact on the mining community of Rosh Pinah. Management, on the other hand, denied the severity of the problem and claimed that it had little impact on the mining industry. The observation was that mining companies were less concerned about its impact on individual level, but were more concerned how it affected the performance of their company.

After 2004 when the prevalence survey revealed HIV/AIDS infection rates in Rosh Pinah to be slightly above the Namibian average, vigorous voluntary counselling and testing (VCT) services, peer education, wellness programmes and community-based initiatives, treatment of sexually-transmitted diseases and anti-retroviral programmes were implemented in 2005. The voluntary participation in the VCT programme among the mine workers was sluggish. The service was provided, but less than half had participated. The long distance between the mining site of Skorpion Zinc and the clinic was a main reason discouraging mine workers from going for testing. During the first nine months of 2008, only 94 employees of Skorpion Zinc mine participated in the VCT programme. A trial period of on-site testing was conducted from October to the middle of December 2008 which showed a significant increase in the numbers of mine workers being tested for HIV (Skorpion Zinc, 2009). The estimates by the private clinic revealed that 21% of the mine workforce in Rosh Pinah was HIV positive.

The settlement had a relatively good health care infrastructure, but it was foreseen that a dramatic change could occur once the mines are closed. The state of the art services provided by the mining companies to a limited number of people could experience dramatic decline as the mining company would withdraw from funding the services. The elaborate facilities of the Sidadi clinic could become a white elephant. Due to the reduced number of people in the settlement, the local community could be left to pay for the well-developed infrastructure that was created without consideration of the community's needs and capacities. The facility could be oversized and too expensive to run and instead of helping local communities, mines would leave a burden behind. It was very likely for the private Sidadi clinic to be of no use because the incomes of those who could remain in town will not be sufficient to pay for the services provided there. Eventually the clinic will have to drastically scale down, leaving the expensive infrastructure underutilized.

Educational institutions

The educational infrastructure in Rosh Pinah was of reasonable quantity and quality, particularly in the private sector, providing residents with all basic needs for pre-primary and primary education. Rosh Pinah had a range of educational institutions such as a crèche, kindergartens, privately owned pre-primary schools, several government and private primary schools, adult training centres and a public library serviced by the Ministry of Education.

With the support of the mining companies, the settlement had a few early childhood development programmes. Together with Oranjemund, the enrolment of children in

these programmes was among the highest in the Karas Region. Sixty-two percent of the children in Oranjemund constituency were involved in early childhood development programmes.

Stepping Stones pre-primary school in Rosh Pinah was a private school that started to operate in 2004, employing seventeen staff members – six teachers of whom four were qualified and six assistant teachers. The school was experiencing difficulties to recruit their staff locally. The remoteness of Rosh Pinah and lack of incentives and future prospects discouraged qualified people to stay in the settlement. Most of their qualified staff was brought in from other parts of Namibia. The Stepping Stones pre-primary school taught children aged from three years to six years of age, coming from different areas and social backgrounds. Despite initial difficulties, very different skills and income profiles of their parents, the children seemed to integrate very well. The school catered for up to 150 children. At the time of the investigation in 2010, the school had 137 children and a year later 131 children (Source: interview with PR002 on 27.04.2010). In order to accommodate children from various social backgrounds, the school fees were set on a sliding scale. The standard fees were N\$1300 per month, but parents with a lower income paid lower fees, being subsidized by the mining companies. Each mine contributed on behalf of its employee's children. Children of mine employees were guaranteed a preferential treatment for enrolment at this school. Children of non-mine employees were accepted only if there was an opening and were also subsidized by the mines. The school was highly dependent on the assistance of mining companies, particularly for their operations and maintenance. In the three years 2006 to 2008, Scorpion Zinc mine contributed N\$ 3.7 million in school fees (Skorpion

Zinc, 2009) while during the same period Rosh Pinah Zinc Corporation paid N\$ 178 891.36 in school fees (RPZC, 2008). With this funding and donations from the Skorpion Zinc mine in 2007, the school had established a good small library for their children and a well-equipped computer centre where children got the opportunity to use a variety of educational software.

Despite its dependency on subsidies provided by the mines, the Stepping Stones pre-primary school was willing to become financially self-sustainable in the future. Their outlook was optimistic although they were fully aware that the closure of the mines would mean less people who can afford to pay the school fees and that enrolments could drastically reduce. Even under the current circumstances the school infrastructure was underutilized and could proportionally be too big for the size of Rosh Pinah after closure of the mining industry and was likely to close down if alternative ways for financial assistance was not found.

Another pre-primary educational institution available in the formal part of Rosh Pinah was Kabouterland pre-primary school that started some fourteen years ago in 1996. The school was operating only on a small scale, accommodating some thirty children. Its operations were challenged by financial constraints despite Skorpion Zinc mine continuously assisted the school by paying staff salaries and providing groceries on a monthly basis. This significantly improved its capacity, but it was not sufficient to ensure quality operations and without the support from the mine the school was unlikely to remain functional.

Not all parents could afford to take their children to the privately owned pre-primary schools. Financial limitations as well as the distance to these schools was a limiting factor for many parents. The residents of Tutangeni informal settlement had to walk two to four kilometres to take their children to a school located in the formal part of Rosh Pinah. No taxi or bussing services were provided for these children. There were smaller size kindergartens and crèches available for Tutangeni residents, one of them was 'Happy Kinder Garden' founded in the middle of 2007 catering particularly for working parents of Tutangeni informal settlement. The kindergarten operated from a small shack and was not well-equipped, but it helped many working families to care for their children while the parents were at work. Demand for such services was mounting.

Primary education in Rosh Pinah was offered by its only public primary school - the Hoeksteen primary school, providing education from Grade 1 to Grade 7, accommodating about 570 learners. The school was supported by the mines, paid the salaries of five teachers and provided accommodation for eleven others. Maintenance of the school at large was also provided by the mining companies. Skorpion Zinc mine funded the construction of five new classrooms, a computer centre, and the upgrading of an office block and a staff room (RPZC, 2008). The dependency on both mines for financing was very high. With the development of the Skorpion Zinc mine and growth of the settlement the number of learners increased and Rosh Pinah felt a need for either another primary school or the expansion of the existing one. In January 2009, a new private primary school - the Rosh Pinah Academy opened its doors with the Skorpion

Zinc mine assisting with the school buildings. In 2010, Rosh Pinah Academy had approximately 100 learners enrolled in their Grades 1 to 7.

There was no secondary school in Rosh Pinah or in the close vicinity. The closest secondary schools were in Keetmanshoop and Lüderitz, or in Springbok and Upington in South Africa. There was no other option for parents than to send their children to one of these urban centres to complete their education at boarding school. Mines were assisting their employee's children with school transport, boarding and school fees, but for the general public such services were not available. From the community survey in Rosh Pinah it became evident that the Rosh Pinah community would welcome a local secondary school. That would offer great advantages to the residents being able to send their children to schools where they live and for children to be close to their parents and families. The non-existence of a secondary school was one of the obstacles discouraging people to settle in Rosh Pinah permanently, particularly families with minor children. They stayed in Rosh Pinah while their children were young, but left the settlement as soon as the children had reached the secondary school level. Some married mine workers came to Rosh Pinah to work, but left their families behind because Rosh Pinah could not offer secondary education to their children.

Adult training for Rosh Pinah residents was provided by a well-functioning centre for social development and enhancement of the community through the promotion of entrepreneurship in the Obib training centre. The educated adult population could better chances to an improved quality of life and to ease the transitional stage should the mines close, as education was a key to a better future and sustainable development.

The Obib centre offered skills training such as brick making, needlework, vending and other artisan courses (see Figure 51). Apart from the training, the centre produces 61 000 bricks per month supplying building contractors and private people with bricks. The production of bricks guaranteed enough income for safety clothing, tools and building materials for the registered adult apprentices, and also provided for some monthly allowances. According to the Obib training centre the brick making project has a good potential for sustainability as there was sufficient demand for bricks and bricklaying in the area (Source: interview with PR016 on 30.04.2010).



Figure 51. Illustration of selected SME's training projects at the Obib training centre in Rosh Pinah, Namibia (2010).

With the help of the Skorpion Zinc mine a free welding training course was offered to the community members, developing the potential to earn some income through smaller contracts with the Skorpion Zinc mine. The Obib training centre also assisted through securing the service contracts with mine operators and giving a chance to small and medium scale enterprises to do the work. One such example was a bio-remediation plant where contaminated soil was treated and recovered (see Figure 52) through a plant situated behind the Obib training centre. In a mining environment with large vehicles and heavy earthmoving equipment, there were always some spills

containing oil and diesel. Through this project contaminated soil from the mining operations was treated over a period of six to nine months. During this period the unwanted chemicals in the soil were broken down through a natural biochemical process and compost was produced as an end result and later sold at reasonable prices for gardening and agricultural purposes to the Rosh Pinah community and nearby areas.



Figure 52. Illustration of the soil reclamation project in Rosh Pinah, Namibia (2010).

The success of the Obib training centre depended largely on the support from the mines for operational costs, skills development training courses and different SMEs support projects. In 2010, the Obib training centre was not self-sufficient and its sustainability was challenged. The only way to continue the initiative after closure of the mines could be diversification and securing contracts that were independent from the mines.

The educational infrastructure in Rosh Pinah was adequate for the size of the settlement, but the sustainability of most educational institutions in Rosh Pinah was challenged by their dependency on funding from the mining companies for service provision and maintenance, particularly those receiving support from the mining

companies to cover their operational costs such as salaries for teachers. The representative from the Obib Training Centre acknowledged the support provided by both mines, but cautioned adding that there is “*a need to invest in people of the Region, not only Rosh Pinah*” (Source: interview with PR016 on 0.04.2010).

Security and safety

Rosh Pinah was considered to be a small, quiet and safe mining settlement. The police warrant officer described Rosh Pinah being a peaceful settlement, but not crime free. To keep the order and maintain security for residents of the settlement, there was a small police station, using the same building for forty years since the town was established. At the time of the survey in 2010, the police station employed twenty-three staff members and had two vehicles at their disposal to fight crime twenty-four hours a day, but these were not adequate (Source: interview with PR010 on 28.04.2010). Since then, in March 2011, a new Rosh Pinah police station was inaugurated with forty-three new recruits, among them highly ranking police officers. The construction of a new police station was a long awaited occasion and took seven years to complete. Private security activities in the settlement were carried out by the security service provider namely G4S.

There were different perceptions of safety regarding the two areas in Rosh Pinah. The formal part of Rosh Pinah being safe and Tutangeni informal settlement being unsafe. The community survey confirmed the presumption. People living in Tutangeni were more concerned about the safety issues with 46% of residents not feeling safe, whereas in the formal part of Rosh Pinah only 12% felt unsafe. The community’s sense of

the safety in the settlement was reconfirmed by the police warrant officer, named Tutangeni as an area with a higher crime rate, with the tendency to rise. The rise of criminal activities in the area was attributed to the worsening economic situation preceding 2010 and increased unemployment. Many of the criminal incidents, particularly in Tutangeni informal settlement, were blamed on poverty. With social pressures and poverty, more people turned to drugs and alcohol abuse, contributing to increasing crime activities.

Among the most common crimes committed in Rosh Pinah were housebreaking, assaults with grievous bodily harm, domestic violence, malicious damage to property, theft, drug related crimes, prostitution, rape and occasionally murders. The proximity to the South African border meant that sporadically there were some instances of people contravening the immigration act. Burglary was a major criminal activity that significantly effected local businesses in Tutangeni. It decreased their ability to run profitable businesses. Previously it was blamed on the lack of street lights, and since the electrification of Tutangeni, many Tutangeni residents and small scale businesses indeed felt safer, as confirmed by the community survey of this research.

According to the police warrant officer, there was a drug syndicate operating in Rosh Pinah with drugs being brought from South Africa, Keetmanshoop and Windhoek. It was a longstanding problem in the settlement, but in recent years, before the survey in 2010, it had escalated to such an extent that the police had to seek for additional assistance from the drug enforcement experts in Keetmanshoop. On average there were two to three cases of drug related crimes per month. With the deterioration of people's

financial situation affecting their family lives, the domestic violence occurrences were also on the increase. It was very difficult to address domestic violence as in many cases the victims were hesitant to bring a case against the perpetrator and the actual number of incidences could be even higher.

Prostitution was present in town, but not to the extent of what it was believed to be a decade ago when mine management raised alarm about a trend for Namdeb mine workers to come to Rosh Pinah to visit prostitutes in the informal settlement. The allegation was never confirmed, and the explanation was given that the Namdeb workers did not come to seek prostitutes, but to see their family members who arrived from the north and stayed in the Rosh Pinah informal settlement because access through the Sperrgebiet to Oranjemund was restricted (Development Planning and Research, 1998).

There was an increase in teenage pregnancies that had come to the attention of the Rosh Pinah police office. A few statutory rape cases was reported. Rosh Pinah had housed a workshop on Gender Based Violence and related matters and it was hoped that representatives from the community will address these challenges in the settlement. The police warrant officer acknowledged the need for a shelter in Rosh Pinah, because in many cases victims had nowhere to turn to and if the victim did not open a case, the police could not help.

Occasionally more tragic cases were reported such as murders or abandoning of newborn babies. *“Crimes are becoming more sophisticated and the public does not*

cooperate” (Source: interview with RP010 on 28.04.2010). Most of the murder cases were solved apart from a murder that occurred in 2009 as the offender was never traced. On average there were ten crime cases reported per day, but many cases were later withdrawn, particularly those of domestic violence and assaults. One would assume that most of the crimes were committed by males, but statistics disclosed the opposite. Crimes committed by women accounted for approximately 65% of all crimes and most in the age group of 16 to 35 years old females. The police station in Rosh Pinah did not have a detention facility and all detained people were sent to Aus. Ninety-five percent of those detained in Aus were people from Rosh Pinah.

In general the Rosh Pinah community felt safe with 89% of the community survey respondents being satisfied. RoshSkor described the settlement as being one of the safest towns in Namibia. To improve on safety, the community suggested twenty-four hours police patrols, improved availability of police and faster response, particularly for the areas of Tutangeni informal settlement. The police was not optimistic about the future should the mines close abruptly. *“If mining closes, there is no future”* (Source: interview with PR010 on 28.04.2010), which would mean that unemployment will be on the rise. Many people would move out, but many would remain in a very depressed state. Potentially, that meant that crime could be also on the increase.

Government services

There was a very limited presence of Government institutions in Rosh Pinah apart from some educational institutions, a state clinic and police office. Since 2009, there was a small office for the Ministry of Environment and Tourism, severely understaffed, with

only one permanent staff member in 2010. The office was opened due to an expected increase in tourism activities in the area following the opening of the Sendelingsdrift border post, the opening of Sperrgebiet for tourism, and increased agriculture and mining activities near the Orange River; the impact of which on the environment needed monitoring. The expected scale of tourism did however not materialize.

Residents of Rosh Pinah experienced difficulties in obtaining government services and liked to see these to be more prominent in Rosh Pinah. The closest regional centres for most of public services were located 260 kilometres away in Keetmanshoop or Lüderitz.

Recreational and cultural facilities

There were numerous recreational facilities accessible to the entire Rosh Pinah community. The settlement offered a range of sporting facilities, such as a golf course, swimming pool, tennis courts, squash courts, soccer station, cricket field, and facilities for gymnastics, snooker and volleyball. These sporting facilities were highly developed and maintained by both mines. Many residents however preferred gambling places and shebeens to the sporting or cultural facilities. The prominence of liquor use was pointed out by the Rosh Pinah community and the demand for shebeens had prompted their growth in the informal part of the settlement.

Rosh Pinah had a small public library that was open during working days. The library was small, but it had a good selection of books and a supportive librarian from the Department of Education of the Karas Region. According to the librarian, at the time

of this research, 179 adults and 151 children were registered as members of the Rosh Pinah Public Library. At N\$6 per year, an adult could borrow six books, and at N\$2 per year children could borrow two books at a time. The library offered great help to learners who used the library for school projects. There were always readers in the library, the majority coming to page through the newspapers, particularly those who were looking for jobs. A visitor to the library did not need to be a member to read newspapers.

A range of Christian denominations were represented in the settlement (see Figure 53). Some denominations shared the same building, but held separate services.



Figure 53. Illustration of churches in Rosh Pinah, Namibia (2008 & 2010).

The vicinity of Rosh Pinah had ideal locations from which to explore the surrounding area, visit the National parks, could have a picnic at the Orange River, or partake in other tourism attractions in the region.

5.1.6 Environmental concerns

Rosh Pinah could be described as a clean town, taken care of by the RoshSkor. Particularly, the newer residential areas of the Skorpion Zinc were designed for and equipped with modern, high standard and exemplary waste management and maintenance systems. Residents appreciated the new initiative and people from other parts of formal Rosh Pinah would be pleased to implement the same. The cleanliness of the settlement was not a concern, but the residents and business community in Rosh Pinah were on the alert for pollution, particularly air pollution from the mining industry. Among the several possible environmental concerns presented in the survey questionnaires for both community and businesses, 50% of Rosh Pinah resident respondents named air pollution as a major environmental challenge in the settlement (see Figure 54).

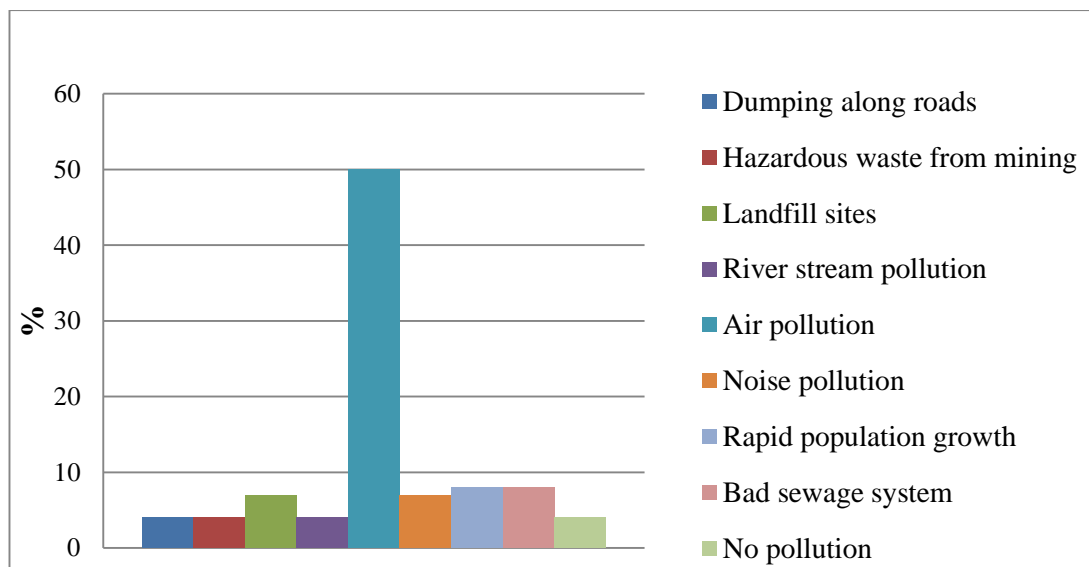


Figure 54. Environmental problems perceived by the Rosh Pinah community, Namibia (2010).

Mistrust regarding the environmental situation in Rosh Pinah was even higher among the mine workers. Seventy-one percent of surveyed mine workers believed that mining activities negatively affected their health, some complained about increased allergies and respiratory tract problems which were not experienced before settling in Rosh Pinah. Similar complaints from the residents had been observed years ago. In the 1990s, some studies tried to establish the cause of such ailments, and concluded that high dust levels in the settlement were at fault with the source of the dust being the mining tailings located in the south-east of Rosh Pinah. With prevailing winds from the south-east and south-eastern residential areas, the school and crèche were downwind of the tailing dumps (see Figure 55) and on windy days the settlement suffered increased levels of dust. The main concern was that the dust could contain a high level of lead and zinc (Development Planning and Research, 1998), but it was not proved and the findings were inconclusive. Another residential area exposed to the dust from the mine tailings was the residential area for RPZC mine workers located next to the mine (see photograph in Figure 55).

Rosh Pinah could not be sustainable if the community's health was negatively affected by the mine tailings that were located in very 'wrong' parts of the settlements where prevailing winds brought a lot of dust from tailings, reaching the settlement and affecting the health of the local community. Water-related diseases and health problems resulted from poor air quality, exposure to toxic substances and industrial pollution could not appear instantly, but years after the mine had ceased to exist. The state of the environment needed to be monitored and peoples' concerns taken seriously. The community was not kept informed and aware.

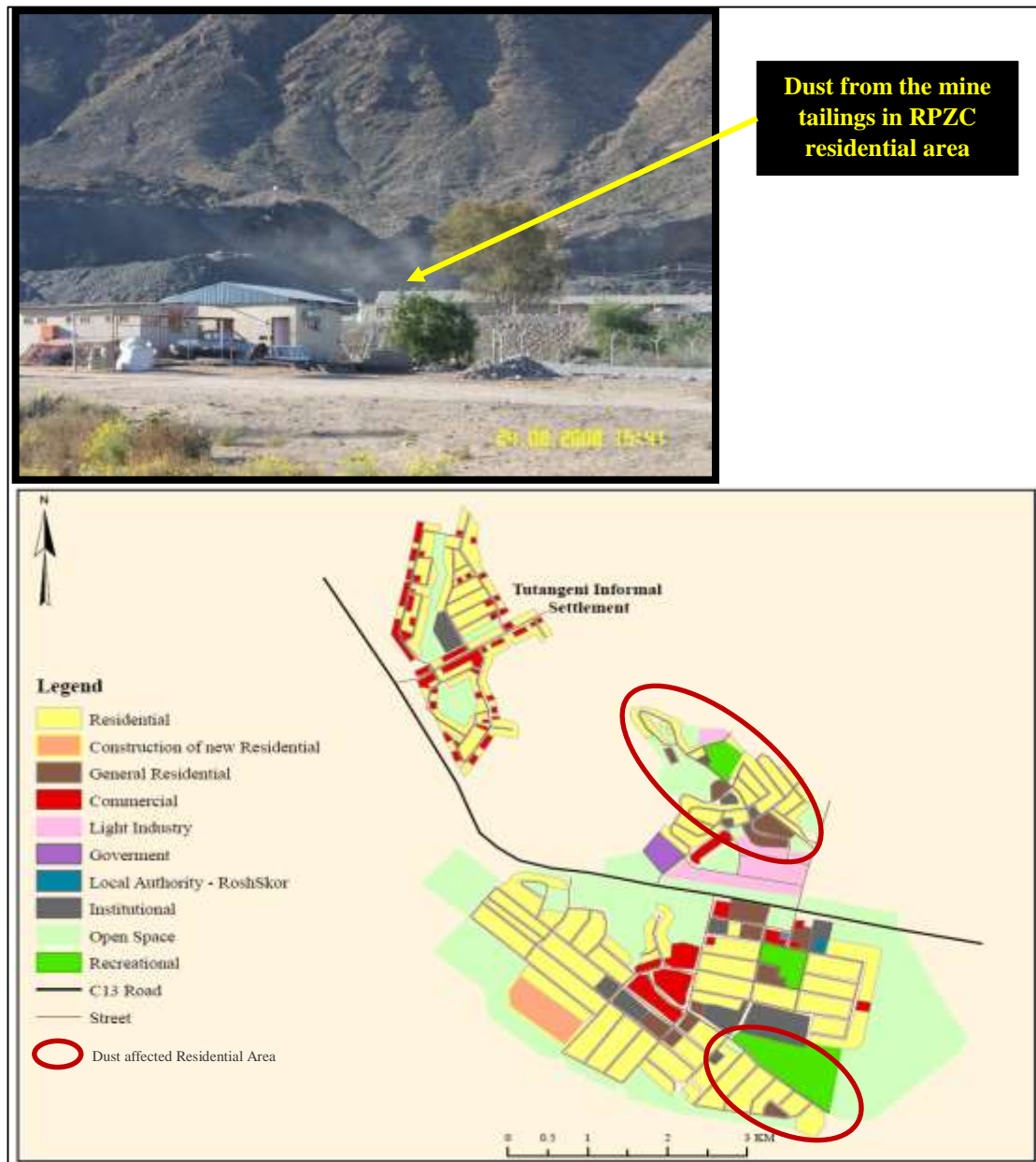


Figure 55. Illustration of residential areas affected by dust from the maining tailings in Rosh Pinah, Namibia (2010).

Despite the calmness in Rosh Pinah, the community's concerns about the settlement's environmental state and the impact on their health slightly lower the sustainability perspectives.

5.2. Klein Aub

Klein Aub is a small village situated in central Namibia approximately 180 kilometres south-west of the capital city Windhoek, ninety kilometres south-west from Rehoboth and seventy kilometres east from Solitaire (see Figure 56). The settlement is located at the junction of the C24 road and a branching untarred street leading to the central part of Klein Aub settlement.

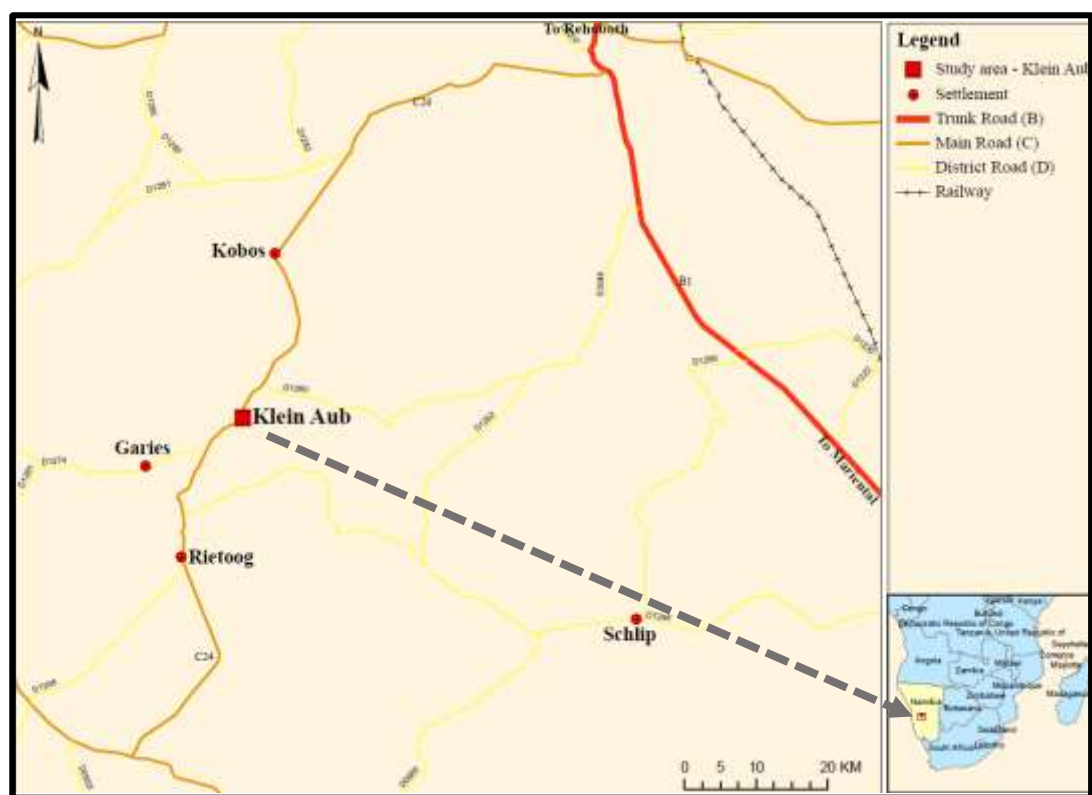


Figure 56. Geographical location of Klein Aub, Namibia (2010).

The area is sparsely populated, tranquil and relatively remote with few tourists visiting Sossusvlei or Namib Naukluft Park who passes through the area.

The morphology of the area is flat with some hilly ridges and peaks flattening towards the Namib Naukluft Park to the west of the settlement. It is an area with a semi-arid climate with an annual average rainfall of approximately 150 mm (Mendelson, Jarvis,

Roberts & Robertson, 2002). The daytime temperatures during the hottest months of October to March range between 35^o to 45^oC and could drop below 0^o C between June and August with prevailing eastern winds, usually stronger during the winter months. The soil of the surrounding Klein Aub area is poor and unsuitable for crop growth. The climate and soil could support only a short and scrubby vegetation dominated by grass and shrubs permitting mainly small livestock breeding. The farms surrounding Klein Aub are small scale subsistence homesteads who graze their small herds of cattle, goats and sheep for local consumption and for export.

Klein Aub is within the boundary of Rehoboth rural constituency of the Hardap Region and is a small scale service centre.

5.2.1 Historic overview of Klein Aub development

Before the ‘Baster trekkers’¹⁸, the area was settled by Nama people who maintained a nomadic way of life. Until the 19th century, the area was quiet and largely unpopulated and the territory of Klein Aub fell within the jurisdiction of the Nama chief Willem Swartbooi. The peace and tranquillity changed around the middle of the 19th century when the surrounding areas of Klein Aub experienced increased movements of people. This period was characterized by large migration. Oorlam Afrikaners from the Northern Cape crossed the area, so did the ‘Baster trekkers’ under the leadership of Hermanus van Wyk and curious traders and explorers of European origin.

¹⁸ Descendants of a mix between European settlers and the local Khoikhoi tribe, who came to Namibia from the old Dutch Cape Colony and settled near Rehoboth in the early 1870’s.

In 1855, rich copper deposits were found in the Khomas highlands resulting in a brief ‘copper rush’. In March of the same year the Walwich Bay Copper Mining Company approached the chief Willem Swartbooi (!Huisseb #Haobemab) to get permission to exploit some promising copper deposits at Klein Aub. Small exploration activities took place, but the plans for developing a mine did not materialize and the company left the area in 1856. In the meantime, the area was traversed by Basters, who settled in areas surrounding Rehoboth (Limpricht, 2012) and gradually through acquiring the land from Swartbooi inhabited the surrounding area of Klein Aub. In 1915, a war between Germans and Basters was declared. Basters began to flee Rehoboth in all directions. Klein Aub happened to be within the area of conflict, witnessing atrocities of gruesome battle between Germans and Basters in May 1915 (Rhodes, 2010; Britz, Lang & Limpricht, 1999). The copper deposit left behind by the Walwich Bay Copper Mining Company in 1856 was not forgotten, but constantly under the spotlight of explorers, even during the different war times. The occurrence of copper on the farm Klein Aub 350 was first recorded by Rinmann in 1915.

In 1927, the mineralization zone in Klein Aub was explored under the supervision of Dr. Hans Merensky, but the results of test pits, trenches and a ten metres inclined shaft came back as disappointing. More copper occurrences were opened up in the following years, but most of them proved to be too small in size or grade for economic exploitation (Schneider & Seeger, 1992). By the late 1950s, most of the known strike of the copper-bearing horizon in the Klein Aub vicinity was pegged. An intensive diamond drilling campaign from 1959 to 1960 by the Tsumeb Corporation Ltd., delineated a potential one million tons of copper ore, conveying excitement among

various exploration companies interested in further investigations of the ore and leading to the opening of the Klein Aub mine. The production of copper was started in 1966 by the Klein Aub Copper Company (Schneider & Seeger, 1992).

A small mining settlement was established next to the Klein Aub copper mine with the sole purpose to accommodate mine workers. The laws of the time governed that the entire mining force had to be recruited according to the provisions of the migrant labour laws; workers were racially segregated and accommodated in separate residential quarters. The houses within the residential quarters were identical, functional and of simple design. Initially there were few amenities but as the settlement grew conditions improved and by the time the mine was operational Klein Aub settlement had its own clinic, police station, banking services assisted by the mining company, and small scale retail outlets selling daily supplies. Klein Aub emerged as a planned company settlement right next to the mine.

The peak of the Klein Aub mine production occurred during the late 1970s until early 1980s. The success of the mining operations lasted continuously for twenty-one years, producing 5.5 million tonnes of copper (Schneider & Seeger, 1992). Klein Aub was mining low grade copper and with the depressed copper markets in 1987, the production was not seen to be profitable and the mine closed (Dierks, 2002), leaving some ore reserves in the ground amounting to an estimated two million tonnes (Schneider & Seeger, 1992). The closure came unexpectedly; many mine workers were unaware until they were told to stop and leave the settlement. Most of the mine workers returned to their places of origin. The Klein Aub mine was abandoned without

any rehabilitation. The mining infrastructure was left behind and dilapidated structures and old lorries were still present at the site of a scrap yard at the periphery of the Klein Aub community (BGR, 2001).

After closure of mining operations, the settlement experienced a fast and abrupt decline, leaving a deserted Klein Aub settlement to struggle for its daily survival. With the lack of alternative economical potential to boost the livelihoods of people in Klein Aub, every consecutive exploration company was looked upon, leaving lots of expectations with the local community for a revived mining project. To counter the community's destitution government located a small number of government institutions to provide essential basic services to the people. Klein Aub had never revived since the closure of the mine when stagnation had set in, persisted until 2010.

5.2.2 Socio-demographic profile of Klein Aub community

Development of Klein Aub community

Initially Klein Aub was populated by migrant workers from the northern areas of Namibia, some local Baster community members and a small number of foreign expatriates. At the peak of production in 1982, Klein Aub mine, under Gencor's ownership, employed 1057 people (Catholic Institute for International Relations, 1983). After closure of the copper mine, the settlement was deserted; only a small number of Basters remained hoping for mining to revive. Revival never occurred, but several workers stayed and grew attached to the area and decided to retire in Klein Aub. With the closure of the mining activities the significant migration from the northern Namibia was considerably reduced and the direction of migration shifted

towards migrants coming from nearby farms. The migration flow could be reversed in the case if mining activities were reactivated or if another large scale project was started in the settlement.

The last twenty-five years had witnessed several human migration into the Klein Aub settlement, the majority of the influx, 55%, originated from the nearby farms and Rehoboth accounting for 35% of the migration (see Figure 57). These were mainly people with ancestral roots in the territory of the previous Rehoboth Gebiet¹⁹ while a smaller number of people originated from the northern, southern or coastal areas and were in equal shares of less than three percent of the total influx. There was no indication of substantial migration from the north-east which was likely to be the result of the language barrier. The most spoken language in Klein Aub was Afrikaans and people in the north eastern part of Namibia were not familiar with the language.

Twenty-nine percent of Klein Aub residents lived in the settlement for over twenty years and most of them were senior citizens, a few of them were previous mine workers or those who moved to Klein Aub just after the closure of the mine. A smaller share of long term citizens consisted of people who moved to Klein Aub being minors during or shortly after mine closure. They grew up in the settlement and did not know any other place to call home.

¹⁹ Literature refers to the Rehoboth Gebiet as the area where the Baster population settled in Namibia.

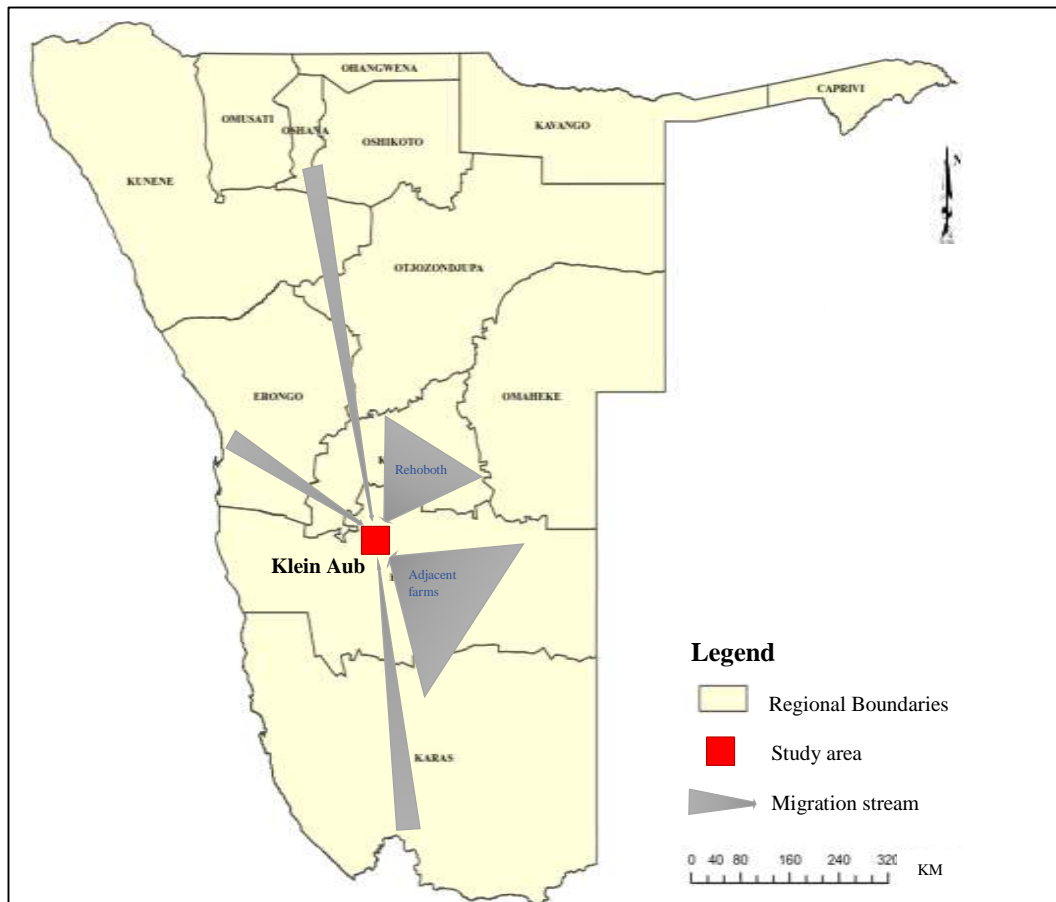


Figure 57. Origin of Klein Aub residents, Namibia (2010).

The community survey established that 14% of Klein Aub’s adult population was born in the settlement and consisted of a large share of the young people, mainly residents in their twenties. They were offsprings of previous mine workers. These two groups of people constituted the core of the permanent residents, amounting to 43% of Klein Aub’s population. There was a very small share of people living 10 to 19 years in the settlement while a larger share was relatively new to the area. Nineteen percent of the population lived in Klein Aub for three to nine years and 33% are those who came to Klein Aub less than three years ago (see Figure 58). The origin of these recent migrants was primarily from the nearby farms in a radius of eighty kilometres.

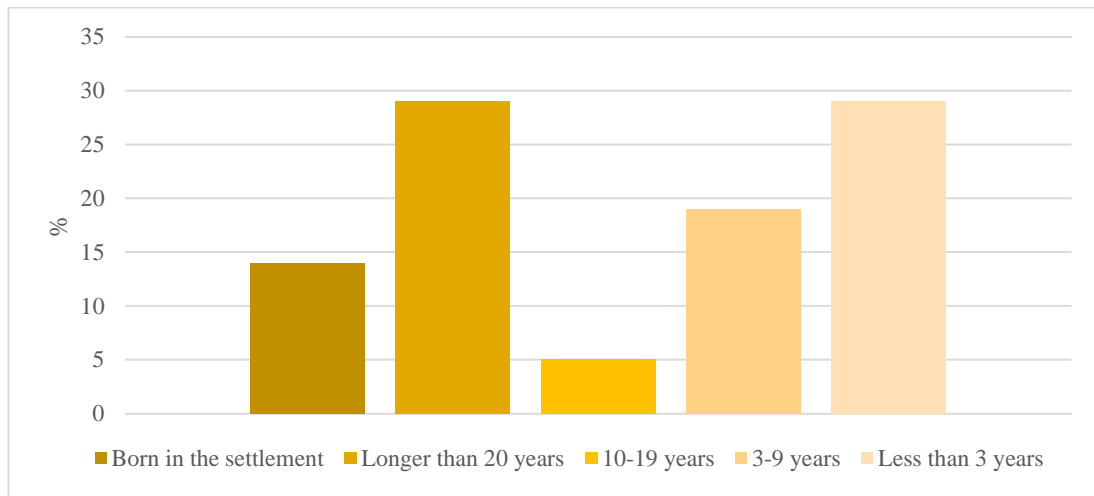


Figure 58. Residents' length of stay in Klein Aub, Namibia (2010).

The above trend indicates that a very small share of recent migrants stayed in the settlement and most of them were families with children, who came to Klein Aub for the schooling. The community survey uncovered that 42% of newcomers to Klein Aub believed that Klein Aub was a good place for their children to get education (see Figure 59). These were mainly children of farm workers who moved to Klein Aub and were accompanied by their parents or a family member, or came to Klein Aub on a temporary basis to lodge with the family or a relative already living in Klein Aub.

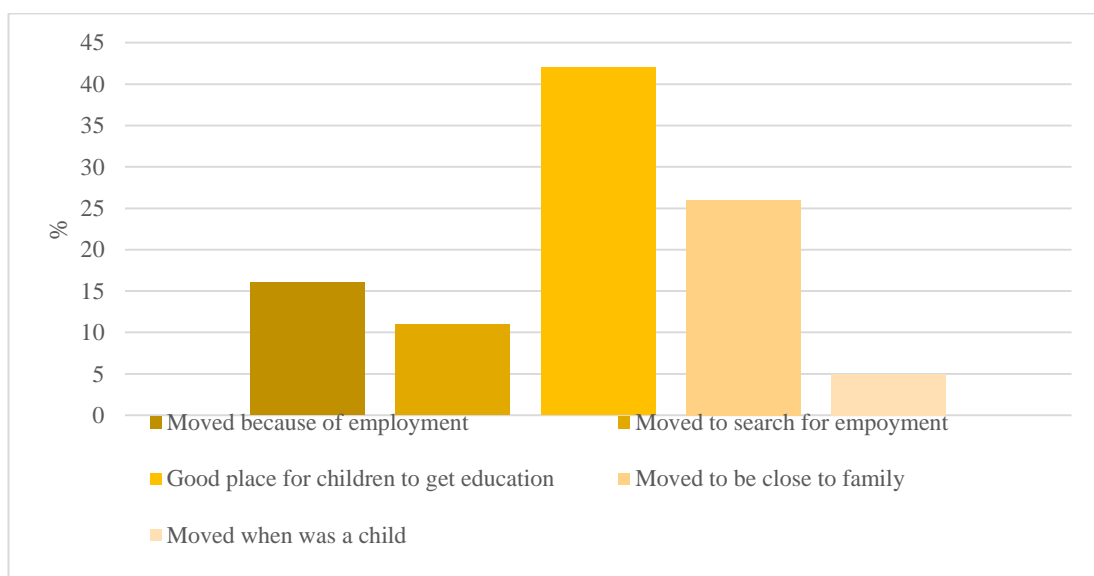


Figure 59. Reasons for people settling in Klein Aub, Namibia (2010).

Twenty-six percent of the community survey respondents moved to the settlement to be close to their family members. This group consisted mainly of family members previously working on a farm or who accompanied another family member who secured employment in the settlement. A relatively smaller share included those who got married to or were in a relationship with a partner from Klein Aub. Only a small share of 11% of migrants came to the settlement to search for better job opportunities, mainly came from nearby farms, or was a relative of a person who lived in Klein Aub, but was originally from the northern part of Namibia. Those who come from nearby areas intended to stay in Klein Aub while those from the northern part of Namibia had intentions to leave, particularly because the possibility to find employment in Klein Aub was extremely limited.

Many residents considered moving out of Klein Aub, particularly if they could find better job opportunities elsewhere. There was a relatively large share, 52% of the residents, who were happy to stay in Klein Aub and had a sense of permanence (see Figure 60). With this trend Klein Aub settlement exhibited a social maturity. People felt connected to the settlement and had a sense of belonging to the Klein Aub community. Those who considered moving were young people who mainly wanted to move out for better job perspectives or, people who were in Klein Aub on a temporary basis, particularly farmworkers' family members with children schooling in Klein Aub. A few these residents had expressed their intentions to leave. A smaller share of residents who expressed intentions to leave were senior citizens planning to retire on some nearby farm.

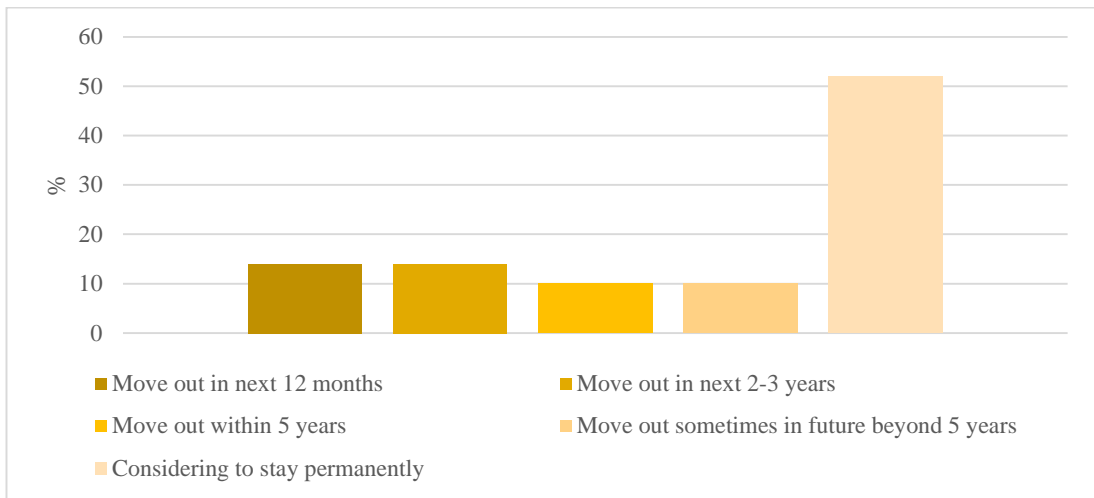


Figure 60. Residents' intentions to stay or move out of Klein Aub, Namibia (2010).

Destinations of potential out-migration were directed towards Windhoek and Rehoboth (see Figure 61) with very negligible migrations back to the places of origin in the northern Namibia, nearby farms and the southern part of Namibia.

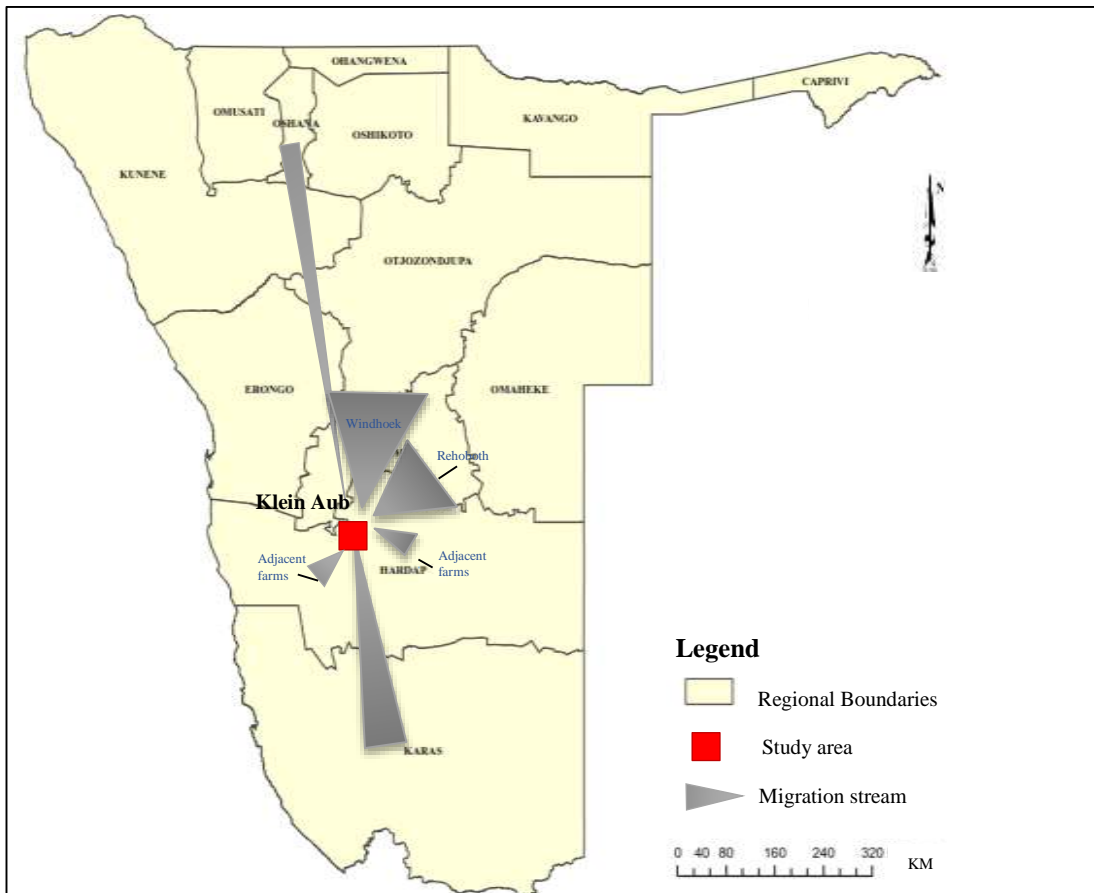


Figure 61. Direction of potential population outflow in Klein Aub, Namibia (2010).

The population dynamics showed a negative trend with the potential outflow of people surpassing those who were coming to the settlement. The fact was evidenced by the statistics of the local Settlement Office and surveys for this research. The formerly small but vibrant mining settlement, accommodating more than a thousand people during the production time of the Klein Aub mine, at the time of research in 2010 was a home to approximately 500 people.

Demographics of Klein Aub residents

The Klein Aub's community could be described as very young by age composition. The presence of two schools in a small settlement such as Klein Aub had contributed to the large share of youth; around 30% to 40% of the settlement's population were children below fifteen years of age (Source: interview with KA001 on 03.06.2010). The population age ratios were balanced and consistent with the national population age composition. The distinctive characteristic of a mining settlement of having a very small to a non-existent presence of people in retirement age had disappeared. In 2010, there were at least 5% of the people older than sixty years. There was a growing trend of retired people spending extended periods in Klein Aub and then moving to their small farms in the nearby vicinity. Although they stayed for extended times on their farms and came to the settlement only for provisions and pensions, they considered themselves as Klein Aub residents.

The majority of the adult population in Klein Aub were people in a young age group, slightly exceeding 40% being in the age group of 21 to 30 years and more than 20% 31 to 40 years old. A noticeable demographic gap was observed in the age group of 41

to 50 years and statistics for this age group did not exceed 5% (see Figure 62). The phenomenon could be explained by the fact that the probability of people in this age group having children in the primary school age was lower, and the likelihood of them staying in the settlement for the education of their children was small. They were still economically active people and the lack of employment opportunities coupled with a non-existing secondary school for their children did not encourage their staying in the settlement and they were likely to leave for better job opportunities or go to centres where their children could attain secondary school education.

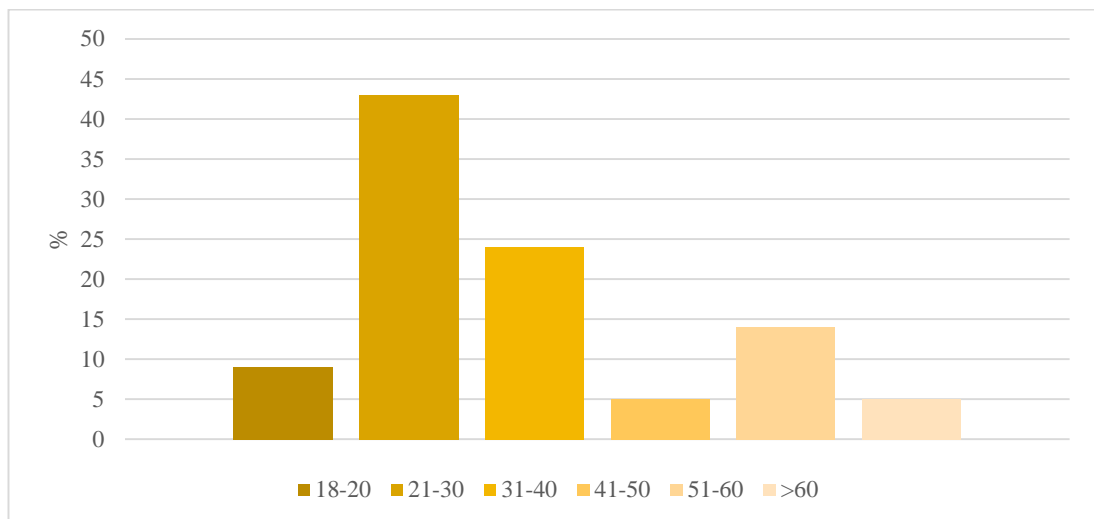


Figure 62. Age of Klein Aub adult population, Namibia (2010).

The previous national census revealed that there was a larger male than female population in the Rehoboth rural constituency (Republic of Namibia, 2012a), while the same applied to the Klein Aub settlement where despite the fact that the mine had closed more than twenty years ago and many workers had moved out, the settlement had a slight male dominance. The population survey attained the ratios of 51% male and 49% female in Klein Aub. This was negligible in comparison to the early 1970s and 1980s when the male population was reaching 90% of the total number of residents

in the settlement. It was obvious that the community's demographical profile had balanced out in the twenty five years after closure of the mine, transforming from an overwhelmingly male dominant settlement to a settlement with relatively balanced gender ratios.

In 2010, Klein Aub had a small single adult population, amounting only to 23% of the total respondent population. There was no gender variance among the single people as single males and single females were in equal shares and the majority of single people being in the age group of 20 to 35 years'. Klein Aub had however a relatively high occurrence of people in co-habitation or living in consensual marriages where people lived together without being legally or traditionally married. According to a respondent identifying herself as a Baster, marriage was not a matter of respect in the Baster community as it was claimed to be in other Namibian tribes which were very sparsely represented in Klein Aub.

Motherhood among women in Klein Aub started at a fairly early age. Teenage pregnancies were erratic and showed a trend of being on the increase. Most of these young women raised their children without fathers. The proportion of separated and divorced people in the settlement was high (41% of respondents), particularly among women.

The education level in Klein Aub settlement was low. From the community survey it appeared that 45.5% of the community had less than a Grade 10 education, 33% had Grade 10 and 14% Grade 12 (see Figure 63). The lowest education was among the

elderly who lived in Klein Aub over twenty years and among those who settled in Klein Aub only in the last three years, particularly females. Many of these females with education lower than Grade 10 were mothers who came to the settlement for their children to be educated at the Klein Aub primary school. There was a positive sentiment among these women that with better education their children could be able to lead better lives than themselves. Sixty-two percent of the Klein Aub community and especially less educated women were interested in training to uplift their education and skills, expressing a particular interest in courses to learn needlework, HIV/AIDS counselling and computer skills.

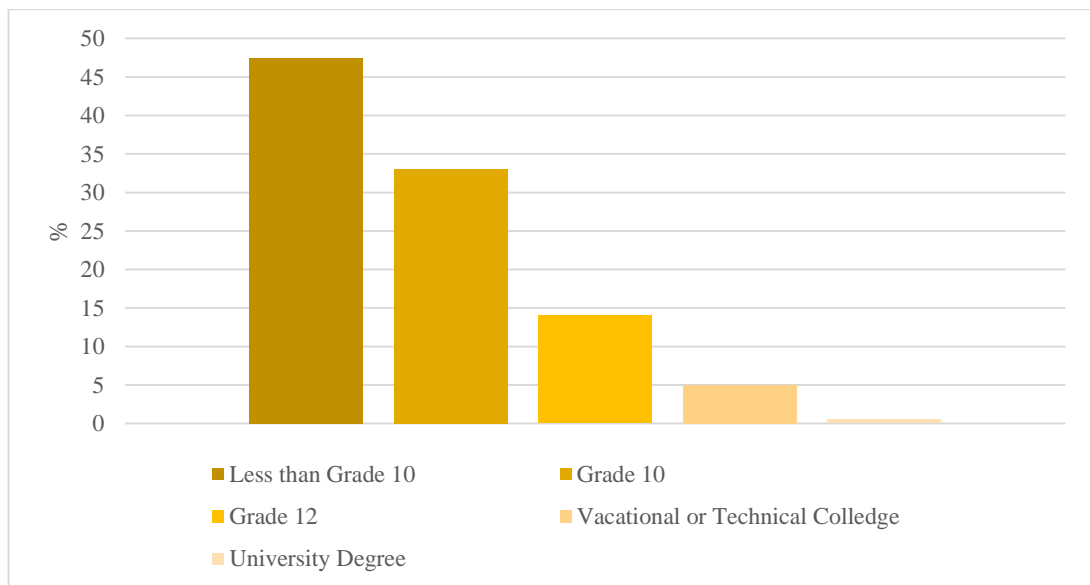


Figure 63. Education level of Klein Aub residents, Namibia (2010).

Employment and incomes

Employment in Klein Aub was severely limited, leading to exceptionally high unemployment rates with 67% of people did not have any form of employment. The unemployment figure was considerably higher if the informal sector was excluded. The local authority suggested the unemployment rate was as high as 85% (Source: interview with KA001 on 03.06.2010).

Unemployment was particularly severe among the young and uneducated with the majority of the unemployed being residents with an education below Grade 10. The female unemployment ratios were observed to be higher than male unemployment. During the survey women expressed some concerns about being sidelined, with most of the employment taken up by males, leaving only one-third of the existing employment to women. The research confirmed that 72% of all employed were males and only 28% were females. Many of the unemployed females resided in the depressed environment of the informal settlement and stayed there only because their children attended school. Several expressed willingness to work while their children were at school and all of them expressed readiness to leave Klein Aub if a job was offered elsewhere or when their children had completed their education. Amongst the most desired destinations for those who wanted to leave the settlement were Windhoek and Rehoboth.

Employment in the formal sector of Klein Aub constituted vacancies in the Government institutions such as schools, hostels, a clinic and a couple of private enterprises. The settlement did not have many of job opportunities for local people with low level of education and since most formal employment positions required skills and education they often were filled by people from outside the community. Employment prospects for residents with a Grade 12 or Grade 10 education were better, but residents with education lower than Grade 10 found employment mainly in the informal sector such as cuca shops or shebeens. Employment in the informal sector was often on a part-time basis and involved working for a family member. Thirteen

percent of Klein Aub residents claimed to be self-employed. One percent of the self-employed were retired people and part-time farmers in the vicinity of Klein Aub.

The survey established that resident's incomes were severely deprived and poverty was widespread. Fifty percent of the community survived on less than N\$ 1000 per month while 37% of the people had strategies to cope with less than N\$500 per month (see Figure 64). The majority of residents' monthly incomes did not reach the N\$5000 mark which made Klein Aub to score the lowest among the surveyed mining settlements. Only those employed in the public sector were better off receiving salaries in the range of N\$1000 to N\$5000 per month.

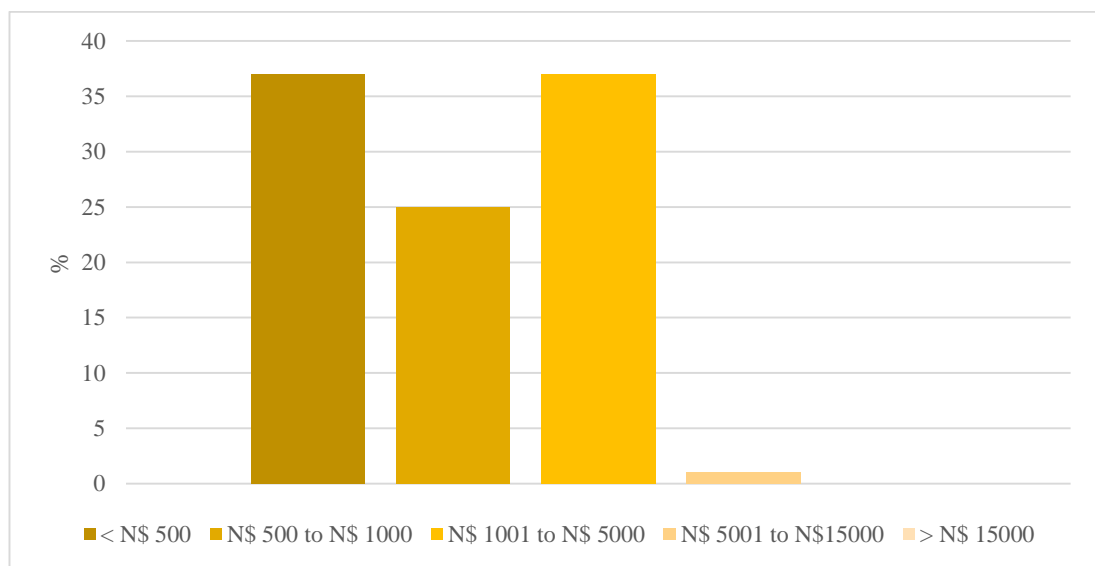


Figure 64. Klein Aub residents' monthly incomes, Namibia (2010).

Based on the Settlement's Office population estimates and the community survey data, it was possible to estimate the monthly earnings for the whole Klein Aub community, with the lowest in the range of N\$ 342 690 per month and the highest possible earnings for the total community would be N\$ 1 167 315 per month. This indicated the monthly amount of money at the community's disposal which was absolutely low for a

community of approximately 500 people. Thus it could be concluded that the buying power of Klein Aub was severely restricted.

Household characteristics

The average household size in Klein Aub was relatively larger (5.8 people per household) in comparison to the average of the Rehoboth rural constituency, which was 3.7 per household. None of the surveyed community respondents' household comprised of a single person per house. Thirty-eight percent of the respondents had up from six to ten people per household. The occupancy per household was higher in the formal housing than in the informal areas of Klein Aub.

The largest share of formal housing in Klein Aub belonged to the government and consisted of houses that previously belonged to the mine operators, until the closure of mining activities. The tendency where individuals who rented a house from the Government started to accommodate extended family members or friends contributed to a high density in formal housing. Many dependents who shared such households were school-going children, often a relative of the person renting the house. Ninety-five percent of households had children and 24% households had senior citizens.

5.2.3 Former mine workers' survey

Klein Aub copper mine had large scale operations employing large numbers of people from the northern part of Namibia and local Baster community. Recruitment of the mine workers was governed by the contract labour system where movement of Africans was controlled by various regulations and proclamations which prohibited

movements of the indigenous people and after the contractual obligations they had to return to their 'homeland'. At the peak of the mining industry in Klein Aub the number of employed people exceeded 1000 workers. In March 1987, work ground to a halt at the Klein Aub copper mine as the approximately 500-strong black labour force went on strike in a bid to win concessions before being finally retrenched when the mine was to close at the end of April in 1987. The first batch of 76 workers was retrenched on March 14, 1987, while the rest stayed on to dismantle the mine until the final closure in April on the same year (Munamava, 1987). The mine labour force that went on strike demanded to be put on pension, a three month payment in advance when the mine closes, and compensation for those injured while serving at the mine. Management turned down the workers' demands but agreed to one month's pay in advance, including a bonus subject to the strike being called off and provide with the transport to take them to their homes in the north. After mining industry's departure, the settlement became stale.

At the time of the survey in 2010, the former mine workers' community consisted of approximately 2% of the total population of Klein Aub. Twenty-five years after mining stopped, those who remained in the settlement were now senior citizens in their 70s and 80s and were very willing to share their stories about life during the years when the mine was operational. Due to their age, the numbers of former mine workers in Klein Aub were diminishing which meant the history from direct witnesses, if unrecorded, could be lost to future generations.

The research recorded some exciting stories and historical accounts from the days when Klein Aub was a prosperous settlement. None of the interviewed former mine workers was born in Klein Aub or its immediate vicinity. One former miner, 82 years old, had worked at the mine since its inception and came to Klein Aub from the Rehoboth area while another, 80 years old, came to Klein Aub from Karasburg (see Figure 65). They came to Klein Aub to work on the mine leaving their wives and children behind. The mining company provided workers with basic accommodation and the types of accommodation was based on their racial origin. The settlement was teeming with single males, as only few women were employed. The working



Figure 65. Snapshots of interviewed former mine workers in Klein Aub, Namibia (2010).

conditions were hard, and although they wanted to see some improvements, they were never realized. Discrimination was obvious, particularly towards people from the northern part of Namibia. Medical care for black workers was extremely limited and if seriously ill, the worker was sent back home.

During its lifetime, the mine experienced numerous serious accidents; a considerable

number of people lost their lives. The mining tunnel that lied approximately 100 metres underground, beneath the Klein Aub settlement, got filled with water several times, a problem that persisted from the very beginning when it was built. One of the interviewed ex-mine worker almost drowned on one occasion when the tunnel sunk. He managed to escape, but the experience was dreadful.

The relations at the workplace between management and mine workers were neither good nor bad. The former miners recalled the events, but did not have major complaints, as single men who came to Klein Aub to earn some money, they were satisfied with the working conditions and management. The Baster community was treated slightly better than those who came from the northern areas of Namibia. Working conditions for Ovambo mine workers were particularly unappealing. They were constantly mistreated and their living quarters were rougher. The salaries for black mine workers were lower and life was not strike free. Former mine workers recalled several occasions when people from the northern part of Namibia organized strikes due to unfair treatment and lower salaries.

Klein Aub was owned by the mine and everything was provided by the mine operator; from very basic provisions to daily supplies. The settlement had a small clinic for mine employees and a doctor came on a weekly basis from Mariental. Although the workers' health was monitored, treatment was mainly for specific illnesses or injuries from the mining operations. The settlement had an ambulance available for mine workers if there was a need for a patient to be transported to the hospital. Former miners were not aware of what they were entitled to, or if any social guarantees were provided. At the

end they received a retrenchment package, but it was so small that it covered only the transport back home for those who were leaving.

The mine workers knew that mining was not permanent and they were prepared that they would eventually have to leave. There was no sense of permanence in the settlement; workers were there only to stay for the duration of their work. However, none of the mine workers expected the closure to be so abrupt. The mine was operational and the decision to close in 1987 was so sudden that many did not really understand what exactly was going on. They were just informed that there would be no more jobs and people shall return. This was particularly sudden as the mine workers saw that deposits were not exhausted. There was still copper to be mined in future. Unfortunately the economics prevailing at that time were not favourable and workers were told to leave. Mining was abandoned.

Both former miners confided that mining had somehow negatively affected their health. Despite their age they felt fit and strong, but they did question if some of their health problems were not from the toxic waste and hard working conditions in the mining tunnels, where they had to be in a crawling position for long hours. One of the former mine workers reflected on the hard working conditions and physical exhaustion and felt that it had affected his spine.

Overall they had also fond memories of life in Klein Aub. “*Life was safe, cheaper and there was a job!*” told former mine worker (Source: interview with L001 on 04.06.2010). They felt life was easier than today. They appreciated the mine’s

contribution towards community development; it built a clinic and a police officer for the community. The mine helped them with banking services which they could not get in Klein Aub today (in 2010). The Population office assisted the pensioners with government pensions, where they could be collected every month end. Pensions were claimed to be too small and their monthly income was less than N\$500. However, they acknowledged that they could be better off than other, much younger residents of Klein Aub who had no income at all; no sustenance. They saw that jobs and other business opportunities were becoming less and less, leading to young people not wanting to stay in the settlement. The settlement was described as being stagnant. At the time of the survey in 2010, they found it difficult to buy daily provisions and services; most of these needed to be brought in from other towns or areas. Klein Aub slowly but surely experienced deterioration and it got more difficult to get around and manage one's livelihood. There was no alcohol abuse in the old days when the mine was operational. Today (2010) the community was desperately poor and alcohol abuse was prevalent leading to many unnecessary crimes committed under the influence of alcohol. Klein Aub was much safer twenty-five years ago than it was at the time of the survey in 2010.

However, former miners embraced strong hopes for the mine to be reopened. The main reason why they stayed behind was the strong faith and belief that there was a potential for the mine to be re-opened. Unfortunately they were too old and retired to be employed, but they hoped for the future of their children and Klein Aub's community at large. The enthusiasm to see the mine reopened was so high that they happily assisted any potential explorers in the area, offering to show them the areas where they

believed the ore was left. The closure occurred due to the unfavourable economic situation. *“When mine closed it was still in its baby stage, there are still a lot of reserves in underground”* (Source: interview with L001 on 05.06.2010). Belief was resilient and spirits were high.

At the time of the survey in 2010, the previous mine workers were retired and were not actively working. They felt nostalgic about the disappearance of the active part of their life when they worked at the Klein Aub mine. In 2010, some of them kept themselves busy with informal businesses or small scale farming activities on nearby farms. After so many years in Klein Aub, they did not see themselves moving anywhere else, they were to stay in the settlement, quoting that life in the settlement is cheaper than if they were to move to Rehoboth. The truth might be that they had developed a sense of belonging to this area and saw it as their only home. Their families were in Klein Aub and the children had grown up in this settlement.

5.2.4 Economic analysis of Klein Aub

Klein Aub was established as a self-sufficient mining town where everything was provided by the mine operator. That time, the only economic base of Klein Aub was mining. With the abrupt end of mining in 1987, the settlement’s economic base had to evolve essentially from the start if the settlement was to survive. The human capital was too small as many mine workers moved out of the settlement and those who remained did not have sufficient skills, there was no development structure and the potential for economic growth was low. After closure of the mine the settlement became stagnant. To rescue those who remained from obscurities and the infrastructure

from undergoing complete collapse, the Government took over the responsibility of managing Klein Aub by proclaiming it as a settlement under the Local Authorities Act (LAA) of 1992. In the absence of mining, Government became the biggest employer in the settlement shifting dependency on mining to dependency on the Government.

Non-existence of the strong formal private sectors reflected in the land use of Klein Aub where both formal and informal businesses were scattered around and did not form a nodule within the settlement (see Figure 66).

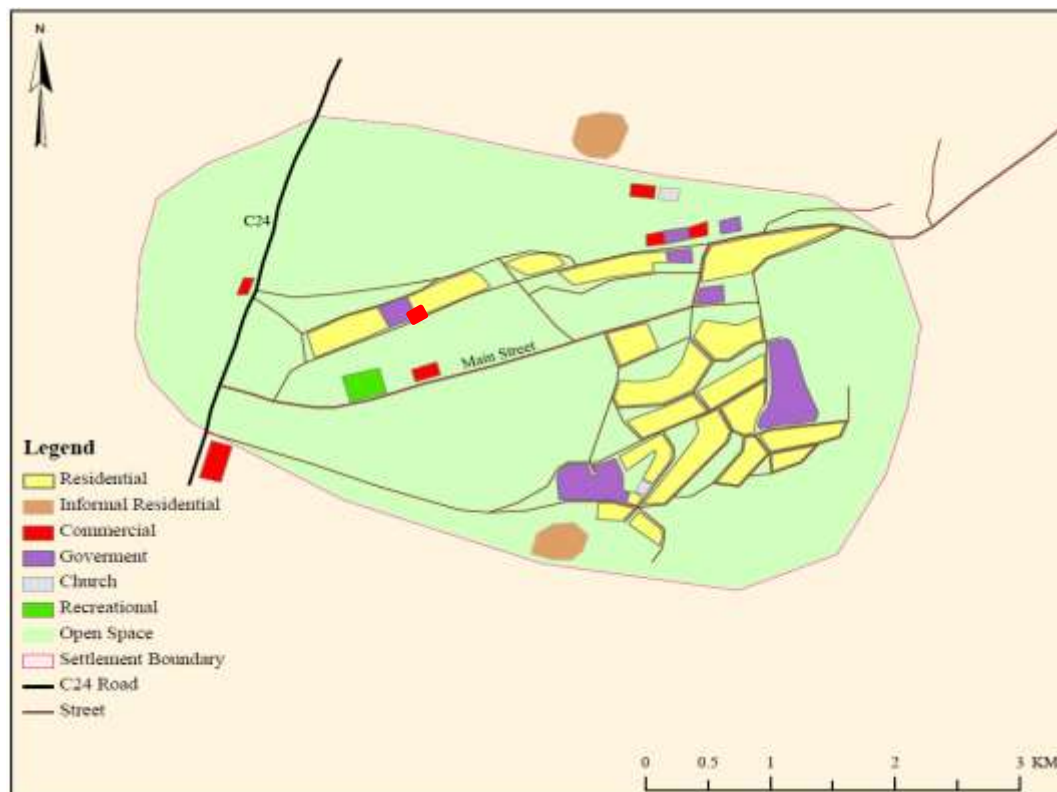


Figure 66. Land use zones in Klein Aub, Namibia (2010).

Businesses' inventory

In 2010, the business community of Klein Aub was extremely limited. The only bottle store located next to the public road (the C24) and a tourist stopover with a small bistro on the outskirts of the settlement were the only places that could entice some tourists

to stop in the area, to buy a drink or snack and after a short stopover they were gone. These were the only places that occasionally had some supplementary incomes from the outside community. Tourists did not venture into the settlement as there was nothing to offer. The economic survival of Klein Aub depended on the local customers. Approximate estimates from the business community survey suggested that 78% of goods and services were sold locally in Klein Aub; only 11% were sold to clients outside of Klein Aub community. The market size of Klein Aub did not exceed 500 people. Entrepreneurship and local business faced a deprived customer base. Apart from a very small market, the buying power of people was extremely low as most of the community members were from an underprivileged background with very low incomes.

The private sector in Klein Aub was represented by the NamPost and Telecom parastatals, two bottle stores, a funeral service provider, four shebeens and insignificant number of occasional goods and service providers. Their businesses were very simplistic (see Figure 67). Occasionally some creative people offered 'braai' stands or sold other items to the community at the end of the month, capturing monies received by the residents from pensions or postal transfers.

Most entrepreneurs in Klein Aub were sole proprietors; mainly running unregistered family owned informal businesses. *"Nothing is here. Tried some community gardening, but no success. I am aware only of one formalized business"*, depressed description of the business environment in Klein Aub by the representative from the Settlement Office (Source: interview with KA001 on 03.06.2010). Three out of seven

businesses were run and managed by owners and two out of seven had employed managers. Employee turnover was very high, the survey observed that one-third of management had been working for less than a year, another one-third from one to three years although some businesses had been operating in Klein Aub for more than five years. Several business owners chose to manage their businesses themselves.

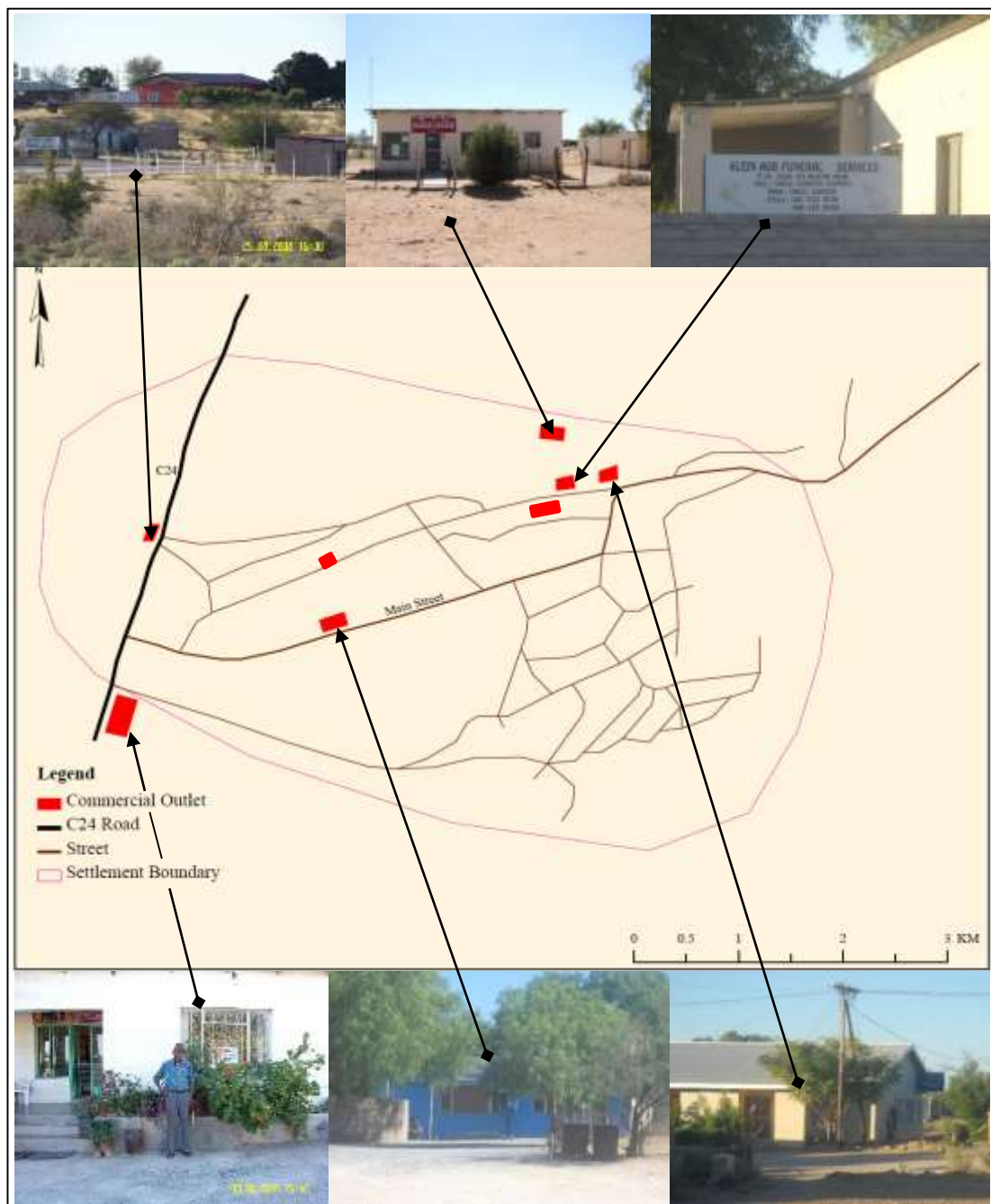


Figure 67. Illustration and location of commercial outlets in Klein Aub, Namibia (2010).

Demographic characteristics of surveyed businesses revealed that business owners were largely of a mature age and differed from other surveyed mining settlements for this research, where the proportion of very young entrepreneurs was higher.

Those with higher education had better chances to succeed. In 2010, Klein Aub had a large share of people with less than Grade 10 education, thus none of the businesses were run by an individual with education lower than Grade 10, proving that education did help to succeed. Only one business establishment in Klein Aub was owned and run by an individual with a university degree making him the most successful business man in the community. According to the community his business was dominant, his bottle store was referred to as a main bottle store in the settlement offering the widest choice of goods, but often too expensive for many. Other businesses in Klein Aub depended on and required goods and services from nearby urban centres or areas in Namibia. The main centres to source their goods and services for the local market are Rehoboth and Windhoek, depending on the availability of transportation. There was no potential for running a formal business if the owner did not have a motor vehicle. Smaller and informal cuca shops or other daily supply outlets got their stock from the main Klein Aub bottle store located next to the C24 road. The non-existence of personal transport and a regular transportation network diminished the opportunity to diversify the stock and prices. The residents had no choice but to buy their necessities from the two bottle stores at ever increasing prices. Daily necessities were too expensive and not within the financial reach of many. Lack of transportation determined that smaller informal entrepreneurs had to buy their stock at the only formal bottle store and after adding a small amount to their retail price; their own

profits were extremely small. Their stock was dependent on the two local bottle stores and the occasional availability of a vehicle. Transport ownership involved large running costs as there was no petrol station in Klein Aub but only in Rehoboth, seventy kilometres away. Therefore car ownership in Klein Aub was suppressed. The operational costs and maintenance was too high. This was one of the main challenges in the strive for development that was mentioned by the community and businesses

Lack of competition made for a steady, loyal clientele. Small scale business owners enjoyed the satisfaction of offering the service to their community without significant competition. The clientele was loyal, but it was not always by choice, it was rather for lack of other options. Thirty-seven percent of the customers chose these local services in Klein Aub because they did not need to travel, some of them did not have transport or money to travel to Rehoboth or Windhoek. Such small but dominant businesses in Klein Aub could not be definite in improving the quality of life. There were no banking services available, and neither was there an Automatic Teller Machine (ATM) in the settlement. The Klein Aub Settlement Office assisted local pensioners with the option to receive their pension in cash at their offices.

Research established that the Klein Aub settlement did not serve the surrounding area as a central place in terms of retail and thus could not be looked at as a retail centre. The retail establishments in Klein Aub were few and most of these businesses were informal. However, Klein Aub could be seen as a centre for government services – schools, a clinic, and other public institutions. The government was the largest employer in the settlement.

The economic linkages with surrounding areas were weak with the limited number of retail establishments. A small and struggling tourism establishment was located on the periphery of Klein Aub and run by a long term resident in the area whose family has been living there since the mine operations began in 1966. The experience of the business owner pointed out that Klein Aub was more vibrant during the time of mine operations, including her own family business ventures. The business became stagnant since the closure of the mine and ceased to operate in 1994. Only in recent years, when the economy showed a slight improvement in 2007 and 2008 the business restarted on a small scale. *“I promised my late husband to restart the business. I restarted, but we are struggling”*: told an elderly business woman (Source: interview with KA003 on 03.06.2010). In 2010, her business experienced several challenges with the absence of electricity connection being a major one. The business depended on family support and did not have much potential to expand. It was also highly dependent on the performance of the tourism sector, especially the number of tourists passing through a remote area like Klein Aub.

The farming activities in the region were insignificant and mainly small scale stock farming. Some of the Klein Aub residents were part-time farmers on the nearby farms, breeding sheep and goats. Despite livestock not being allowed in the settlement, some sheep and goats were observed during the field investigations suggesting some small scale peri-urban agriculture. Some community gardening initiatives years ago, but none of them had any success and did not proceed any further (Source: interview with KA001 on 03.06.2010).

Economic performance of businesses (prior 2010)

There was a very pessimistic outlook on the performance of the local economy. The majority of the community members, amounting to 90% of the surveyed residents in 2010, believed that the local economy had been declining during the two years preceding the research. The community opinion contradicted the business community's opinion. Two out of seven businesses reported their businesses to have declined, while three were making enough money to maintain themselves without considerable profits and two reported growth (see Figure 68). Among those reporting growth were the government parastatals and formal bottle stores. It was observed that the business communities of Klein Aub just managed to maintain themselves earning small incomes for survival, but without tangible profits.

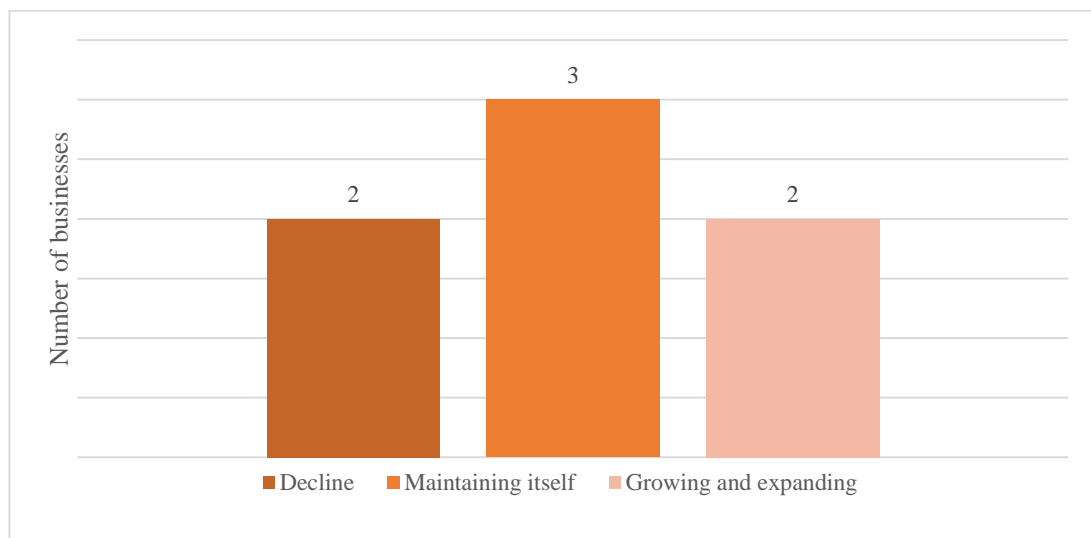


Figure 68. Self-assessment of businesses in Klein Aub, Namibia (2010).

Three out of seven businesses reported a decrease in their clients during the period of 2008 to 2010, two did not experience any change regarding the number of customers and two of businesses managed to increase their customer base (see Figure 69). The decrease in their customer base was more severe in comparison with other mining

settlements that were surveyed for this research (Rosh Pinah and Tsumeb). Despite economic hardships and a declining customer base, none of those businesses had considered closing in the near future. They were ready to persevere and wait for better times.

Those who reported the growth of their customer base were formal retail outlets selling daily supplies, reaping the benefits of general economic decline, and an undertaker whose increasing client base could be related to the unfortunate circumstances, demographics or community health specifics.

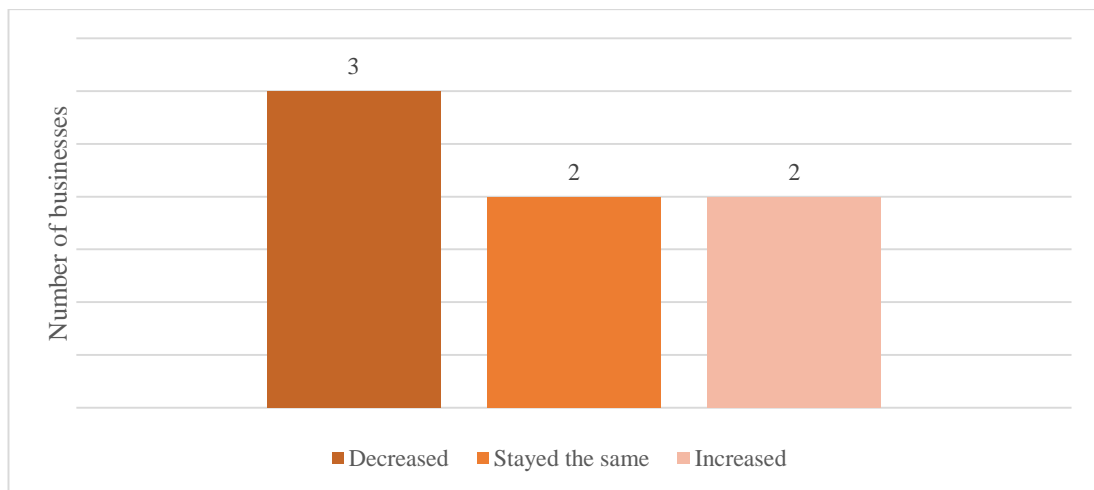


Figure 69. Growth of Klein Aub businesses' customer base during the period of 2008 to 2010, Namibia (2010).

The majority of the Klein Aub's businesses reported decline but their outlook remained positive. Six out of seven businesses were positive and believed it was only a temporary phase they were going through. Since mining no longer formed the economic base of the settlement, local businesses depended on general national economic conditions and seasonal fluctuations in other sectors. Businesses operating in Klein Aub from the time the mine was operational and had experienced the difficult

transition period after closure of the mine remained positive and believed it was only a phase in a mining cycle they were going through and that mining could re-open in Klein Aub. They were confident that should mining resume, their businesses once again would experience success.

Challenges for economic development

The settlement was too small and remote for considerable retail growth and the income levels of people were too low. Ninety-five percent of the population agreed that there were no job opportunities thus limiting the economic potential. The business community struggled to find skilled people to run their businesses as the level of education in Klein Aub was very low. Official positions were often filled by the imported skills from other parts of the country.

Several aspiring individuals tried to open some small informal businesses, but ended up struggling with finances and eventually closed. This could be associated with poor planning and the stale economies. Along with the very limited buying power of the local community, many businesses struggled with their own cash flow. To run their businesses, entrepreneurs needed capital, particularly during the first years of their businesses, but they rarely managed to avail of such sums of money. Five out of seven businesses experienced serious difficulties with cash flow. The problem could be resolved if they had access to financing from the banks or other financial institutions. The majority did not have collateral, but two businesses that did have, could not get their loan approved. Businesses felt alienated because of the lack of support from central and local governments. Six out of seven businesses in Klein Aub experienced

difficulties in dealing with the local authority or other government institutions. They liked to see the cooperation improved and feel more supported by the government. The community shared a similar sentiment of not being sufficiently supported by the government. Twenty-nine percent of the Klein Aub community was sidelined and not supported by anybody at all.

Poor infrastructure and low maintenance did not encourage economic business development. Two entrepreneurs thought they could do better in the settlement if the infrastructure was upgraded. Improvements were needed to attract more businesses in Klein Aub such as road maintenance, cleanliness of the settlement, better public transport connectivity with nearby areas and other urban centres, maintenance of streets and the organization of some special events and festivals that could promote Klein Aub (see Figure 70).

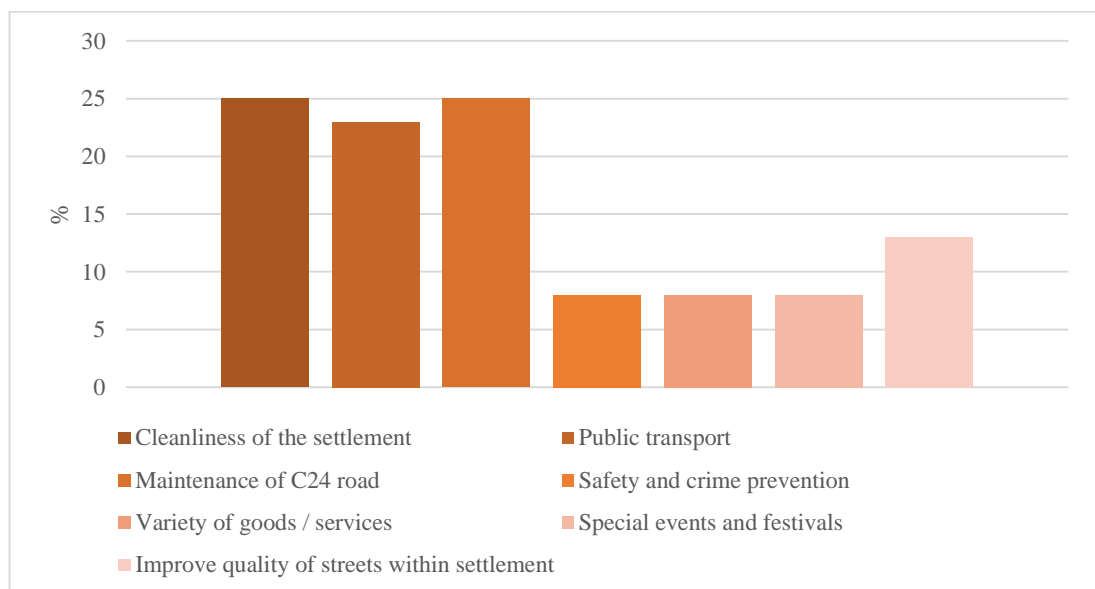


Figure 70. Business community's opinion on needed improvements to attract more businesses to Klein Aub, Namibia (2010).

Environmental concerns raised by the business community were the quality of ground water, abandoned buildings at the old mine site and dumping along the roads. These were main concerns that they felt could deter new businesses from coming to Klein Aub as people would like to have a tidy and well organized environment. None of the business community survey respondents considered mining to be bad and an obstacle to the development. The business community would rather be happy if mining re-opened, they had high expectations for mining as a solution for Klein Aub.

Future outlook for businesses in Klein Aub

The residents of Klein Aub had not forgotten their mining past. The community saw mining as the only sector with the potential to recover Klein Aub's depressed livelihoods. Re-working or reuse of tailings could be an option; some suggested the reuse of tailings to make cement, tiles or other building materials. People were very eager and excited to talk about the re-opening of the mine. Eleven percent of the community believed that the future for the settlement depends entirely on mining; without mining the settlement would slowly deteriorate and eventually vanish.

The Klein Aub copper and silver mine was still an area of interest to numerous prospectors; since the closure of the mine several companies had tried to do some exploration and prospecting. The reports of several exploration companies suggested the potential for mineral extraction (RBS, 2010; Geotec Namibia, 2001) and the possibility of Klein Aub mine to reopen in an effort to recoup what was not depleted when operations stopped abruptly with the dip of the copper price. Klein Aub was only one of many copper deposits stretching over a hundred kilometres to Witvlei in the

east, being unofficially perceived as the “Namibian Copperbelt”. Klein Aub could serve as a hub for all smaller mining projects in the surrounding area. There was also a potential to re-treat the tailings located at the settlement by modern processing techniques. The tailings contained copper and silver that could also be re-mined. Potentials were there for Klein Aub, but most of them were short-term. Nevertheless Klein Aub had to be ready and use the opportunity to boost and induce sustained development. Should the revival of the Klein Aub mine be successful, it would be beneficial to the local communities, but it might be a short term benefit. The community would have to think beyond the life span of the mining activities. With mining or without, only one out of seven businesses in Klein Aub believed in a positive future for the settlement. In future they would like to increase their operations, employ more people and diversify their activities (see Figure 71).

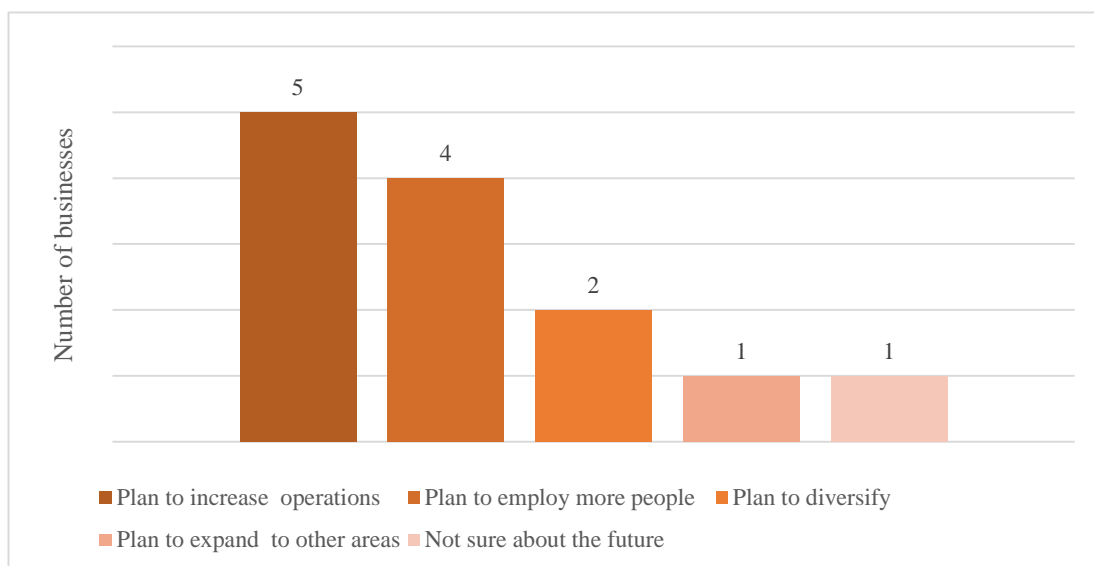


Figure 71. Future plans of business community in Klein Aub, Namibia (2010).

The businesses that residents of Klein Aub liked to see more of in their settlement are summarized in Table 10. Many of them could be unrealistic such as big shopping centres, more lodges and hotels, several fast food restaurants, a sports ground and

swimming pool, and a service station, but these entirely reflected their visions to see Klein Aub big and growing, they expressed the residents' wishes and positive outlook on the future.

Table 10

Desired businesses by Klein Aub's community, Namibia (2010)

Type of business	Responses (%)
Big shopping centres	15
Small shops and boutiques	4
Fast food and restaurants	8
Libraries, museums and theatres	7
Sport grounds and swimming pool	8
Churches	7
Dry cleaners	1
Vehicle repairs	4
Electrical or plumbing services	4
Legal services/law practitioners	3
Banking	7
Service stations	8
Insurance brokers	3
Estate agencies	1
Lodges and hotels	13
Government institutions	8

On a more realistic level, residents liked to see more goods and services available in the settlement, particularly daily provisions and 37% of the people wished for lower prices of some necessities available in the settlement and of which the prices were unreachable. The goods and services they bought in Klein Aub were much more expensive than in Rehoboth, and if they had transport they would be buying them from Rehoboth directly. The community was inventive and imaginative suggesting that the old mine infrastructure could be better utilized, mentioning businesses such as poultry farming, a college for the government, a training centre for mining and related activities. At the time of the research in 2010, the outlook for the future was glum as

Klein Aub slowly but surely declined. Apart of revived mining, the government was seen as the only saviour of the settlement.

5.2.5 Infrastructure and social service analysis

A vital element in the quality of life for small and remote communities is the quality of and reasonable access to infrastructure and services. In 2010, Klein Aub settlement had the basic infrastructure in place and a potential to expand. Quality of infrastructure and service provisions lagged behind and urgently needed maintenance. Residents felt that the local authority failed to provide services adequately to all citizens, only 2% of the community were satisfied. There was lack of confidence in the local authority among the Klein Aub community; merely 15% of the people felt that the local government cares for them and did its best to provide the settlement with an improved infrastructure.

Klein Aub was a classic example of a mining settlement that was abandoned after closure of the mine, leaving an infrastructure without the capacity to maintain it. The infrastructure was too large for a settlement that has only 500 residents. Since the closure of mine the settlement endured, but development continued stagnate to and the settlement was idle.

Provision of housing and land tenure in Klein Aub

Most houses in Klein Aub were government owned. After the mine had closed, the government took over the land and the houses built by the mine. At the time of the survey in 2010, most of these houses still belonged to government and accommodated

several public servants working in Klein Aub settlement; others were rented out to the general public. The houses were old and required improvements (see Figure 72).

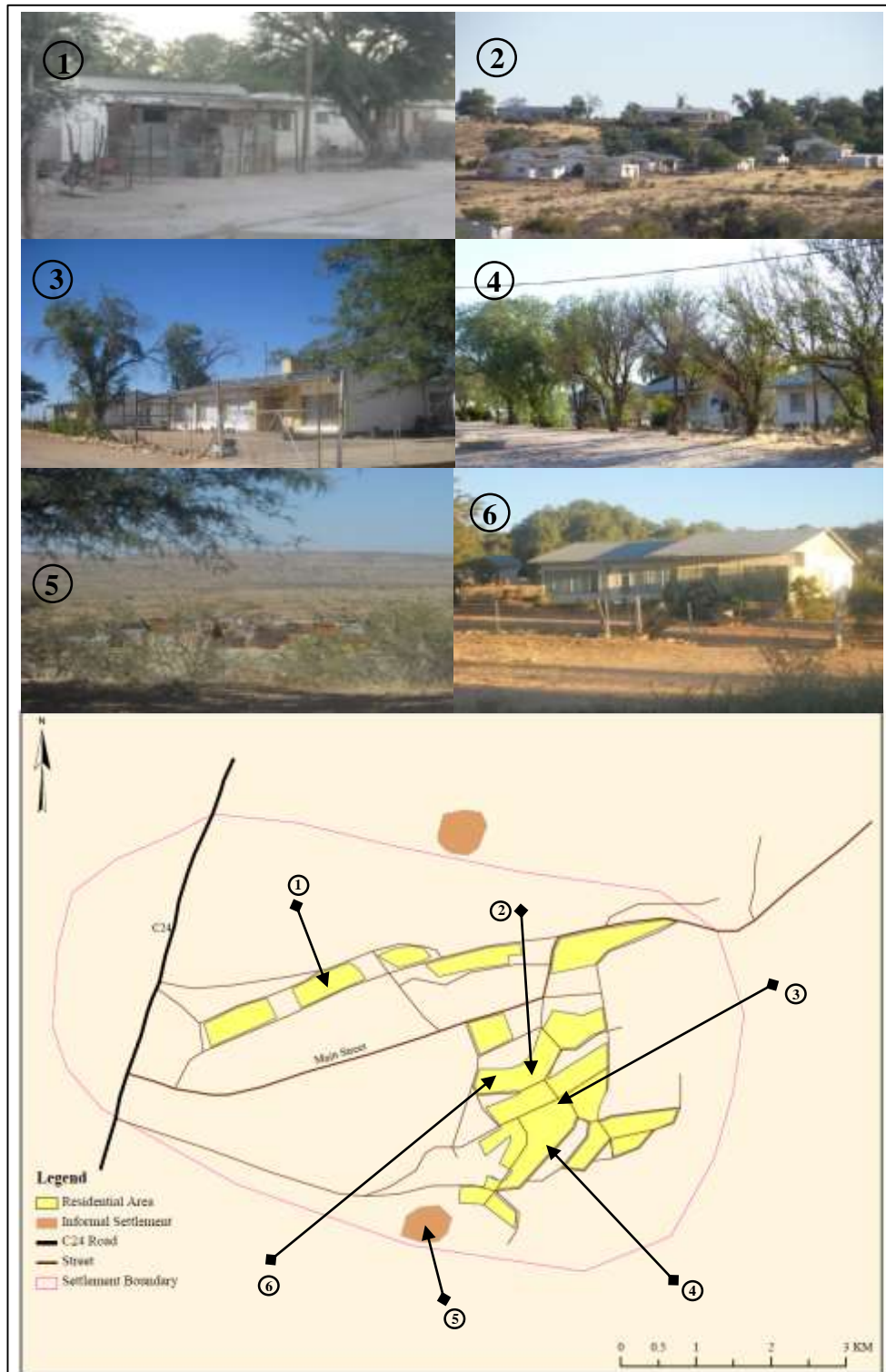


Figure 72. Illustration and location of residential areas in Klein Aub, Namibia (2010).

Klein Aub has a small informal settlement, named Sonderwater. The name means without water, referring to the fact that there was no water in the area. The location was formed in 2004 on the outskirts of Klein Aub between graveyard and the dry riverbed. Most of its residents were from the farm Kobos who came to Klein Aub for their children to attend school. The estimated number of shacks in 2004 was fourteen with a population of fifty two (Shack Dwellers Federation of Namibia, 2009).

Municipal service provisions

The areas surrounding Klein Aub were serviced by a fragile 66kV power supply system producing a stream of too low current. There was a need to upgrade the electrical power supply, while there was an increasing demand for electrical power in the area of Sossusvlei and the south-western areas of this region. There was a need for a new 132kV power line as well as upgrading the remaining 66kV power supply system to meet the growing power demand in the area and to ensure a more consistent supply of electrical power to Klein Aub and nearby areas. The Klein Aub Settlement Office acted as municipal service provider, maintained the infrastructure and municipal services, did the repairs of pipelines and sold pre-paid electricity to people. Ninety-five percent of houses in Klein Aub were electrified (see Figure 73), had access to safe drinking water, and were fitted with indoor toilet and cooking facilities. Even though the houses belonged to the government and people paid rent, they were responsible for their own electricity and water municipal bills. The informal settlement had access to water, however, not indoors, but there was an evident lack of services such as electricity and toilet facilities, and people had to go outdoors or into the open veld.

Waste in the settlement was managed by the Settlement Office. Bins were emptied twice a month, but illegal dumping in some areas (see Figure 74) suggested that the waste management was not of a high standard.



Figure 73. Illustration of municipal infrastructure in Klein Aub, Namibia (2010).



Figure 74. Illustration of illegal dumping of waste in Klein Aub, Namibia (2010).

Roads and streets

Klein Aub settlement is located next to the C24 gravel road (see Figure 75) which is mainly used by tourists passing through on their way to Sossusvlei or Solitaire and by the communities from nearby areas. The community survey established that Klein Aub

residents were not satisfied with the quality of the road, requested it to be better maintained. They believed it would improve the image of Klein Aub and attract more business and investments to the area.

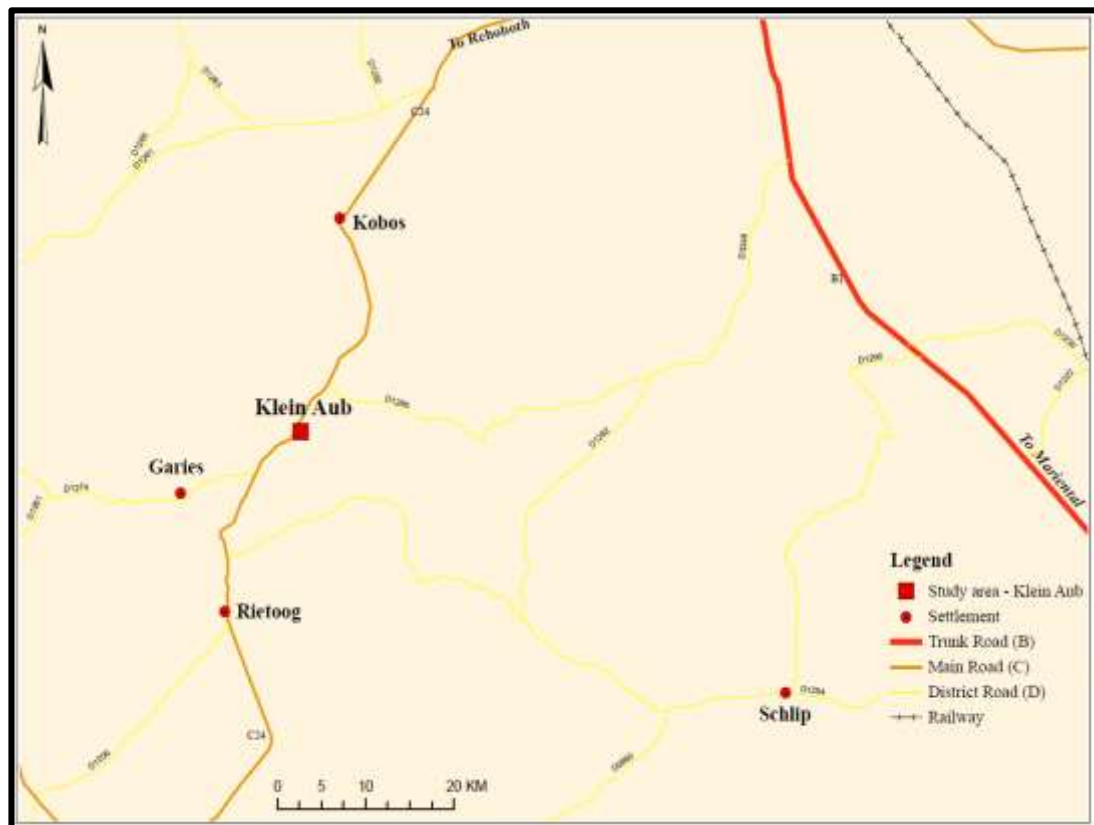


Figure 75. Roads infrastructure in surrounding areas of Klein Aub, Namibia (2010).

In 2010, Klein Aub had un-tarred streets linking the settlement with the C24 road and connecting residential areas and the old mine within the settlement (see Figure 76). The streets did not have electric lights leaving the settlement in darkness at night.

The roads were not frequently used, only by pedestrians and donkey carts as a local way of transportation; very few residents had a motor vehicle. According to the community the donkey cart was a more convenient way of transport to get around the settlement and nearby rural villages. The reason why people preferred donkey carts

over motorized vehicles was deprived access to the nearest service station which was approximately eighty kilometres away from the settlement.

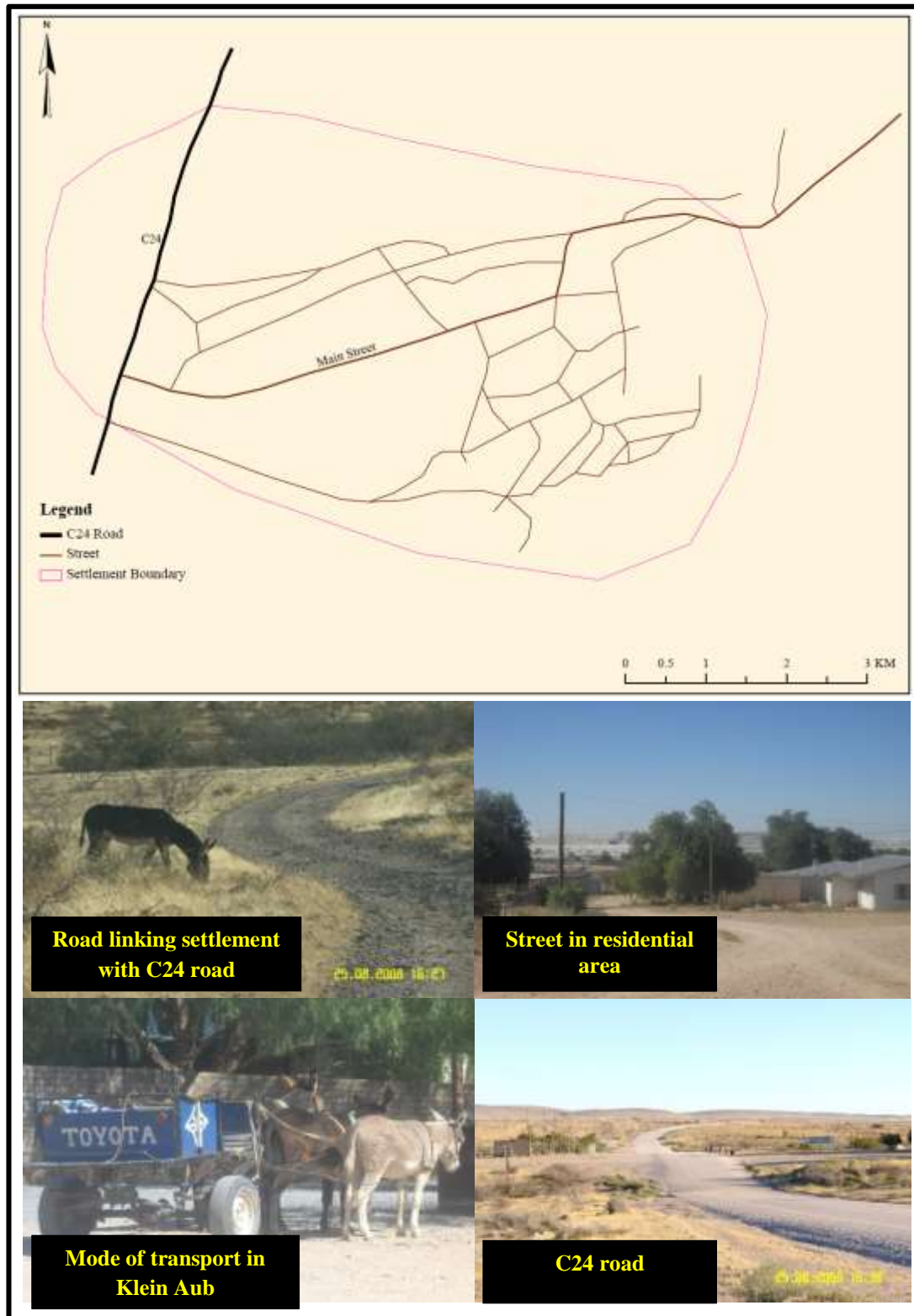


Figure 76. Illustration of road and street infrastructure in Klein Aub, Namibia (2010).

Telecommunications and postal services

Small and remote settlements like Klein Aub relies heavily on telecommunication services to stay connected to their families and friends as well as to run their businesses and acquire services they could get in the settlement. Klein Aub had an adequate telephone infrastructure with the Telecom office located in the settlement. Residential areas were equipped with the public phone booths and there was good mobile network coverage of the MTC service provider. Among the community residents mobile telecommunications were used more frequently, with land lines mainly installed in the public offices.

The presence of the NamPost office in Klein Aub assured the residents of access to postal services. The office was small, employed only two people, but it provided postal services to the residents of Klein Aub for more than forty-five years, since the establishment of the Klein Aub mining settlement.

To the disadvantage of the Klein Aub residents, there was no availability of the Namibian Broadcasting Corporation (NBC) services. People could not follow the national news, panel discussions or watch the local shows. There was no access to newspapers, they were not sold in the settlement and the only way they reached the settlement was when an individual bought them in Rehoboth or any other urban centre. This meant that by the time news reached the settlement it was usually outdated. Members of public had expressed the sentiment of “*being disconnected from the outside world*”. A town that loses its newspaper loses a gift for democracy (Olmstead, 2012). Residents of Klein Aub lived in a greatly uninformed environment and had very

little knowledge about what was happening in the country or the rest of the world. Improved modern telecommunications could assist Klein Aub to strengthen the settlement's economic potentials and service provisions. It could encourage the growth of some smaller economic activities.

Healthcare facilities

Klein Aub had only one government clinic in 2010 which originally served as a private clinic during the times when mines were operational, but when mining closed the government took over health care services to Klein Aub residents. At the time of the survey in 2010, there was only one nurse employed and two community counsellors. The shortage of staff was felt by the community of Klein Aub as health care was one of the main services residents wanted to see improved in their settlement. On average, fifty people visited the clinic per month, mostly female patients and elderly people. They came for follow-ups on their chronic disease check-ups and collected their medication. From the interview with the Klein Aub clinic's personnel, they would need two more nurses to be able to provide a good service to Klein Aub's current population size (Source: interview with KA005 & KA006 on 04.06.2010).

Fifty-two percent of the community survey respondents articulated their unpleasant experiences with health care services in Klein Aub. The lack of an ambulance meant there was no quick access to hospitals in emergency situations. The ambulance could be called from the Rehoboth state clinic which was seventy kilometres away. It could not be driven fast and took time to arrive and travel back to Rehoboth as the gravel road needed maintenance. The absence of a vehicle resulted in the delay of delivery of

medication to the clinic. Some patients needed medication on a weekly basis, but that could not be guaranteed by the personnel at the clinic as they depended on transport from Rehoboth. From the community survey it appeared that only 5% of people in Klein Aub could reach the hospital or doctor in Rehoboth using their own transport. Ninety-five percent regretted that in case of poor health, they did not have access to medical doctors. A doctor from Rehoboth was supposed to come to the Klein Aub clinic on a monthly basis, but it did not happen. The nurses at the clinic confirmed this and added that absence of transport prevented doctors from visiting the Klein Aub clinic. During the year of the survey, by mid-2010, there was no doctor's visit at all. The nearest specialist doctors and dentists were available in Rehoboth.

The nurse at the clinic was a registered midwife and in some emergency cases she was present when women went into labour. Long distance to the nearest hospital or maternity ward meant that most women in Klein Aub gave birth at home in the settlement, few decided to leave the settlement and temporarily moved to Rehoboth or Windhoek to give birth in a hospital environment.

Their priorities regarding the health care sector were expressed by the community where 57% liked to have a resident doctor in the settlement or that a doctor would come on a regular and pre-defined basis. Fourteen percent of the residents expressed the need for local ambulance services being available at the Klein Aub clinic and 5% of the community members liked to see a hospital and maternity ward in the settlement.

HIV/AIDS was a rising concern among the Klein Aub community. At the time of the survey in 2010, there were twelve people on retroviral medication that came to the clinic on a regular basis to collect their medication. In total the clinic was aware of twenty people being HIV positive, the majority of them were young people in the age group of 20 to 40 years, but it also included one senior citizen and two children. Klein Aub clinic had a HIV testing kit and encouraged people to come and be tested; it also provided HIV/AIDS counselling as they had two HIV/AIDS community counsellors. Condoms were distributed free of charge and the staff at the clinic had taken the initiative to educate the community on the use of condoms. From their observation people were ignorant about it, particularly the older people. According to the clinic's staff there was no prostitution in Klein Aub and no significant concerns about sexually transmitted diseases (STDs).

Educational institutions

Klein Aub provided important educational services to the Klein Aub settlement and the nearby areas within a radius of thirty kilometres. Klein Aub offered education through two government schools: a primary school accepting all children in the age group 6 to 17 years, and the Klein Aub special school, accepted children with learning disabilities from all of Namibia. These were children who struggled with their academic performance and not children with behavioural problems. The school did not enrol children unless they had learning disabilities.

The Klein Aub primary school was opened on 25 January 1968 when the mine was still operational. Opened for the children of mine workers, it started as a small school

and grew to accommodate 176 children in 2010. The number of children had noticeably increased, particularly during the three years from 2007 to 2010. This could suggest that due to the worsening general economic situation in the country some parents could no longer afford to send their children to Rehoboth or Windhoek boarding schools, resolved to send them to Klein Aub primary school. At the time of survey in 2010, most children at the Klein Aub primary school were from an underprivileged background, either from Klein Aub or a farm worker's family who brought their children to school from far distances and very often they had nowhere to stay since the school did not have a hostel. Children that came to the primary school were sent by their parents to stay with family members in Klein Aub or children came with their parents and resided in Klein Aub's informal settlement. The school together with the state clinic could be regarded as the main nuclei that attracted people to reside in the settlement and helped it to persist. Klein Aub primary school was one of such example that served the public far beyond the Klein Aub borders.

The school experienced a shortage of qualified staff. "*Staffing is a major problem*" identified principle of Klein Aub Primary School (Source: interview with KA002 on 03.06.2010). On the date of the survey in 2010, the school had six qualified full-time teachers and two support teachers, which was not sufficient. The challenge they faced was non-existent positions, meaning they could not recruit more teachers. To find a teacher who would be willing to teach in their school was another challenge as the area was considered to be remote and there were no tangible incentives for qualified people to come to Klein Aub (Source: interview with KA002 on 03.06.2010).

Like in other rural schools, Klein Aub was not an exception where learners had limited access to better and more advanced learning materials and tools, such as computers, which had a negative impact on the performance of learners. The performance levels were poor, particularly as far as reading skills were concerned. The school aimed that at least 90% of the children could read when they complete their primary education. There were children in Klein Aub primary school with both parents illiterate and unable to help their child with studies. In many cases parental involvement was non-existent. Approximately 2% of the parents did not get involved at all in the education of their children. To reopen Klein Aub mine was a big dream as it was hoped that it would improve the livelihood in the settlement; parents would have jobs and afford to support their children's education. Despite their limited resources and being understaffed Klein Aub primary school was committed to education and hoped for a positive future.

At the time of the survey in 2010, there was no secondary school in Klein Aub. The nearest was the Junior Secondary School which was some twenty-five kilometres away from the settlement. Those families who could afford and found a place for their children to stay, sent them to secondary schools in Rehoboth.

The Klein Aub special school, established in 2003, enrolled children with learning difficulties from across the country. In 2010, there were eighty-three boys and sixty-six girls in the school. The school was staffed with ten teachers, but it was not sufficient and due to the specifics of the school they needed at least two more support teachers (Source: interview with KA007 on 04.06.2010). The school was struggling with

financial provisions which affected the performance of the learners as there was a lack of adequate teaching materials. The school did not have a computer or projector and the accommodation facilities for the learners were in a very poor condition. The school had a small library, but liked to supplement it with up-to-date newspapers to keep children informed. Another challenge was that because of the remoteness of Klein Aub, the school was often in dire need of daily supplies and it did not have a vehicle to help them provide the school with these daily. Even when the parents sent money, the school could not provide all the necessities as the goods sold in Klein Aub were extremely limited. Most of the daily supplies were brought from Rehoboth, but the absence of a vehicle restricted the range of provisions. It was claimed that at times there was not enough food for the children which severely affected their academic performance. The challenges did not uplift their education and the children's performance was very poor with very low pass rates. These children already struggled with learning disabilities, but the challenged environment deprived them even further (Source: interview with KA007 04.06.2010).

The school had good initiatives though. The severity of learning disorders varied among the learners, but since most of them struggled with their academic performance, the school empowered them with some artisan skills such as building, engineering, woodwork and gardening. There was a small garden on the school's premises where children learnt how to plant and cultivate vegetables (see Figure 77). The school wished to see the Klein Aub mine re-open as it could possibly involve the learners in some mining activities, using the approach "learning by doing", thus enhancing the

education of the youth with learning disabilities and teaching them practical skills in the mining sector through internship.



Children at the gate of the Klein Aub primary school

Acting principal of Klein Aub Special school at the school's vegetable garden

Gate to the Klein Aub Special school for children with learning difficulties

Figure 77. Illustration of education infrastructure in Klein Aub, Namibia (2010).

Security and safety

Security and safety guarantee a community's stability and sensible social and economic development. In 2009, a new police station was established in Klein Aub. This was a positive development for the settlement resulting in improved security and safety. Previously Klein Aub residents had to travel sixty kilometres to the nearest

police station to report their cases. On occasion of the police being called in, it took time for a police vehicle to arrive. This resulted in many cases not being reported, particularly as many did not have a vehicle to travel such a distance - thus depriving the residents of a sense of security. Thirty-three percent of the Klein Aub residents did not feel safe in the settlement, which was one-third of the population.

The police station had five staff members and was provided with only one vehicle which was not enough. To increase the efficiency to fight crime, police needed more vehicles and one of them had to be four-wheel drive as the access in some areas could be problematic for a small car. According to the information of the warrant officer from the Klein Aub police station, they received approximately ten calls per month, which included complaints from Rietog, Nabaseb and nearby farms. Generally the calls were about domestic violence incidents and stock theft cases. There was an increase of criminal activities "*towards month's end when pensioners receive the money*": said police warrant officer referring to the time when pensions are paid out to pensioners living in Klein Aub (Source: interview with KA004 on 03.06.2010).

Most domestic violence cases were the result of alcohol or drug abuse. Alcohol abuse was a serious problem in the settlement and teenagers as young as sixteen years had serious alcohol addiction problems. The antisocial behaviour was blamed on poverty that lead to the desperate situation where people tended to abuse substances to numb the desperation. The police was aware of four shebeens operating in Klein Aub and selling unlicensed alcohol. At the time of the survey in 2010, a desperate woman sought help and asked to report unlicensed alcohol sales to higher authorities in

Windhoek in order to get shebeens to close down. This incident pointed to mistrust of the local police. It could be an indication that despite their presence in the settlement, people did not have enough trust and confidence to co-operate with the police. Residents liked government to intervene.

The community survey revealed that a few residents were not satisfied with the abandoned old mine structures on the periphery of the settlement (see Figure 78). They felt it served as a breeding ground for criminal activities and that the presence of these structures were undesirable. This was denied by the warrant officer assuring that it was not a problem area.

There were no incidences of prostitution in the settlement. The drug use and trafficking, particularly dagga, had been detected and investigated. Drugs found their way to Klein Aub mainly from Rehoboth. According to the police warrant officer, the future of Klein Aub was not promising if there was no economic development in the settlement. The reopening of the mine or development of other economic opportunities in Klein Aub would mean improvement of the community's wellbeing, less poverty and a safer environment for all residents. This would result in reduced criminal activities (Source: interview with KA004 on 03.06.2010). Residents suggested better police control and more armed response.

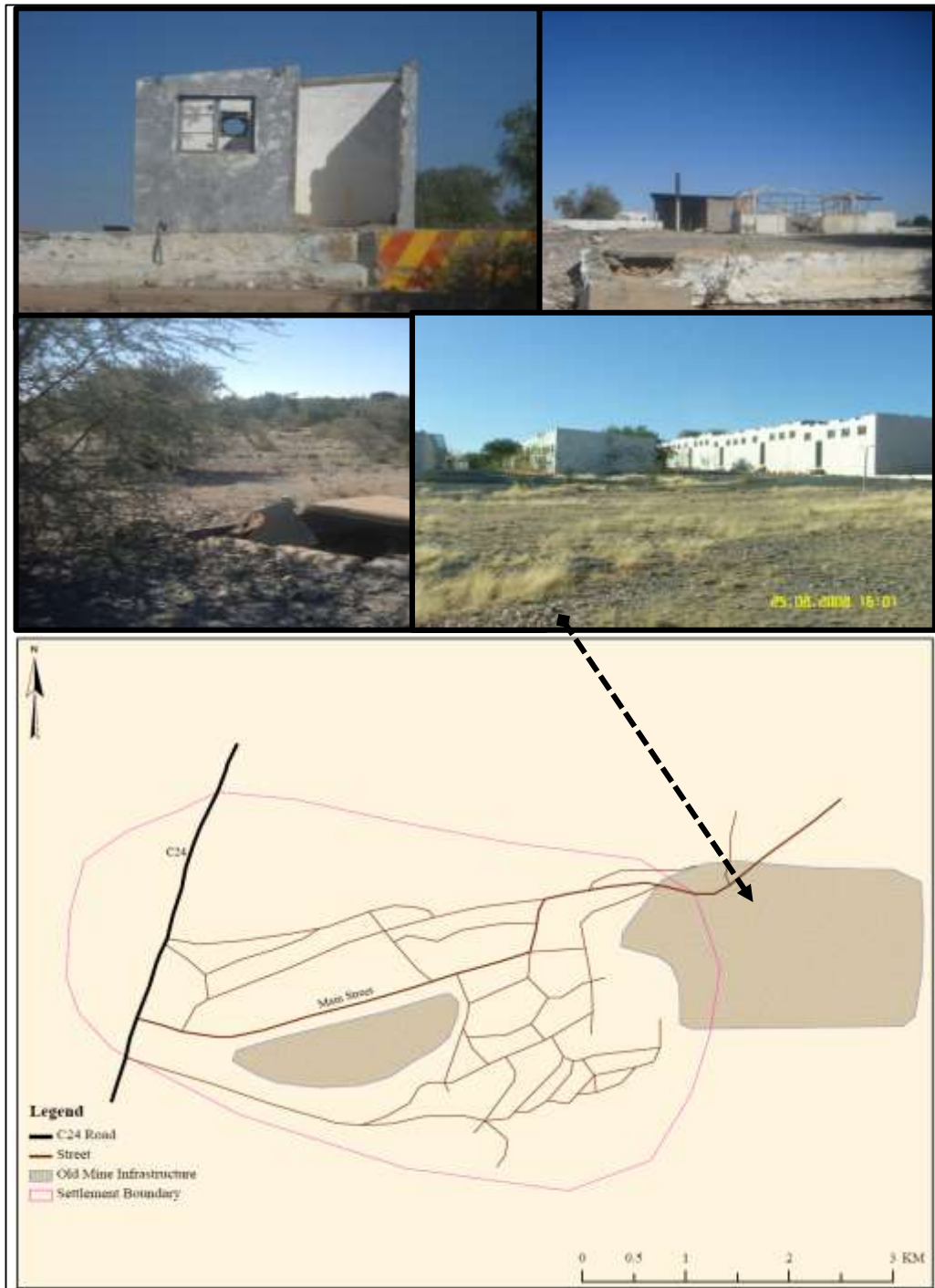


Figure 78. Abandoned old mine structures in Klein Aub, Namibia (2010).

Government services

Klein Aub was devoid of government infrastructure. Apart from the Settlement's Office under the Ministry of Regional and Local Government and Housing and Rural

Development (MRLGHRD) and the Ministry of Home Affairs and Immigration, the settlement did not enjoy the presence of other ministries in the area. The Klein Aub Settlement Office was singled out as a major public service provider for the community. It had many more functions apart from its core business. People went there to receive pensions, paid their municipal accounts, and bought pre-paid electricity. Due to the lack of other public institutions and their representation, the Settlement Office was seen as a main centre and authority of Klein Aub community. Other government institutions included the state clinic and schools.

Recreational and cultural facilities

There was a shortage of recreational and cultural facilities in Klein Aub. After closure of the mine, the mine operators abandoned a few sport facilities (see Figure 79). The sport facilities such as the tennis courts and soccer field were underused and resulted in low maintenance and no resources to maintain these facilities. There was an old soccer field that remained from the times when the mine operated, but it was not in very good shape.



Figure 79. Illustration of underutilized sport facilities in Klein Aub, Namibia (2008).

The settlement did not have a public library, no access to the internet, or newspapers to read. The non-existent cultural life stimulated the growth of undesired recreational activities, such as entertainment in shebeens, most of which were not licensed. People loved to see some more recreational and cultural activities in the settlement, some suggested that Klein Aub could serve as a venue for some kind of festival or annual events.

The religious needs of the residents of Klein Aub were taken care of by two churches. Observation made it clear that the church life in Klein Aub was weak and growing even weaker. The deterioration of the community's wellbeing, non-existence of job opportunities, and lack of resources reduced the significance of the church in people's lives. The community experienced apathy towards religion.

5.2.6 Environmental concerns

The mining landscape of Klein Aub community and its physical legacy was not distinctive, but the challenges created by these legacies were not the same. These included planning problems, historic preservation and environmental remediation concerns. The most significant features remaining from the time of mining were the mining tailings and abandoned mine infrastructure with a visible part of it on the outskirts of the settlement and underground infrastructure right below the settlement.

When mining in Klein Aub ceased in 1987, the settlement was left rather abandoned and no environmental rehabilitation was implemented. The old mine infrastructure was abandoned and the mining waste dumps left behind. Years later some environmental

concerns aroused. At the community level, residents were not aware of the potential harm of those, but, at the time of the survey in 2010, they were more concerned about the most visually evident and tangible problems such as abandoned mine buildings, dumping along the roads, ground water contamination and air pollution (see Figure 80).

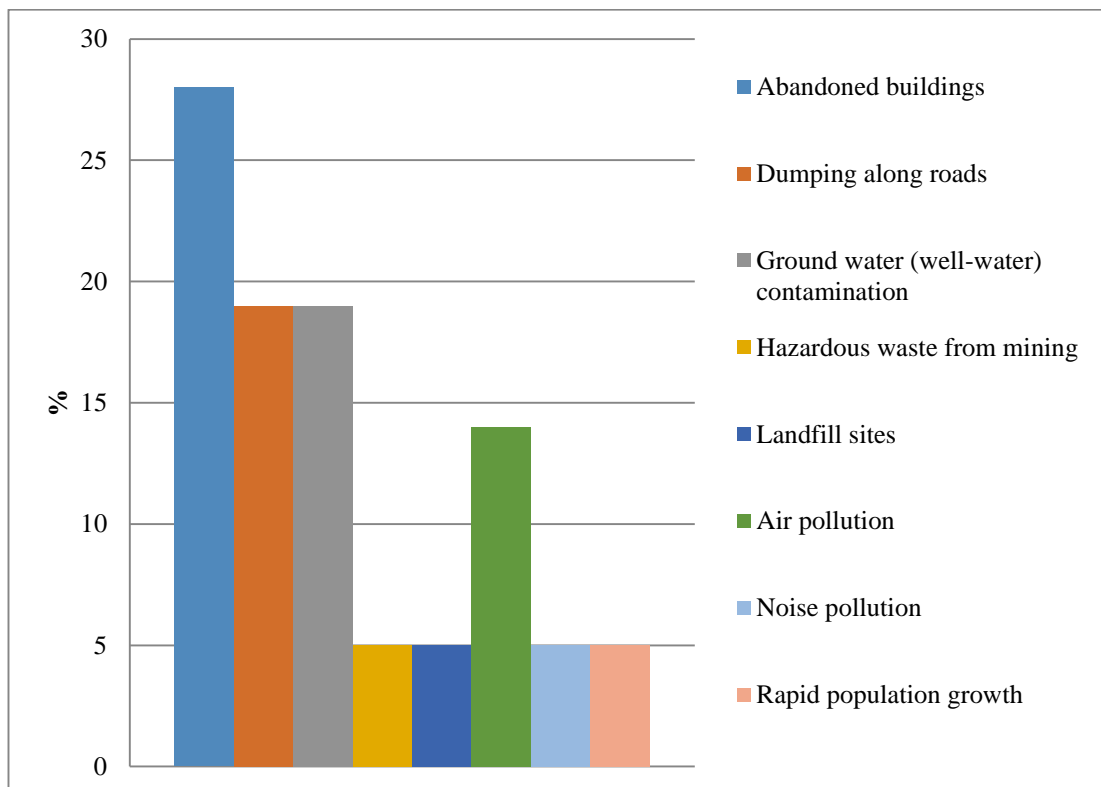


Figure 80. Main environmental concerns expressed by the community of Klein Aub, Namibia (2010).

Twenty-eight percent of people were concerned about the abandoned buildings on the outskirts of the Klein Aub settlement. The presence of abandoned structures was blamed for increased criminal activities in the area. These ghost structures were used as hideouts for antisocial behaviour involving drinking and use of other substances that led to criminal activities. People were afraid to walk in the area and were concerned about the safety of their children.

Dumping waste along the roads and the ground water quality were other concerns expressed by the community. Visually untidy streets and waste along the roads did not make a good impression and discouraged potential investors and kept tourists from stopping over. Residents were of the opinion that the ground water, referring to the subsurface water resources in abandoned mine shafts, was of low quality and blamed this for increased digestive problems. *“People use water, but it is not good, even after boiling it”*, told an elderly former mine worker (Source: interview with L002 on 03.06.2010).

In 2001, the Federal Institute for Geosciences and Natural Resources (BGR) in corporation with the Namibian Government conducted a study on the rehabilitation of abandoned mine sites in Namibia. Their testing did not detect anything of serious concern and the microbiological analyses indicated that the water complied with the Namibian guideline for drinking water. The water quality was adequate, but increased levels of sulphate concentrations, however within acceptable limits, could be a reason for residents to be dissatisfied with and doubtful of the water quality.

A more serious environmental concern was air pollution. The community of Klein Aub was affected by easterly winds which transported dust from the adjacent tailing dump. The BGR report recommended that the velocity of the wind be reduced by the construction of windbreaks and thereby lower the transport of fine tailings material. In 2010, only 14% of the community was concerned about air pollution, mainly those living closer to the tailings dump site and from the nearby school. Only 5% of the

community comprehended that the consequences of air pollution could be much more significant than generally perceived.

From interviews with medical staff from the Klein Aub clinic it appeared the fine dust made some people sick and that the clinic constantly received numerous complaints of chest pain and coughs. To their knowledge the old mine tailings were tested, but they never received feedback on the results from the Ministry of Health and Social Services. A particular concern was for the safety and health of children that could be affected. The Klein Aub special school and eastern residential areas of Klein Aub were located next to the old tailings and on the pathway of the winds (see Figure 81). On windy days there was a lot of dust in the air and the impact of these wind-born tailings dust on the community was not addressed (Source: interview with KA005 & KA006 on 04.06.2010).

Another environmental and safety concern for local residents was the old collapsed structures related to the underground mine (BGR, 2001). During its time of operation there were numerous Klein Aub mine collapses, and of particular concern was those close to the Koper River and the West Shaft, where the underground workings were less than twenty metres below ground level. These led to extensive flooding when water from the river entered the mine (BGR, 2001). The collapsed structures were stabilized by filling and covering them with waste rock, but should large amounts of mine water be pumped for horticultural or other purposes the status quo might change.

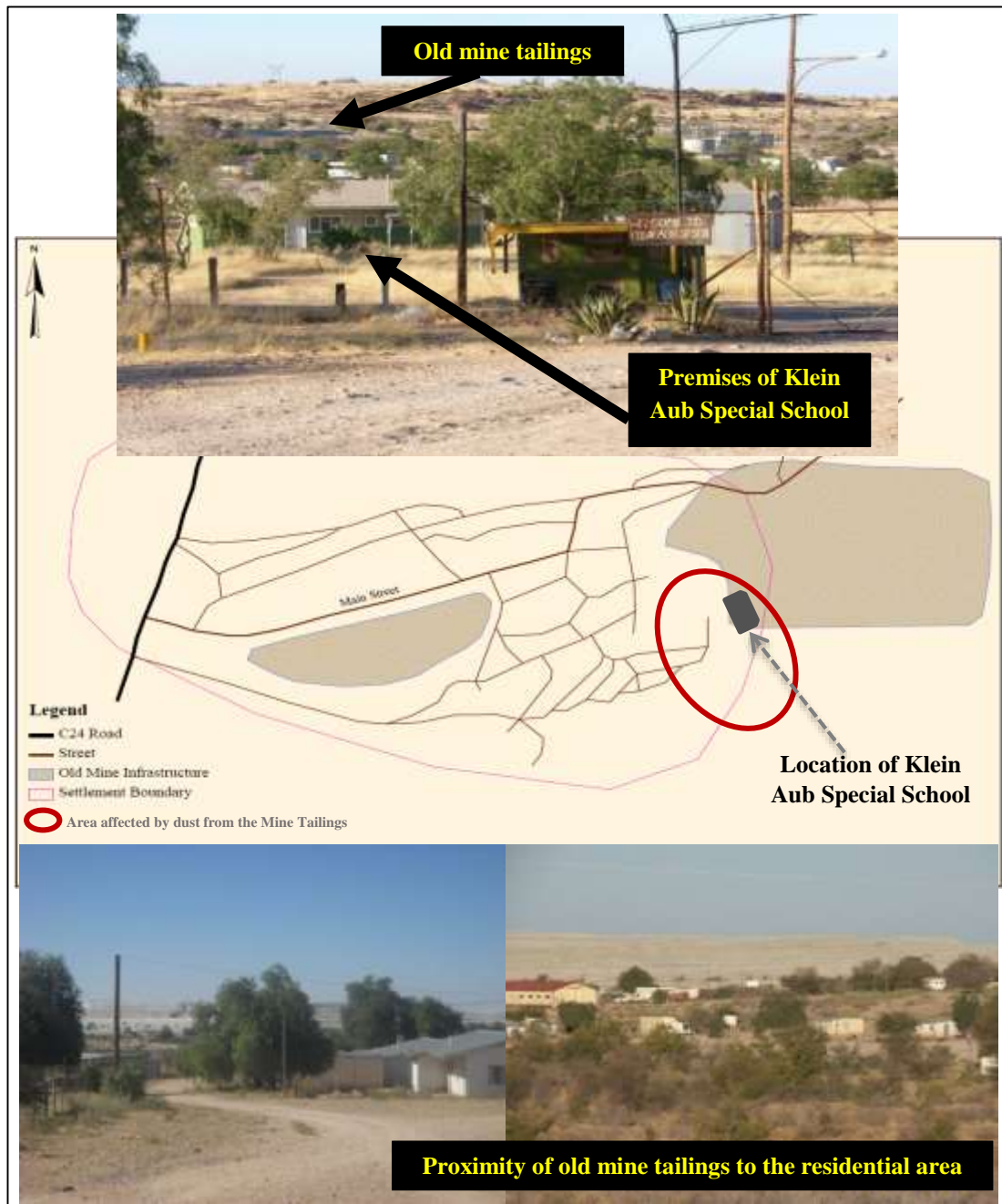


Figure 81. Illustration of area affected by dust pollution from the mining tailings in Klein Aub, Namibia (2010).

Further problems were related to the sinking ground where old shafts collapsed and became a danger to local people. Klein Aub settlement sat right between two shafts joined by an underground tunnel (see Figure 82). The western shaft was within the settlement area and both of these shafts became flooded. In early 2010, after heavy

rainstorms, the ground above the mining tunnel, right underneath the settlement, caved in leaving a deep hole.

The retired former miner was still familiar with the mine infrastructure and recalled the background situation. He was approached for his assistance and advice. The local authority did not have detailed structural engineering plans of the old mine infrastructure. The lack of such knowledge and information about the old mine structures could have a negative impact on future planning that should consider any risk to ensure safe developments.

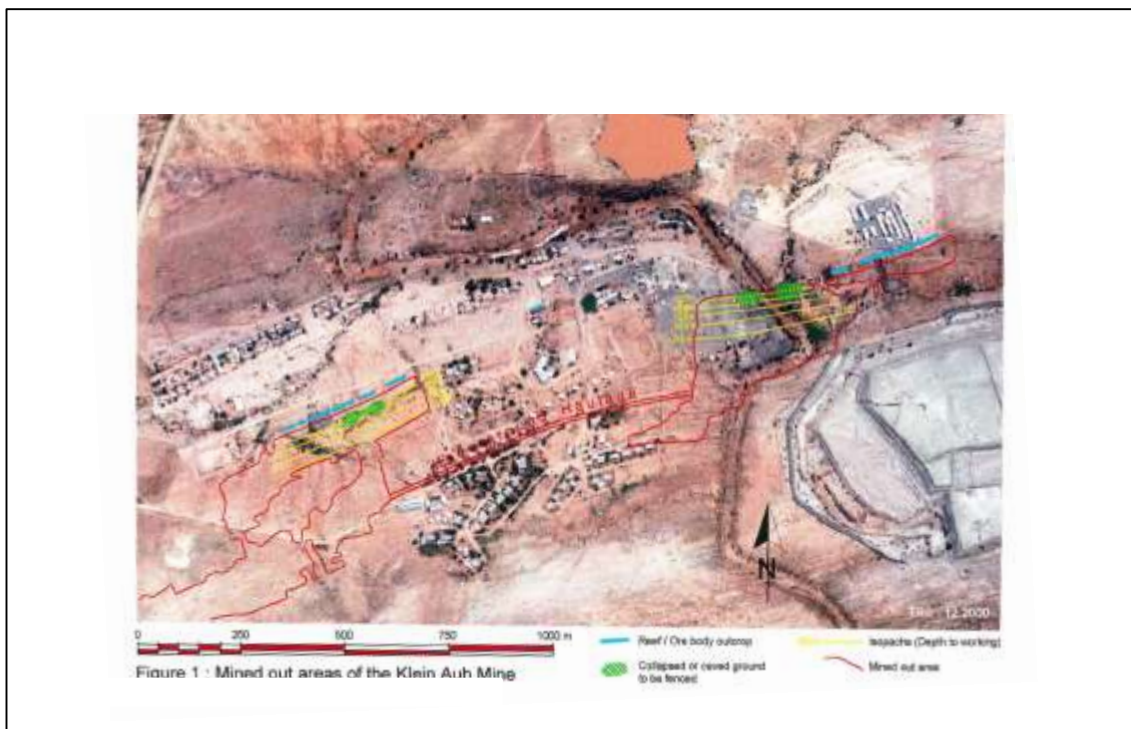


Figure 82. Mined-out areas in Klein Aub, Namibia (Source: BGR, 2001).

5.3. Tsumeb

Tsumeb evolved from being a minor copper trading place to a mining town and finally transforming into a significant urban centre located in the northern Namibia, 431 kilometres north of Windhoek, 57 kilometres north-west of Grootfontein, sixty-five kilometres north-east of Otavi and 283 kilometres south-east of Oshakati (see Figure 83).



Figure 83. Geographical location of Tsumeb, Namibia (2010).

Tsumeb is a gateway to the Etosha National Park, eighty kilometres to the west, and located along the Trans-Caprivi Highway and Tsintsabis-Katwitwi road. A road and a railway line also conveniently connect Tsumeb with the coastal port of Walvis Bay. Its positioning in a subtropical climate, bordering on an area with a semi-arid climate,

determines that Tsumeb and its vicinity receives good annual rainfalls compared to the rest of the country. The average rainfall amount to more than 550 mm, though in some years it could be twice that amount. The rainy season that lasts from November to March is hot, reaching 45⁰ C, but relatively easy to bear due to high humidity. During the other half of the year, from April to October, it does not receive any rain and average minimum temperatures drop to between 4 and 6⁰ C and at night could drop below freezing point. The differences in temperatures between day and night is less extreme than in other parts of Namibia.

Good annual rainfalls coupled with fertile soils in Otavi Mountainland are particularly favourable for lush vegetation. The surrounding vegetation is dense and could be defined as woodlands and large evergreen trees retaining foliage throughout the year. Tsumeb is one of the very few areas in Namibia where underground water is still abundant. With good annual rains and fertile soils the area allow for intensive agriculture. Tsumeb belongs to the so-called “Tsumeb, Grootfontein and Otavi maize triangle” and is renowned for agricultural production. The nearby farms are big commercial farms, mainly growing grain, fruit and vegetables.

Located in the Oshikoto Region, Tsumeb forms an independent electoral constituency. The town was the regional capital until 2008 when the Omuthiya settlement to the north of Tsumeb was proclaimed as a town and Tsumeb lost its former title.

5.3.1 Historic overview of Tsumeb's development

The Otavi Mountainland that stretches from Grootfontein westwards to beyond Outjo was populated by the Hai//kom and Damara tribes (Source: Tsumeb Museum materials). An abundance of their place names in the area indicates that they have been occupying this land for many centuries, long before the arrival of the first European explorers. The mountains in the Grootfontein-Tsumeb-Otavi area held rich high grade copper ore deposits that were mined by the local Hai//kom San people (Schneider & Seeger, 1992). It is impossible to determine the exact time when the copper ore was first broken from the outcrop at Tsumeb for smelting, and a discussion of the development of mining in the town's environment will thus go back no further than two centuries (Agenbad, 2004). The San themselves never smelted copper (Source: Tsumeb Museum materials). They had the knowledge on location of copper ore deposits while the Ovambos mastered the technique of smelting. The Ovambo people smelted copper on the sites where they obtained it and after it was smelted, they left the area. In this manner the early copper trade took place for centuries and the deposits of the Otavi Mountainland were worked for generations prior to the arrival of European explorers, starting from 1851 and onwards. First written evidences of copper deposits are reflected in the diary of the Englishman Sir Francis Galton, who visited the Otjikoto Lake area and met various local groups of San and Ovambo people, trading with the copper ore (Söhnge, 1967). Several exploration missions followed as the interest about copper was high and worldwide driven by the enormous growth of world copper demand in 19th century (Joseph & Kundig, 1999).

Between 1892 and 1901, the German government granted concessions to eight companies to operate in Namibia, formerly known as South West Africa. These concessions were partly, but by no means wholly, based on land sales and the granting of mining and other rights by Namibian ‘kapteins’ and ‘ovahona’ (Wallace, 2011). On 18 August 1892, the South West Africa Company Ltd was founded in London with the assistance of the German government. Their objective was the exploitation of the mineral deposits in the Otavi Mountains. On 12 September 1892, the company obtained an area of 50 000 square kilometres, including the Otavi and Tsumeb copper mines (Source: Tsumeb Museum materials). The South West Africa Company (SWACO) was given exclusive rights to the minerals as well as construction of the railroad system. The condition was to develop a mining operation within twelve years and to continue development after that period, otherwise its mineral rights would lapse (Gebhard, 1999). An expedition was sent from London into the Otavi Mountainland to assess the ore deposits. On 12 January 1893, the expedition under Matthew Roger arrived in the Tsumeb area and reached the twelve metres high and 150 metre long ‘green hill’ and 1893 was considered to be the founding year of the Tsumeb settlement (Dierks, 2002). Roger stayed for approximately a year in the area, made an assessment of the ore body and concluded that this was the best specimen he had ever seen. The positive results at Tsumeb necessitated further investments for the development of the ore body. The Otavi Minen-und Eisen Bahngesellschaft (OMEG)²⁰ was founded as a colonial company on 6 April 1900, and was given instructions to undertake further surveys to determine the magnitude of the copper deposits described by Roger.

²⁰ The Otavi mining and railway company, Otavi Minen-und Eisen Bahngesellschaft (OMEG), was founded to build a railroad between Swakopmund and Tsumeb.

Tsumeb consisted of a few, widely spaced little shacks, locally known as “Koppelbuden” and tents. Others under construction were a laboratory, three water reservoirs, and two hospitals for whites and non-whites, a doctor’s house, corrugated iron dormitories for miners, two mess-rooms and twelve houses for the OMEG staff (Gebhard, 1999). Before the railway line was finished and copper ore production could start in 1907, Tsumeb mining settlement was complete and functional. In 1905, Tsumeb was proclaimed as a town.

The same year when the first shipment of ore took place, the first blast furnace at Tsumeb started to operate in 1907. The first full fiscal year of production from April 1907 to March 1908 showed extremely satisfactory results. The high grade export ore was shipped to Germany, Wales and America (Söhnge, 1967). Tsumeb proved to be more profitable than originally expected (Catholic Institute for International Relations, 1983). Production was for the world market, and the effect on the local economy was very different from that of pre-colonial mining. It was very limited and very disruptive. Most mining inputs, goods for the residents were imported; only some food and timber came from the miners’ own farms or business entrepreneurs who bought plots and farms from the OMEG to supply growing town with fruit and vegetables (Söhnge, 1967; Gebhard, 1999). A major impact of mining was in supplying tax revenue and bringing into being parts of the railway network (Catholic Institute for International Relations, 1983). Very little supporting industry was stimulated.

During the first years of organized mining, the living conditions in Tsumeb mining town were very primitive and amenities at a minimum. In 1909, many of the personnel

were still housed in 'Koppelbuden', little two times three metre timber shacks, inherited from employees of the railway construction crew (Söhnge, 1967). Each iron dormitory accommodated ten people of various cultures and nationalities. At that stage Tsumeb did not have streets and the few existing houses were reached by footpath. One of the first permanent buildings in town was the mine office with a tower (Gebhard, 1999). In 1909, heavy rain caused disruption in the water supply from Otjikoto Lake, when the pumps were submerged by rising water. This resulted in a shortage of drinking water for Tsumeb town. The water pumped from the mine had been tested and considered to be unfit for human consumption. Thus water had to be railed from Otavi to Tsumeb (Gebhard, 1999). People started to fall sick with kidney diseases, many of whom, especially infants, died. The cause was the presence of lead in the drinking water. Lead poisoning caused the most fatalities among the miners (Gebhard, 1999). An alternative water source was searched for and a spring was discovered at Klipfontein.

In 1909, the copper price dropped sharply while mining costs continued to rise. There were always problems with the labour recruitment, but after the discovery of diamonds in 1908 many Ovambo mine workers left for the newly-opened diamond fields in Lüderitz where they could earn better wages. It became necessary to recruit 250 Cape Coloured men on a one year contract and ten miners were brought in from Germany (Gebhard, 1999). After their one year contract had expired in 1910 the mine faced the same problem and considered importing a Chinese labour force, but the proposal was refused by the Administration. The complement of German miners was increased, bringing the permanent staff at the OMEG to a total of 120, all of them of European

origin (Gebhard, 1999). There was a high turnover among the underground labour force, claimed by mine management to be because local people generally were not willing to work underground. The labour supply remained problematic and the mine management decided to source some labour from the neighbouring British colony, South Africa. The living conditions of the local miners were simple. Every miner was given an unfurnished room. Bedsteads with bug-infested mattresses could be bought at the warehouse. Furniture was nailed together from dynamite box planks. Temporary mine workers who could not get company accommodation were given one Deutschmark daily for living expenses. They had to live in tents or rented sleeping quarters from the mine's store. This store had a shed with fifteen beds. Every bed stood with its legs in small paraffin-filled containers to keep bedbugs and other unwelcome nightly visitors at bay. Above each bed there was a locker. A water-filled basin completed the furnishings. For those who preferred to do their own cooking, there was a large woodpile in front of the shed (Gebhard, 1999).

With the onset of the World War I and the mobilization of an army, the mine once again was facing a shortage of labour. While the mine continue with limited operations, the Tsumeb smelter had to be shut down in July 1914 and then followed by closure of Tsumeb mine in 1915. When the German garrison surrendered to the South African forces, the mining town considerably reduced in size, but not everyone who worked in Tsumeb returned to their place of origin (Gebhard, 1999).

In 1918, Tsumeb endured the outbreak of Spanish influenza, which took the lives of mine workers. Almost half of the local miners died during the influenza outbreak and

only 8% of Europeans succumbed to the disease (Catholic Institute for International Relations, 1983). The living conditions in the compounds of local mine workers were very poor, twelve or more people lived together in one room. The deaths were so many that bodies were transported out of town with the mine train and buried in mass graves. The smell of death hung over Tsumeb (Gebhard, 1999). In spite of the lost war that placed the former German South West Africa under the administration of the South African Protectorate, the OMEG retained all the mines within its jurisdiction and the mining operations resumed when the German prisoners of war returned. The OMEG found it very difficult to restart activities as this required substantial financial input. After long negotiations, the Standard Bank granted a loan of 20 000 pounds sterling, accepting as surety 300 tons of ore in Swakopmund and 10 000 tons of ore in Tsumeb (Gebhard, 1999). In 1921, the mining resumed and operations were in full swing once again.

The town was vibrant again. A good relationship developed between the new administrators and the remaining inhabitants. The town attained new capital projects. A large hospital for non-whites was built in 1925 followed by a modern compound the following year and in June 1926, Tsumeb gained a new Lutheran Church building. Gardens, streets lined with tall trees and a beautiful park in which there were always some trees in bloom became striking features of town.

In the 1930s, the world market slumped - and with it mining in the then South West Africa. The world depression affected Tsumeb operations. The base metal prices were shrinking. Mining started to show losses, workers were retrenched and, growing

worse, mining operations ceased on the 1st October 1932. The mine was put on maintenance and care, only personnel attending to general maintenance and the overhaul of all the machinery remained at the mine. In 1933, the smelter also had to cease its operations. Rock bottom was reached in 1934 when the copper price sunk to a new all-time low. The town was deserted and many private institutions such as the school and companies serving the miners' needs were no longer able to finance themselves.

The economic despair was worsened by environmental mishaps. In 1933, very heavy rains fell and washed away whole stretches of the railroad network. As a result the trade and traffic in the country came to a standstill. The scarcity of daily necessities was frightening. Trains got derailed and attempts to transport the necessary goods repeatedly failed. Dry riverbeds started to flow with lots of catfish. After the rain locusts came to Tsumeb, swarm after swarm for eight months. They destroyed not only the gardens and sowing fields but completely denuded the veld and trees. A further result of the rains was a severe outbreak of malaria, sapping the strength of many miners (Gebhard, 1999).

A gradual improvement came in 1937, with the price of metal rising once again. The Tsumeb mine was dewatered and production re-started in December 1937, while the smelting already took place a few months earlier, in June 1937. This new productive phase was abruptly cut short when World War II broke out. The metal price fell again and production costs rose above acceptable limits. Mining was abandoned on 1 January 1940, a year after the outbreak of the war. With the mine out of action it

became necessary to charge for house rent, water, electricity and sanitation. Life became dull when all radio sets and photographic apparatus had to be handed over to the police. In 1941, Tsumeb came under military occupation and barricades were set up across the streets at the railway station and police headquarters, while livestock was no longer permitted to graze in town. Medical services were curtailed to a near standstill. The hospital that was a private practice for Dr Jensen was taken over by Dr Fourie, a military medical officer (Söhnge, 1967). By February 1944, no medical doctor was left, Tsumeb became dependent on Grootfontein for the treatment of serious illnesses. There were many deaths from malaria and pneumonia while meningitis claimed a heavy toll among the local people. The military occupation of Tsumeb ended in February 1944.

In 1946, the Tsumeb mine was put up for sale. The O'okiep Copper Company on behalf of the Tsumeb Corporation Limited (TCL) submitted a bid and it was granted on 6 January 1947, being the highest of several tenders. The main shareholders of this newly-founded company were Newmont Mining Co., the O'okiep Copper Co. and the South West Africa Company. Within a week personnel from O'okiep arrived in Tsumeb. The employees were discouraged to bring their families, as there was not enough accommodation in the settlement. The shortage of accommodation became so bad that they had to convert the Turnhalle into sleeping quarters for additional personnel (Söhnge, 1967). The new look of Tsumeb evolved in two cycles, the first associated with the growth of the mine from 1947 to 1954, and the second with the smelter from 1960 to 1966. A new power plant and a flotation plant for the concentrator were built. TCL was expected to invest in the mine's expansion and

modernization. Many capital projects and the upgrading of the Tsumeb township were initiated and the mining activities in Tsumeb resumed in 1948 (Kramer & Hultman, 1973). When the mine sprung to life in 1947, an influx of mine workers caused a sudden demand for fresh produce. Cattle ranching had continued under the OMEG control throughout the war years, but there was also an instant need for milk, vegetables and fruit. Extensive gardens were laid out just north of the town and subsequently at Lake Otjikoto (Söhnge, 1967). The old corrugated section of the Minen Hotel disappeared in 1951 and was replaced by a larger and modern structure. The compound premises for local labourers were completed the same year. Five hundred and sixty-three new houses for married non-white miners were built and opened in 1953 (Söhnge, 1967) and some 400 new houses for whites were also built. Most of the town's streets were tarred and the town gained a neat and modern look. The population grew and Tsumeb became a magisterial seat of a new district in 1952.

Unfortunately the upward development was cut short in 1958 when drop in world metal prices occurred. The mining industry was undergoing a completion of another mining cycle. The mine workforce diminished by 15%, but the slowdown was not devastating and lasted only until 1959. The copper, lead and zinc price quickly recovered bringing about the next wave of expansion and modernization in Tsumeb. For every new building in town provision was made for water lines, sewage pipes, power lines as well as telephone cables, all of them involving large additional expenditures. The quiet little mining camp became a sprawling town with tarred streets and newly planted rows of trees (Söhnge, 1967). When the signal was given for the construction of the smelter in 1961, Tsumeb burst with the addition of block after block

of houses and experienced a wave of new influx of smelter personnel. Lots of infrastructure improvements occurred during the 1960s. A new road was tarred, and at the time a modern gravel highway was also built between Grootfontein and Tsumeb. By the end of 1966, the tarmac road was open to traffic all the way to Windhoek and its extension northward through Ovamboland to the border with Angola well underway (Söhnge, 1967; Kramer & Hultman, 1973). In the 1970s, Tsumeb was Namibia's largest producer of base metals, including lead, blister copper, and zinc concentrates, with by-products of silver, germanium and cadmium. With a workforce of about 6 000 people in 1971 to 1972, Tsumeb had more employees than any other private industry in Namibia. Forming the nucleus of the company's operations Tsumeb was a 'jewel mine' in Namibia (Kramer & Hultman, 1973). The company was also Namibia's largest employer of contract labourers. From the restarting of Tsumeb's operations in 1948 until 1972, the company relied on SWANLA (South West African Native Labour Association) for recruitment of these workers. Over 98% of Tsumeb's African employees were contract labourers recruited from Ovamboland and the Kavango. The difference between the working conditions of white and non-white workers were remarkable. The discrimination and separation was so obvious that it created tension not only between mine workers and management but also between workers along racial lines. In December 1971, a massive strike broke out, when almost half of the Ovambo migrant workers returned home to prove their disagreement with their contracts. For months the workers remained in Ovamboland, where the South African army was deployed, a state of emergency declared and repressions unleashed. In the middle of the strike, the South Africans agreed to abolish the South West African Native Labour Association (SWANLA) labour recruiting agency. A new contract

called an 'agreement' was imposed, which supposedly made it easier for workers to change jobs. In the event, these changes prove more cosmetic than real; the labour bureau run by Bantustan 'authorities' replaced SWANLA, and it was still impossible for families to move to the place of work, the men went alone (Catholic Institute for International Relations, 1983; Cronje & Cronje, 1979; Hishongwa, 1997). The 1971 to 1972 strike had an influence on labour conditions. Average cash wages at Tsumeb were increased by 60% between 1971 and 1973 and another large rise of 51% in 1976 (Catholic Institute for International Relations, 1983). Once again, the Tsumeb mine experienced a mineral boom in the 1970s before the slide began in 1979, ending in the major fall two years later. The world slump was quickly reflected in falling metal processing, and this had immediate effects in Namibia. The copper smelter that used smelting concentrates from Otjihase copper mine also had to shut down in 1978. In 1981, copper prices were at their lowest level in thirty years the impact on the people's livelihoods was immense (Kramer & Hultman, 1973). Mining activities reopened the same year, but sales were 32% down on 1980 levels. Management responded to it by cutting expenditure, mining higher grade ore and raising loans (Catholic Institute for International Relations, 1983). Tsumeb smelter reassumed work in 1982.

The previous, 1971 - 1972, strike did not bring significant improvements for miners working conditions. With no social benefits and poor wages more than 400 people went on a three months strike in 1987. Many of those who went on strike were fired and not allowed to reapply (Source: interview with T005 on 12.05.2010). The TCL strike of 1987 was a protest not only against the poor salaries but also against the inhumane hostel conditions that mineworkers had to endure, workers experienced

ongoing racism and tension that continued to build until the historic strike of 1996 (LaRRI, 2002). Coupled with operational mishaps - insufficient ore and high water inflow to the shaft which increased pumping costs, the strike of 1996 was damaging and violent, leading to complete immobilization of mining operations; the TCL mine closed without warning (Insight, 2006) and went into liquidation on 29 April 1998.

Closure of mining resulted in the retrenchment of about 2000 workers who were given their pay-outs as required by law (LaRRI, 2002). Tsumeb was under pressure with a decrease in population, and with no financial viability it was on a visible decline. Many people who lost their jobs and those who did not return to their homes in other areas in Namibia had to rely on the informal market as a source of employment. With no alternative employment opportunities, the closure of TCL provoked a crisis in Tsumeb. The government wanted to ensure a re-opening of the mine to retain the jobs and to ensure the survival of Tsumeb (LaRRI, 2002). Until 2000 Tsumeb was merely pursuing for its survival. The government of Namibia was left with the choice of nationalizing the mine or finding an appropriate buyer. Eventually in 2000, a deal was reached with key individuals of the TCL management team and the trade unions, the Namibian Mineworkers Investment Corporation (NAM-MIC) and Labour Investment Holdings (LIH). The new company was called Ongopolo Mining and Processing (Pty) Ltd. and it was wholly Namibian-owned. Ongopolo reemployed some 800 to 900 of the former 1500 TCL workforce and restarted operations in 2000. Ongopolo Mining and Processing operated three copper mines throughout Namibia and smelted copper for export to world markets. TCL had spent some N\$50 million on a new but untested Ausmelt smelter just prior to closure. The challenge to Ongopolo

was to restart operations and reinvest without the presence of shareholders with significant capital. From the very beginning Ongopolo was disadvantaged by not having well trained professionals in the industry and by a bad legacy from the TCL days. The lack of local expertise hampered the management of the new organization, increasing inefficiencies and reducing productivity. Ongopolo did not invest enough in education and did not focus on its future role to position the Organization for the changing world economic climate (Nujoma, 2009). At the same time, international copper prices were sinking to an all-time low (Insight, 2006). By 2005 Ongopolo could no longer sustain its operations, largely as a result of poor management decisions and investments which led to liquidation. During the period the mine was closed in 2005, the town appeared uninhabited, several businesses closed shops and many people left to seek employment elsewhere. The residents feared the worst as they watched the collapse of Ongopolo. In 2006, a UK company Weatherly International plc. received the green light from the High Court of Namibia to acquire a 97% stake in Ongopolo paying US\$9 million to key lenders and injecting US\$20 million of new investment into the business. The Weatherly International's decision to buy out the cash-stripped company was looked at as a welcome relief (Insight, 2006), but the Namibian copper industry was once again in the hands of an international company (Nujoma, 2009).

The Weatherly bought the mines when the copper price was very high and there was a great excitement in the mining industry. It did not last long and by October of 2008 the copper mines in Namibia were feeling the effects of falling metal prices. Weatherly stopped operations at the Tsumeb West Mine, transferring their people from that mine to the Tschudi Mine, only Tsumeb smelting operations were relatively unaffected by

the copper price slump. The smelter was functional due to the bulk of its revenues from the custom treatment of imported concentrate. The three years agreements with mines in Bulgaria and Peru to process 100 000 tonnes of concentrate per year secured its survival. In 2009, they produced approximately 21 200 tonnes of blister copper and were planning to increase the production and add an acid plant. While Weatherly's other copper assets in the country were closed or put on care and maintenance, the smelter was operational. However, in 2010, the ownership of Tsumeb smelter was changed to the Dundee Precious Metals of Toronto, Canada, which had a long term plan for the smelter. At least until 2020, which is safeguarded by the agreement with Chelopech mine in Bulgaria.

Despite the closure of Tsumeb mines, the takeover of the smelter softened the obscurity of withdrawal of mining activities from Tsumeb. Tsumeb remained relatively unaffected by closure of mines. While most of mine workers lost their jobs and left for their places of origin, the share of those who remained was reabsorbed in smelter operations. By closure of mines, Tsumeb had also managed to attract many other investments and instead of decline, it experienced growth. The town that for centuries depended on mining was no longer influenced by the decline of the mining industry. Since 2008, no mining activities had taken place in Tsumeb, it is only Tsumeb's smelter that still represents the industry, but it has no supremacy in the town and its development. The long awaited transition of the mining settlement to a diversified urban centre had occurred.

5.3.2 Socio-demographic profile of Tsumeb community

Development of Tsumeb community

Before mining began commercial production, the area of the present Tsumeb was settled by temporary mine and railway construction workers whose numbers grew considerably over the subsequent years. Around the proclamation of Tsumeb town in 1905 more than 1 000 people were living there, all of them on a temporary basis. People came to Tsumeb with the purpose to work and left the town after their contractual obligations had expired or because of better employment opportunities elsewhere. Tsumeb was remote and isolated and access to the settlement was not easy and only the families of white senior mine workers were accommodated in other rural or urban centres closer to the settlement, mainly in Grootfontein.

When the first diamond was discovered near Kolmanskop in 1908 a large number of non-white mine workers left the settlement for work on the diamond fields where they were paid better wages and salaries. The population turnover was very fast and the mine struggled to keep its mine workforce, particularly local indigenous people. Apart from that, the first half of the 20th century experienced many different misfortunes; the two World Wars, constant outbreak of different diseases and the occurrence of other environmental cataclysms. In 1918, the Spanish influenza alone killed so many people that the population of Tsumeb shrunk from more than a thousand residents to merely 328 people remaining in the town. By 1922 Tsumeb mine personnel grew to eighty two Europeans and 1283 local workers, and increased further to 300 and 2400 respectively within the next two years.

The World's Great Depression slow down the production, but by 1937, everything stabilized and business was back to normal, the mine labour force grew to 3000 local miners and 300 of European origin. It was very short period of time of stability and growth that was followed by the next population decline. The World War II brought the Tsumeb copper mine operations to a standstill, a year later the smelter closed. The closure affected the jobs of 3800 individuals. People were sent back home, Tsumeb became completely deserted, only those attending to general maintenance and overhaul of all the machinery remained. By the end of 1940, there were only 116 men, 153 women and 159 children in Tsumeb. The town was a very quiet place during World War II. World War II took its toll, and when it was over there were 428 people living in Tsumeb. After the war Tsumeb slowly recovered and stabilized. A few years later the economy rose sharply and the vibrant commodity markets stimulated expansion of mining production in Tsumeb's copper mine, resulting in an increase of the mine's work force. Between 1971 to 1972, there were already 6 000 mine workers living in Tsumeb alone, and with their family members and the growing number of service suppliers the population was nearing 10 000. The population matured and more and more people remained in Tsumeb. With every consecutive mining cycle Tsumeb added a larger share of long-term residents withstanding the conditions prevailing during economic slowdowns. People started to settle permanently and the permanent population of Tsumeb was on the rise.

A sequence of several mining cycles followed, but with every slowdown, the negative impact on the settlement's ability to retain its population started to lessen, with the exception of the mine worker strikes of 1987 and 1996 when Tsumeb hit rock-bottom

and the survival of the town was on the edge of collapse. The effect of the strike in 1996 was so devastating that although mining ceased and reopened, a lot of mine workers left the town for good. The economy was paralyzed and residents employed in other business sectors were also concerned about the future, considering whether to leave or remain. The years after the strike were very hard with very limited mining activities, but the population of Tsumeb managed to grow. The growth was associated with a natural population increase and non-mining migration, establishing a population base with the potential to sustain itself without relying on employment in mining. Tsumeb changed from being a mere mining community to a settlement with more diverse community.

In 2001, mining once more suffered losses and the newly established Ongopolo did not contribute much to increase employment, although there were 14 907 people in Tsumeb. According to the 2011 national census Tsumeb was home to 19 500 people accounting for 10.9% of the total Oshikoto Region's population. The population increase since the 2001, census amounted to 4 593 people could not be attributed to the mining operations, but rather to recent migrations and natural population growth which was stable according to the statistics of the Population office in Tsumeb. The data revealed a large number of birth certificates, issued per month, amounting to an average of fifty to seventy as compared to death certificates amounting to twenty one per month. This suggested that birth rates exceeded the death rates contributing to a positive natural growth. However, the official at the Population office, pointed out that these statistics only be considered as indicative since there was an increasing trend for people from other areas to come to Tsumeb to give birth, suggesting that actual birth

rates among Tsumeb's residents could be lower (Source: interview with T011 on 14.05.2010).

Approximately 5 000 people who lived in the informal settlement on the outskirts of Tsumeb were not included in the official statistics of Tsumeb, but formed an important base of the demographic situation of Tsumeb and should be considered for future planning purposes. In total there were close to 25 000 people whose livelihoods were directly or indirectly linked to Tsumeb (Source: interview with T004 on 12.05.2010).

Every consecutive opening of the mining activities brought new excitements and a new wave of influx of migrants in hope of job opportunities, many of them of a poor background though and at times looked upon as a burden to the town. In the long run, these extra people contributed positively to the settlement's positive development, to an increased population base for the retail market, diversifying not only the economic base of the town, but also balancing its demographic characteristics, particularly male and female ratios, leading the settlement to become more enduring. The population base of Tsumeb transformed and the growth of the town was no more reliant on the mining activities alone. A demographic analysis revealed that only 800 people were employed at the Tsumeb smelter, making for three to four percent of the total population still being related to the mining industry. This was a very small share and indicated that the town was no more a mining town as the population employed by the mining industry, including smelting, was in the minority and on the decline. On the other hand, the origin of today's population was complex. It did not represent one particular tribe or ethnic group. The cultural mix of people had been shaped by mining

for more than a century, bringing in people from different places, the majority being from the northern areas of Namibia, such as Ovamboland and the Kavango, and adding some residents of European origin. Tsumeb had a large number of descendants of old mine workers who were born in Tsumeb and called it home.

Tsumeb's community survey revealed that 28% of the residents were born in the town and 14% have been living there for longer than ten to twenty years (see Figure 84). The statistics indicated that Tsumeb had at least 42% long-term residents. Over the years the town had matured and people chose to stay there on a permanent basis, and not only saw it as a place of work. The demographic characteristics of the long-term residents indicated that these were mainly people in their late 40s or 50s; 65% of them were female, and many of them employed in the public sector, particularly in the education sector.

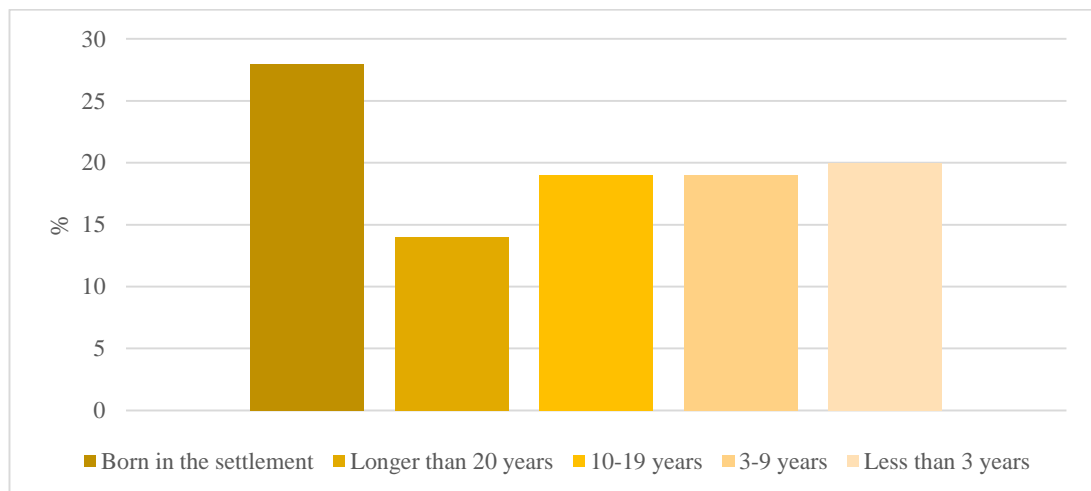


Figure 84. Respondents' length of stay in Tsumeb, Namibia (2010).

Nineteen percent of the community lived in Tsumeb for at least three to nine years and 20% had arrived less than three years ago (2008-2010). The recent influx of people could be associated with the latest developments in Tsumeb, the opening of the

Ohorongo Cement factory and the road constructions that brought a lot of people in the hope of finding a job. Forty-seven percent of the respondents moved to Tsumeb because of their employment and 17% moved to be close to the family. A relatively small share, only 9%, moved in the hope of finding a job (see Figure 85).

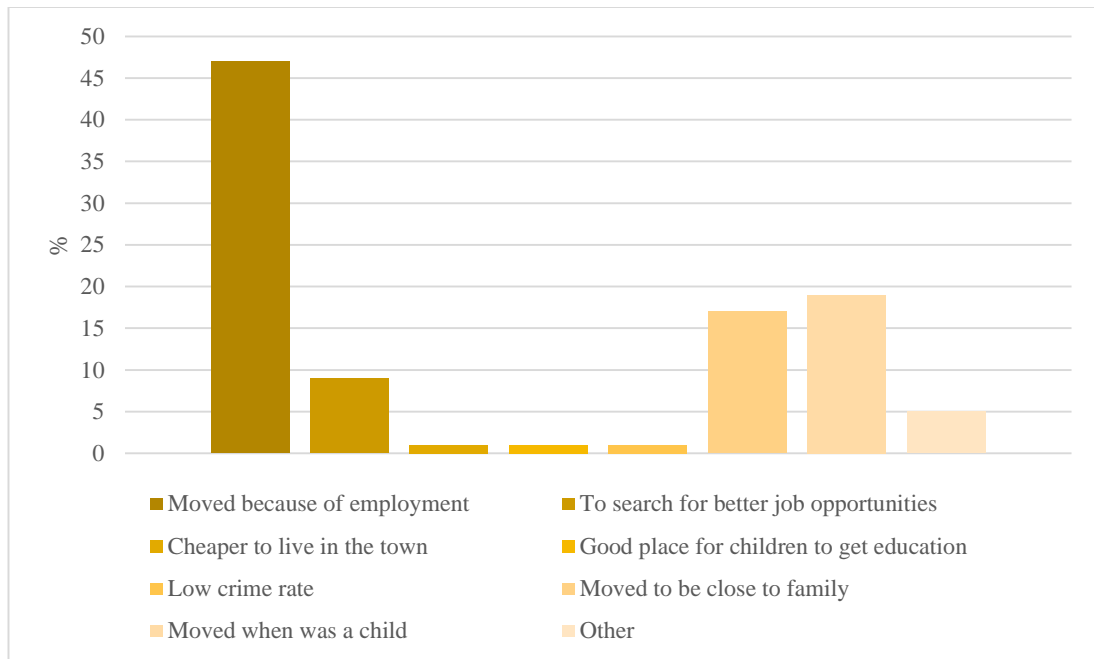


Figure 85. Residents' reasons for settling in Tsumeb, Namibia (2010).

For a long time the movement of people depended on the mining operations. It was recounted by several long-term community members that there were more job seekers in the town when the mines were operational, particularly a large number of male migrants. In 2010, the reasons why people moved to the town were diverse; they were no longer determined by mining alone. Among 47% of those who moved to Tsumeb for employment opportunities did not rely on employment in the mining industry, but rather wished to have employment in other private or public sectors.

was cited to be the possible employment opportunities or that they accompanied a family member who had already secured employment in Tsumeb.

Despite the sense of permanence, only 24% of the people were sure they will never leave the town (see Figure 87). These were people who were either born in Tsumeb or have been living there for at least ten years and longer. Only one recent migrant expressed willingness to stay in Tsumeb permanently. There was no particular gender division regarding those who liked to stay, but a noticeable majority of them were married, suggesting that they have established families in Tsumeb and are willing to stay and raise their children in the town.

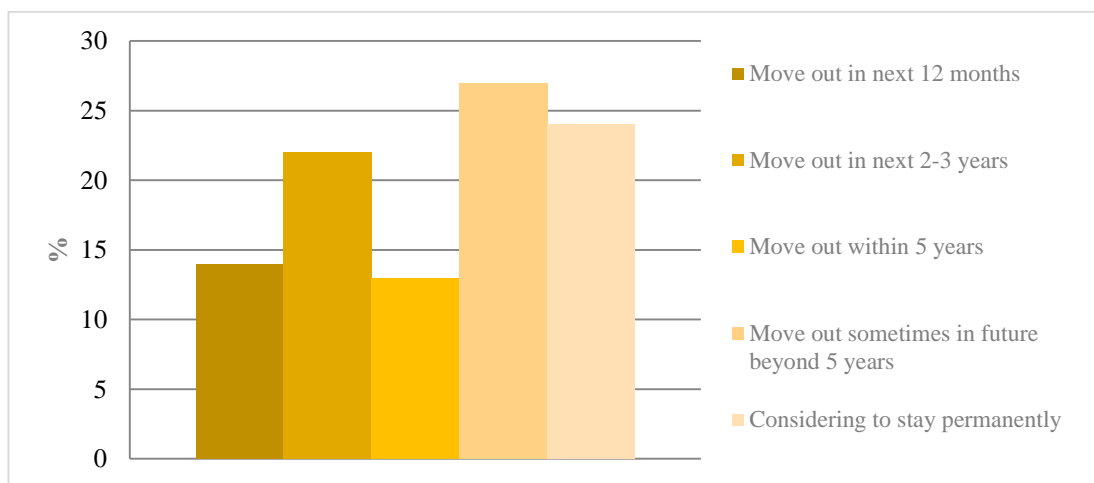


Figure 87. Residents' intentions to stay or move out of Tsumeb, Namibia (2010).

The residents who expressed their desire to move out of Tsumeb were young people originally from adjacent rural and urban centres, particularly from the northern areas of Namibia and from Grootfontein. They had not been staying in Tsumeb for longer than three to ten years and considered the town as a temporary stopover before proceeding to other, usually larger, urban centres in Namibia. Thirty-three percent of all respondents liked to move to Windhoek as a final destination while the coastal area

Demographical characteristics of Tsumeb's community

The migration trend in Tsumeb had influenced the age and gender composition of the town. The stop-over for youth before moving to other larger urban centres and the capital city defined that the town had a large share of population in the age group of 21 to 30 year olds. The composition of Tsumeb residents where the majority was in an economically active age group (see Figure 89) was relatively favourable and defined a positive future for the town. On the other hand an enlarged number of recent school graduates put tremendous pressure on employment opportunities for these age groups. The age analysis revealed that only three percent of the adult community was older than 60 years and the population dependency ratio was considered low.

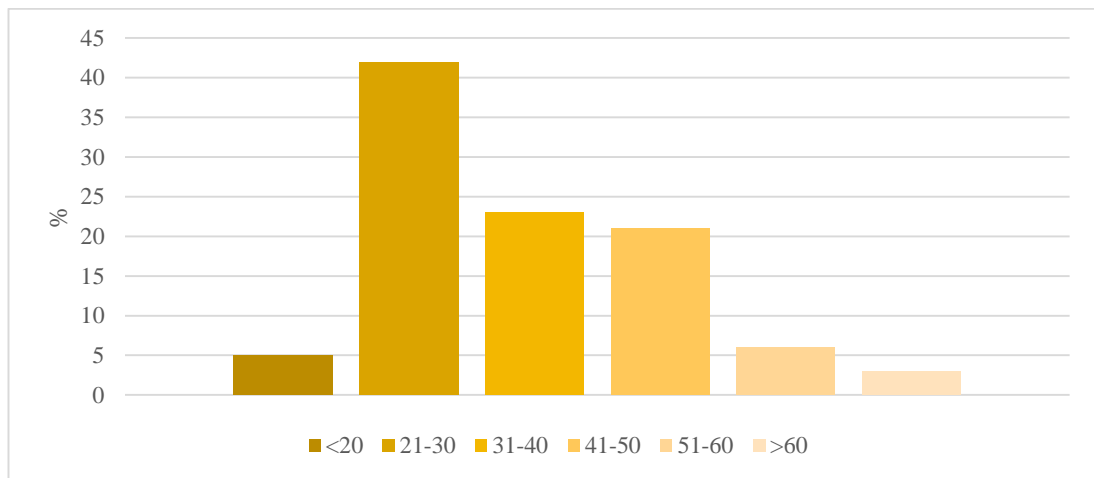


Figure 89. Age of Tsumeb's adult population, Namibia (2010).

There was no significant imbalance in the town's gender ratios. Tsumeb had 9 900 female and 9 600 male residents, the same trend was confirmed by the community survey and the demographical analysis of the town. The equal share of male and female population suggested that Tsumeb did not have to depend on the male work force only and therefore did not represent the typical demographic characteristic of a mining settlement where the male population was in the large majority. Fifty-one percent of

the surveyed community were single, and 39% were married or in permanent relationships. There were more single females than males among the single population group in Tsumeb.

The education level was among the population relatively high, 22% of the community had a tertiary education, while a share of people with an education lower than Grade 10 was minor (see Figure 90). The analysis revealed that females were more educated than males, a particularly large share of females were among the people with tertiary degrees. Over twenty-six percent of surveyed women had a university degree or other tertiary education qualification. Among male population, tertiary education was completed by 16% of males.

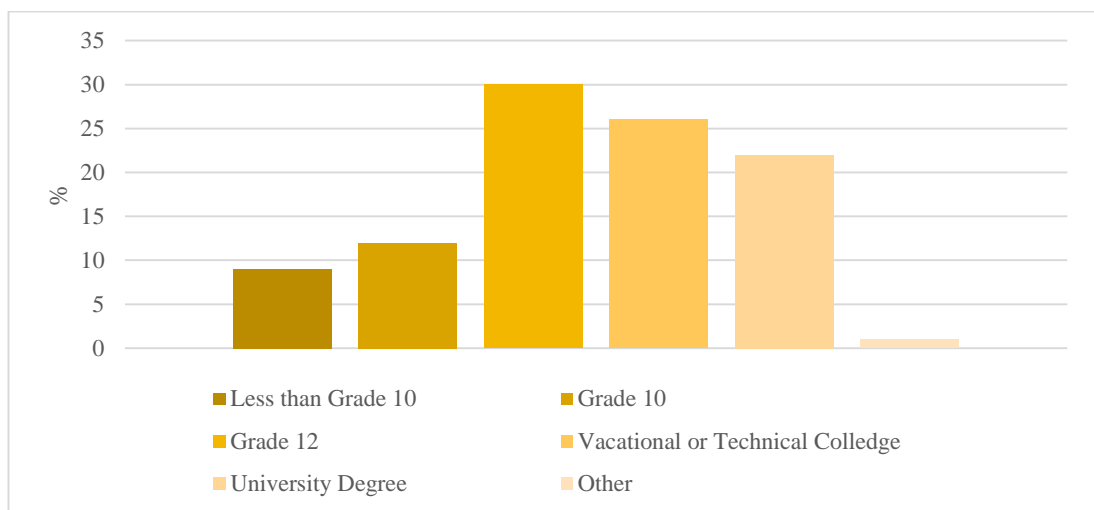


Figure 90. Education level of Tsumeb's residents, Namibia (2010).

Employment and incomes

The relatively high education correlated with satisfactory employment rates. Only 18% people of the surveyed adult community considered themselves as unemployed. Slightly different estimates were provided by the Municipality of Tsumeb, enumerating more than 35% of Tsumeb's population being unemployed. The

difference could be caused by the survey including people who were occupied in informal sector and therefore counted as employed. Unemployment was higher among males than among females, respectively, 56.2% and 43.8%. This was in line with the data on education verifying a higher education level among female residents than among males. Not one university graduate was unemployed among the surveyed population. The unemployment rate was more severe among Grade 10 and Grade 12 certificate holders.

Women unemployment was more widely spread among the older age groups of forty one to fifty years while male unemployment was higher among young and single males in the age group of twenty one to thirty years. Unexpectedly, unemployment was particularly severe among those who were born in Tsumeb across different age groups. The largest group of unemployed, however, was recent arrivals: those who came to Tsumeb in the last three years from 2007 to 2010. The main purpose of recent arrivals was to find a job and if unsuccessful they were ready to move further to seek employment in other urban centres in Namibia. This was in contrast to residents who were born in Tsumeb and had expressed willingness to stay in the town despite the lack of job opportunities. It transpired that a large share of the recent influx to Tsumeb was potentially transient where 43% of them have expressed willingness to move to Windhoek within the next twelve months.

Seventy-six percent of Tsumeb's employed community respondents were committed to full-time employment working for wages and salaries. Self-employment in Tsumeb is below 10%. With five income brackets Tsumeb had a large share of people

employed with relatively high remuneration (see Figure 91). Nine percent of interviewed people earned more than N\$15 000 per month and 37% earned between N\$5 000 to N\$15 000 per month, which were high earnings in comparison to other surveyed mining settlements for this research. The buying power of Tsumeb's community could be considered high. People who earned more than N\$15 000 per month had higher levels of education and skills. There was no gender distinction since they had an equal earning capacities. The monthly incomes were lower among younger people, and particularly low in the age group of twenty to thirty. The lack of higher education and work experience disadvantaged them from employment opportunities. This group was pessimistic about the future, expressed unhappiness about the lack of jobs for young people. Several of them shared the same sentiment that *"jobs are reserved only for friends"* and they felt powerless to compete on the job market in Tsumeb. According to them, the only jobs they could secure were some odd jobs such as stocktaking in the shops or other casual jobs.

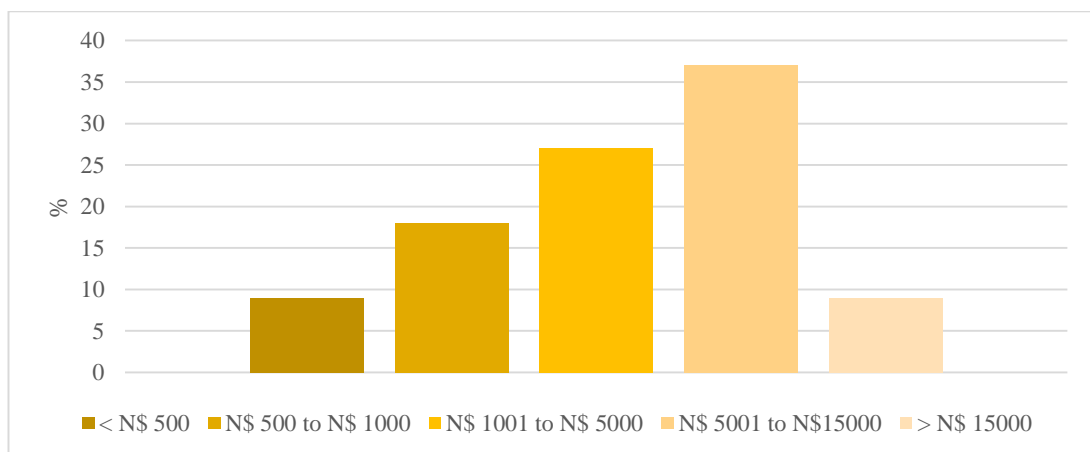


Figure 91. Monthly incomes of Tsumeb's residents, Namibia (2010).

A trend among the youth was to try and drink their frustrations and resentment away which in turn contributed to the crime rate in town. Fifty-three percent of the

community thought that there were more job opportunities in Tsumeb in recent years, but agreed that the job opportunities for young people, particularly school leavers, were very low. Only 13% of the community thought that there were job opportunities for school graduates.

Household composition and characteristics

In total there were 5000 households in Tsumeb with an average of 3.9 people per household, which was the lowest in the whole Oshikoto Region where the average was 4.8 (Republic of Namibia, 2012a). These figures compared favourably with the 2001 census data when the average household size in Tsumeb was 4.2 people and 5.6 in the Oshikoto.

A large share of Tsumeb's residents owned a house. Almost half of the residents reportedly lived in their own houses, 17% stayed in accommodation provided by the company and 16% rented their own space. Twenty-four percent of the people stayed with their family or friends, the majority of whom were young people who were born in Tsumeb and still stayed with their parents or families. Another group contributing to the large share of people staying with their family and friends on a temporary basis were recent migrants who had come to the town in the hope to find employment. Despite a few them being employed, these were predominantly of the lower income categories, such as cleaners, domestic workers or other casual workers.

5.3.3 Mine workforce survey

During the time of the survey the mining operations in Tsumeb were halted, with only the Tsumeb smelter still sustaining operations and contributing towards employment in the mining industry. Interviewed former miners who remained in the town after layoffs recounted their experiences of life in the mining settlement, the way of life at the Tsumeb mine, their work and interaction with the mine management. The experiences and opinions of recent employees in the mining industry, supplemented by the contemporary perspective of the current smelter workers indicated that although the times had gone by and much had changed, the experiences of the past were astonishingly similar.

The mining operations in Tsumeb halted in October 2008 and about 600 mine workers, most of them local Tsumeb residents, received upsetting news. Weatherly International, the owner of the Tsumeb mine and other copper properties in Namibia, decided to stop mining operations due to worldwide depressed copper prices in 2008. The copper price had crashed from around US\$ 8000 a ton at the beginning of 2008 to below US\$ 3000 a ton by the end of 2008 (see Figure 92). The previous expectation of a significant increase in mining jobs was replaced by prospects of job losses, threatening Tsumeb's community with serious social consequences. In response to plummeting copper prices, the Tsumeb West mine was closed and some of the workers transferred to the Tschudi mine some twenty five kilometres westwards from Tsumeb, but it did not take long before Tschudi mine succumbed to the same fate.

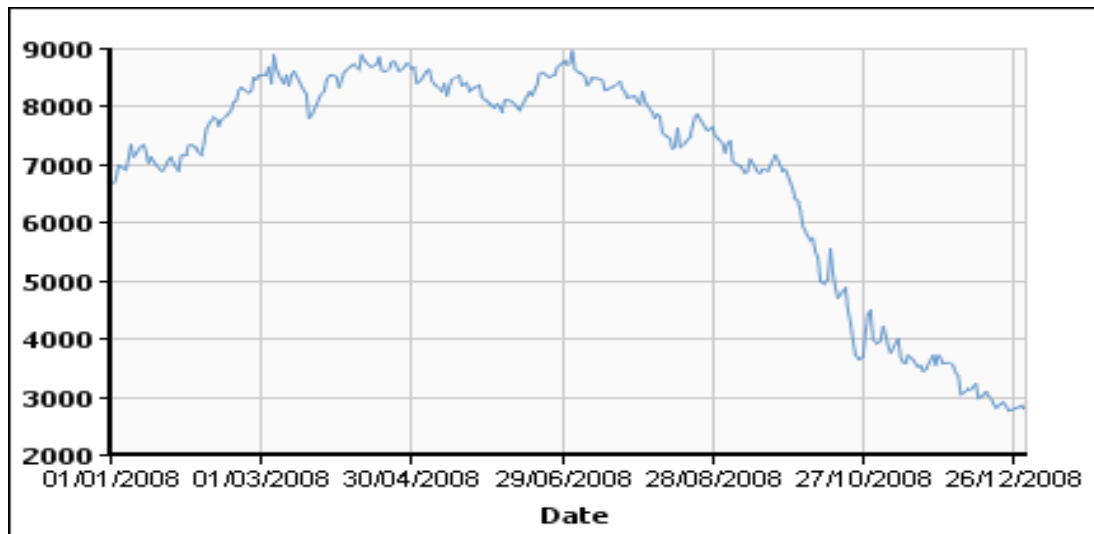


Figure 92. Global copper prices in 2008 (Source: London Metal Exchange, 2012).

The closure of the Weatherly mines left many workers uncertain about the company and their future. The copper mining company insisted that the exercise was aimed at reducing the production costs that came with the decline in the world copper price. Many mine workers were not convinced at the point and were planning an industrial demonstration that was called off at the very last minute. Only Tsumeb smelter remained operational and continued to employ people in the mining industry. The smelter was not affected by the dramatically plummeting copper prices as its functionality was secured by a long-term contract supplying copper ore from overseas.

In 2010, the Tsumeb smelter employed 290 workers permanently with an additional hundred positions created for subcontractual cleaning and security personnel. The smelter absorbed around 15% of former mine workers that were laid off in 2008. The major age groups of those employed in the smelter were men between forty to forty-eight years old, supplemented by a growing number of very young men between eighteen and twenty one year old. There was no official policy regarding the

employment of a particular age group, but the company tried to diversify the demographics of its employees and encouraged younger people to join the industry. In 2010, 20% of the total work force at the Tsumeb smelter were of a younger age group. The mining sector was dominantly male with women not exceeding 10% of the workforce.

Unlike in the past, the mining operator in Tsumeb did not provide accommodation. There were no company houses available for smelter workers. The old mining housing stock was already sold to individuals when the industry was operated by Ongopolo and remaining hostels were sold by Weatherly. The entire housing infrastructure that formerly belonged to the mine, in 2010, was the private property of individuals. Most smelter workers could not afford to rent a house and ended up living in shacks in the informal part of the town. Approximately 60% to 70% of workers lived in such unappealing conditions because their housing allowance was not sufficient to afford decent housing in Tsumeb. Dundee, new owner of the Tsumeb smelter, was contemplating a new housing policy that could assist employees to buy houses. The smelter operator planned to create a trust from which employees could borrow money on low interest for their mortgage needs. This was thought to ensure that smelter employees have formal accommodation instead of industry contributing towards the expansion of the informal settlement.

Apart from low salaries and wages, in the health of smelter workers had been a major concern. The interviewed workers complained of skin irritation and respiratory illnesses attributing them to the impact of the smelter operations. At the time of the

research in 2010, there was a growing sense of dissatisfaction with environmental conditions in Tsumeb which might have influenced workers' opinions about their own health, relating negative publicity on environmental issues in town to their own experiences with health issues. There was supposed to be specific time lags between exposure to risk factors and detectable occupational diseases, while on several occasions the respondent had not worked at the smelter for longer than one to three years.

Despite the fact that the smelter operator provided workers with a medical aid, many felt it was not sufficient. *"The smelter is not taking care of medical expenses sufficiently, but negotiations with management are underway"* (Source: interview with T001 on 11.05.2010). HIV/AIDS was named as a big concern by the employees, but it was not significant to the management. HIV/AIDS testing was voluntary and in 2010 and the smelter had no officers trained as HIV counsellors. The most pressing problem raised by smelter workers was their dissatisfaction with the employer not taking care of medical expenses for HIV/AIDS related complications in which case workers must fall back on their rural households and public health systems. During the time of the survey in 2010, the issue was taken up by the union, and negotiations with the smelter operator were underway.

While the economic conditions were satisfactory, workers seemed to be resentful; although no industrial action had been taken. Historically, the low copper price was at fault in most cases of decreased production, leading to job cuts and rising dissatisfaction with employment conditions among the mine workers, often ending in

organized strike and eventual closure of the mine. The legacy of some closures was still alive. For example, the TCL liquidation in 1998 was still a subject of discussion and unresolved workers-management issues were still pertaining. The former TCL mine workers, mainly elderly men, were still bitter about the unfair payouts after the closure of mining in 1998 when approximately N\$116.9 million contained in the pension fund was used in the liquidation. The workers felt that their employer had no legal right to use that money and they were petitioning to Namfisa²¹ by way of several demonstrations to take the necessary steps and brought all the parties together to discuss the immediate return of the pension fund surplus used by TCL that belonged to them. The unresolved issue was still pending.

None of the interviewed former mine workers was satisfied with the working conditions at the time of their employment in the mining industry. They all wanted to see improvements, but these never happened. The relationship between mine workers and management in most cases were described as bad or very bad. The memories from the days when they were employed were bitter rather than something they would cherish. In all cases, past and present, there was very little trust between employer and workers and very often it was an '*old mentality*' problem (Source: interview with T005 on 12.05.2010), even in 2010, among the younger generation. Failed communications between mining companies and the community throughout the life of the mining projects could result in the mining community struggling to accept the end of tenure, leaving a negative perception about the mining industry.

²¹ NAMFISA is a public body established in terms of the Namibia Financial Institutions Supervisory Authority Act, 2001(Act No. 3 of 2001), and is tasked with the responsibility of regulating and supervising non-banking financial institutions in Namibia.

Previously mining had been considered as one of the biggest contributors to employment in Tsumeb, but the labour figures told a different story. The significance of mining as a main source of incomes has been shrinking. For example, just in the period from 1990 until 2008 when apart from the smelting, mining activities came to an end, the number of employees in Tsumeb's mining industry had decreased four times in the short period from 1990 to 2007 (Table 11).

Table 11

Number of employed in the mining industry in Tsumeb (Namibia) during the period of 1990 to 2008 (Source of data: Chamber of Mines, Annual Reports 1990-2008)

YEAR	SMELTER	MINING	TOTAL IN INDUSTRY
1990	697	1693	2390
1991	626	1545	2171
1992	457	1585	2042
1993	657	1159	1816
1994	608	1100	1708
1995	597	1100	1697
1996	468	511	979
1997	525	448	973
1998	521	374	895
1999			
2000	217		
2001	281		
2002	224	50	274
2003	212	101	313
2004	212	110	322
2005			903
2006			903
2007			644
2008			n/a

Despite the absence of the mining industry in the town, negative perceptions still persisted and the same concerns were raised over and over. If in the pre-independence period the major problems were caused by the labour hire policy, very low accommodation standards and discriminatory treatment of non-white mine workers, then in 2010 people were dissatisfied with the same issues, only seen from a different

perspective and in a different setting. In 2010, the main concerns expressed by the employees of Tsumeb's smelter were low salaries, housing problems and the poor benefits of their medical aid. Regardless of the bitterness and the relationship between the mine workforce and management, it was widely acknowledged that the mining company had contributed towards the development of both the local communities and the town. This was not only by way of employment creation, but a contribution to the wider community and its development. This was widely appreciated and the extent of it will be remembered for a long time.

After mining operations had closed several former mine employees remained in the town because they were already settled with established families. Others stayed because they thought that mining in Tsumeb would soon restart and that closure was only a temporary measure in response to the low copper prices. They believe there was still potential in mining, but despite the copper prices starting to pick up in 2009 and reaching an all-time high of more than N\$10 000 per ton at the beginning of 2011 (see Figure 93), mining never resumed.



Figure 93. Global copper prices in the period 2009 to 2011 (Source: London Metal Exchange, 2012).

The older generation of mine workers that remained after closure of the mine established permanent homes and perceive Tsumeb as their home. It was however not widely regarded as a place of retirement as people were in favour of retiring in their rural homes, mainly in the northern parts of Namibia, the places where from they came. Such a trend was not present among the younger generation. They saw their future in Tsumeb or in the case of strained economic conditions they could consider moving to other urban centres in Namibia, with particular preference given to Windhoek. Past experience showed that every consecutive mine closure ended in out-migrations of the workforce but there were always a share of former mine workers who remained. This started already a century ago, during the very early mining activities in Tsumeb when the mine employed many foreigners and a transient workforce. There was always somebody who wanted to stay in Tsumeb after the closure of operations and over the years this had contributed to the growth of a permanent population base. It appeared as if every consecutive mine closure became easier as the residents learned how to deal with and survive these difficult times.

5.3.4 Economic analysis of Tsumeb

The function of a town relates to its economic and social development and refers to its main activities. In the case of Tsumeb, mining was the main economic activity from the origin of the settlement and over a long period of time, serving the needs and requirements of mining companies that operated the mines. Life in Tsumeb was not always easy as copper prices fluctuated and impacted on the economic vitality of the town. Tsumeb has gone through the sequences of growth and declines, with some being so dramatic that it nearly did not escape the fate of becoming a ghost town.

Tsumeb was particularly hard hit during the wars, the World Great Depression in the 1930s and the dramatic closures of the TLC and Ongopolo mining operations. On several occasions the closure of the mine incapacitated capital investments and caused the economy to decline. The majority of people lost their main source of income, and those who remained in town struggled to exist.

Life was unpredictable, but with every re-opening of mining, the hope returned along with some new economic activities and with every consecutive life-cycle Tsumeb evolved stronger and more independent from the mining industry. When Tsumeb became the region's administrative centre it boosted the development of several non-mining businesses and services, particularly local business developments. The latest closure of copper mining operations in 2008 was frightening for local people and the business community, but proved that Tsumeb had transformed. The closure of mining did not shake the economy and population base as it was feared. Although mine workers left the town, new investments and people came in, saving the town from ruin.

Tsumeb emerged as a self-sufficient town and is moving away from being termed a mining town. Currently Tsumeb exhibits the characteristics and the processes of a transformed urban centre in Namibia. The main focus had moved from mining to other economic activities, such as tourism, industrialization and retail trade. The town's dependency on mining was something of the past and it emerged as a self-sustainable urban centre with diversified economic activities. Only the presence of the Tsumeb smelter evidenced the existence of the mining industry, contributing towards the economic development of the town through employment in the mining sector and

endowing about N\$ 170 million per annum into Tsumeb's micro economy (Source: interview with T013 on 27.05.2010). The processed copper was shipped from Tsumeb via rail to Walvis Bay, contributing towards the existence of Namibia's railway network and the Walvis Bay harbour. The contribution was not insignificant, but it was not as crucial to the town's economy as it was in earlier years when Tsumeb depended entirely on the mining industry for its survival and development.

Inventory of businesses

The economic base of the present-day Tsumeb relied on the expansion of the retail sector and service provision, growing manufacturing, tourism and the establishment of linkages within and beyond its hinterland. The economic structure of Tsumeb was dominated by a strong local formal private sector while the contribution from the informal sector was negligible. There was a large and increasing share of medium and large scale companies, chain shops, franchises and a growing number of local small scale business entities. Thirty-one percent of the surveyed businesses were private companies with limited partnerships, 28% were closed corporations and a less significant share was small family owned companies or sole proprietorships.

Manufacturing was represented by the Family Choice sugar millers and refiners, the Goal Maize CC and the Henning Crusher (Pty) Ltd., the latter provided sand and stones and produced bricks. In July 2011, a new project opened a factory to manufacture concrete railway sleepers. It was expected that 80% of the products would be used locally and that the factory would look to create a market in the rest of the Southern African region. The new factory that had been in operation since July 2011, was

projected to produce 500 sleepers per day, or 150 000 annually, with an expected annual growth of five percent. It provided employment to seventy four people and was planning to increase. In years to come, the factory hoped to diversify with their produce and manufacture items such as window lintels, paving bricks and culverts (Tsumeb to get railway sleeper factory, 2011).

In 2010, the retail sector was wide and diversified. There was a modern shopping centre, a variety of chain shops, different specialist and niche markets and small retail outlets in the form of flea markets and informal trade shops. The retail sector was concentrated mainly along the main road and clustered around the historic part of central business district while a new retail cluster emerged at the southern entrance of Tsumeb. Small scale registered and unregistered businesses were scattered around the town and often mixed within the residential areas (see Figure 94).

A large share of businesses was new, operating between one to three years (see Figure 95). This coincided with the period since the closure of the Tsumeb mine, suggesting that Tsumeb had experienced a growth in business activities since 2008, when the mines had closed. The growth had occurred in terms of the numbers of different businesses, and less in size. This was a positive development signifying that the town's economic base had diversified and "*most people who diversified their businesses were local*" (Source: interview with T004 on 12.05.2010).

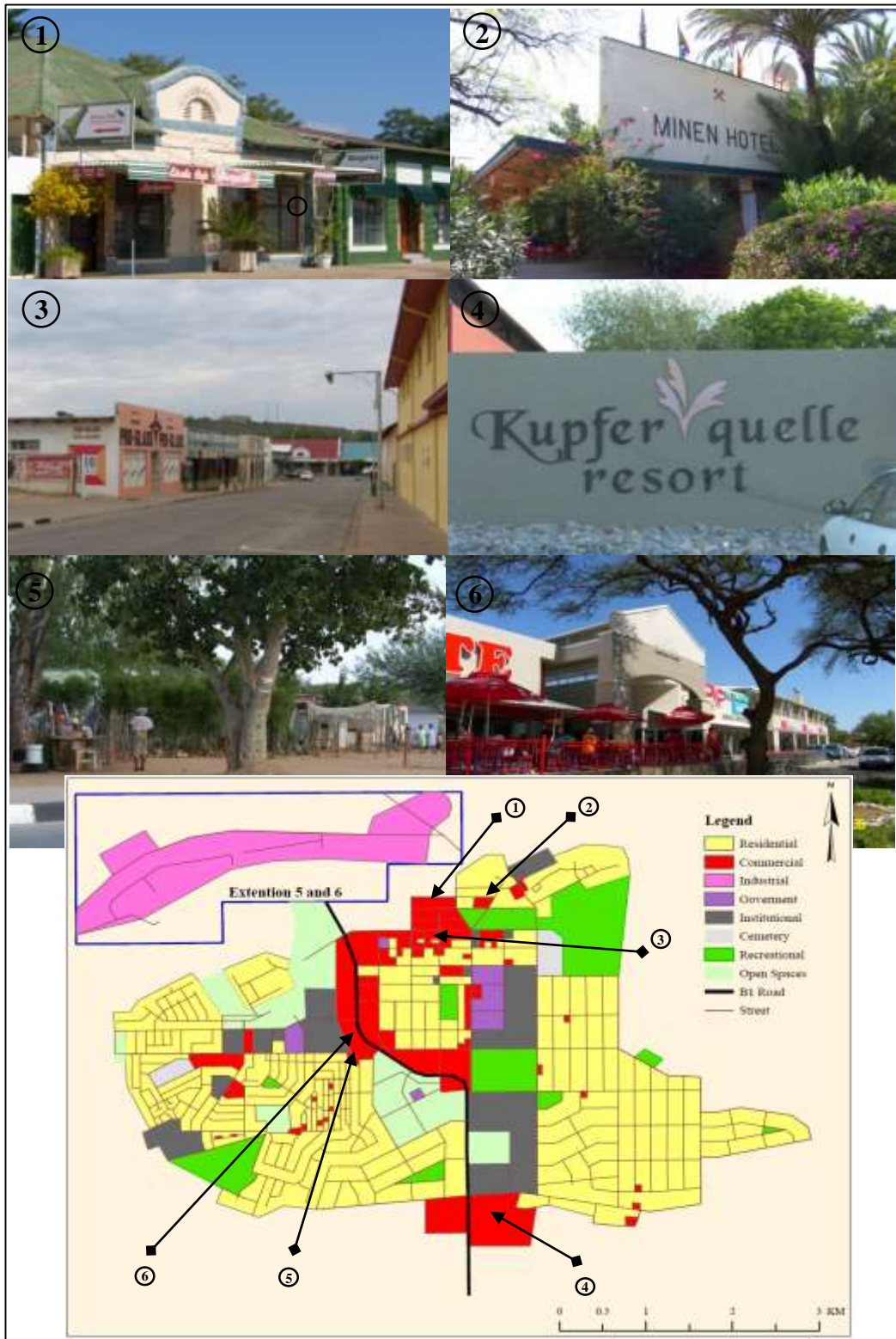


Figure 94. Illustration and location of commercial outlets in Tsumeb, Namibia (2010).

There was also a good share of businesses, namely 28% that had been operational for over a decade (see Figure 95). These businesses endured several mining-cycles and still remained operational, many of them transformed to medium and large scale enterprises. The businesses matured and did not depend on the mining industry for their viability. Fewer businesses were in existence for four to six and six to ten years, validating Tsumeb's struggle period and emerging during hard times of economic decline when the future of mining was not clear and lots of uncertainties existed among the business community of the town.

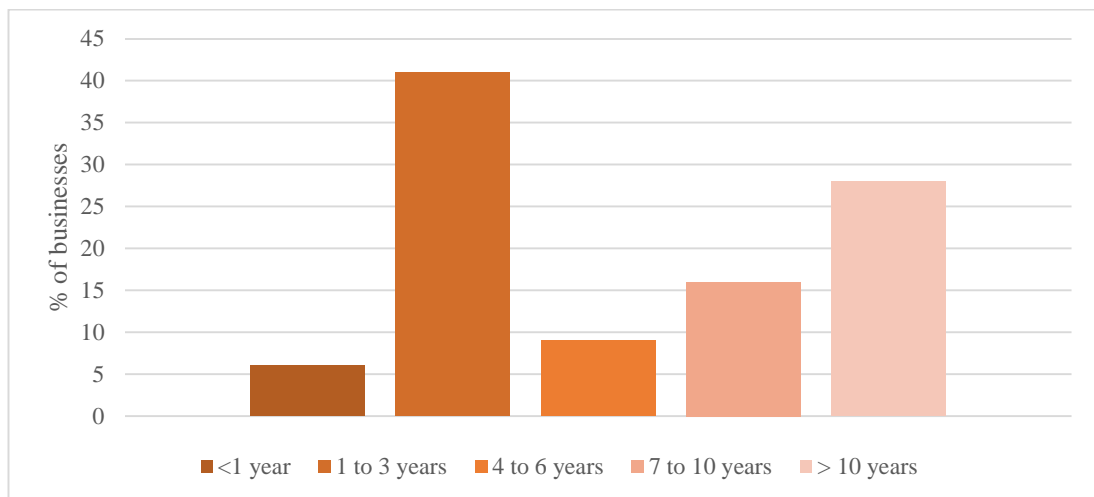


Figure 95. Period of businesses operating in Tsumeb, Namibia (2010).

In 2010, Tsumeb had several banks which opened branches in town to provide residents and the local business community with fast access to financing and to accelerate their business transactions. Tsumeb had a wide choice of banks and ATM's. Branches of big banks, such as Standard Bank, First National Bank and Bank Windhoek were located in the town providing full branch services. Twenty-one percent of the surveyed businesses that approached banks for financing had successfully obtained the desired loans, while some were still waiting for their application to be approved.

Since the smaller scale companies had limited security to offer they found it difficult to obtain financing from banks and turned to other smaller financial institutions instead. Tsumeb had a large and diverse choice of small cash loan and micro-loan service providers, such as CEB Loans, Akim Financial Services, Carpe Diem, Cash Express Tsumeb, Choice Financial Services CC, NH Financial Solutions, Jeneel Financial Services, Orange Cash Loan, Rubicon Cash Loan, Nam-Mic Financial Solutions (Pty) Ltd. and Metcash Namibia. Although there were a few these institutions they all seemed to find sufficient customers. The presence of banks and smaller financial institutions in the town assured businesses of quick access to funds, eased operational procedures and saved time. Tsumeb's business community was satisfied with the banking sector in town and no one reported difficulties dealing with local financial institutions.

Forty-two percent of businesses took out loans to cover their operational costs, 33% of businesses used loans for investing in the company's assets, mainly office furniture or equipment. Among businesses that turn to financial institutions for a loan to cover their operational costs were mainly small and medium scale companies operating in Tsumeb for four ten years.

At the time of survey in 2010, Tsumeb offered numerous high order goods and services (see Appendix 11) of a wide variety while the informal sector was far less diversified, mainly vending fruit and vegetables, alcohol and some daily necessities. The community survey revealed that Tsumeb's community liked to see a broader variety of goods and services, particularly where goods of a higher quality were concerned.

There was a potential market for shoe repair services, dry cleaners, medical specialists, a theatre and a cinema. Tsumeb was self-sufficient and practically any goods or services could be found in town, but for a selection of desired higher order goods such as motor vehicles and specific hardware for which residents had to travel to Windhoek. Similar trends were observed among the business community where 55% of the businesses obtain their services and supplies from another urban centre and mainly from Windhoek and/or chain shops directly from South Africa. Many businesses had linkages with nearby farms and Grootfontein, being the closest larger urban centre. Goods sourced from nearby farms or from within the Oshikoto Region were mainly agricultural produce such as vegetables, fruit and meat. Tsumeb became more and more the centre to sell local agricultural produce. A large share of community respondents, 45%, sustained their operations with locally available goods and services.

Forty-eight percent of the goods and services produced in Tsumeb were sold to the local market, 15% to the region, 27% within Namibia and 20% to overseas (see Figure 96). In comparison to other surveyed mining settlements for this research, Tsumeb had a larger market and more linkages within the region and a larger share of goods and services sold to Namibian and overseas markets.

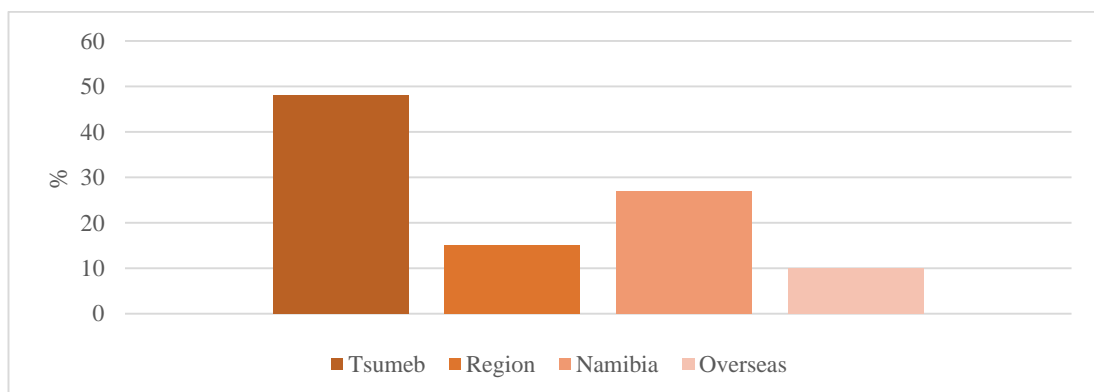


Figure 96. Markets for goods and services produced in Tsumeb, Namibia (2010).

The majority, namely 54% of businesses reported that their competition is within town, 17% was in the region, 22% somewhere else in Namibia. By way of self-assessment businesses revealed that the success of their operations lied in the fact that they offered cheaper goods or services (33%) than their competitors, 21% ascribed it to their larger variety of goods and 21% thought that their customers were loyal to them (see Figure 97). Only 5% of the businesses considered themselves to be the only supplier of their goods or services. This confirmed that competition was good for economic growth.

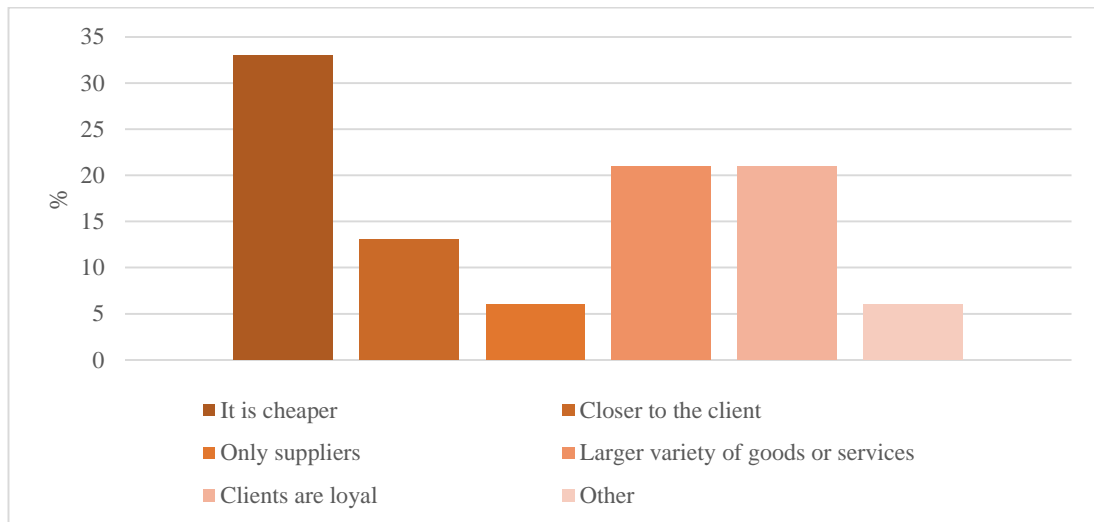


Figure 97. Customers' reasons of choosing companies' services in Tsumeb, Namibia (2010).

Forty percent of the clientele were residents of Tsumeb, 17% came from nearby farms and 19% from the region (see Figure 98). In total, 76% of the clientele was within Tsumeb's hinterland. In contrast to Tsumeb, Rosh Pinah and Klein Aub sold their produce mainly to people within the settlements. The broader customer base created more linkages with the hinterland and beyond. Tsumeb emerged as a functional retail centre, providing goods and services beyond the town's borders. It was of great

regional importance serving people and businesses and had particularly well established linkages with Otavi, Grootfontein and Oshivelo.

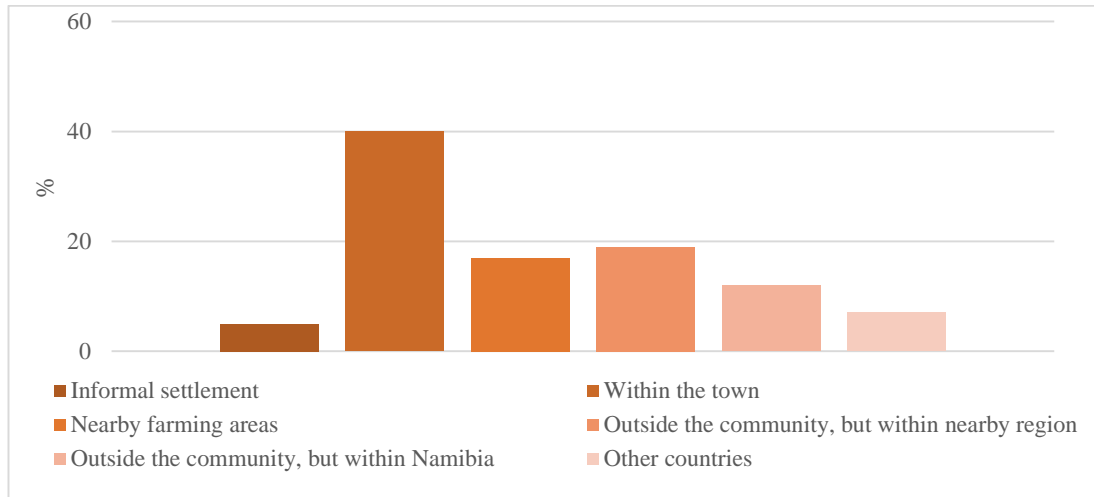


Figure 98. Location of customers in Tsumeb, Namibia (2010).

The strategic location of the town along the Tsintsabis-Katwitwi road, the B1 and the trans-Capriivi highway that passed through Tsumeb, supported the growth of tourism in the area. The town attracted visitors who travelled to the northern parts of Namibia as well as those visiting the Etosha National Park. *“It is cheaper for tourists to stay in Tsumeb and more expensive in Etosha National Park”* (Source: interview with T003 on 11.05.2010). In 2010, Tsumeb offered a variety of overnight accommodation to tourists, from low budget self-catering accommodation to luxurious lodges and hotels, such as Hotel Makalani, Minen Hotel, Elkole B&B, Travel North Namibia B&B, Mousebird Backpackers & Safari, Tsoutsomb Self Catering Bungalows and B&B Pension.

From the surveyed tourism establishments it became evident that most of their clients were foreign tourists, mainly those on their way to Etosha National Park. These were mainly in-transit visitors who stayed in Tsumeb overnight before they proceed further.

Local tourism compromised approximately 30% to 40%, the majority of which were business people. As these establishments did not have to depend on the mining industry the closure of the mines did not affect them as most of their client base was not related to the mining industry.

Small scale formal and informal businesses and single vendors were not concentrated in one particular locality. There were a few small scale businesses scattered around the town. However, most of the informal businesses were located amidst the residential area, locally called Soweto. Small scale single vendors specializing in sales of agricultural produce positioned themselves along the main road. There was a large number of single vendors, but the produce they sold was the same at every stand (see Figure 99), such as seasonal fruits and vegetables, often produced on the same commercial farm.

From the survey it appeared that most vendors next to the road were not local residents, but people from Grootfontein and Rundu. They were in Tsumeb only for the duration of sale of their produce, after which they intended to return home. The Municipality of Tsumeb did not approve of ad-hoc markets next to the road claiming this made Tsumeb look untidy and unattractive to potential investors and tourists. Therefore in 2011 and 2012, a new community market was constructed consisting of twelve stalls particularly meant for the small and medium scale enterprises (SMEs) and thirty-three stalls for vendors to be rented for a fee of N\$100 per month. The market included other facilities such as a restaurant, boutique, salon and tourism shop where artwork and crafts could be sold.

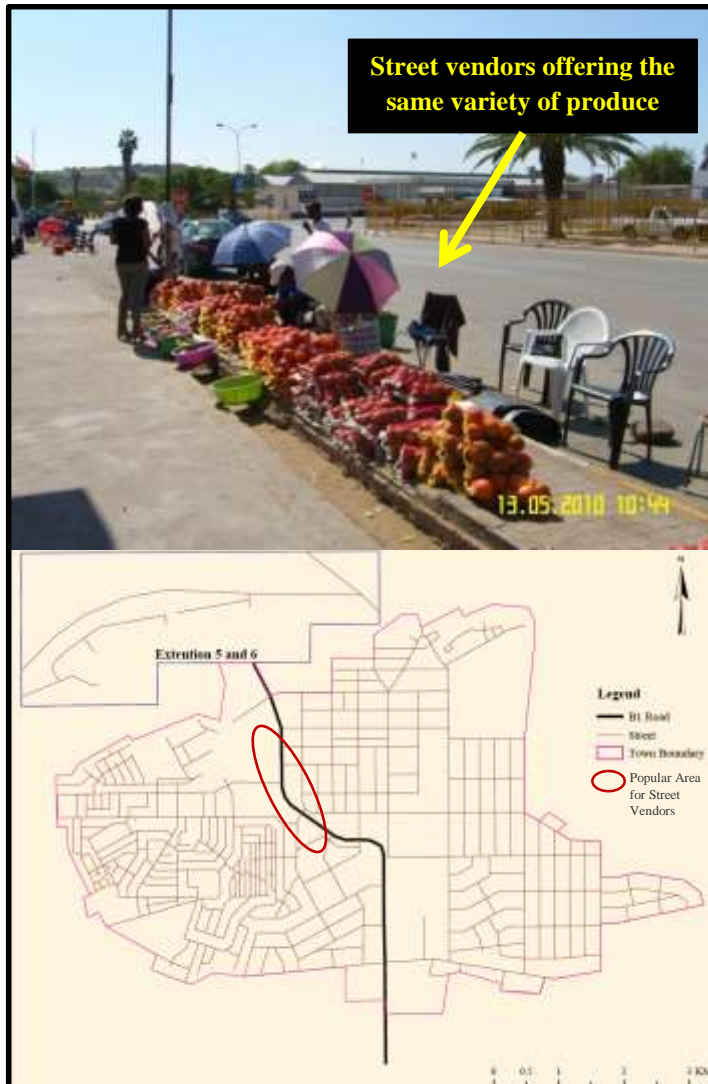


Figure 99. Illustration and location of street vendors in Tsumeb, Namibia (2010).

The small scale vendors were not enthusiastic to move to the new market, they found it more convenient and expense-free to operate from the roadside claiming that it was more convenient for customers to stop at the road than to park their car and walk to the market. Many of their clients were people in transit through Tsumeb to the north or central parts of Namibia.

Since 2007, several small and medium scale businesses and several aspiring entrepreneurs in Tsumeb were supported by the non-profit organization, the SME Support. The organization provided training in entrepreneurship, marketing, bookkeeping, writing business proposals and makes loans available up to N\$5 000. Their services were provided to both registered and unregistered businesses, but most of their clients were from the informal sector (Source: interview with T008 on 14.05.2010). The efforts to support small scale businesses proved to be fruitful as

several successfully entered the local business community and managed to grow. The challenge for small scale entrepreneurs is lack of finances, but the representative from the SME Support Centre observed that “*people expect to be given money*” (Source: interview with T008 on 14.05.2010).

Informal businesses could be characterized by being simple, often selling the same goods, mainly vending with daily groceries and alcohol, and providing the same type of services. Their main market was residents of the informal settlement or people from lower income groups. Also among the informal activities, particularly on the outskirts of the town, was charcoal production. According to the Municipal estimates there were five or six individuals who run different charcoal businesses.

The good rainfall pattern and good soils determined the great potential for agriculture. The areas around Tsumeb were known for large scale commercial agriculture, predominantly livestock production such as cattle and small stock; horticulture such as cabbage and tomatoes; and fruit production such as citrus and mangos. Situated in a close proximity to Tsumeb was Namfo, one of the major suppliers of fresh produce in Namibia. It had been growing fruit and vegetables since 1991, mainly oranges, mandarins, tangelos, mangoes, tomatoes, green pepper, cabbage, onion, lettuce, beetroots, green beans, potatoes, sweet corn, pumpkins, gem squash, butternut, radish, broccoli, watermelons and carrots. All produce was exclusively sold for the Namibian market. Sixty percent of the produce went to Windhoek, while the rest was supplied to the northern and north-eastern parts of Namibia. The farm provided jobs to 280

permanent workers of which 20% were skilled such as mechanics, while 80% were unskilled (Hoes, 2010).

Apart from Namfo, there was other larger and smaller producing farms around Tsumeb although a few of them struggled to sell their products, particularly to the local market which many farmers saw it as being too small. The major challenge for local agricultural sector was the high input cost where farmers could not compete with products imported from South Africa. As a result their locally produced fruits and vegetables were more expensive than those that were imported from South Africa. It was identified that the high input cost was due to the fertilizer costs imported from abroad. Farm labour was never a problem since there were always people available.

Tsumeb was of relatively insignificant as a market for agricultural produce grown in the region. Only an insignificant share of the produce was actually sold in Tsumeb as the bulk of it, particularly from large scale farming projects, by-passed the town. This was particularly applicable to the export-oriented cattle-raising sector as well as to several horticultural products which were transported directly to larger centres or to the harbour thus by-passing possible economic contribution to the town of Tsumeb.

Economic state in 2010

In the past Tsumeb had faced many declines and it could be characterized as a town with survival instinct. Despite the economic setbacks the town existed after the closure of the Weatherly mines in 2008. In 2010, 55% of businesses reported growth and

expansion for the previous two years (see Figure 100), the period that coincided with the post-closure of mining activities.

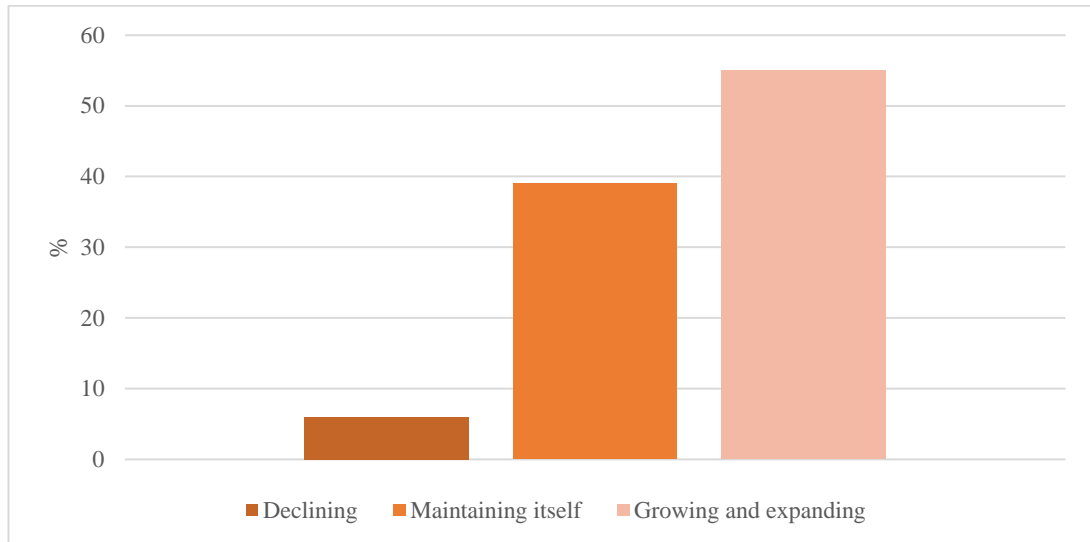


Figure 100. Self-assessment of businesses' performances in Tsumeb, Namibia (2010).

Thirty-eight percent of those who reported growth were well established businesses that had operated in Tsumeb for over ten years. A fashion retail outlet established in 1960 was still going strong. This cluster of businesses had become accustomed to the mining cycles and knew exactly how to react to the pressures. A few niche markers also found their way to run successfully suggesting there was a market and sufficient demand for higher order goods, often very specific and luxurious retail items. Cross-checking the businesses that did not succeed and reported decline in the two year period of 2008 to 2010, revealed that none of them was directly related to the mining activities. Therefore it could not be argued that the decline of these businesses was due to the closure of the mines in 2008. These businesses were rather dependent on economic fluctuations than on mining cycles.

The new developments that came to Tsumeb after closure of the mines had boosted the local economy and to the extent that the town did not feel the obscure transition from being a single industry town to a town with a diversified economic base. *“Businesses have grown, the Town Council did a lot to diversify by marketing the town”* (Source: interview with T009 on 14.05.2010). A significant number of new businesses developed within the past years, particularly in the hospitality sector, aviation, recreation, retail sector, small and medium scale enterprises (SMEs), housing, lighting and road construction. The town had managed to attract strong businesses like the newly established the Le Platz Shoprite shopping complex, Kuperquelle Resort, the Auto Tech Truck & Coach Collision Repair Centre, various housing projects and Private Public Partnerships (PPP) consisting of numerous partners undertaking, for example, the renovation and expansion of Tsumeb airport. One of the major manufacturer, Henning Crushers, had expanded. The arrival of several chain shops and other retail outlets such as Shoprite, OK Furniture and Hungry Lion fast food outlet indicated successful investment injections in the town’s development. The community of Tsumeb had attained another shopping establishment.

It was argued that the chain shops were able to attract larger investments and create many jobs in a short time (Pedersen, 1997) that could help to spin off the economic development for the town. It had proved to be correct as many job opportunities emerged and mostly local sub-contractors and workers were hired for the construction of the new mall. The presence of big chain shops and franchises in Tsumeb guaranteed the supplies from their head offices and thus they were thought to be less volatile to

local micro-economic fluctuations. However, the presence of local enterprises tends to be more integrated into the local economy and thus have larger driver effects. For regional development the presence of local medium and larger scale enterprises are more beneficial than international branches or chain shops. In Tsumeb's case the benefits were simultaneous, the town experienced an increase in chain shops as well as the emergence of medium and large scale local enterprises. The new developments undeniably uplifted Tsumeb in short and very crucial time when mining ceased but new investments in the town were vital.

The positive attitude towards the future of their businesses was confirmed by 88% of enterprises. The business community of Tsumeb was certain that the town did not depend on mining activities, including smelting while only 11% of businesses thought their future depended on mining and the re-opening of mining operations. This could be the consequence of an old mindset, particularly among businesses owned or managed by older people as in most cases it was established that they did not have direct linkages to the mining industry and the opinions were rather perception about the industry.

Sixty-one percent of businesses reported an increased customer base in the previous two years, from 2008 to 2010 (see Figure 101). Businesses that depended on the local market for selling their goods or services performed particularly well. Twenty-one percent of businesses reported a reduction of customers, while 71% of businesses with a declined number of customers were positive about the future and did not plan to close their businesses in the near future. Another 9% of enterprises were considering to close

their businesses within the next three years, more than half of them were unregistered businesses operating less than two years in Tsumeb. This was not surprising as the turnover of informal businesses was very fast, only few managed to operate beyond three years. Other types of enterprises which reported a considerable decrease in their customer base and foresaw closure were enterprises selling high order goods. The cause of their decline could be poor planning and the lack of proper feasibility research before establishing an enterprise. A very specific shop selling beads could not acquire the necessary customer base in Tsumeb and be profitable, the sales were too low and insufficient to maintain its operations.

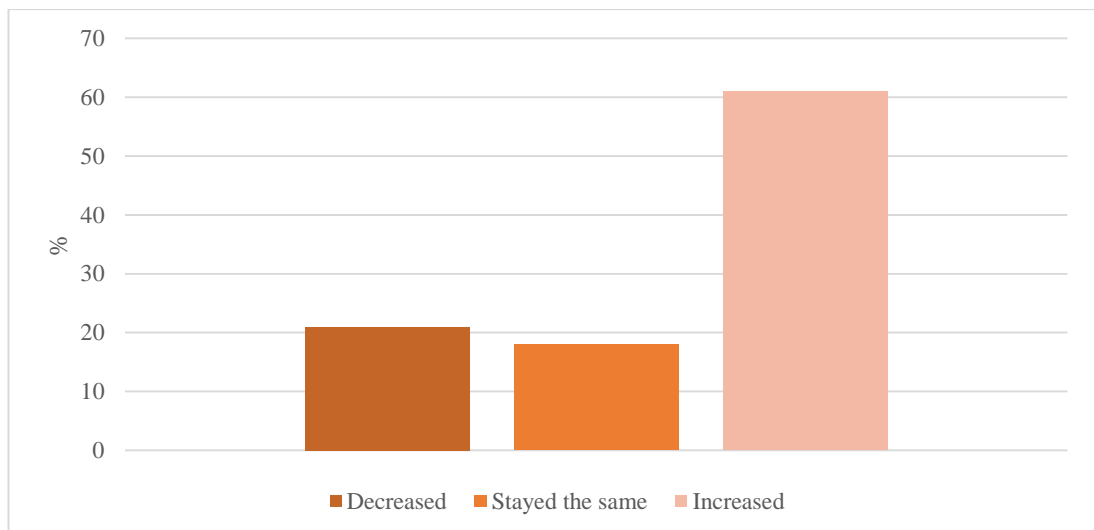


Figure 101. Growth of businesses' customers base in Tsumeb (2008 to 2010).

Among the businesses with an optimistic outlook regarding the future, 23% were planning to expand to other areas, 13% to diversify and 18% planned to employ more people. None of the surveyed companies were planned to retrench or reduce their staff. There were no considerable job losses foreseen for residents of Tsumeb.

The enterprises slightly depended on mining activities because they provided them with their goods and services experienced decline at the time of investigation in 2010, particularly in finding a market for their services. One-third of the businesses in Tsumeb considered their operations to be affected by the mining cycles, many of them indirectly, through the increased or reduced customer base in town and the demand for particular goods or services when the mines were operational. A few enterprises considered mines as an agent for growth, attracting more people which in turn meant better business for them. The businesses with a more pessimistic outlook were those who suffered during previous downfalls of mining in Tsumeb, particularly after the closure of Ongopolo. Many of these businesses were older than four years, but less than ten. The previous experiences could have been haunting them still as they had not developed trust and confidence in Tsumeb's ability to exist without mining. According to the Namibia Chamber of Commerce and Industry (NCCI) branch in Tsumeb the year between 2009 and 2010 experienced a decrease in the numbers of businesses registered with the NCCI²², namely from thirty two registered members in 2009 to only twenty in 2010. This could be a negative economic indicator suggesting a slowdown in the local economy, but not necessarily reflect the actual economic situation. The reason for the declining membership was not established, but it could also be associated with the NCCI's internal policies and marketing campaigns.

²² Namibia Chamber of Commerce and Industry (NCCI) is the leading business representative and support organisation in Namibia. NCCI assists its member businesses through networking, marketing, identifying issues affecting the business environment, advocates for a speedy resolution, and additionally NCCI offers a comprehensive and continuously developing range of training and business services.

The community's outlook on Tsumeb was more depressed than that of the business community's outlook. About 53% of people stated that they had not seen improvements regarding job opportunities and new developments in the town during the previous two years. The job opportunities were still not enough and 87% of people believed there were no job opportunities at all for young people after graduating from school. There were people with skills such as car repair technicians and mechanics, but no employment opportunities existed for them.

The experience with the cyclic nature of the settlement's economy and dramatic downturns of previous declines did not boost the confidence to invest in the area. In such times many tried to adapt the strategy "wait and see", others closed or moved their businesses to other areas. Tsumeb had overcome these fears and the future for the town looked promising. The mining was closed but the town was buzzing. Shopping centres were crowded with people most of the days. Tsumeb had transformed. It did not rely on foreign investors to open new businesses in town. Locals were setting in and establishing new businesses. Such involvement and establishment of local businesses was a rather positive indicator and displayed the confidence of local people about the future and they want to be a part of it.

Challenges for economic development

The research revealed several constraints for the economic growth and expansion and the main three were lack of available land for expansion, lack of cash flow and difficulties to recruit skilled personnel. The companies that felt limited and constrained by the unavailability of land for expansion were mainly medium and larger scale

enterprises. Lack of land was due to the fact that most of the land surrounding Tsumeb that could be used for industrial and commercial purposes belonged to the mining companies. The Municipality had negotiated the handing over process for some portions of land, but it was a lengthy procedure to proclaim and service the unsurveyed land. It was expected that the lack of land be solved within five years and that there would be enough serviced land to accommodate economic growth.

Twenty-five percent of the business community was affected by the lack of cash flow what businesses referred to as being operational cash flow where incoming or consumed cash originated from the company's core business activities. Over fifty-four percent of the cash-strapped companies were still making profit and had reported growth and expansion, only 6% of businesses with a lack of cash flow actually underwent decline. This gave the impression that companies that experienced a lack of cash flow were still profitable, but only experienced problems with the business' liquidity. Sixty-nine percent of these companies had not considered the option to apply for a loan through the bank, despite the range of banking choices available in Tsumeb. Several businesses, 19%, mentioned the lack of skilled people and the difficulties to acquire skilled employees; this despite of the town's demographic characteristics showed a large share of residents with high attainments in education. There was an imbalance in Tsumeb between the demand for and supply of people with certain professional qualifications and particular skills. Those that were sought after were medical doctors, interior designers, managers and artisans with skills such as welding and construction.

The business community of Tsumeb had divided opinions about the size of the population in the town. The division was due to different aspects. The businesses that did not experience the shortage of a client base were more concerned about the in-migrants putting tremendous pressure on the town's infrastructure. This was also a concern of the local authority asserting that Tsumeb was not ready to absorb numbers of people who had come to settle during the previous two years (2008 to 2010) as there were no jobs for so many and it only led to increased numbers of unemployment. On the other hand, the more specialized businesses that experienced a lack of customer base liked to see more people in Tsumeb, hoped that this would directly benefit their business. Although none of these businesses reported decline, finding a sufficient customer base for their high-order retail outlets remained a challenge.

The businesses did not feel supported by the central and local governments; 17% had expressed clear lack of support, and another 18% felt that the public, including businesses, were not involved in any decision making to the benefit of the town's future. The community survey obtained similar results with 14% considered a lack of support by central and local governments as an obstacle for economic development in the town and 20% expressed disappointment of not being involved in decision making. This could be an echo of the friction within the local authority, widely reported in the media at the time when the survey was executed. There was a clear mistrust of the local authority among the Tsumeb community. The business community was regarded as the main driving force behind the promotion of local economic development in the town whereas the Municipality was seen to be helpful by only 20% of the residents. In order to prevent economic decline the challenges need to be eliminated, in which case

the businesses would be capable to diversify. It is therefore important to create a favourable investment climate to persuade investors to commit themselves. The land tenure must be addressed and the local authority needs to find suitable land for business expansion. In some cases it was the people's mindset that was an obstacle. People were afraid to take risks; they were scared to invest in the town with its reputation of severe declines.

Potentials for economic development

Tsumeb and its surrounding areas are blessed with natural resources, including minerals and fertile agricultural land, along with good availability of underground water. The town is strategically situated and has the potential of being a gateway to the northern and north-eastern parts of the country, particularly with all the elaborate infrastructure developments that were about to be completed. Its proximity to the Etosha National Park and location along the Trans-Caprivi Highway guarantee a steady flow of people passing through Tsumeb and make the town ideal spot for tourism and business development. Tsumeb has all the potential to grow and develop socially and economically. *“The future is bright, 10 to 15 years from now Tsumeb will have a lot of progress”* (Source: interview with T012 on 14.05.2010)

The community identified several sectors and niche markets that they liked to see more of in Tsumeb. The residents were eager to have more shopping centres that could create more jobs for local residents, more government institutions to have better access to public services, more cultural and entertainment facilities, sport grounds and a swimming pool. Residents wished to have more tertiary education institutions in the

town which could accommodate their youth that were struggling to find jobs and liked to continue with their education. As far as niche markets were concerned there was potential for boutique clothing shops for elderly women, printing shops, shoe repair and dry cleaning services as well as more shops selling building materials such as tiles, sanitary ware, wood and timber products, similar to the existing retailers from Windhoek namely CTM, Timbercity and Obeko.

The community widely acknowledged that the potential was there, but the town needed many improvements. The business community liked to see improvements in safety and crime prevention, improved Municipal services and Tsumeb being a cleaner and better maintained town. Residents of Tsumeb believed that there was potential for new businesses and job opportunities if businesses were given incentives such as lower taxes and lower rates for water, sanitation and land. It could help many businesses to diversify and Tsumeb could have more enterprises owned by local people and be less dependent on big shops and chains.

The improvements that needed to be addressed in near future were job creation, particularly for the youth, to fight the alcohol and drug abuse in town, reduce the crime rates, improve educational facilities, fight corruption in central and local government, and prevent air pollution and control hazardous waste from mining. It was crucial to attend to the views and opinions of the community, both residents and businesses, as the public and personal opinions of the Tsumeb community will determine what the town will be like in future.

5.3.5 Infrastructure and social service analysis

In the past all service provision and maintenance depended on mining for financing and management. At the time of the research in 2010, the Tsumeb Municipality was directly responsible for all urban services and infrastructure as part of the social and welfare services of the government. The availability of land and service provision had become an increasing concern. Infrastructure and services required maintenance, expansion and advancement to meet the emerging needs of the urban population. Failure to address this could lead to the downfall of the service provision to the residents of Tsumeb and negatively affect the businesses which could lead to unwanted stagnation or decline of the town.

Housing and land tenure analysis

Since the proclamation of Tsumeb in 1905, the town had grown. Older parts of Tsumeb, to the east of the main road (see Figure 102, photographs 1 to 4), represent well planned and organized residential areas that were built in the 1960s and the 1970s to accommodate the mine employees, mainly for the privileged white mine workers. The residential area was vast, old buildings nestled on large plots with lush gardens and mature trees and structures reflecting the architectural characteristics of the time when they were built. The areas were laid-out in ordered context and represented formal squares linked by broad streets with rows of big green trees on each side.

The residential areas to the West from the main road, namely Nomtsoub and Soweto, were built to accommodate non-white mine workers. The buildings were constructed under the "Bantu Construction Act" and reflected the inequalities when compared to

the former “white” residential areas to the East from the main road. Nomtsoub and Soweto housing was mainly represented by a basic rectangular structure with one or two bedrooms, built on an individual plot, close to the street and crammed next to each other. At the time of the research in 2010, very little had changed and although people could move and settle as they wished, the social inequalities still persisted and reflected in different housing areas within the town. Nomtsoub and Soweto were perceived as low-cost residential areas (see Figure 102, photographs 5 and 6). Previously, the houses in the Nomtsoub and Soweto residential areas belonged to the local authority. Through a vigorous alienation process in the early 2000s a large number of people attained private ownership of these houses and with private ownership the appearance of the residential areas was slightly changing. By 2008 most of the houses in Tsumeb’s residential areas were privately owned. The mining companies in Tsumeb no longer owned houses as the majority were sold to private owners during the Ongopolo tenancy and the remaining hostels were sold by Weatherly during the 2000s.

Until 2009, Tsumeb was one of the few towns in Namibia that did not have a dedicated area for an informal settlement. The only informal structures or ‘shacks’ in Tsumeb were sporadically built in between houses or in backyards in the formal housing areas (see Figure 103). Every bit of available space was developed resulting in a very high population density.

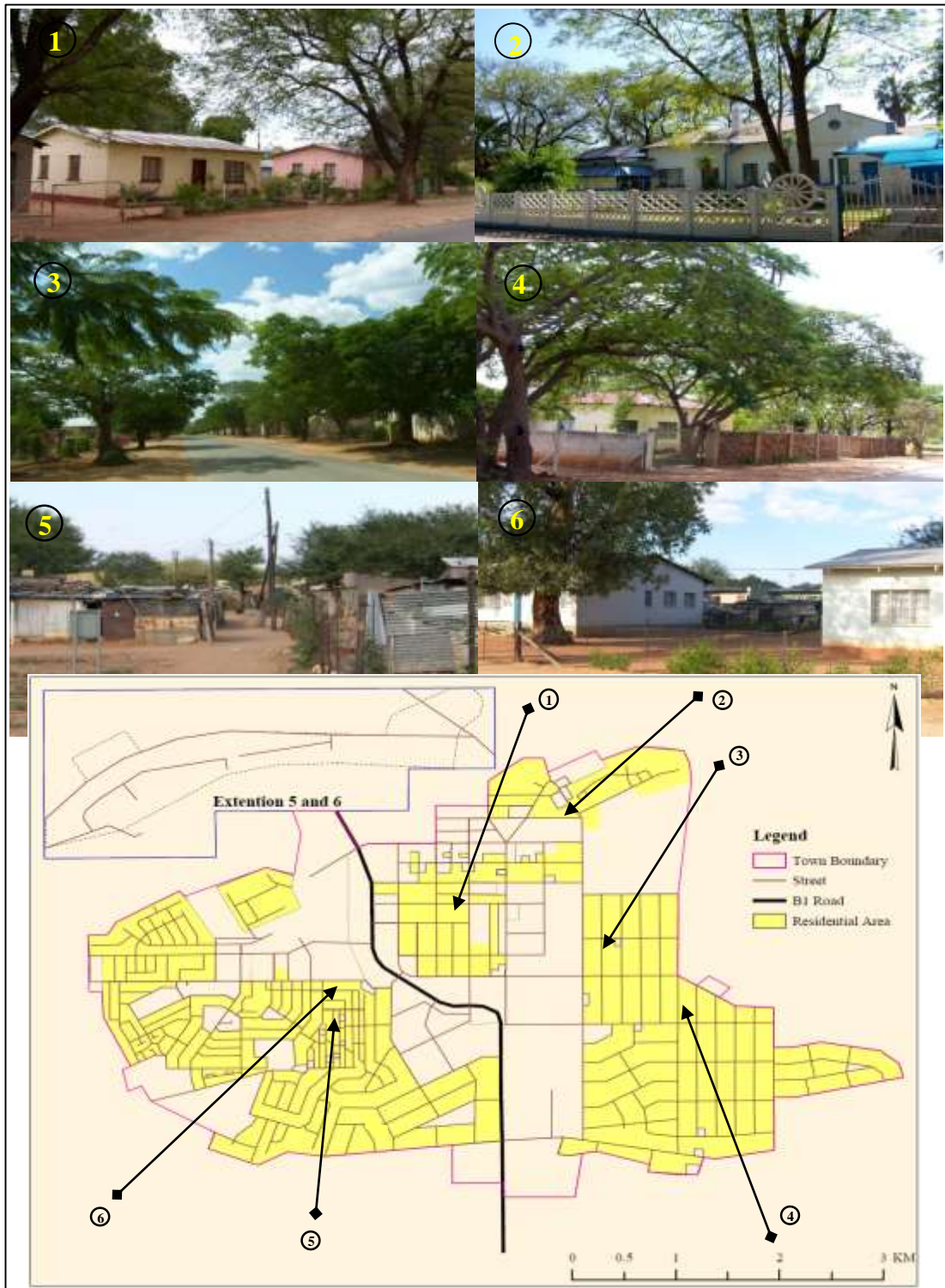


Figure 102. Illustration and location of residential areas in Tsumeb, Namibia (2010).

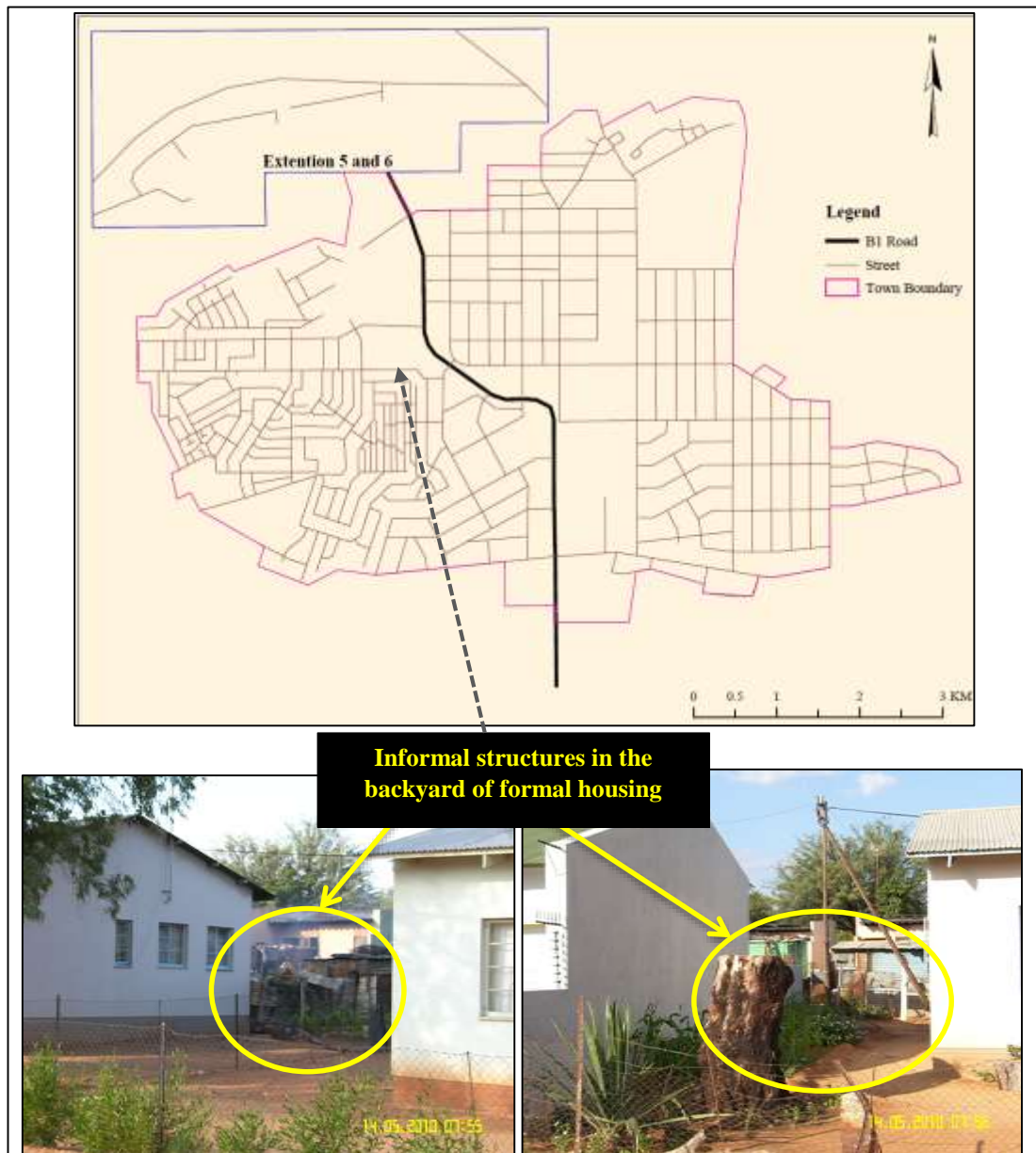


Figure 103. Illustration and location of informal structures in the formal residential area of Tsumeb, Namibia (2010).

With the increased influx of people to Tsumeb, it was impossible to find accommodation within the town's borders. In 2009, a group of people who failed to get accommodation in the formal part of Tsumeb, settled on its outskirts. That was the beginning of the evolvement of the informal settlement, Kuvukiland. It quickly started to expand with more people arriving and settling there. The settling that started in 2009

on a bare land became home to an estimated 2000 people by 2011. Initially there was an agreement with the Tsumeb Municipality that 350 people would be allowed to settle at Kuvukiland, but the numbers kept growing and some moved onto Weatherly's privately owned land. These were mainly people from nearby farms who came to Tsumeb in search of employment.

The Town Council negotiated with Weatherly to take over the piece of land where informal settlers had started to settle, but contrary to the settlers' expectations, the Municipality requested them to vacate the plots. This led to seventy residents of Kuvukiland being evicted in June 2012. The evictions caused frustration among the local residents who claimed that many people from Kuvukiland lived there off the town's two dumpsites. They collected empty tins, scrap metal and other items which they sold to pay for food and their children's education (Shivute, 2012). The residents of the new informal settlement felt frustrated and ignored by not being provided with basic sanitation, enough water points, electricity and other services ordinarily provided by a local authority. The informal settlement put a lot of pressure on the Municipality and Municipal service provisions in the town, while the allocation of suitable land for these people was still a challenge.

Land supply plays a crucial role in supporting the quality of life in urban areas. In the last two years from the time of the investigation in 2010, economic development, diversification, commercial development, job opportunities, provision of infrastructure and low cost housing in Tsumeb have been on the increase. The town was growing, but there was not enough serviced Municipal land. Tsumeb had reached

its limits in terms of the availability of land. Lots of land around Tsumeb's Municipal border belonged to the mining company, Weatherly International. Therefore the town lacked the space for expansion. The Municipality of Tsumeb vigorously negotiated with the mining company to acquire land and an agreement was reached. The land for expansion was assured, but it was a lengthy process as the land required to be serviced to meet the growing population and the employment needs. The land needed to have all infrastructural and service provisions before it could be sold or leased to people.

The construction of the Tsumeb-Tsintsabis-Katwitwi road resulted in a demand from the business community for the plots along the new road. Because it linked Tsumeb with southern Angola it was expected to boost trading opportunities and many businesses saw the advantage of placing their businesses close to the road, and aligned them with the new developmental axis. The Municipality managed to find land for the projected business expansion, but it was more challenging to find suitable land for residential growth. The Council had allocated 300 plots for new housing developments and the construction of low cost housing by the Shack Dwellers Association. The project had been a major success, provided housing to over 297 families.

Provision of low cost housing had been satisfactory, but the town had to address the blockage in other housing segments. The main constraint derived from environmental issues that Tsumeb faced. It was difficult for the Municipality to find land suitable for residential use. The unoccupied portions of land in the Municipality's possession were not suitable for resettlement purposes due to the soil contamination from past and present mining activities (GSN, 2007a). The lack of communication between the

Municipality and the people raised frustration among the residents who saw an unwillingness to develop the empty land. They did not know about the contamination and subsequently saw the Municipality being unwilling to attempt to improve the people's quality of life. Lack of communication and public involvement in the planning process eroded the community's trust in local government and the satisfaction level with the local authority among Tsumeb's residents was low.

Municipal services

Businesses and households depended on basic Municipal services and the effective delivery thereof are crucial for the settlement's development. Service provision and its quality determine the economic development of Municipalities. The challenge for the Municipality was how to provide better services with constrained resources and increasing demands. At the time of field investigations in 2010, Tsumeb had a well-developed water infrastructure, but due to an increasing demand for new connections the Municipality started to fall behind. Fifty-five percent of the community survey respondents had an indoors water infrastructure and 33% could access it outside of their premises. The town's water table was said to be very low. This affected the Municipal fees and the augmented cost was passed to the residents. The Town Council also faced financial difficulties mostly due to the consumer's debt (Source: interview with T004 on 12.05.2010). Until 1996, Tsumeb received water from Ongopolo mine. The payment for water recovered from the consumers mainly covered the water treatment requirements and the water tariffs were low. Since 1996, the Municipality of Tsumeb had to pump its water and cover the costs. The Municipality was also responsible for the running of three booster stations to pump water over a distance up

to eleven kilometres to the main reservoir (Tupperware) and to the sub-reservoirs (Huettenberg concrete reservoir, South East steel tower and Nomtsoub steel tower) in order to supply the distribution network of the town with water. This enormously increased the costs for the electricity used for the piping of water and to maintain the water infrastructure. The cost was passed to the end user and it was extremely hard for the residents to accept the transition from services being sponsored by the mine or other private institutions to being responsible for their own water use. The habit of being provided for was difficult to get rid of. This was very typical to mining settlements, particularly those who were facing transition from being a mine managed settlement to a proclaimed municipality where the municipality was in charge of service provision and maintenance. Although Tsumeb was proclaimed a long time ago, it was still enjoying the lower cost of services that were subsidized by the mine operators for many years. Financial difficulties hampered the maintenance of this infrastructure for years, whereas the lack of maintenance led to even greater losses. Tsumeb Municipality was under pressure and struggled with ways to provide affordable services to all in a financially sustainable way.

There was visible dissatisfaction regarding the water service provision among the community. Three percent of community members reported no access to clean water at all. The majority of these were residents of informal structures, of both those that were erected within Tsumeb's Municipal border in between the residential areas and those of the new informal settlement that developed on the outskirts of Tsumeb.

Electricity in the town was supplied by the CENORED²³ which was responsible for the provision of all electricity needs since 2005. There was less criticism about the electricity supplies in Tsumeb and the community and businesses were fairly satisfied. Seventy-seven percent of the surveyed households were electrified and about 80% had a stove indoors, while 16% generated their own electricity.

The growth of the town resulted in an increase of refuse removal by 57% for both garden and domestic waste. The Municipality struggled to provide adequate services and therefore it out-sourced its solid waste management to a local company, the Enviro-Fill, a subsidiary of a Namibian registered private company, Millennium Investment Holdings. The contract involved rehabilitation and daily management of the Tsumeb landfill site, door-to-door waste removal, cleaning of streets and public toilets and disposing of garden waste. A separate contract was given to another company, Eclips Investment, which concentrated on operations in the Nomtsoub Township. With outsourcing the waste management to the local companies, the waste management in the town improved, but residents still felt the Municipality could do better. Fifteen percent of the community survey respondents reported dumping of waste along the roads to be a serious problem in Tsumeb, 3% of people were not satisfied with the landfill site, naming it as “*a growing environmental concern*”. The previous geological surveys of Tsumeb’s waste disposal site had indeed indicated that the location of the landfill site was a serious threat to the ground water supply of the town and was suggested to relocate and rehabilitate as fast as possible. A suitable

²³ CENORED is a regional electricity distributor in Namibia.

location for a new landfill was identified further away from the town (Mwiya & Giles, 2004).

The sewerage plant in Tsumeb was modern, but the capacity was too small and required expansion. Most of the households, 86%, had access to toilets and 9% had access to shared toilet facilities in the neighbourhood. The provisions were there, but the capacity and efficiency often did not match the needs. Six percent of surveyed residents were not at all satisfied with the sewage management.

Roads and streets infrastructure

The favourable geographical location of Tsumeb and construction of new roads was expected to boost development and economic growth in Tsumeb, diversifying it further away from being branded as a mining town. Once tarred the Tsumeb-Katwitwi road was expected to become Namibia's second main gateway to Angola, being a spin-off of the emergence of Windhoek-Luanda Corridor. The communities along the road could benefit from new business opportunities, particularly in tourism, and trade and industry.

The roads and streets infrastructure in Tsumeb was satisfactory. Streets were regularly maintained and improved, unpaved streets were assessed and paved. For example, in 2008, the streets to the Soweto entrance, connecting Vinia Adadi street to Milka Naujoma street and the street connecting Leevi Mwashekele to the street leading to the Otjikoto secondary school were tarred. The tarring of streets stimulated growth in areas lacking any kind of transportation service and attracted more development. The main

road (Hage Geingob street) passing through town brought many new developments along this particular road, leaving the old central business district (CBD) behind in terms of new developments.

Another advantage of Tsumeb was its railway connections. Tsumeb was at the centre of all routes connecting Namibia and beyond. The new railway link to Oshikango, the town at the Namibian and Angolan border, was another advantage with the potential to strengthen the viability of Tsumeb.

Tsumeb Airport was undergoing an upgrade. The Municipality entered a public-private partnership (PPP) with local businessman where the upgrading could cost each partner N\$ 40 million. After its upgrade, the airport was expected to be used for direct flights to other countries. At the time of the research, the airport was small scale, handling only local flights. A further plan of the Municipality after the upgrading of the airport was to open a pilot school.

Telecommunications infrastructure

Tsumeb is a commercial centre and access to telecommunications is crucial as they give the enterprises the tool they need to compete in the market economy. In 2010, the town enjoyed a good coverage and variety of telecommunications, with the same access to services as other larger urban centres or the capital, Windhoek. All the necessary telecommunication provisions were there to support urban development in Tsumeb. The community had access to fixed land line telecommunications, fax, telefax and choice of mobile telecommunications and internet.

The postal services in Tsumeb offered the same range of services as in other larger centres in Namibia. Apart from its core business of delivering and posting mail, it performed banking transactions. The presence of a variety of courier services, such as DHL, Formula courier services, Parcel Force couriers (Pty) Ltd, Jet-X couriers and Formula courier services signified the large demand for this type of services.

Considering the existing telecommunication infrastructure and other communication networks available in Tsumeb, the capacity to convey the information and the dimension of the network was vast and diverse. Tsumeb was well linked and information could be transmitted instantly.

Healthcare facilities

The provision of health care facilities and services is fundamental for a community's wellbeing and residents of Tsumeb had access to affordable health care and health promotion activities. Tsumeb had both private and state health care facilities. In 2010, there were two hospitals, one state hospital and one private hospital and additionally there were two state clinics. Public health care services were provided and were accessible to all. The state hospital was adequately equipped but overcrowded which placed tremendous pressure on the quality of service delivery. The hospital had ninety beds and four doctors which was too little to provide quality services to all. For more complicated cases that could not be treated at the Tsumeb state hospital, patients are referred to the state hospitals in Windhoek or Oshakati (Source: interview with T002 on 11.05.2010).

The state hospital in Tsumeb experienced a shortage of qualified personnel. The hospital needed specialists, particularly a surgeon and gynaecologist. There was a maternity ward, which at times became overcrowded. There was an increase of patients from outside of Tsumeb Municipal borders. The hospital served the wider community from the region, particularly underprivileged people with low incomes and those who could not afford the services of a private hospital. Ill health could aggravate poverty and inequality as family finances were quickly drained by costly health care and no ability to earn. On average one doctor attended to thirty patients per day. These were mainly people without medical aid and from an underprivileged background. Although the mining companies provided medical aid for their workers, the state hospital attended to several contractual mine workers, which suggested that the medical aid provided by mine operators may not be comprehensive. This was in line with the outcomes of the mine workforce survey where employees of the Tsumeb smelter expressed dissatisfaction with the medical care provided by the smelter operator which did not cover for HIV/AIDS-related illnesses and for which treatment was obtained from the state hospital.

On a daily basis doctors attended to many people with trauma, injuries, accidents, HIV-related diseases, respiratory problems and gastro-enteric nature complaints. Respiratory problems were on the increase (Source: interview with T002 on 11.05.2010). From the community survey it appeared that 54% of the residents considered pollution to be the major environmental problem in Tsumeb that needed to be resolved as soon as possible. Air pollution was pointed out as the main culprit where health problems were concerned, and particularly so in the case of respiratory types of

ailments. There was an increase in complaints from the smelter workers with ailments such as skin irritation problems. Eighty-one percent of the community members believed that their health was negatively affected by the mining and smelting activities in Tsumeb.

More than half, 58%, of the surveyed community members experienced unpleasant experiences with health care in Tsumeb. Tsumeb had the highest proportion of dissatisfied patients in comparison to the other surveyed mining settlements; although one would expect a town like Tsumeb to be more efficient than settlements with less population. While interviewing some of the people who expressed dissatisfaction, the main reasons for that were poor service, discrimination against patients and slow service delivery where people had to wait long hours before they got the doctor's attention. This confirmed the finding that the number of doctors at the state health care institutions in Tsumeb was not sufficient. With the growth of Tsumeb, the expansion of health services will be even under more pressure. The Tsumeb community regarded health care (both clinics and hospitals) as a priority sector which they liked to see improved in the near future.

Educational institutions

Tsumeb had several kindergartens, primary and secondary schools, as well as tertiary educational institutions. The availability of and physical access to educational institutions were fairly good. The town had a wide choice of primary institutions ranging from the Tsumeb primary school, Francis Galton primary school, Nomtsoub primary school, Ombili primary school, Opawa primary school, Tsintsabis primary

school, and Ondundu primary school where children received quality education. Additionally, there was a choice of secondary schools and parents did not have to worry sending their children away from home. Tsumeb gymnasium, Tsumeb junior secondary school, Roman Catholic Church school, Otjikoto secondary school, and Etosha senior secondary school all provided secondary education for learners from Tsumeb and the region. The schools were adequate and competed with other secondary schools in Namibia.

The operations and management of primary and secondary educational institutions did not depend on mining companies for support or funding. None of the schools was funded by a mining company or smelter operator. Some schools received the contributions from the Namibia Customs Smelters (NCS) as a smelter's social responsibility towards the community. NCS donated furniture to Francis Galton primary school, provided building materials in support of the new school hall and kitchen for the Ondundu primary school in Tsumeb, and donated laboratory equipment to the Opawa primary school in the town. None of the educational institutions' operational budget was dependent on the mining or smelting company.

Adult education was offered through the Adult Education Centre, which received funding from the Ministry of Education and Culture. The centre promoted and enabled adults to further their education. Tertiary institutions in Tsumeb were represented by the University of Namibia through the Teachers Resource Centre. The Polytechnic of Namibia was also present in Tsumeb. In 2007, the Namibia Institute of Mining Technology (NIMT) established in the town offering courses in mining, engineering

and manufacturing. Almost one-third of the community with higher education was born in Tsumeb. This suggested that one-third of the people who obtained their tertiary education in Tsumeb or elsewhere either stayed in or returned to the town after completing their degrees and continue to contribute to the development of Tsumeb. This was a positive sign regarding the town's future and displayed people's drive to stay in the town and contribute towards its development.

There were more private organizations and private individuals who were enthusiastic about uplifting the community's life through skills training. Tsumeb's Art Performance centre was established in 2004 and helped the youth and young adults to develop their musical talents where students could learn to play different musical instruments, such as keyboard, recorder, violin, trombone, saxophone, clarinet, horn, guitar and marimba. Apart from music, the centre offered teaching in painting, dancing, visual arts and drama. The centre had more than 400 registered members with 200 students attending classes on a daily basis. Tsumeb had a small but good public community library with a wide selection of books, helpful staff and was accessible to residents of Tsumeb and beyond.

Security and safety

Tsumeb is a very diverse town where people with different cultural values and social backgrounds lived together in a limited spatial territory. The deviations of these differences and segregation in service provisions and land use influenced the security and safety and created a particular tension between the formal and informal townships in Tsumeb.

From the community survey and interviews with relevant authorities, it appeared that the safety and security situation in Tsumeb was under control and manageable; the community did not experience uncontrollable crime. Seventy-five percent of the population in Tsumeb felt safe, but noted that the town was not crime free. Tsumeb experienced increasing pressure through social marginalization, particularly through unemployment, poverty, and rising landlessness among the recent influx. In many cases, crimes in Tsumeb were committed by young people in the age group 19 to 35 years. In most of these cases “the crimes committed were driven by unemployment and poverty” (Source: interview with T007 on 13.05.2010). Eighty seven percent of the community agreed that there were no job opportunities for the youth. Crime, alcoholism and drug addiction were among the major issues that people faced. Community members feared the growing number of school-boy gangs in town and felt unprotected as they claimed that police did not respond to their calls or arrived too late. Residents were eager to see improvements, some suggested that police could patrol streets more often, have night-shifts and police to respond faster.

The most common crimes committed in Tsumeb were housebreaking and robberies, car break-ins, attacks on tourists, robbery and increasing numbers of rape cases (Source: interview with T007 on 13.05.2010). The growth of the informal settlement and the lack of street lights were blamed for “breeding crime”. An alarmingly high number of rape cases were reported in the nearby Oshivelo, many of them committed by the Namibia Defence Force (NDF) soldiers, while Tsumeb also followed the undesirable trend of an increased number of rape cases. The police warrant officer

presumed that the occurrence of rape cases in Tsumeb could be higher, but that many were left unreported. For that reason, police had come up with an initiative to speak to traditional leaders and educate women about their rights. Apparently this initiative had started to bear fruit, causing the situation to stabilize.

Alcohol abuse was a growing concern in the town and considered to be the main cause of domestic violence and rape, particularly among young people. Numerous crimes were committed by offenders being under the influence of alcohol. The sale and use of drugs was another concern, but according to the police the problem had not reached an alarming scale. The occurrences of such cases were low, but with moderate tendency on increase which kept the police alert.

On average, ten robberies were reported per month and occasionally major crimes such as murders were committed (Source: interview with T007 on 13.05.2010). In the year of the survey, 2010, a murder was committed on a farm twenty kilometres outside of the town. The period from January 2010 to April 2010 was considered as relatively calm. The statistics were grimmer for the same period a year before. In 2008 to 2009, 170 were arrested, 70% of them being male. It could not be established if the increased criminal activities were to be blamed on the closure of the mines. It could rather be blamed on general global and national economic conditions that experienced a slowdown in 2008 to 2009, while in 2010 Tsumeb saw a lot of new developments and job opportunities.

Police reported that in most cases offenders were not local people from Tsumeb. The crime rates were particularly high among the recent influx, indirectly pointing a finger towards the fast growing informal settlement that became a safety and security concern for the town. The police in Tsumeb experienced a severe shortage of human and financial resources and could not execute their duties satisfactory if they did not have enough vehicles. They were in particular need of more four wheel drive vehicles that could be used outside of town as many calls were received from nearby farms where access was problematic.

Private companies, the most prominent of which was the Rubicon security services assisted the police to maintain safety and security in Tsumeb. They provided safety and protection services to individuals and companies for their assets and employees. Rubicon also offered their services to government agencies and departments, municipalities, schools, non-governmental organizations, parastatals, banks, commercial businesses and other public and private enterprises and had a wide network of offices in Tsumeb, Grootfontein, Otjiwarongo and Walvis Bay. Similar services were provided by the Sowden security services.

The public was not certain how the cessation of mining and smelting activities could affect the security and safety in the town as many had bad memories from previous times when the town experienced an increase of crime during closure. Until last closure of the Tsumeb mine, the town never experienced long stretches during which the mines were closed, therefore the community and authorities were very cautious regarding safety concerns.

Government services

Until 2008, Tsumeb was the capital of the Oshikoto Region with all services it was entitled to provide to the citizens. To fulfil peoples' civil and political rights, Tsumeb was important in providing residents of the wider community access to government services. Government institutions located in Tsumeb served the wider community, in the settlement and beyond its borders. Government had located its institutions in Tsumeb to be able to serve the people and gave them benefits not only in access to education, health, social security, sanitation, potable water, electricity and housing, but also to services provided by different ministerial institutions.

Tsumeb had a wide scope of governmental institutions and people could obtain services ranging from the application for birth certificates, identification documents to assistance for the resettled farmers. Although the basic services were provided, the residents of Tsumeb liked to see more governmental representation in the town and 10% of the community admitted that an increased presence of government institutions in town would enhance upliftment and development in town.

Since Namibia's independence, there was significant improvement and more government institutions were located in Tsumeb such as the Population office, representing the Ministry of Home Affairs that established in Tsumeb in 1994. Before that many of its functions were executed by the Magistrate. Although identification cards were actually issued in Windhoek, people from Tsumeb and the region could submit their application forms in Tsumeb and the Ministry facilitated the further process. An extension office of the Ministry of Agriculture and Water Affairs has been

operating in Tsumeb for more than ten years. The Ministry worked with local farmers; visited individual farms and assisted emerging farmers. Several government research stations were also located in Tsumeb or its proximity, such as the Research Station at Manheim doing crop, horticultural and fruit trees research and the Tsumeb Magnetic Observatory with a station monitoring seismic activity as part of the Global Seismological Network (GSN).

Recreation and cultural facilities

Culture, recreation, religion and a positive social life contribute to the health of individuals and communities by keeping them busy, interested, positive and optimistic, enjoying the activities they like. In addition to building healthy bodies and spirits, involvement in clubs with different interests and cultural activities could help people to avoid emotional and social problems. This was particularly important for the youth of Tsumeb to keep them interested in healthy and positive recreational activities to reduce boredom that could lead to drugs and alcohol abuse or other anti-social behaviour and crime.

In 2010, Tsumeb had an abundant choice of different recreational, cultural, sporting and leisure activities and facilities, from a wide choice of different clubs and interests, number of sporting facilities and religious amenities. There was the open air museum, Tsumeb Museum, Tsumeb cultural village, arts and crafts centre, the newly built Kupferquelle resort, several sporting facilities and a wide choice of religious denominations.

Tsumeb Museum was opened on 5 April 1975 and was located in the historic building which was built in 1915 as a German private school and now declared as a national monument. The Museum had a wonderful collection of artefacts and its historic materials about the origin of Tsumeb and life throughout history. The ethnological department of the Museum exhibited photographs portraying the life and culture of the Ovambo, Herero, Kavango, San and Himba tribes, served as educational material for all. The Khorab Room presented numerous photographs of the German Schutztruppe and the Union troops from the times of World War I. The Mine Display Room offered a wide selection of photographs from the early years of 1902 to 1906 and described in detail the construction of the railway line from Swakopmund to Tsumeb, the pioneer days of Tsumeb, and the mining. The Museum had endured thanks to the donations and assistance of many people in Tsumeb. The artefacts have been donated by the residents or people who used to live in Tsumeb or their descendants. The Museum was very informative and also organized tours to the mine. In the same street there was the Tsumeb's arts and crafts centre presenting a great variety of African artwork and curios and where it was also possible to watch the artists and craftsmen at work. Those who were active and loved the outdoors could participate in different sport activities. Participation in recreation and regular physical activities could improve self-esteem and acceptance and reduce depressive symptoms, stress and anxiety. Sporting enhances psychological well-being and could keep the youth off the streets. Tsumeb had a large number of facilities and sports clubs, such as the Faras horse academy, Etosha skietklub, bowling club, gym & health club, rugby club, soccer club, Netball Club and motor sports club. Among other sport facilities available to the local

community were a soccer stadium, tennis court, squash court, swimming pool, golf course, horse riding stables, off-road race tracks, bike dirt-tracks and a rugby stadium.

Tsumeb provided for many different faiths and congregations. There were nineteen denominations represented in the town.

Twenty five kilometres north-west of Tsumeb lies the Otjikoto Lake, which was a perfect recreational and tourist spot for people of Tsumeb and tourists from other areas. Apart from its tranquillity the Otjikoto Lake has an interesting history surrounded with many stories and myths.

Since 2003, Tsumeb hosted an annual Copper Festival that brought together registered entrepreneurs and informal businesses allowing them to showcase and trade with their goods, to market their skills and compete for the best food and industrial and commercial stall prizes. The event attracted an increasing number of outsiders, from high ranking Government officials to tourists, because it offered a variety of opportunities and entertainment. The businesses increased their turnover and boosted their incomes during the festival which usually lasts a few days in October and runs under different themes every year. The Copper Festival was an event that every resident of Tsumeb looked forward to. All these activities added flavour to the town's gratitude towards the copper mining activities.

5.3.6 Environmental concerns

Both historically and viewed at the time of the research in 2010, mining could have adverse effects on its surrounding areas if protective measures were not considered. There was always a probability of massive contamination of the area surrounding mines due to the various chemicals used in the mining and smelting processes. Tsumeb developed just next to the mine and its close proximity caused exposure to high concentrations of some toxic chemicals, such as lead, cadmium and arsenic over a significantly large area.

Fifty-four percent of the community in Tsumeb were not satisfied with the air quality, blaming mining and smelting activities as the main culprits for the air pollution in the town. The pollution was described by different wording – ‘*air pollution, gasses, fumes*’, but they all referred to the same occurrence.

Among the other environmental and land use problems, 14% of the surveyed community were not satisfied with dumping along the road and 13% complained about hazardous waste from mining, referring to tailings and slag dumps in the smelter area. There was not a single person who believed that there was no pollution in Tsumeb.

The contamination of the agricultural land in the surrounding areas of the Tsumeb smelter complex has been known for years and researches had been carried out from time to time. The pollution was traced back to emissions from the old and the current smelter as well as to windborne dust derived from the tailings and slag dumps in the smelter area (GSN, 2007a; GSN, 2007b; Uribe et al, 2005, Nunes, 2007; Ettler, Johan,

Křibek, Šebek & Mihaljevič, 2009; Ettler, Johan, Křibek & Nolte, 2009). The current smelter was constructed in the early 1960s to process concentrate from the Tsumeb copper mine and was one of only four commercial-scale smelters in Africa (Source: interview with T013 on 27.05.2010). The Tsumeb smelter was one of the few in the world that could treat complex copper concentrates that contained arsenic and lead impurities. In 2007, the Geological Survey of Namibia (GSN) implemented a comprehensive soil sampling campaign resulting in a detailed delineation of the contamination plume (GSN, 2007b). Heavy metals occurred naturally in soils but rarely at a toxic level. The soil contamination in Tsumeb was confirmed as being a result of copper mining and processing activities over a period of more than 100 years (GSN, 2007a).

In the absence of the guidelines on the minimum risk levels (MRLs) in Namibia, previous researches had used other international guidelines such as the World Health Organisation (WHO) and Food and Agriculture Organization at the United Nations (FAO) guidelines to evaluate soil contamination. The results were not good. The medical tests conducted on residents in Tsumeb showed that more than a fifth of the 148 investigated persons had lead concentrations in their blood, exceeding the WHO guideline values (GSN, 2007b). More affected were residents of the Nomtsoub township of Tsumeb (western suburb) as well as residents and workers of the industrial zone to the north. Less affected were people in the eastern suburb of Tsumeb which was separated from the smelter complex by a mountain ridge (GSN, 2007b). The analyses showed varying but generally high contaminations of arsenic, cadmium and lead, exceeding by far international standards for soils in the study area (Nunes, 2007).

The abnormally high lead and arsenic contamination occurred in areas with severely contaminated soils (GSN, 2007a). The soil pollution traced back to dust emissions from the old and the new smelter as well as its tailings and slag dumps. The effect of historic emissions from the old smelter was not to be underestimated as a source of heavy metal contamination in the areas of TransNamib and the TransNamib Hostel which were located directly opposite and downwind of the old smelter site. Especially critical was the area towards the west and north of the smelter within a radius of three to six kilometres (Figure 104). Bio-accumulation of the toxic elements such as lead, cadmium and arsenic was evident in all plant samples (GSN, 2007a). The report suggested that the growing of leaf vegetables such as parsley, spinach and lettuce and root vegetables such as carrots and potatoes should be generally restricted in the wider surroundings of the smelter including the whole town and the farmland up to ten kilometres west of the smelter (red area in Figure 104) (GSN, 2007a).

At the time of the research in 2010, the concentrate was produced by the Chelopech mine in Bulgaria. The smelter did not smelt copper produced from the Otjihase and Kombat mines for economic reasons (Source: interview with T013 on 27.05.2010). Environmental pollution of the area due to mining and processing of complex copper and lead ores had been known for many years, but little was done to address the issues. The Tsumeb community complained of cancer-causing fumes from the plant, blaming mainly the processing of imported Bulgarian copper ore that was said to contain a high percentage of arsenic. Residents blamed the copper smelter for processing Bulgarian copper, which contained a high level of toxic elements, and was not wanted anywhere else in the world.

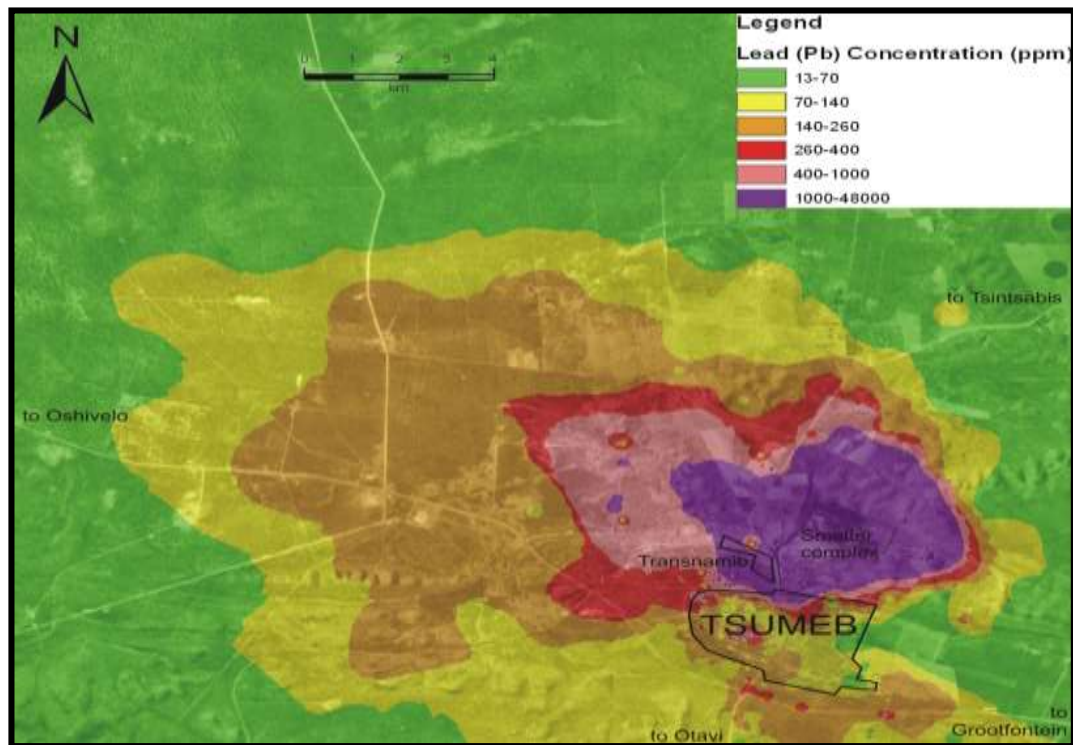


Figure 104. Lead contamination of surface soils in the surroundings of Tsumeb, Namibia (Source: GSN, 2007a).

Speculations were many, including an alleged problem with the smelter's filter, but the public was kept uninformed. The patience of Tsumeb residents reached the limit and in 2011 about hundred residents marched in protest demanding to halt the copper concentrate imports for refining at the NCS. They alleged that the residents of the town were exposed to dangerous pollutants which damaged people's health. The residents also called for the compensation of workers who were exposed to arsenic and other similar toxic agents. Then Government ordered an investigation into the allegations of human and environmental contamination by the NCS, produce the report and in the meantime agreed to reduce the volumes. The first results of an on-going environmental impact assessment of the smelter showed that sulphur dioxide emissions exceed international guidelines in some areas, while concentrations of lead and cadmium released into the atmosphere fell below international exposure guidelines. The

environmental report said some places were found to contain higher levels of cadmium, a potentially toxic element, with levels higher than the Canadian guidelines on which the study was benchmarked since Namibia did not yet have guidelines of its own. The report said emissions from the smelter's chimneys required attention. Since Dundee acquired the Tsumeb smelter in 2010, it has spent more than N\$800 million to upgrade smelter operations in order to safeguard the health and safety of workers and protect the environment. An additional N\$800 million was committed to the construction of an acid plant that could significantly reduce sulphur dioxide emissions and create more jobs (Poolman, 2012).

NCS acknowledged that the smelter faced numerous challenges with regard to sulphur dioxide emissions and the processing of copper concentrate with arsenic content. At the time of the research in 2010, the NCS processed only 2500 tons of concentrate per month and the bulk had to be imported due to the fact that Namibian mines could not produce the required amount of concentrate to feed the smelter with enough material (Elago, 2012). NCS spent N\$3 million on systems to measure sulphur dioxide and dust emissions from its operations. In 2012, the NCS commissioned the oxygen plant and in 2012 it produced 190 tons of oxygen. NCS was planning to add a second plant, and then it could be able to smelt all concentrate received in the most environmentally responsible manner, using the best practices of the international smelting industry. Apart from the environmental pollution from the old and current mining and smelting activities, Tsumeb residents were also not satisfied with the dumping of waste along the streets and other types of environmental pollution.

6 PROSPECTS FOR ROSH PINAH, KLEIN AUB AND TSUMEB

The results of empirical investigations revealed various sets of data within different communities, business environment and with the local authority and how they worked together and made decisions that impacted the settlement's development. Based on these empirical results from the case studies, this chapter looks at the complex relationships between different aspects of problem formations in mining settlements to develop more comprehensive understanding. The chapter will deliberate on variables that were chosen from the conceptual framework and were tested to attain better understanding on developments in the mining settlements, their viability and prospects.

The current state of the examined mining settlements is the result of governance and actions taken previously through adaption of different policies at the local level. The mining settlements reflect the interaction and relationship between stakeholders, the decisions that they had made, actions that resulted from these decisions under different external influences throughout their histories, and impacts such as global commodity price fluctuations. Many physical characteristics of a mining settlement may never fade away, but others like socio-demographics and the economic base of the settlement may change instantaneously or gradually. The variation of these characteristics may be determined by the factors such as the duration of the mining industry's presence in the settlement which is determined by the length of mining cycle, population size and demographical characteristics of mining settlement resulting from the company's labour hire and settlement's management policies, the number and length of short term mining cycles that have subjected the settlement to decline and growth and are caused

by different facets of mining economics. The chapter will confer the sets of variables influencing the mining settlements viability and prospects in three case studies.

6.1 Discussion on viability

A single industry tends to make its presence known through several socio-demographic, economic and environmental characteristics. The first clear trait of the mining settlement is that it was created to serve mining industry. The visible evidence of which are mine tailings, a derelict mine infrastructure, the uniformity of old residential areas, all reminiscent of the past. Housing is often characterised by well-planned rows of accommodation for the mine labour force. The population reflects the mining company's needs and labour policies where the movement of people may be restricted. The vast majority of residents are born outside of the settlement and find themselves forming a part of a transient population in the mining settlement. There is a clear absence of elderly people, male dominance and a very specific pattern regarding the education level of the residents, namely a large share of people with very low education and a small share of people with highly specialized skills that are needed in mining industry. This describes a typical mining settlement built to serve the mining industry and which functions as a single-industry settlement. Therefore these specific characteristics of mining settlements were used as indicators to determine the settlement's reliance on the mining industry, which allows further to evaluate the settlement's ability to persist without the presence of the mining industry. The indicators were explained in Chapter 4.5 and Table 12 presents the outcomes of the assessment.

Table 12

Assessment of the case study settlements' reliance on mining industry (2010)

INDICATOR (IN SCALE 1-3)	Rosh Pinah	Tsumeb	Klein Aub
Share of people living less than 20 years in the settlement. 3 - 35%; 2 - 20%; 1 - 0 to 5%	3	1	1
Male dominance. 3 - 55%; 2 - 50%; 1 - 45%	3	1	1
Absence of elderly population. 3 - 0 to 1%; 2 - 2 to 4%; 1 - 5% and more	3	2	1
Fraction of big share of people with education of Grade 10 and below (A), and a small share of people with highly specialized skill or tertiary education (B). 3 - (A) 61 to 80% / (B) 2 to 10% ; 2 - (A) 40 to 60% / (B) 2 to 10% 1 - any other combination	2	1	1
SOCIAL Sub-Score (Minimum – 4, Maximum – 12):	11	5	4
Employed in mining industry. 3 - 20% and more; 2 - 5 to 20%; 1 - 0 to 5%	3	1	1
Presence of medium and large scale enterprise. 3 - more than 10; 2 - 5 to 10; 1 - less than 5	3	1	3
Scale of diversification of local economy. 3 - very limited; 2 - diverse, but not in quantities; 1 - diverse	2	1	3
Settlement is serviced and managed by mining company/s. 3 - yes; 2 - partially; 1 - no	3	1	1
Ownership of land tenure and formal housing by mine. 3 - fully owned and managed by mine 2 - partially owned and/or managed by mine 1 - is not owned or managed by mine	3	1	1
Existence of long-distance commuting (LCD) employment policy. 3 - LDC in place; 2 - a segment of LDC; 1 - LDC does not exist	2	1	1
ECONOMIC Sub-Score (Minimum–6, Maximum–18):	16	6	10
Established by industry on virgin site. 2 - yes; 1 - no	2	2	2
Degree of isolation of settlement. 3 - very isolated; 2 - isolated, but good connectivity; 1 - not isolated	2	1	2
Maturity within mining cycles. 3 - still in operational stage, has not experienced closure 2 - full mining cycle and closed 1 - one or more full mining cycles and is still functional	3	1	2
Separation of mine labour force from the community in settlement's layout. 3 - yes; 2 - partially; 1 - no	3	1	1
Service provisions adequate and accessibility to all. 3 - only for mining community; 2 - adequate for mining, less general public; 1 - no access for general public	2	1	1
ENVIRONMENT Sub-Score (Minimum – 5, Maximum –14):	12	6	8
TOTAL SCORE: 15 - minimum score suggesting characteristics of dependent settlement; 44 - maximum score suggesting characteristics of a regular urban centre.	39	17	22

Rosh Pinah, not surprisingly, revealed strong reliance on the mining industry, scoring 39 points out of 44. This points out to Rosh Pinah's relatively deprived potential for long-term development without the presence of the mining industry and its likelihood of severe decline after the closure of mining activities, unless the magnitudes of the indicators are modified and its reliance on mining industry is reduced. A particularly high score was observed for socio-demographical indicators.

The demographical characteristics of Rosh Pinah reflected the signs of its dependence on the mining industry. This may undermine the settlement's transformation after closure of the mining activities because the unbalanced demographics will not favour the stabilization of imminent depopulation. Economic diversification has occurred, but mainly among small scale entrepreneurs and the informal sector, both being the most volatile to economic fluctuations. The ability of Rosh Pinah to maintain its existence without presence of the mining industry is jeopardized.

Klein Aub and Tsumeb, on the other hand, demonstrated a weaker dependency on the mining industry, and its presence is not overwhelming. Both settlements bear resemblance to regular urban settlements in Namibia of the similar sizes. The slightly elevated outcomes among the economic indicators for Klein Aub indicate the presence of dependency or a stagnant local economy. The assessment and outcomes of the field investigation indicate a likelihood of the settlement's strong reliance on government's support for its development, job opportunities and services. A direct reliance on the mining industry is not present.

The settlement's reliance on the mining industry is linked to its inability to sustain itself after mine closure. Long-term viability is not possible unless the settlement has diversified and does not rely on a single industry for its functioning, the demographics of the settlement are more balanced and the environment is taken care of. The symbiosis between mining and settlement will weaken the settlement's possibilities to diversify and to develop beyond the mine's life-cycle. The viability of a mining settlement, normally subject to internal and/or external constraints, lies in its capability to maintain its existence as an urban structure (Plashed, 2006). External constraints, like global mineral commodity prices and the financial performance of the mining companies, are very erratic and beyond control, but internal factors such as the settlement's socio-demographics, the local economy and the environment can be balanced and smoothed to direct the settlement's development into a favourable direction.

Figure 105 presents the viability modelling outcomes for the three case studies. The pointers are seen as a reflection of the current state of the settlement rather than a cause for viability. The more condensed the viability path, the closer towards the core of the radar shape, the better the chances for the mining settlement to go through the transition and emerge as an independent rural or urban centre within Namibia's settlement framework.

Tsumeb appeared viable with only one variable alarming the potential blockage in its development, whereas Klein Aub's and particularly Rosh Pinah's viability is considerably threatened with their viability paths stretching towards their outer limits

(see Figure 105), indicating that at this point these settlements have very weak likelihood of existence and development as independent urban structures that are capable to prosper. Klein Aub's viability is threatened by depressed economic indicators, but Rosh Pinah's viability is threatened by negative demographic projections, business environment and service provision aspects.

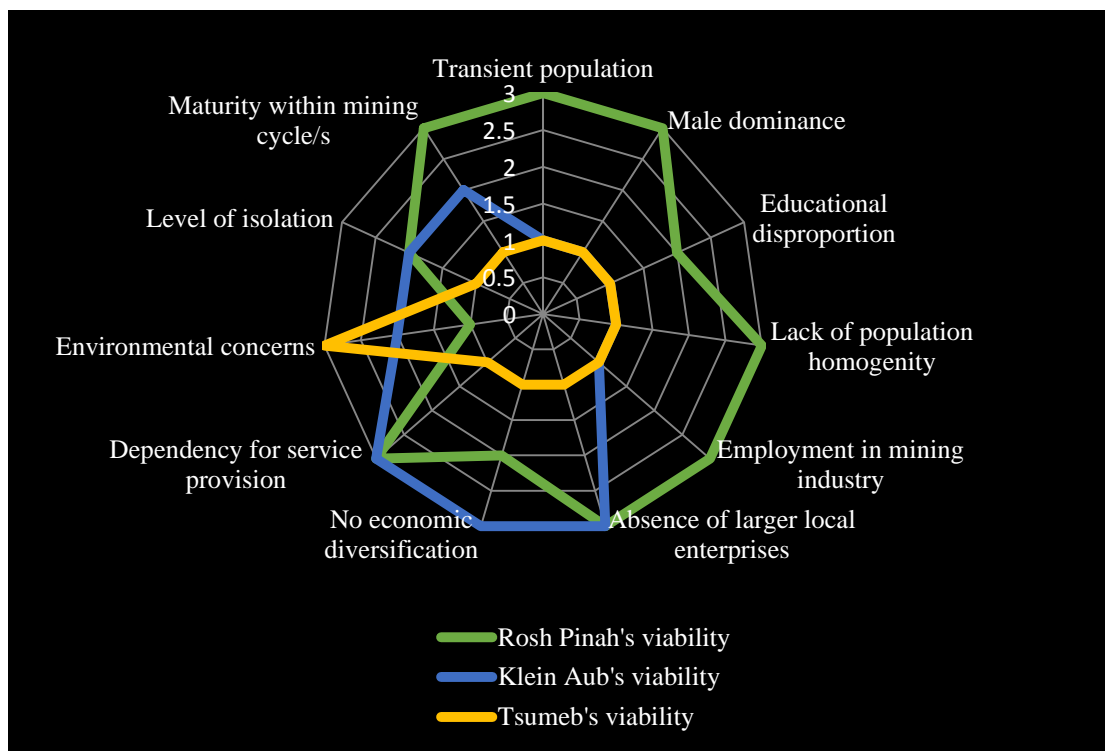


Figure 105. The viability paths of the case study settlements (2010).

6.1.1 Demographic projections

The demographic parameters for the viability of Rosh Pinah are alarming (see Figure 105). The large share of a transient population signposts residents' unwillingness to settle on a permanent basis and people are likely to leave the settlement after the closure of mining. There is a constant turnover of people in Rosh Pinah with new people arriving while others leave. The growth is mainly on account of the transient population, job seekers whose stay in Rosh Pinah are more opportunistic rather than

one with long term plans. In the event of closure of the mining companies or a significant downscale of mining activities the population losses are expected to be tremendous and the scale of depopulation alarming. An analysis of the Rosh Pinah community revealed that only 17% of the residents will stay in such event. If the statistics of the privately owned local authority RoshSkor data are used, the population size would shrink to 1 870 people, while the estimates from the National Census data suggest the depopulation will leave Rosh Pinah with only 884 residents. Most of the young and educated mine workers would be among the first to leave Rosh Pinah. The settlement might remain with an elevated share of middle age population groups and most of them unskilled. The out-migrations will be male dominated. Many of them will be returning to their wives and children, families that at present do not live with them in Rosh Pinah, but are supported by these workers. The gender ratios might level out over a period of time and become more balanced with a slight female dominance, which is a normal trend for urban areas in the Karas Region. Gender might balance out, but the lack of job opportunities for females who are already severely under pressure, will become worse. There will be more females for fewer jobs and the percentage of unemployed women will grow. The out-migration of mine workers will not make more job opportunities for others because the local economy will also suffer financial and workforce losses along with reduced markets.

The growth of the permanent population base is slow and the main reason could be non-existence of title deeds in Rosh Pinah. People cannot purchase immovable property because the land in the formal part of Rosh Pinah belongs to the mine operators. Therefore the considerable growth of permanent population that would be

beneficial for the settlement's development is not present unless Rosh Pinah is proclaimed as local authority. At present there is no stimulus for residents to invest in the town either financially or emotionally. The fragmentation of the settlement's population dividing the settlement into the formal part for the mine employees and informal for the general community hinders the social cohesion and the homogeneity of the population.

The segregation of Rosh Pinah residents is not only between the mine workers and the general public, but also between the mine workers of different mines. Segregation does not contribute to the homogeneity of the settlement; it is undesirable and may create a sense of strife between those employed in mining that have better access to services and housing and the rest of the community. Over the time, particularly during worsening economic conditions, this may lead to intolerance that will be destructive to the settlement's development and contribute to an increase in crime, alcohol and drug abuse, prostitution and other social ills. As soon as mining will start to downscale, depopulation will set in, unemployment will escalate and the likely social tensions may arise due to poverty.

In comparison to Rosh Pinah, the demographic characteristics of the viability paths for Klein Aub and Tsumeb are well confined towards the core (see Figure 105) suggesting a stable and balanced population base. The demographics of both settlements can be considered as steady and are not uncommon for settlements of similar sizes in Namibia. There are no significant potential warning signs in terms of the demographic characteristics that would be undesirable and challenging to the viability of these

settlements. There is no indication of the male dominance or absence of the elderly population group that is characteristic of mining settlements. Most of the population base of Klein Aub is local people usually from the nearby areas, where the share of transient people is negligible and the current flow of migration is not significant enough to threaten the settlement's viability. The same relates to Tsumeb, which over the time period of the operations and closure of the mine, leading to the present day, documents the transformation of a company town to an independent and diverse community. However, the recent trend of influx of people to Tsumeb, particularly from the northern regions, and the establishment of a new informal settlement alerts of its potential to alter the population composition by increasing the share of a transient population and lowering the population homogeneity. Numerous previous attempts to clear the land of informal settlers in Tsumeb have failed. The failure may be attributed to political reasons such as fear of becoming unpopular or a lack of coordinated action. In the case of Tsumeb, it is not only the inflow of people that is of concern, but the nature of migrants who are transient. There are more people migrating in from the northern regions with intentions to leave either to the coastal areas of Namibia or to Windhoek. The process should be monitored and the strategies must be found to retain Tsumeb's permanent residents, particularly its youth, because these are major challenges that may alter Tsumeb's viability which otherwise can be considered stable at present.

The challenge for Klein Aub is its small population which gradually diminishes and thus extremely limiting for economic development and diversification. The experience from other countries points out that the towns like Klein Aub would be closed down

and people relocated. Leading general perception is that small towns must disappear and are not viable (Bandaranaike, 2003). This may not be a desirable solution for Klein Aub, because the settlement has been persisting since its establishment in 1966 and did not close down after mining had ceased. A few people, particularly the present senior citizens and those who were born in, or came to Klein Aub at a very young age have developed an emotional attachment to the settlement to which they attach a sense of permanence. Current demographic characteristics for Klein Aub and particularly for Tsumeb support the settlement's capability to maintain its existence. The population base is stable, but needs to be reassessed constantly.

6.1.2 Business environment

The business indicators of the viability path revealed very diverse status quos for all three mining settlements (see Figure 105) with Klein Aub ostensibly being the most disadvantaged. The economic indicators for Klein Aub's viability are extremely deprived indicating a complete absence of larger local enterprises with no economic diversification taking place. The problems are not only those of a small population base, but the spatial isolation of Klein Aub explains the settlement's struggle to develop linkages with the region. The economic vitality after closure of the mine came to a near standstill; the economic base narrowed to a level where the only employment opportunities in Klein Aub are in the public service or informal sector. The significant proportion of the labour force employed in the public sector indicates economic decline and in the case of Klein Aub it also reflects the strategic decision of the central government to maintain the settlement since the closure of the mine in 1987. Overall Klein Aub is not self-sufficient and its potential for economic growth is limited. The

indicators for economic viability are so low that the only hope for Klein Aub is to attract new investments to the area to boost the local economy and trigger some growth, without which Klein Aub may remain a small rural community depending on government compassion.

Rosh Pinah exhibits a more favourable state of local economy despite the strong reliance on the mining industry, with most of its people employed directly or indirectly in the mining sector. The estimates from the National Census data reveals that more than 24.2% of Rosh Pinah residents are directly employed in mining and likely the same share to be indirectly dependent on the mining industry. Considerably lower estimates are obtained from the RoshSkor population data, revealing approximately 12% of Rosh Pinah residents being directly employed in mining and likely the same share to be indirectly dependent on the mining industry. The current employment structure is a significant setback for Rosh Pinah to diversify.

Irrespective of temporary economic fluctuations, the local economy of Rosh Pinah presently can be regarded as strong notwithstanding its small size private sector. There is a presence of economic activities that can provide all the basic goods and services. Rosh Pinah's residents can access several higher order goods and services such as furniture stores, shops for sports and outdoor wear, a jeweller, a photographer, legal services and environmental consultants. The variety of the higher order services is sufficient and could compete with a medium size urban centre, but many of these enterprises are either subsidiaries of larger national or international companies or branches with the mother company somewhere in Namibia or South Africa, or

businesses owned and run by a family member of a mine employee who is likely to leave after the closure of mining. Their client base also consists mainly of people employed in mining and mining supporting businesses. In the event of downsizing or closure of the mining industry the market size that will remain in Rosh Pinah will not be able to sustain business enterprises offering higher order goods and services. The dip in people's incomes is expected to affect the buying power that will be considerably weaker and unable to sustain enterprises providing higher order services and goods. At present there is an income gap between people employed in the mining sector and other community members. There are two disadvantages to this occurrence, one is that the higher wages paid to mining employees affect other businesses by making it difficult for them to compete with the salary scales of the mining industry and thus attract qualified staff, and secondly, in the case of the closure of mining the majority of current incomes will be lost. With the worsening of the local economic situation and loss of population, such businesses will decline and eventually close or relocate.

Declining global commodity markets and the slow-down of the economy between 2008 and 2010 had weakened the local economy to such an extent that small and medium scale enterprises had to relocate to the informal settlement. Half empty buildings in the formal part of Rosh Pinah indicated abundance of rental space. The unoccupied property was an indication of the struggling local economy and the potential that in case of the closure of the mines, the local economic base might be paralyzed and not survive the hard pressures of transformation.

Despite its good access roads, Rosh Pinah remains isolated from other urban centres and the rural population base in the Karas Region is insignificant with a density of 0.5 people for square kilometre, being the lowest in Namibia (Republic of Namibia, 2012a). Assumption based on its present population size, Rosh Pinah will not have much potential to maintain its economy and consequently the settlement will become smaller in population size and limited services and retail outlets. The businesses would struggle to maintain the level of activities with a smaller population and lower buying power unless new projects and investments were to flow in. The informal sector which can be regarded as being strong in Rosh Pinah will temporarily benefit from the residents' income declines, but only for a short time. Many of the entrepreneurs and small retail outlets in the Tutangeni informal settlement rely on stock obtained from the formal part of Rosh Pinah. With the deterioration of formal businesses the informal sector will also suffer losses as many of their suppliers will move out and in the long run they may not be able to secure stock from other suppliers because of Rosh Pinah's isolation and long distances away from other urban centres in Namibia, the closest being Oranjemund. Limited unsophisticated local businesses and lack of sufficient local medium and large scale enterprises are major weaknesses leaving the settlements with a very limited potential for future viability.

Tsumeb has experienced several booms and declines and this has strengthened the town's position; it matured with each consecutive mining cycle whereas Rosh Pinah had never experienced a complete standstill of the mining industry and the imminent consequences thereof. There is no maturity and the forthcoming transformation of the

settlement will test the settlements capability which is not known and extremely difficult to estimate. The economic viability of the settlement is seriously challenged.

Tsumeb on the other hand has experienced several mining cycles and has managed over the years to diversify its local economy until only four percent of people remain related to the mining industry, mostly those employed in copper smelting operations. Such a share of people employed in mining is low, with very little potential to significantly impact on the settlement's economic base in the event of closure. It would be hard for people, but the settlement would survive. The horizontal diversification of the local economy has not only expanded, but it also intensified by way of offering several outlets of the same type of higher-order goods or services and a sufficient client base for all. Within the framework of Central Place concepts, Tsumeb would score a high rating by being able to provide and sustain these services in addition to having a significant market size. In recent years the town has managed to attract a growing number of new and local investments. The establishment of local medium and large scale enterprises in the town has contributed enormously to the stabilization of the economy and reducing the settlement's dependency on external investments and an external labour force, further strengthening Tsumeb's capacity to maintain its existence and its capability to guard the local economy from other external constraints. Tsumeb is exhibiting all signs of a self-sufficient urban centre.

6.1.3 Service provision

Reliance on external support for service provision in Rosh Pinah and Klein Aub seriously affected the settlements' prospects for long term sustainability. The viability

path exhibits serious challenges in this sector pushing the viability line to its external edge (Figure 105). This means that at present services and infrastructure in these settlements are not sustainable.

The investigations have revealed that services and infrastructure in Rosh Pinah are adequate for the current needs and requirements, but the private ownership of its managing company hinders the chances for its long-term sustainability. At present the RoshSkor, the company responsible for the management and the maintenance of all services, is efficient, but the ownership by the mining companies means that all the settlement's services and management depend on the mining industry for funding and their operational capacity. This applies to both soft and hard infrastructure of the settlement. In the event of closure of the mines the service provision will be paralyzed and be left without any resources, financial or human, to manage the settlement's infrastructure and services. Consequently, former privately owned infrastructure which is also oversized will fall into a state of disrepair and disuse and might become a burden to the national government. This is a classic instance and consequence situation where the infrastructure is developed out of necessity for the mining industry, rather than for the current and potential needs of the local people. Despite the presence of a considerable social infrastructure, it is unlikely that the remaining population base will be able to support and maintain the physical infrastructure on the same level and standard, particularly because the growth of the population base of Rosh Pinah is mainly built on increasing number of unemployed and poor people. The infrastructure to remain after the withdrawal of the mining companies will be undermined, and its deterioration will cause people to be reluctant to plan their future in the settlement.

Education is important for families with children and the non-existence of such services or its poor quality will drive people to move out of the settlement to other centres where their children can obtain better education. The settlement being provided with a good social service infrastructure and amenities for all, not only the mine workers, would increase the chances for the settlement to retain its population and attract more people from the nearby areas, particularly if a secondary school could be established in Rosh Pinah. So far Klein Aub succeeded to persist because the government took over the responsibility to manage the settlement and took over the administration of social infrastructure. Presently the settlement exists as a small centre for government services such as medical care and education and it is unlikely that it would persist without the government's support. The reliance on government for its service provisions limits Klein Aub's self-sufficient existence.

The infrastructure and service provision in Tsumeb forms a part of government's social and welfare services. Infrastructure, housing, basic social services and amenities do not depend on mining activities and the Municipality is in charge of all planning and development issues in town. There is no dependency on mining or any other private or public sector for its operations, maintenance and financing. By being self-sufficient the town's viability is not confronted by other external factors for service provisions. At this stage the only limitation is unresolved land issues since provision of urban infrastructure must keep up with the pace of the increasing population. Although this may hinder development, it is presently not considered as being a serious threat to Tsumeb's viability.

6.1.4 Environmental concerns

The environmental quality and pollution concerns in the settlement can seriously destabilize the community and upset the settlement's viability. A healthy community will enjoy a better quality of life; happier people can make a better contribution towards the settlement's development while a poor environmental quality challenges future development.

Currently, the environment is well-maintained in Rosh Pinah. The residents are happy with their physical environment, only the increasing presence of allergies and respiratory tract related illnesses among them may hint of an environment that is not as healthy as it seems, particularly with the old mining tailings located in the pathway of prevailing winds. Society is becoming less tolerant of environmental legacies left by mining and its aspect of people's health cannot be ignored. Furthermore the mine closure and reclamation may have an impact on viability long after the mining has ceased. Klein Aub is in a similar position where old mine tailings located to the east of the settlement and close to the school and residential areas started to raise concern among the local residents. The people start to become aware and alert of the potential impact on their health. Although it is not the dust from the tailings that presently challenge Klein Aub's viability, but the sinking grounds in the middle of the settlement where old mining shafts collapse, creating danger to local people that disadvantaged the settlement's viability path (see Figure 105). The environmental indicator is slightly raised due to the presence of the old mine infrastructure that is not rehabilitated. If the concerns of residents are not attended to, these will remain to be potential setbacks and

might discourage new investments in the area and nonexistence of detailed old mine infrastructure plans deter the future developmental plans.

For very long Tsumeb enjoyed peace of mind with very little environmental uproars despite its large potential for substantial contamination in the area surrounding the mines and smelter due to the various chemicals used in the mining and smelting processes. Tsumeb developed next to the mine and its close proximity determined exposure to high concentrations of some toxic chemicals, such as lead, cadmium, and arsenic over a significant area. Large areas are considered unsuitable for the land development, limiting the settlement's growth and expansion potential. The community's dissatisfaction with the poor cooperation from the Municipality led residents of Tsumeb to express their concerns through peaceful demonstrations, which severely downgraded the viability of the town. Environmental pollution is a serious threat to human lives and may put pressure on the settlement's health care, and impact on the local economy, particularly on the availability of skills and capacities. The current cooperation between the communities, public and private mining sector is stabilizing the situation, but in case of failure Tsumeb may expect an outflow of people, with in-migrations slowing down or maintaining its current levels ascribed to the pool of people with lower skills and education, significantly weakening the potentials for strong local economy.

6.1.5 Findings on viability

The findings of the viability modelling of this investigation suggested the following:

- i) Rosh Pinah - not viable, but that can be altered;

- ii) Klein Aub - viable, but with stagnant existence, and
- iii) Tsumeb - viable with potential to prosper.

Present Rosh Pinah may be considered as not being viable in the long term. The examination has demonstrated that if mining operations in Rosh Pinah cease today, the impact on the settlement would be ruthless. The closure of mining operations would have a dramatic impact on the populations of Rosh Pinah with a large number of people expected to leave to seek employment elsewhere. Consecutively, the economic flow-on effects to private and government businesses and services in the town would be significant. The human losses will exceed the human capital needed to stabilize the economy and maintain the infrastructure and services in the settlement at its present level. Keeping in mind assumption of the central place concepts, the threshold population is important aspect as there is the minimum number of people needed for a central place business or activity to remain active and prosperous. Emerging entrepreneurship is very weak and not sufficiently supported, without access to land ownership and financing opportunities. There is success with the growing informal sector that has good potential to formalize over time, but the closure of the mines in the foreseeable future (Skorpion Zinc – 2016/2017 and Rosh Pinah Zinc Corporation - 2020) may hinder the chances to prosper. Local economic development is mainly preoccupied with the settlement's vertical diversification which does not dissect the dependency tie with the mining industry, only makes it stronger. It boosts local economy, but it will last only while mines are present in the area. There are several exploration activities in surrounding areas of Rosh Pinah, proving positive results for additional resource, and expectations of extending mining life cycle is high, yet the

mining economics cannot guarantee the needed growth of global commodity markets. Rosh Pinah may not be viable without the mines and it is unlikely that something else will arise to sustain the town at nearly the same size. The shock of decline for Rosh Pinah is unavoidable, but the capability to recover from it will depend from preparation and planning activities that are put in place towards the inevitable and anticipated event of closure of mining in Rosh Pinah.

Viability of Klein Aub is threatened. Its previous dependency on mining has developed into a new form of dependency - reliance on the government. This situation is undesirable, particularly in the long-term as it has the potential to develop a new mindset among the local people - the expectation to be provided for without having to fight for themselves and to create new economic activities. The economic potential is also limited by the settlement's insufficient population size. In the short term, a new investment could bring some development to the area, an opportunity to be grasped and be encouraged to continue. At present, without external stimulus for growth Klein Aub cannot be viable. It may remain as a struggling centre that distributes government services to its rural hinterland.

Tsumeb, on the other hand, presents a strong potential for stable and long-term viability. At present most of the viability indicators favour the long term sustainability except for the environmental situation that is escalating and entering the political arena. This may negatively influence the development, but at the current stage it is not critical and since 2013 has started to ease.

Tsumeb does not exhibit particular characteristics of a mining town. It starts to display resemblance to other non-mining urban centres in Namibia. Tsumeb does not mirror the ebb and flow of the commodity markets as the copper prices have gone up and down since the closure of mining in 2008. The population size and local economy remained stable and displayed the signs of growth. The dependency on mining industry is practically non-existent and thus the town does not experience the mining industry's induced fluctuations of population. The maturity of the town through several mining cycles and its evolvement as an independent and diversified urban centre is one of the strongest pillars to maintain the viability. It is expected that in future Tsumeb will develop along the same path as any regular urban centre in Namibia. Another discovery of mineral deposits in the vicinity of Tsumeb would alter some local economic and demographic compositions, but with the current trend of the mining industry employing less people and relying more on high tech operations, it is very unlikely that Tsumeb's economy will decline because of the mining industry.

6.2 Prospects and hypothetical scenarios

The prospects are formulated as foreseen, future developments. Prospects and scenarios should not be understood as being absolute. While prospects depict the potentials of future development for the mining settlement and its region, the two scenarios for each mining settlement reflect a prognostic sequence of events based on the consequences of different choices made concerning the settlement's development. Each case study presents two different scenarios, highlighting outcomes of two dissimilar pathway of development. While Scenario 1 presents development that has occurred with neglected and missed opportunities in planning process, Scenario 2

mirrors the development path rooted in appropriate planning entrenched in vision of sustainable development. Rather than a projection into the future, scenario is constructed as an outlook on events that have already occurred, it is a back cast from the future. The methodological aspects of prospect and scenario formation for this research are explained in Chapter 4.5.

6.2.1 Rosh Pinah: isolated pocket of development?

Rosh Pinah has existed since 1968 as a self-sustained mining centre without considerable linkages to other rural or urban centres in Namibia. Rosh Pinah's development is marginal and it resembles an isolated pocket of development with limited effect on the surrounding region. The affluence created other than serving the needs of the settlement itself, does not significantly contribute towards the establishment of linkages with the surrounding areas. The distributional pattern of consuming and production is concentrated rather than dispersed, and does not make any significant contribution to a continuous flow system which links Rosh Pinah with other centres. While mining is present and dependence on it is obvious, the central place concepts fail in Rosh Pinah.

The precise hinterland border cannot be delineated as boundaries vary according to commodity, but the hinterland does not extend far beyond the settlement's borders. In contrast, the service provision areas from where Rosh Pinah obtains its services and goods are scattered within a larger area and it does not form a distinct region, but rather a cluster in discontinuous different service provision areas. Rosh Pinah's service supply area may appear to be large, but the physical characteristics of the area where

Rosh Pinah is located - a sparsely populated desert and semi-desert environment, determine that most of Rosh Pinah's supplies are drawn from three distant urban centres, Keetmanshoop, Lüderitz and Springbok, the latter being in South Africa, and to a lesser extent from Upington (see Figure 106). Frequently the supply area is limited to be within the national boundaries, but in the case of Rosh Pinah it extends into South Africa.

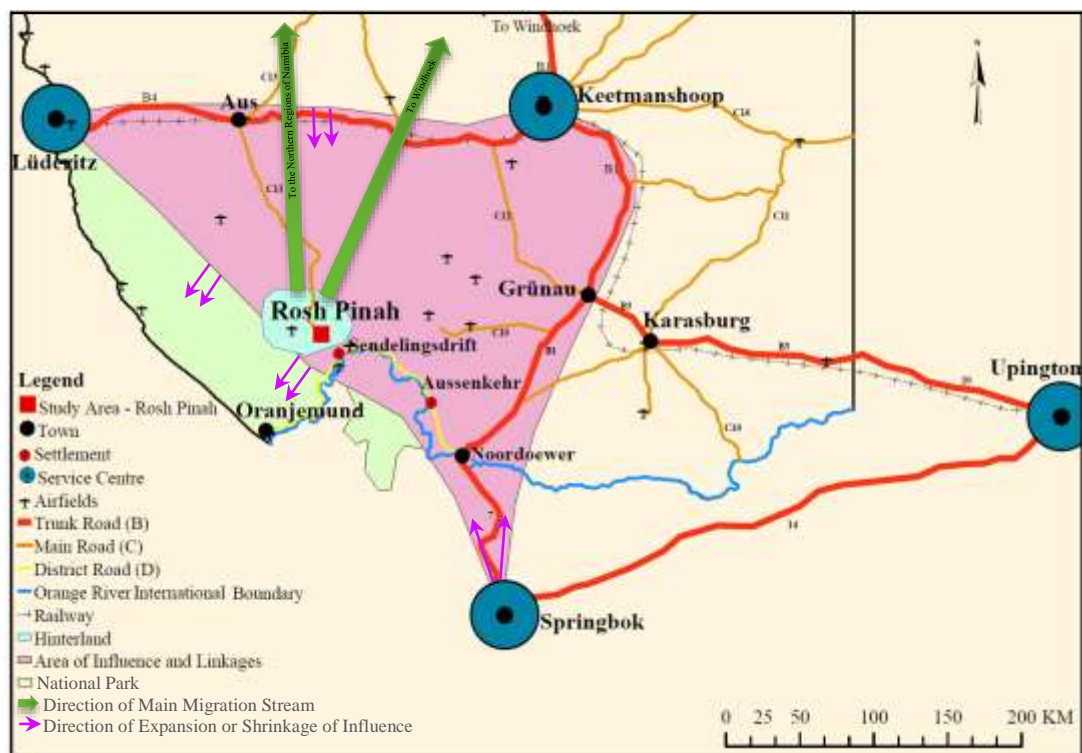


Figure 106. Regional perspectives for Rosh Pinah, Namibia (2010).

In Rosh Pinah all daily food and groceries are provided for by the branch supermarket Spar and other branded chain shops which may have very little integration into the local economy. Most of their products are brought in from the mother companies or other urban centres, often beyond the national border. This arose due to the cost of supplies and transport which is often cheaper if the goods are brought from Springbok or Upington. Namibia imports a great share of supplies from South Africa where they

are delivered to other larger centres and then distributed to smaller centres like Rosh Pinah, considerably increasing the cost. Due to Rosh Pinah's proximity to the South African border, many private individuals and entrepreneurs source their supplies directly from the nearest South African urban centres. This trend would be extremely difficult to eliminate and is likely to remain unless Namibia industrializes and produces its own supplies at a cheaper rate or if subsidies are introduced for local goods. Opening a secondary school in Rosh Pinah or in the nearby Oranjemund would lessen the significance of South African nearby urban centres. The non-existence of a secondary school in the area strengthens the linkages between Rosh Pinah and Springbok and Upington to where many families send their children for schooling at the secondary level. These are not only families from Rosh Pinah but include inhabitants of Oranjemund and the wealthier farmers around the Orange River. Rosh Pinah is well located and would be capable to attract learners from the southern tip of Namibia. The location of secondary school in the settlement would also contribute to Rosh Pinah's permanency.

The commercial interaction of Rosh Pinah with surrounding rural lands is very weak. Rosh Pinah lacks the well-developed urban hierarchy and the potential for growth is limited because of its physical environment and relative poverty in external economies. Rosh Pinah and its surrounding area are relatively uncompetitive. The private sector in Rosh Pinah and the surrounding areas is underdeveloped. Only a small proportion of 12% is employed in the private sector other than mining and agriculture. The small market size cannot support the trade with higher order goods and services. An insufficient threshold does not create economic diversification. A current market of

higher order goods and services is available in the settlement with insignificant spillage to nearby farms. Other farmers in the area are keener to travel to Keetmanshoop or Lüderitz for their supplies than to Rosh Pinah.

Rosh Pinah's foreland is limited to within the settlement's borders, only mining products which cannot be considered part of Rosh Pinah's foreland due to their detached relationship with the settlement, are sent to far beyond the national borders. The wealth created in Rosh Pinah does not stay in the settlement or region at large; it is taken away to international markets. Mining's contribution to national revenues is appreciated, but there is a lack of reinvestment into the area where the wealth was created.

The agricultural potential is very low and therefore limits prospects for agriculture to expand, particularly to areas further away from the Orange River. The harsh arid climate determines limited crop agriculture in the area. The land is not suitable for large scale agricultural schemes, like larger livestock breeding, but it can be used for small stock breeding, mainly sheep grazing (Republic of Namibia, 2011). Most farms near Rosh Pinah are run primarily for hunting. There are small scale goat and sheep farming activities, but it is not enough to generate sufficient incomes. Damara sheep are the best adapted to the environment, and are produced for both meat and wool. The sheep are sold to brokers and speculators in Bethanie and Keetmanshoop, whereas cattle are sold at the stock auctions in Okahandja and Outjo. The potential for agricultural production is concentrated in the areas along the Orange River where water is pumped directly from the river. The last decade has experienced evolvment

of intensive irrigation projects north of the Orange River, such as a large scale project at Aussenkehr and Naute Dam Irrigation project near Keetmanshoop. The government of Namibia has allocated forty hectares of land to the Naute Dam Project in line with a five-year strategic plan, creating job opportunities to seventeen permanent workers and 140 seasonal workers. Despite of the remoteness from commercial markets and highly regulated water usage from the Orange River for irrigation by agreement with South Africa, some irrigation projects successfully produce table grapes for export. It is more difficult to penetrate the local markets due to a low demand for grapes. Aussenkehr is another large irrigation project cultivating approximately 4200 date palm trees covering an area of some thirty six hectares. The dates produced at Aussenkehr are sold in Durban and exported to Europe. The climate also supports production of pumpkins, butternuts, tomatoes and other vegetables throughout the year. The agricultural projects along the Orange River, together with the mining industries are main employers in the Karas Region, accounting for 61% of employment. However, chances of farming along the Orange River are constrained by the declining water quality. Unmanaged direct return of flows from irrigation farms on both the Namibian and South African side of Orange River which carry high loads of pesticides and leached fertilizers, threatens the ecological integrity (Republic of Namibia, 2011). Apart from the larger irrigation projects along the Orange River, smaller community projects also emerge. The Prosopis Orange River Basin Project which would clear the banks of the Orange and the Fish rivers and all the tributaries feeding these two rivers from the Prosopis tree that is an alien species in Namibia. The purpose of the project is not merely to clear environment from the Prosopis trees, but to create some employment and income generating activities for local communities by

making firewood, charcoal or even construction timber from the *Prosopis* tree. However, the economic contribution from the project is insignificant, short term and localized without considerable future prospective to grow.

Tourism plays a small but vital role in the region. Rosh Pinah holds a strategic position within the Karas Region and has the potential to be a stop-over for tourists on their way to the Orange River and Namib Desert, and attract travellers between Oranjemund and Keetmanshoop. The remoteness, specific landscapes and unique geological and botanical features might be appealing to a particular niche in the tourism market. The region contains a few attractions including Namibia's first cross-border park, the /Ai-/Ais Richtersveld Transfrontier Park, a protected area of 6045 square kilometres that goes beyond the South African border to encompass one of the richest botanical hot spot in the world, the Succulent Karoo biome with unique succulent plants and breathtaking scenery. The Fish River Canyon which is situated in the southern part of Namibia is second largest canyon in the world. Other potential tourism attractions are /Ai-/Ais Hot Springs, Bogenfels rock arch, the Orange River wetlands, fossilized dunes and the Sperrgebiet park that was proclaimed in 2009 and covers an area of 26 000 square kilometres of Succulent Karoo and Namib Desert. With the opening of the border post, South African tourists who wanted to visit the south-western corner of Namibia and its coastal areas like Lüderitz, Walvis Bay and Swakopmund started to prefer entering Namibia from the Sendelingsdrift border post. The tourist attractions of the region have the potential of growth and popularity. This is confirmed by the increased numbers of visitors since the opening of the Sendelingsdrift border post at the Orange River in 2007.

The eased access to the Sperrgebiet opened opportunities for tourists to visit old mining ghost towns such as Pomona, Bogenfels, Kolmanskop and Elizabeth Bay. However, according to previous researches on tourism in southern Namibia, large scale tourism should be avoided as it would constrain the area. Tourism on such scale would be neither feasible nor desirable, given the fact that the fragile attraction of the desert ought to be managed extremely carefully. Stimulation of small tourism activities in the surrounding areas would indirectly contribute to the development of Rosh Pinah, such as increased flow of people traveling through the settlement to stop over to refuel a car, visit retail facilities, or enjoy a meal at the local restaurant or fast food outlet. It would not be feasible to build additional accommodation to attract overnight visitors as Rosh Pinah has an abundance of accommodation facilities. Increased tourism traffic around Rosh Pinah would support expansion of the hinterland towards the west creating closer back and forward linkages. The likelihood of its hinterland's extension towards the west is strengthened by the proclamation of Oranjemund in 2011 that opened previously restricted areas to the general public and may increase migrations.

Enhanced accessibility by tarring the road from Aus to Rosh Pinah, opening of the new border post at the Orange River, proclamation of Oranjemund as a public town and opening previously restricted Sperrgebiet areas, opened Rosh Pinah to the external world and new possibilities to create linkages and close relationships with other parts of the country and beyond its borders. However, the closure of mining activities on which Rosh Pinah depends is inevitable. Uncertainties become intensified with the approaching end of expected life-span of both mines, respectively 2020 for the Rosh

Pinah Zinc Corporation mine and 2016/2017 for the Scorpion Zinc mine (Chamber of Mines of Namibia, 2010). There is still potential to discover new mineral deposits in the area and the recently discovery of the Gergarub zinc and lead sulphite deposit adjacent to the Vedanta's Skorpion mine holds the prospective for extension of the existing life of the Rosh Pinah Zinc Corporation mining activities in the area, meaning extended safety net for the developments of Rosh Pinah settlement. The discovery still requires a pre-feasibility study and an assessment of the economic viability of extraction and processing of new zinc finds is still to be completed. The presence of mineral deposits does not translate into an assured ore body that could prolong the life of the mine. The demise of two large mine operators - multinational mining company Anglo American Plc. and one of the largest South Africa-based diversified resources groups Exxaro in 2011, may be an indication that the life cycle of mining is approaching its final stages and uncertainties on future developments may hold too much risk for the large multinational corporations to put at stake their reputation.

The departure of the mining industry will contribute to regional decline and likely increase government assistance to the area. The job losses in an isolated area can create a considerable regional problem. According to present estimates, 83% of people will leave Rosh Pinah after closure of the mines. That would be a tremendous loss and most of Rosh Pinah's economy will be severely affected. The decline will be felt beyond Rosh Pinah as it will affect the livelihoods of families of current mine employees. Rosh Pinah will shrink to possibly only one fifth of its present size. The severity of decline will depend on many other factors in the region and in Namibia. It is unlikely that Rosh Pinah can find a substitute for employment within the short term. The future growth is

possible with a rather cumulative effect of many smaller and more diversified economic activities and initiatives within the region. One of such initiatives is suggested in the Karas land use plan of 2011 (Republic of Namibia, 2011) with Rosh Pinah to become a centre for solar power generation, research and development. The single initiative would not sustain the settlement, but would certainly contribute to sustaining life of the settlement after closure of mining activities. The timing for future development of Rosh Pinah is crucial. Rosh Pinah's future is built now.

At the current stage Rosh Pinah's capacity to sustain long-term development on its own is weak (see Chapter 6.1). It has two hypothetical scenarios of development. Scenario 1 unfolds the grim outlook of Rosh Pinah, looking back onto unfolding events of a declining town that struggles for its survival and turns to dependency on the government's alimention. Scenario 2 is more encouraging, presenting Rosh Pinah as the settlement that successfully develops into a medium size urban centre (see Figure 107), thriving on consolidated economic activities within the wider region. The trajectory on which direction development will take in the future depends on actions taken today.

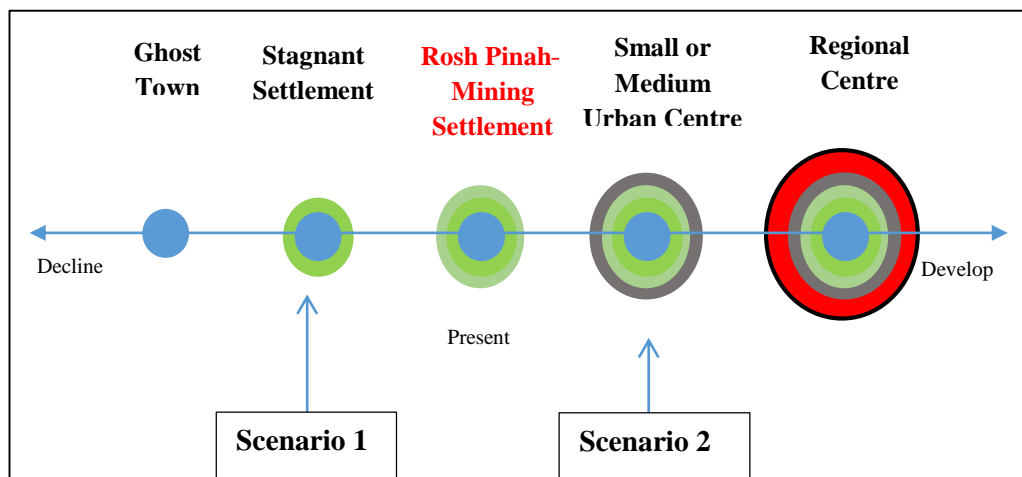


Figure 107. Situation of Rosh Pinah Scenarios within urban hierarchy.

6.2.1.1. Scenario 1: decline as a mode of development

After the closure of the mines Rosh Pinah suffered considerable losses of out-migration, 83% of the people left the area. The population shrank to 2 550 people and is undergoing further reduction, however at a slower pace. The demographic profile slowly changed to higher numbers of very young and an increased number of older people, gender ratios balanced out with a slight skew towards females. The education level of the local people is low and skills are absent. The community that remained can be considered as being part of the most vulnerable and marginalized sectors of society.

The local economy collapsed to a near stand-still. Rosh Pinah was left without a significant employer, the majority of medium and all large-sized enterprises closed or relocated, some significantly reduced in size and enduring a constant battle for survival. The branch shops that existed during the time when the mines were operational closed and relocated to other areas soon after the withdrawal of people from Rosh Pinah. The shops either stand empty or are occupied by some smaller scale businesses that struggle to pay rent. The well-developed business infrastructure fell into disuse. Of the two banks, only a reduced FNB banking facility remained, serving mainly the local farming community and a limited number of local businesses.

Rosh Pinah's economic base was reduced to a limited number of unsophisticated private enterprises such as small retail shops offering daily necessities. The stock in these shops is extremely limited. The informal sector flourished when at Rosh Pinah several cuca shops and shebeens opened, afterwards many of them to close soon. The

lack of cash flow does not favour the establishment of a profitable business and they soon retreat to make way for the next venture. After the collapse of the local economy, the settlement was left with severely limited economic linkages with exterior economies. The goods and services are still brought in from Lüderitz and Keetmanshoop, but their significance is reduced. Ties with Oranjemund have increased. Apart from migrations directed towards Oranjemund, supplies are channelled from there. The sourcing of goods from Springbok and Upington is almost non-existent and only sporadically some supplies are brought from there. There is no demand for higher order goods in Rosh Pinah. The previous demand and supply pattern changed in the whole region. The local economy was not able to recover from the shock of closure of mines and soon after the latter the fiscal strain set in.

There were no considerable economic developments in the surrounding areas apart from some small tourism establishments which evolved to benefit from the increase in tourism, but it did not leave a tangible impact on Rosh Pinah. People pass through and stop only to refuel their cars and to buy some groceries at the service station. The major road network remained due to its regional importance of connecting Rosh Pinah with other urban centres as a linkage to South Africa.

The proclamation of Rosh Pinah occurred at the end of the mining cycle before the mining companies had left the town and the settlement did not have sufficient time for transition. Even though the mining companies had good intentions and handed over a large pool of their infrastructure and amenities, they did not have much time to contribute to the transitional process and structures that could have aided a smoother

transition. The sudden change found people unprepared and they struggled to accept. Several businesses and individuals remained without financial support from the mining companies on which they depended; it was expected of the government to come up with an alternative strategy for growth.

The skills and capacities that remained in the area are not sufficient and the settlement struggle with service provision and maintenance. The municipal infrastructure relating to water, electricity and housing was handed over to the local authority by the previous mining companies. The financial capacities of the new local authority are overstretched and it suffers a shortage of human resources. The dispersed layout of Rosh Pinah created enormous costs for the struggling local authority in order to provide vital infrastructure services to all residents. The delivery of services is of a poor quality. Municipal service fees shot up overnight and residents struggle to pay for their own water and electricity consumption. The public outcry was extreme with new rates being too high and beyond the reach of households, and with electricity and water supply suspended. Residents started to adopt strategies to cope with extremely rudimentary conditions.

There are no private schools or clinics in the settlement, all the community's educational and medical needs are provided by the government. The schools and clinic are overcrowded and under severe fiscal stress. After the private medical care provider left Rosh Pinah, the government clinic relocated to the premises of the previous Sidadi clinic. The oversized structure left behind by the mining companies does not

correspond with neither the needs of local people, nor with the capacities of personnel while the lack of maintenance is obvious.

Rosh Pinah's layout changed to a very low residential density. The reduced numbers of people live within the same boundary that existed during the times when mining was present. Some of the housing infrastructure that belonged to the mining companies was taken over by the government, some were sold to private individuals and legal entities and some dismantled and removed. The housing infrastructure built by the mining companies was mostly prefabricated and easy to remove, particularly housing of the previous Skorpion Zinc mine.

In the final years of mining there was a persistent trend of the mining companies to promote house ownership amongst their employees, selling their company houses at a relatively low cost. If proclamation was done timely, this would have been a good initiative, but in the case of Rosh Pinah a lot of former employees and other community members became financially indebted as they could not afford their mortgage bonds after their loss of employment. To resell the house was not easy because there was no demand and the settlement already overstocked with unoccupied housing. The housing stock taken over by government is underutilized. The organization and maintenance of such housing stock is rather a burden to the government.

After suffering massive job losses, the instant and high unemployment rate and extremely low buying power marginalized a large number of remaining communities. Poverty escalated and in turn caused an upsurge of anti-social behaviour among the

community members. Poverty driven crimes became a continuous battle for the security and safety providers.

The intensity of decline and its pace resulted in rapid degradation of the environment, starting from poor waste management and deteriorating environmental conditions to the much larger and serious concern of the mine a tailing waste that is in the pathway of the prevailing winds.

The future of Scenario 1 is bleak and undesirable. The concern is not only the significant reduction of the settlement, but also miserable state of socio-economic conditions. Rosh Pinah was reduced to the state where its existence is centred on the traffic passing through. The settlement is not capable to exist on its own without external support and is likely to endure a lifelong struggle for its survival and may require state intervention. Scenario 1 reveals that the settlement suffers enormously after closure of the mines because the planning for the transition was too late, key challenges were not addressed and practical guidance as to the settlement's development did not occur. The scenario challenges with several problems such as skewed demographics, a deteriorating and underused infrastructure, loss of income and dramatic reduction in people's buying power, and a greater concentration of lower-income people. Currently it appears to be the most likely scenario for Rosh Pinah unless an appropriate elaboration of practical guidance for development takes place. Urgent attention needs to be given to Rosh Pinah. At present the future of Rosh Pinah is seriously challenged.

6.2.1.2. Scenario 2: centre in southern settlement network of Namibian

Closure of the mines was a fearful experience for Rosh Pinah. Reduction of the population was massive and uncertainties set in, but a strategy to retain people in the settlement through diversification of the local economy and employment creation worked well. Even though the population size was reduced, it occurred in diverse population strata and did not paralyze the capacities and skills of the community, saving the settlement from becoming an enclave of unskilled and marginalized people. Over some period of time the demographic profile of Rosh Pinah community became more balanced resembling the characteristics and processes of a regular urban centre.

The proclamation that occurred in 2015 and gave the mining companies the opportunity to invest in social upliftment and the empowerment of local people and the business community. There was adequate time for Rosh Pinah to prepare for the transition from a privately owned mining settlement to an independent local authority. On proclamation the mining companies handed over most of their infrastructure and amenities that are beneficial to the community. The process of handing over was smooth and gradual, with the mining companies slowly withdrawing their financial support. The apathy and tension that existed prior to 2014 among the community, and particularly among the Tutangeni informal residents, was resolved. All groups of the Rosh Pinah community were equally involved, turning the proclamation process into a success. The voice of the people was heard during the planning process and they were aware of every step of the prospective development. The community considered themselves as partners in decision that affected their own lives and the environment in which they lived; they had a sense of ownership over their future rather than being left

in a position where mining companies or government decided for them. The proclamation occurred gradually and over a period of time, ensuring a politically and socially stable transition.

Rosh Pinah remained as a settlement but with a stable content local economy. The initiatives supported by both mining companies established themselves as small profitable entities and continue to develop. Branch retail outlets left the area due to the decreased population base. Diminished monopolistic pressures from the branch retail outlets and reduced unwelcome competition in the local market stimulated the growth of local medium and large scale enterprises which are well integrated into the local economy. The integration of these resulted in external economies. Profits of local businesses stay in the area and are being reinvested contributing to positive growth and capital accumulation. Several new public private partnerships were initiated with additional investments flowing into the area. This created opportunities to increase the engagement of people with lower entry requirements into the development of the local market. The annual trade fare in Rosh Pinah attracts tourists and enhances networking among the businesses locally, regionally and nationally.

Prior to the withdrawal of the mines, there was an increased awareness for the development of new skills, particularly among young people. Several artisan skills such as brick making, welding, carpentry, shoemaking, sewing and cooking, initiatives supported by SME Compete and the Obib training centre have paid off and small successful businesses offer their products to the local market in the settlement and its hinterland. Obib training continues to support small emerging entrepreneurs by way

of securing contracts to the benefit of local people. Previous informal entrepreneurs successfully formalized their businesses. The strategies and planning to develop new economic activities to stimulate growth and upliftment of the local economy found ways to sustain the economic activities of the settlement.

Rosh Pinah is aiming to develop into an eco-industrial hub. The hub links solar energy, mining and tourism, without a negative impact on the long term diversity of the local economy. Entirely new, previously unexplored activities set in together with consolidating economic activities within the wider hinterland. The unspoiled environment with the wilderness surrounding Rosh Pinah remained untouched and continued to attract tourists to the area. The tarring of 160 kilometre road running along the Orange River and linking Rosh Pinah with Noordoewer and the South African border post Vioolsdrif tremendously improved the traffic and reliability for tourists, businesses and the public. The grape farmers and other agricultural producers along the agricultural corridor of the Orange River use the road for transportation of their produce to Lüderitz where the goods are exported through NamPort. Rosh Pinah benefits from being a transit route of this corridor. This completely changed the direction of backward linkages. The importance of Springbok and Upington in South Africa was considerably reduced while the flow of goods and services benefits the surrounding region and national economy.

A new Namdeb diamond mine that opened close to Sendelingsdrift, new agricultural initiatives along the Orange River, community initiatives such as charcoal production

from the Prosopis tree that is an alien species to the area, on-going mineral exploration activities, and a research centre for alternative energy sources were implemented.

The population size and incomes are adequate to sustain and maintain services in the settlement. The water is of adequate quantities and quality, and there is no formal household without electricity. There is great cooperation between the local authority and the community that results in active public participation in the planning for Rosh Pinah's future. Certain strategies are more successful than others, but an involved community resulted in greater success and contributed to social sustainability of their settlement. Timely and well planned and managed proclamation led to the evolvment of a strong and capable local authority. Rosh Pinah has several private and state owned social infrastructure amenities. After the proclamation of Rosh Pinah a few government institutions set in. A feasibility study revealed that the threshold population in Rosh Pinah and its surrounding areas is sufficient for establishing a new secondary school to serve the settlement, residents, nearby farms and other centres such as Oranjemund, Noordoewer and Aussenkehr. A new tarred road improved connectivity between Noordoewer, Aussenkehr and Rosh Pinah, and as a result residents prefer to send their children to Rosh Pinah's secondary school rather than to Springbok in South Africa.

Homogeneity of the community increased, incomes levelled out and employment opportunities safeguarded the contentment of the local community. The contrast eased between rich and poor. The residents developed attachment and an increased number of people are happy to stay and retire in Rosh Pinah. The number of long term residents

in Rosh Pinah has increased. Possession of a house, well maintained services, access to education and health care, and employment opportunities increased the quality of life and instilled a sense of permanence among the residents.

There are no pressing environmental concerns. The mines closed in a well-planned manner and rehabilitation plans of a high standard were implemented. The land was rehabilitated and left to a viable post-mining use.

Rosh Pinah's success story of transformation while taking advantages of its attractive natural surroundings resulted in the creation of an environmentally sound and economically viable community with a new social vitality. Scenario 2 demonstrates that the desired long-term sustainability with Rosh Pinah evolving as a small or medium size sustainable urban centre within the strengthened region is plausible. The life after closure of the mines does not have to be a misery. It demonstrates that the mining settlement that originated as an outcome of the mining project and not as a driver of development may reach long-term sustainability over a time with timely and carefully planned and guided development. It could serve as a model for other mining communities, facing similar challenges of transformation, and wish to endure into the sustainable future.

6.2.2 Klein Aub: trapped in dependent existence

Owing its origin to mining, Klein Aub resembles a well-planned settlement nestled in a remote rural area. The location next to the C24 road may be the main saviour of its existence in a commercial context by way of attracting some occasional by-passing tourists and serving as a small market to local subsistence farmers. Klein Aub's

existence relies more on government alimentionation than on the market economy. The retail market in Klein Aub is underdeveloped and dominated by small scale formal and informal retail outlets with a very insignificant range of transactions. The goods sold in the settlement are not produced locally. The market is oriented towards the consumption of goods brought from outside rather than linked to local production. Aspiring entrepreneurs of Klein Aub make their profits by trading with goods that are brought in from other urban centres, mainly from Rehoboth and occasionally from Windhoek. The settlement can be considered as a small market for urban consumer goods from other larger urban centres and it caters only for local residents, mainly people from Klein Aub and a limited number of people from surrounding subsistence farms. The low incomes of surrounding rural consumers determines the strategy of households planning their trips to larger urban centres, mainly Rehoboth or Windhoek, to satisfy several needs at once, for example, a visit to a specialist combined with shopping of goods and services, a stopover at the bank, family visits. This means the Klein Aub is often by-passed in favour of larger urban centres that offer a wider range of goods and services. The establishment of banking services, access to other professional services, wholesale and retail sales of manufactured goods sourced from within and outside the region would stimulate a more vibrant economy through widening its hinterland. It is reasonable to assume that in case of poverty reduction and increased household incomes among the population of Klein Aub's rural hinterland there is a potential that people will change their travel behaviour to coincide with the availability of a motor vehicle and a driver. The prevailing very low buying power of the local rural population and insignificant car ownership result in the tendency where mainly people who are within walking distance or who can easily

cover the distance by donkey cart occasionally shop in Klein Aub. On the other hand, the more wealthy farmers tend to bypass Klein Aub due to the settlement's inability to provide the specialised goods and services demanded by this population group. In absence of transport in the area, it applies not only to farmers but also to the farm workers who travel along with their employer to satisfy their needs for goods and services. Therefore it is safe to assume that central place concepts arguing the relationship between distance to markets and the frequency of shopping trips is not entirely applicable to Klein Aub and its rural hinterland. The business transactions in Klein Aub are sporadic, mainly confined towards the end of the month when people receive their salaries and wages or when pensioners come to Klein Aub for their pensions.

The area is arid and water availability is scarce limiting any potential for agricultural expansion. The size of the farms is relatively small with subsistence farming the major type of agricultural activity. The farming jobs within the hinterland are limited with a tendency to decline, resulting in a constant movement of people to Klein Aub in the hope of finding employment. Facing the scarce non-farming employment opportunities in the settlement, a few job seekers move further to Rehoboth or Windhoek. The inflow from nearby farms accounts for 55% of Klein Aub's population while those planning to leave to Rehoboth and Windhoek are 66%. Potentially the out-migrations slowly exceed in-migrations suggesting the settlement is rather stagnant with a tendency towards decline. The absorption of migrants is very minor.

The trade with local agricultural produce is insignificant. Klein Aub does not sell local produce, and neither does it stock the agricultural produce from the hinterland to be resold in other larger urban centres. The settlement does not act as a significant trading centre for agricultural goods from rural surrounding areas. The farm workers in the rural hinterland are among the poorest of the country's population and depend on Klein Aub for essential services such as education of their children and basic health, but their contribution to the local market is derailed by the weak purchasing power which is so low that it can only support the informal sector of Klein Aub.

The resident's low education and lack of skills challenge the potential establishment and growth of functional entrepreneurship. The market is very primitive without substantial linkages with surrounding areas. The gravel district roads are the major links between different farms in the area and the network is sufficient for local movement of people and goods within surrounding areas, but too limited for greater economic interaction. Klein Aub's location next to the C24 road secures a potential for being a stopover for lunch or dinner for tourists with destinations such as the Namib-Naukluft Park, and it may capture some supplementary earnings from other sources. The foreland of the settlement does not extend beyond Klein Aub and the production of goods does not exist.

At present Klein Aub serves as a centre for distribution of public services to its rural surrounding subsistence farming areas, providing schooling and health care facilities to the citizens of its hinterland population. The emergence of better services in larger urban centres and Klein Aub's relative proximity to Rehoboth and easy further access

to Windhoek slightly challenge migration by restricting it to migrants with lower incomes as rural people with higher earnings will go straight to Rehoboth or Windhoek, bypassing Klein Aub. Klein Aub remains to serve the function of central place by providing public services to mainly the rural poor within the hinterland. However, expansion of the public service provision may alter the current migration flow with more people being absorbed in the settlement and a reduced outflow towards Windhoek and Rehoboth. This cannot reach any considerable extent as the population in the Hardap Region is small size and scarcely populated, but the settlement has the tendency to capture undesired migration flows towards Windhoek and Rehoboth as envisaged by Namibia's Vision 2030 which does not encourage over-concentration of the population in a few cities.

Klein Aub has a small to medium potential to grow with support from the national government through targeted improvements and expansion of education, health and other public services. The potential to reach out to new markets is challenged by its remoteness and isolation from other bigger urban centres, but with an increase in public services it may contribute to population growth through absorption of rural people within the hinterland. A larger population would increase the opportunities for commercial activities and may further trigger growth that can attract other private investments to the area.

The primitive market and non-existent linkages with the wider region cause the hinterland to be small, covering limited areas of nearby farms. However, the hinterland

boundary has a potential to expand, particularly towards the south and west (see Figure 108).

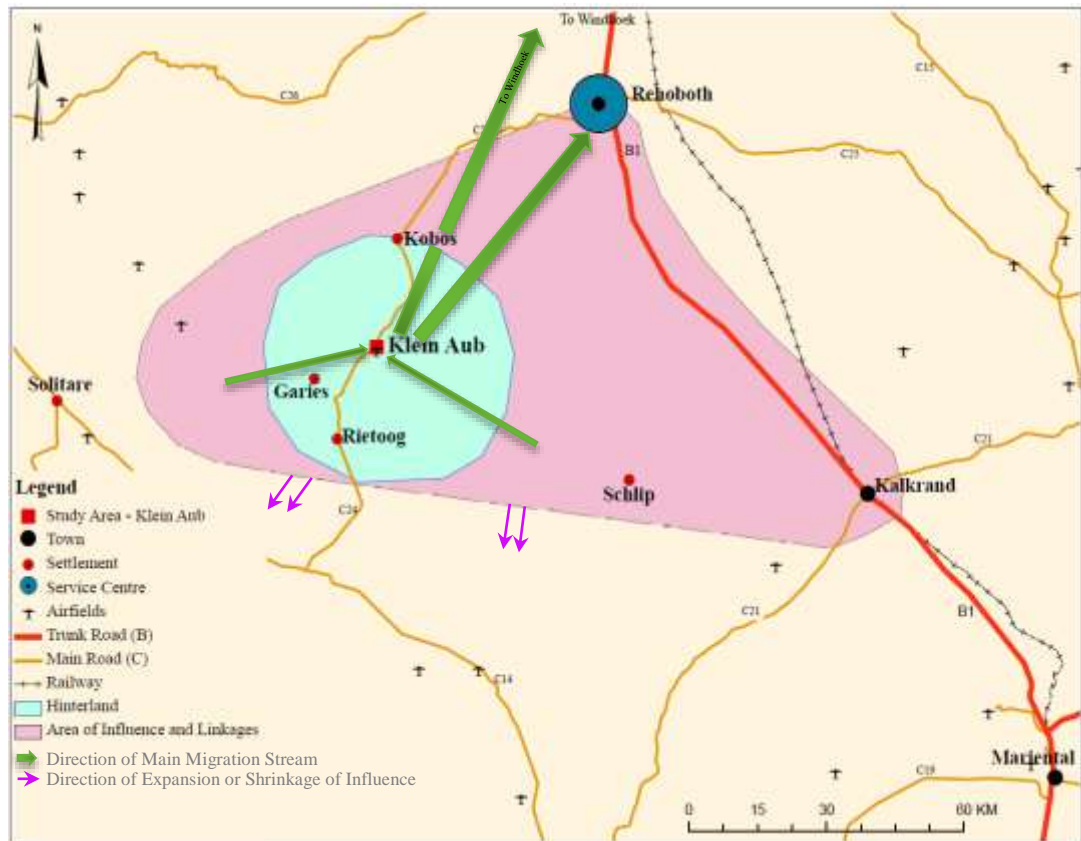


Figure 108. Regional perspectives for Klein Aub, Namibia (2010).

Another trigger for development would be the reopening of mining activities in Klein Aub or the discovery of new ore bodies in the surrounding areas. Although this is possible it should not be relied on. Despite the significant copper deposit in Klein Aub it is of a low grade and may only become actively extracted when the copper and silver prices are likely to rise. To rely solely on mining would be unwise. The potential of mining should only be assumed to be a boost for the economy when it is already performing well. The spin-off from mining should rather be seen as a supplementary rather than a reliant. In case another large ore body is found in the area which is not impossible as the area is often referred to as Namibia's copper belt, the prospects for

Klein Aub to become sustainable would be significantly increased, but with the precondition that careful planning is done to secure the future wellbeing of the residents of Klein Aub. On the other hand, the discovery of a mineral ore body might boost the settlement and relapse into the present stagnation. It is unlikely that Klein Aub will cease to exist and become one of Namibia's ghost towns. Its location next to the road and being strategically positioned for government service provisions safeguards Klein Aub's existence, but does not secure growth. The future for Klein Aub is either to remain a small stagnant settlement as presented in Scenario 1, or to strengthen its position through government intervention and targeted regional planning to achieve the status of a small town and become a centre for small scale production and distribution of goods and services to the hinterland citizens, according to Scenario 2 (see Figure 109). This would attract rural migrants who would otherwise migrate to Rehoboth or Windhoek

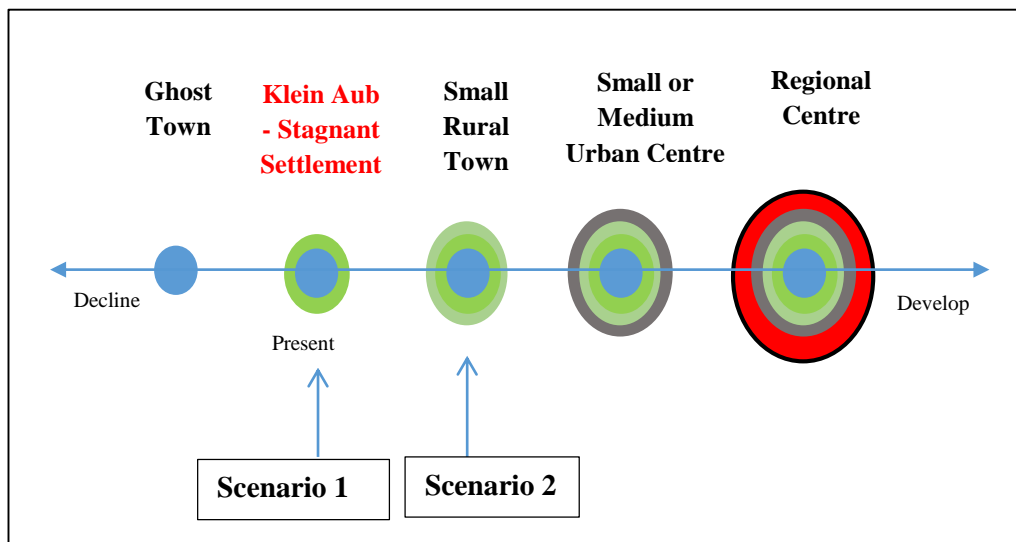


Figure 109. Situation of Klein Aub Scenarios within urban hierarchy.

6.2.2.1. Scenario 1: life-long stagnation

Since the closure of its mine, Klein Aub has never completely recovered, but endured a lifelong struggle for its economic and social viability. Today nothing, but the derelict mine infrastructure and a tailing dump, reminds one of the once lively settlement. What remains is simply a land of extreme poverty.

The population growth is stagnant despite the large influx from nearby farms. As they move into Klein Aub others leave to other large urban centres. The sense of permanence is on the decrease as many long-term residents who lived in Klein Aub during the time when Klein Aub was a mining settlement has passed away, some elders moved to retire on nearby farms. Young people do not get attached to the area; very few consider Klein Aub as their permanent home. Klein Aub resembles a transit settlement with a large transient population, mainly young people; with very low education and skills. These people come from the nearby farms, stay in Klein Aub for two to three years before moving out and giving way to others. Only few previous farm workers who moved to Klein Aub for schooling of their children remained after the children finished their primary education. These are mainly people with very low education and no skills that chose to stay because of the better infrastructure and availability of social amenities which they did not have when living on the farms. Despite the very low female employment opportunities most of the residents who settle on a permanent basis are females with lower ambitions who are satisfied to just live in the settlement. The youth who were born in Klein Aub or those who went to primary school in the settlement leave for other places as soon as they move to secondary school.

The private sector of Klein Aub is exceptionally weak. The settlement has one bottle store which has been operating for a long time serving residents with daily necessities. Any new emerging retail outlet selling daily necessities cannot compete and closes down after one to three years. There is not enough clientele and the buying power is extremely weak for the increased number of retail activities. Informal businesses resell the goods from the formal bottle store or occasionally bring liquor from other urban centres and some subsistence farming produce from surrounding farms. The profits made by these businesses are low, barely covering the operational costs. Businesses are primitive and without specialization. All retail outlets sell the same type of goods, most of them daily necessities. Employment in the informal sector is higher than employment in the formal private sector.

The government is the main employer in Klein Aub and the settlement's existence depends on its alimention. The low level of education and skills weakens the people's self-sufficiency which makes them more reliant on the government. People have high expectations of the government such as to create more jobs and provide them with better basic guarantees. Employment, medical care and education of their children are main priorities for Klein Aub residents. The settlement's existence relies on the decisions of central and local government on a strategy to maintain it as a distribution centre for public services for the residents of Klein Aub and its hinterland. It is only the public services that keep the settlement from turning into a ghost town.

Poverty places great pressure on government and the local authority of Klein Aub. The high unemployment is a burden on the maintenance of the settlement, particularly its infrastructure and services, because the local authority's income from rates and payments for services is low. The residents' income earning capacities are so low that the housing stock inherited from the mining in the 1960s to 1980s and now belongs to government, cannot be released for private ownership. People cannot afford to buy immovable property and the settlement does not have the capacity to attract buyers from outside of the community. The housing stock is managed by the government and rented out to the community who often struggle to pay their rent. The housing is dilapidated with some of the old houses being un-inhabitable while no new construction is taking place. As more houses dilapidate, the settlement becomes more dispersed and fragmented causing unnecessary expenditures on infrastructure and service provision. The population is more dispersed. The fragmentation is aggravated by the presence of old collapsed structures related to the old underground mine in the middle of the settlement. Most of the inner part of the settlement is a restricted area affecting the land zoning and planning of the settlement. Local residents are in constant fear of the looming danger of sudden land collapse which is highly possible.

The old mining site was never rehabilitated and residents unknowingly are affected by the deteriorating environmental conditions. Air pollution and the lack of potable water are among the main concerns. The rate of lung diseases is on the increase, especially among children and those affected by HIV/AIDS or tuberculosis. The need for a health facility is growing. The level of dissatisfaction with the quality of life is on the rise among residents, a lot of blame being targeted towards the government. They feel

forgotten and an unwanted part of society. The self-esteem of residents is low, many turn to alcohol or substance abuse. The crime level is high and crimes are more violent. The depressed society has a pessimistic outlook on the future while very little is done to change the situation.

Klein Aub is a stagnant enclave on the route of decline. The existing state of affairs of Scenario 1 is the most likely future scenario. The future resembles the present socio-economic situation only much more aggravated conditions and the settlement may have to endure lifelong reliance on government and struggle for its survival.

6.2.2.2. Scenario 2: hope in despair?

The residents' attachment to the settlement has grown. People are more satisfied with the quality of life in the settlement and are willing to stay there permanently. Klein Aub has become a small centre for the retention of rural migrants who would otherwise migrate to the large urban centres; the outflow of the population is considerably reduced. The change in migration resulted in Klein Aub's population growth by way of retaining more people. The inflow from surrounding farms and the hinterland is supplemented by an inflow from other parts of Namibia, mainly through labour force movement.

The wave of more diversified settlers adds its own character to the settlement, the community spirit is uplifted and residents are more involved in the community's life and planning for the future. There is less reliance on the government for support; people are more energetic and determined to build more stable and more self-confident

community with less expectation to be provided for by the government. The size of the settlement is below 2 000 people, which resembles a small rural town. The maturity of Klein Aub is strengthened not only by the increased size of the population, but also by the growing number of long-term residents, those who lived in Klein Aub for twenty and more years, the share of which has increased from one third in 2010 to one half.

The in-migration occurred from different directions and within different strata of the population. The new employment opportunities brought in residents with higher education, while the share of people with Grade 12 education has increased considerably. Several local economic development projects have gained momentum. Through small skills-uplifting projects residents attained new skills in artisan work and entrepreneurship. A few small aspiring entrepreneurs have emerged. There are local skills available for plumbing, construction, brick making, carpentry, baking and sewing which were scarce in 2010. The attainment of skills resulted in the evolvment of several small scale companies, mainly of sole proprietorship. A sole proprietorship is the most simple type of business to start, but their emergence has changed Klein Aub's economic prospects. A few formal businesses have surpassed the informal sector and employment is diverse. Klein Aub has become a small centre for non-agricultural activities and retail and service provision. With the growth of cash incomes, a demand for more diverse urban goods and services has emerged. The economic significance of Klein Aub has expanded the border of its hinterland, particularly towards the south and west. The linkages with the surrounding rural areas have strengthened. More of the hinterland's rural people come to Klein Aub for their

daily supplies and the exchange of agricultural produce is on the increase. Klein Aub developed into a small rural town for the distribution of goods and services to hinterland residents.

The incomes from tourism have grown. There are more people passing through the settlement, stopping for a drink and snack or having a light lunch. The small retail facility next to the C24 road is well established and offer more diverse stock, some small locally produced souvenirs are on display. Tourists stop for a quick lunch on their way to Sossusvlei or back to Windhoek.

The public sector is still important in supporting the livelihoods of the Klein Aub community. Since the increased size of the population and the decentralization in the government, the public sector has strengthened its position through an increase in the number and quality of its service provision to the community. The social infrastructure, such as the public education and health care sector has experienced a considerable boost and upgrading as part of a strategy to attract more people to Klein Aub. Consequently, residents enjoy better quality of basic social services and amenities, raising their satisfaction and willingness to stay in the settlement. With the improvement of people's incomes, the local authority has better recovery rates for services provided to the residents. This ensures better waste management solutions and people are pleased with the clean and well maintained environment with no waste dumping next to the road and streets.

The increased population, better public services and quality of life have contributed towards the improved image of the settlement. Most of the housing is in the hands of private owners. Long-term residents were given a chance to buy the property from the government. This has lightened the government's financial stress and responsibility to maintain these properties. People are rightful owners of their houses and are proud to take care of their properties, the houses are better maintained. The properties are never abandoned or left unoccupied.

Several new promising business deals have been concluded and investments flow into the area. External subsidies have come in and set up new business ventures, involving local people in the partnership. The alternative energy plant that was located next to the settlement has boosted the economic growth. Several new projects were launched, utilizing the old mine infrastructure. The deserted area left with some old mine infrastructure and considered as a crime breeding area was slowly rehabilitated and became occupied. There are no old mine wreckages scattered around in the area. The old mine site was rehabilitated and old infrastructure removed. There is positive cooperation between public-private partnership involving private entrepreneurs and the Klein Aub special needs school. The partnership has shown encouraging results with children struggling with their academic performance due to various learning disabilities. Many of these children are unlikely to proceed to university, but the acquired artisan or business skills will secure a brighter future for them. This supplementary education through public-private partnership replaces the previous vegetable gardening project on the school premises considered to be a health hazard due to its location in the way of prevailing winds blowing from the tailings dump site.

The wind-born tailings dust was monitored and to reduce the velocity of the wind and thereby its ability to transport the tailing materials towards the school and the nearby residential area, additional windbreaks were constructed on top of the tailing dam. Air pollution was significantly reduced with people being less exposed to the tailing dust and the community suffering less from respiratory diseases. There is a vigorous environmental monitoring programme in place. The mine's old collapse structures are stabilized and constantly monitored. People can walk around freely without fear that the earth would collapse.

Klein Aub has turned to a healthy, self-sufficient small rural town. Despite its small size it has managed to take advantage of new opportunities for innovative and sustainable employment. Mining is not looked upon as the only saviour. The community is satisfied, pro-active with a high level of pride, closely cooperating with the local authority in decision-making for their own future. The settlement is safe and clean and aesthetically pleasant.

6.2.3 Tsumeb: success of transformation

Tsumeb has the comparative advantage of location and easy accessibility. Tsumeb is part of two main corridors linking Namibia to neighbouring Angola and it has the potential to become a stopover along the anticipated Windhoek-Luanda Corridor, where communities along the road would benefit from new business opportunities, increased tourism, trade and industry. According to the Master Plan on the Development of Regional Urban centres, Tsumeb falls within the priority area of the

Tsumeb-Grootfontein-Otavi triangle, which is to become the logistics hub (Republic of Namibia, 2012b). The favourable geographical location of Tsumeb and the construction of new roads boost development and economic growth in Tsumeb, diversifying it further away from being branded as a mining town.

In the hope for potential job opportunities Tsumeb has attracted several people migrating into the town, particularly those from the most populated northern regions. In accordance with Central Place concept, a larger population size secures a higher-order retail market. It was not the case with Tsumeb for a long period of time, as the population size was determined by the size and scale of mining operations, but after more than hundred years its reliance on mining was reduced and the town diversified. In many cases mining settlements develop and later continue to exist as part of a hinterland to another urban centre. In Tsumeb's case it has succeeded to create and expand its own hinterland. Over the years the hinterland's border expanded considerably and Tsumeb became a regional centre, and for a while it was also the regional capital of the Oshikoto Region. Tsumeb performs first-order functions to several rural settlements and smaller urban settlements and higher-order functions to larger urban centres, such as Oshivelo, Tsintsabis and Otavi. The only commercial rival among comparable centres located close to Tsumeb is Grootfontein. Its proximity affects the hinterland's configurations, and limits its expansion mostly towards the north, the north-west and the south. To the western side there is the Etosha National Park, therefore the future expansion of the hinterland can be expected to occur further towards the north where most of the population comes from and to a lesser extent possibly towards the south (Figure 110).

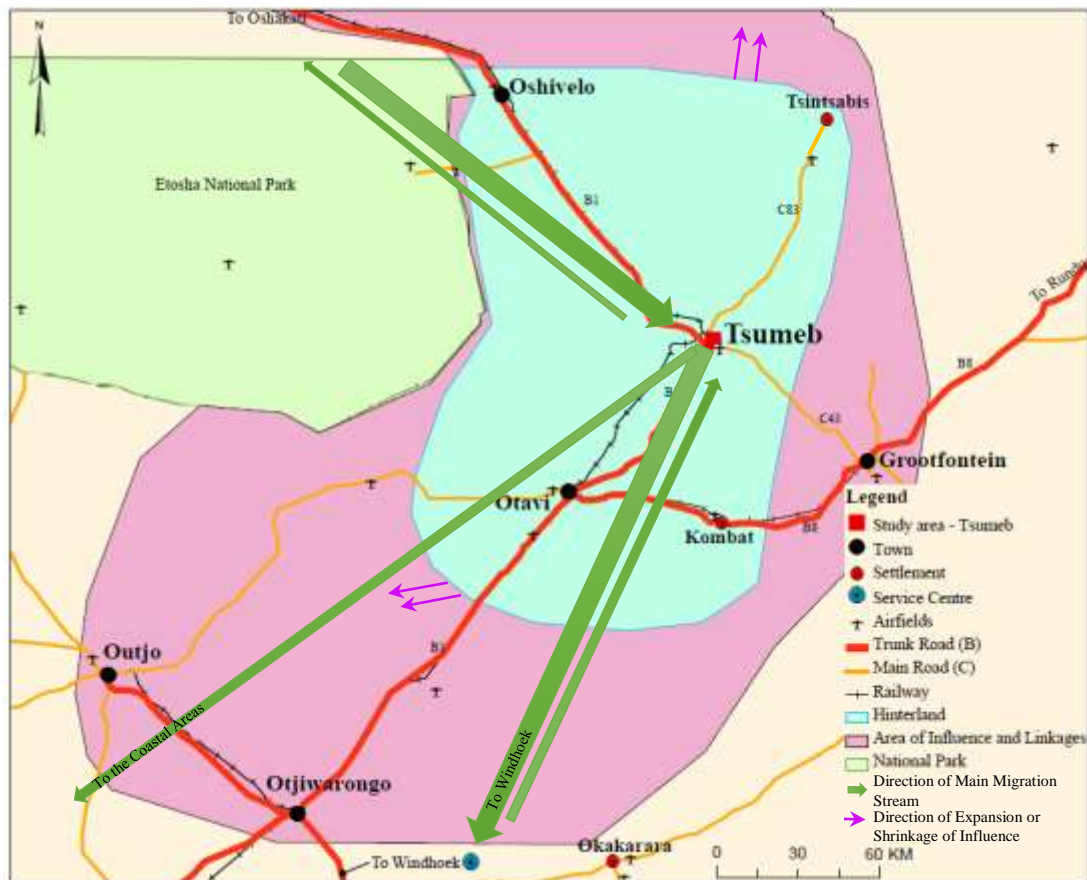


Figure 110. Regional perspectives for Tsumeb, Namibia (2010).

Grootfontein can be of serious competition to Tsumeb as it has the potential to attract migrant flow from the north-eastern areas. Migrations from the north-east have not yet gained momentum, but if it is triggered Grootfontein would capture people from the Kavango and Caprivi Regions.

The primacy of Windhoek is still felt in Tsumeb as a large number of people admitted traveling to Windhoek to buy more specialized goods. Windhoek supplies Tsumeb with a diverse number of highly specialised services and goods, such as cars, software, and electronic equipment. Several public services are still obtainable only in Windhoek. The gravity force of Windhoek is still significant, but with the strengthened

economic development of Tsumeb and wider decentralization of local government services to regions may reduce the strength of the gravity and slightly change the migration pattern with Tsumeb being able to capture more people contributing to the maturity of the town.

Tsumeb is a town with great business potential and the future of the town looks very bright. Since the last economic recess, Tsumeb has not idled or remained stagnant waiting for the situation to normalize, but several new enterprises evolved instead. The Tsumeb Municipality worked hard to attract new businesses and investments.

Tsumeb has considerable potential role to play in regional and rural development, and poverty alleviation. The town can also play a significant role in the distribution of goods and services to the rural regions. The favourable location of Tsumeb may help it to serve as a local market and retail centre for the region and beyond. “*Services have the most potential and agriculture is also penetrating the market*” (Source: interview with T009 on 14.05.2010). Tsumeb can be a strong local market for agricultural produce from the nearby farms which would be particularly beneficial to emerging small scale farmers. The current limitation is inadequate access to credit for most small scale farmers and difficulty to compete with large scale farmers and agricultural imports from South Africa. The input cost is considerably higher resulting in the produce being more expensive than the imports from South Africa. Thriving agriculture could have the potential to boost local urban development.

There are two likely scenarios that may develop reflecting the prospects for Tsumeb, either development or stagnation. The most disadvantaged, but the most easy to achieve as it does not require any considerable planning and action is Scenario 1 - Tsumeb becoming a stagnant medium urban centre and its existence depends on the performance of the national and global economy. The town's location in the proximity of the Etosha National Park guarantees a constant number of tourists passing through while it is also conveniently located for public service distribution to its rural hinterland. Third, with the continued primacy of Windhoek, Tsumeb will be capable to accommodate influxes from the northern regions, mainly on a temporary basis. Tsumeb will not considerably decrease in its size and importance, but following Scenario 1 the town will simply stagnate and idle for its survival (see Figure 111). Scenario 2 is completely different, embedded in continuous upward development with Tsumeb becoming a regional and industrial hub situated at the junction of important transport corridors.

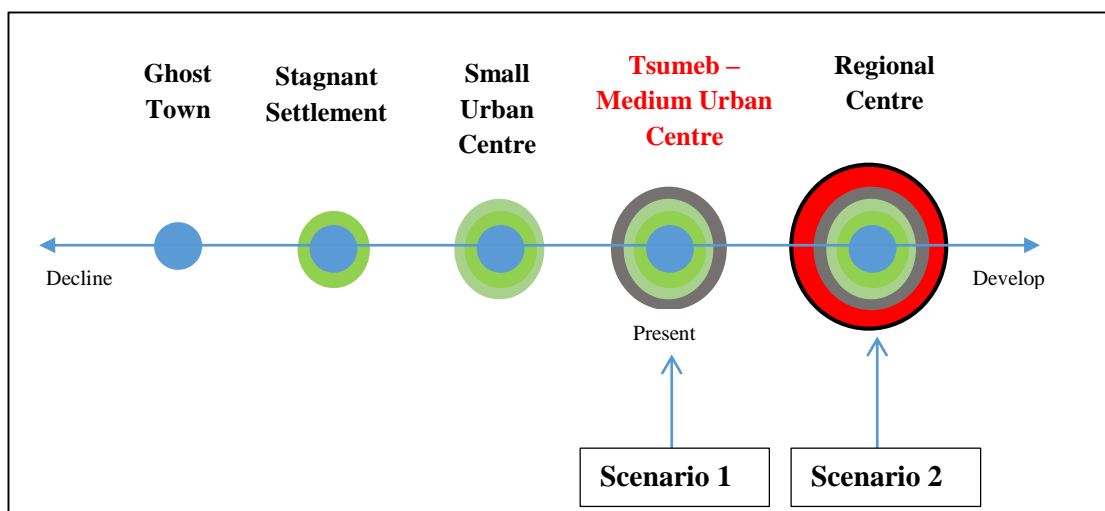


Figure 111. Situation of Tsumeb Scenarios within urban hierarchy.

6.2.3.1. Scenario 1: imposed stagnation due to neglect

Over the past years Tsumeb developed as a mining town and its favourable geographic location and accessibility acted as a spin-off for further developments. Tsumeb has grown, with some degree of diversification, but without stimulus while the lack of long-term vision has exhausted all capacities for further growth and expansion. The development has slowed down and Scenario 1 can be described as the town's persistence with "business as usual". There is no considerable decline, but there is no development either.

The urbanization of Tsumeb is considerably reduced. The population growth in the formal part of Tsumeb is virtually stagnant. The population base is growing mainly from an influx of poor people, mainly from the northern parts of Namibia and nearby farms, finding temporary accommodation on the outskirts of the town. People move to the town with a skewed perception of promised prosperity, numerous job opportunities and the superiority of service provisions. They soon however come to realize that they are trapped in stagnation without any possibility to improve their own quality of life. They do not give up hope and continue to stay in Tsumeb on a temporary basis waiting for a chance to move on, mainly to Windhoek or to the coastal towns. People do not invest into enhancing their life in Tsumeb as they consider it as a stopover to the next destination. On the other hand Tsumeb also captures the returning influx from Windhoek when those who migrated to the capital without finding prospective incomes are on their return track. They do not go back to their places of origin as they still seek the comfort of urban provisions, but at the same time they wish to be closer to their rural homes in northern Namibia. The demographic characteristics such as

population age and gender ratios are balanced and resemble the average for similar urban centres in Namibia. The education level is slightly reduced as there is a tendency for more educated people to move out of the town affecting both strata, those who were born in Tsumeb and those who have come earlier due to their work commitments.

A very drastic change has occurred regarding the income distribution among the community. There is a significant increase in income inequality with a broadening share of those with low incomes as opposed to people with higher incomes. Coupled with reduced public expenditure, the community's buying power has also reduced within the last ten years. As a consequence the size of Tsumeb's market has shrunk. The number of higher order retail outlets was reduced to be replaced by an increased number of smaller businesses providing lower order goods and services. The change has occurred towards narrowing the commercial services provided to Tsumeb's residents. The informal market has sprung up as the demand for its goods and services is growing. The potential for economic growth is still present, but stagnation, reduced investments and Tsumeb's proximity to other urban centres have decreased Tsumeb's significance in the urban hierarchy.

The closure of the mines in 2008 drove the Municipality to invest in several new projects to stimulate economic growth. A boom was achieved within a short term, attracting new investments, concluding new public and private partnerships, leading Tsumeb to completely transform into a diversified town that does not depend on mining. The growth was sustained, but largely with short term visions that after years

of success started to stagnate. This largely resulted from decisions that addressed mostly short-term, pragmatic concerns.

The lack of cooperation with the public and neglected town planning and development due to internal political friction at the local government level meant that the opportunities were never realized and well-intended public private partnerships faded away. The local business communities withdrew their ambitious plans to diversify and expand locally; they redirected the focus to Tsintsabis and Oshivelo which they thought had more potential. Tsumeb remained functional, but without support became an unfriendly place for business, leading to a lack of confidence to invest in the town.

The relationship between the community and the local authority deteriorated. Unresolved land issues and constant political infightings led to the community's withdrawal and disinterest in the planning for the future. The Kuvukiland informal settlement reached a considerable size and the government's failure to attend to the needs of the most vulnerable infused dissatisfaction, leading to violent protests. Residents viewed the government as being insensitive; completely neglecting the people they are supposed to serve.

With a stagnant local economy and lowered buying power of the local people, public expenditure was also reduced. The local authority's capacity to generate funds deteriorated, leading to reduced amounts of money spent on infrastructure and development. Planning for Tsumeb accommodates only the basic necessities for public services to satisfy the current population size. Tsumeb is still serving as a regional

centre for many government services to the public, but its importance has been weakened in favour to other urban centres where growth has occurred.

The ecological functionality of Tsumeb is impeded by pollution from past mining activities; particularly, soil contamination severely limits the future prospects. The smelting operations were significantly improved through investment in modern and sophisticated clean technologies and vigorous monitoring programmes; the old pollution is still a significant concern with soils, particularly in lower income residential areas and in the sprawling informal settlement.

In an attempt to self-help, the urban poor turned to urban agriculture, but the soils towards the west and north of the smelter where the majority of economically disadvantaged live are heavily contaminated by heavy metals. Attempts to educate people about the dangers of the contaminated soils made no impact on the urban poor as the survival for existence is deemed more important than to attend to potential health risks. Initially, lead poisoning is difficult to detect and only when it has accumulated in the body over a period of time, the signs and symptoms may appear. Children and long-term residents of Tsumeb have been affected the most, causing a decline in public health. Residents who are aware of the possible dangers have moved to other residential areas or migrated out of the town. The bad reputation of the environmental quality of Tsumeb has discouraged investments and influx of more educated and skilled people who do not want to risk their health.

Tsumeb holds enormous potential but neglect and poor planning resulted in imposed stagnation. This is not a desirable state for Tsumeb's future, but Scenario 1 could be a likely outcome unless attention is paid to urban and regional planning for Tsumeb's future and immediate action is taken. The possibility of allowing unguided development may severely limit Tsumeb's potential to prosper.

6.2.3.2. Scenario 2: transformation into a doable role model

Since closure of the mines, the employment in the mining industry does not exceed 4% of the total employed and it has a tendency to decrease due to the application of new modern technologies. There is no sign of dependency on mining, the town has successfully transformed from being a single-industry town to a regional centre. This ensures that the town is not dependent on either boom or bust of the mining industry.

The uncontrolled migration flow passing through Tsumeb has slowed down with migrations being more widely distributed. The new developments and improved service provisions within the hinterland and other smaller urban centres such as Oshivelo, Tsintsabis, Kombat, and Otavi ensured there is no over-concentration of population in Tsumeb. Another factor that contributed towards the trend is the uplifted lives of the rural population. The influx of young and mobile migrants is captured and integrated into the community. Their association with rural homes or other areas of their origin has considerably weakened. Many previous migrants identify themselves as locals, have established families and raise their children with pride of being Tsumeb's residents. The trend of migration has changed from Tsumeb being a transit stopover with Windhoek as the final destination, to Tsumeb being a choice destination.

This has contributed to the maturity of Tsumeb's community with a considerably large share of permanent residents. Demographical characteristics are balanced and in line with the national average for the same size urban centres. All citizens have equal access to opportunities for a better quality of life.

The local economic base has diversified and is absolutely self-sufficient. Tsumeb's economic development process includes different segments of businesses: small, medium and large scale local businesses, multinational companies and branches, parastatals and other smaller micro and individual enterprises. Local businesses have succeeded to penetrate new markets, absorb a larger labour force, expand employment opportunities, increase investments and enhance productivity. An increased number of small enterprises service major national projects, many of them successfully transforming into medium size enterprises, employing more people and expanding their business operations.

The presence of various financing schemes for new businesses has augmented the success rates for aspiring entrepreneurs. The emphasis on economic development and strengthening is placed on the advancement of previously disadvantaged groups in the enterprise sphere. Many small scale local vendors are involved in projects at all possible levels. The support from the local government and non-governmental organizations in Tsumeb is tremendous. The cooperation between the parties has ensured success and upliftment of the previously marginalized and poor, empowering them with new business skills. The residents are better educated about the local economy and economic development processes.

The town has initiated several successful local development projects through cooperation with the community, the local business community and neighbouring councils on how to develop local and regional resources, opportunities and potential. The local government has the reputation of being a key player in the local economy and an effective partner in the initial stages of development of many new projects. There is encouraged collaboration and partnership between public, private and community sectors. Several public private partnerships have proved to be successful.

Several new industries with value addition have set in the town and established their factories in Extension 5 and 6 of Tsumeb's Municipality. Industry has placed great importance on the role of local economic development. Previous dependency on foreign investment is replaced by local investments. The industry has transformed in favour of the secondary and tertiary sectors.

The thriving agricultural projects in the hinterland and the success of national policies to support the local agricultural sector have increased Tsumeb's significance of being a local market for agricultural trade. The new chemical plant in Namibia manufacturing fertilizers has considerably reduced the input cost of locally produced agricultural produce, making these more competitive against imports from South Africa and encouraging farmers to penetrate the national market. The linkages between Tsumeb and its rural hinterland have increased and strengthened, particularly with an improved infrastructure and connectivity between other urban centres and new growth corridors.

Tsumeb has developed into a national and regional industrial hub being self-sufficient, reliable and competitive. This is success that resulted from the carefully guided economic growth in a manner preserving and protecting the existing character of Tsumeb without compromising potential economic activities, thus achieving sustainable economic development. The successful economic diversification contributed to reduction of poverty and income disparities among Tsumeb's residents. Employment rates have raised and all forms of marginalization are removed. The economic growth has boosted the local economy which resulted in strengthened Municipal administration and sufficient financial resources, ensuring smooth and effective operation of the local authority.

Planning for the social impact resulting from growth was addressed accordingly to the local authority planning for expansion. The Municipality of Tsumeb has provided superior infrastructure and services to support economic activity and promote the well-being of Tsumeb's community. The services were planned and provided according to the projected growth. In recent years Tsumeb has considerably improved on equitable access to urban land through acquiring additional land and reclamation of the contaminated land, rezoning and determined a suitable land use form. Tsumeb has a few incentives in line with the National Housing Policy. The self-help Build Together Programme provides low interest rate loans to individuals to build their own homes.

There is no settling in informal areas as the town has sufficient stock of serviced land enhancing the choice of housing alternatives, particularly for the urban poor. The previous informal Kuvukiland settlement has been proclaimed and is within the

Municipal borders, serviced and offering the full range of urban amenities and services.

Tsumeb is a well-planned, well managed, clean, safe and aesthetically pleasing urban centre where people have access to adequate housing, safe drinking water, electricity and sufficient sanitation. The service provision and development is in line with the context of the latest National Development Plan (NDP). Tsumeb serves as a central place for the public service distribution to the residents of Tsumeb and the citizens of surrounding areas.

The public education and health care facilities are sufficient, adequately equipped and within easy reach of the public. Tsumeb has a few new multi-purpose learning centres. Empowering people with skills and education has resulted in a more positive outlook towards the future. The community has become more proactive and involved in decision-making about their own economic future and social wellbeing. In the eyes of the community the local authority is addressing daily concerns that affect the town's quality of life and economic development. The community spirit and togetherness is augmented, particularly among the young people. The youth is empowered and given an opportunity to play an active role in the community. Educated youth after completing their tertiary education is willing to return to Tsumeb to contribute towards development of the town they feel proud of. The social life of Tsumeb is uplifted with exciting and healthy choices for recreational activities. People are satisfied with their daily lives in Tsumeb and thankful to the local authority for taking care of their town.

The environmental concerns arising from the previous mining activities were taken care of. The better education of local people in the areas of concern to understand the potential dangers has led to people being more responsible and self-aware. Large portions of the areas previously contaminated with lead and arsenic substances were rehabilitated to a permissible level to meet the requirements for particular land use. There is a high level of responsibility towards the environment and pollution at the Namibia Customs Smelter (NCS). New technologies and vigorous monitoring programmes have assured minimal environmental pollution and no impact on human health. Healthy labour conditions exist in smelter operations.

Tsumeb is self-sufficient with all the social, financial, organizational and environmental elements that meet the needs of the present population without compromising the needs of future generations. Scenario 2 proves the success of Tsumeb diversifying and transforming not only from a single-industry town to become a sustainable town, but also its continuous growth and advancement transforming Tsumeb into a significant self-sustainable regional urban centre that serves people far beyond its Municipal borders.

6.3 Outcomes of dissimilar developments

Scenarios attempting to outline ‘development’ against the paradigm of sustainability are retrospect in nature. Their (ultimately subjective) assessments are built scientifically on often imponderable events experienced in the past. Such observations usually form the platform for judgements on future developments, merged with ‘state of the art knowledge’ of the present. In the set of two scenarios dealing with the mining

settlements examined in this analysis the question arises, which data-based scenario would be most desirable for urban (sustainable) development, and how could the inherent outcome be achieved without compromising the commitment to sustainability in local and regional politico-economic and spatial planning.

Scenario 1 is characterising a worst case situation, while Scenario 2 captures prerequisites that generally are considered to trigger and possibly sustain settlement growth with regional development. Perhaps Scenario 1 offers an easy, comfortable way of apparent development with neglected or little planning. Events unfolded without adequate planning, missing out on opportunities. It spelled out a string of undesirable changes such as deterioration of the mining settlements encroaching on their economic development, loss of human quality of life and environmental conditions; seriously threatening the settlements prospects that might lead into a bleak, troubling future.

Appendix 13 collates core characteristics of decline and deterioration featuring outcomes of Scenario 1. While demographic characteristics of people gradually adjust without major ruptures, extreme economic decay, unstimulated markets, low economic diversification and loss of incomes lead the local community to situation of depression and despair. In case of active mining settlements, the population is weakened by unbearable out-migration, leaving behind people with limited education and skills. Such processes challenge settlements' strength to recover from the shock after the closure of the mines, ultimately e.g., threatening an urban regional centre and its regional hinterland to face a breakdown. This demonstrates that individual comfort

felt from mining is not infinite. The seemingly stable present may become a convenient excuse for ‘doing nothing’ and leave the development to take its ordinary gradual path.

Rosh Pinah is particularly affected. It seems impossible to predict its future, but some consequences of a ‘no-action attitude’ have already started seeping out into reality. Scenario 1 revealed the need and pressure to carry out inevitable changes. It mirrored missed opportunities in planning processes and posed the question whether the conditions could support a livable future for this mining community.

Scenario 2 envisioned the emergence of a strong will for harmonizing future growth and for ensuring a sustainable transition of the mining settlements to an urban centre with a more equitable livelihood for all citizens. Appendix 14 summarizes the characteristics of the Scenario 2 for the three case studies under investigation. Through fruitful cooperation between the mining operators, private businesses, government and the community living in the mining area, the settlements were able to achieve a national consensus in order to take advantage of the various economic opportunities provided by mining, subsequently implementing major changes that support both the mining economy together with the business community. The collaboration resulted in a diversified economy, increased job opportunities, raised self-esteem of people, significantly broke the cycle of disadvantage and created a self-sufficient community. People seem to be satisfied with a vibrant economy, utilizing the variety of local potentials.

These tabularized summaries of characteristics attest that different approaches to planning for mining settlements create different qualities of scenarios. The ‘scenario formulation exercise’ transpired that consequences of not-planning the future of mining settlements in line with their likely life cycle (see Scenario 1 in Figure 112) triggers several unforeseen adjustments effecting the settlements’ demographic features, the local economy and infrastructural establishments. Targeted and timely interventions, however, increased the likeliness of feasible, perhaps sustainable levels of development in mining settlements, producing effects of socio-economic and environmental improvement cascading into the mining communities.

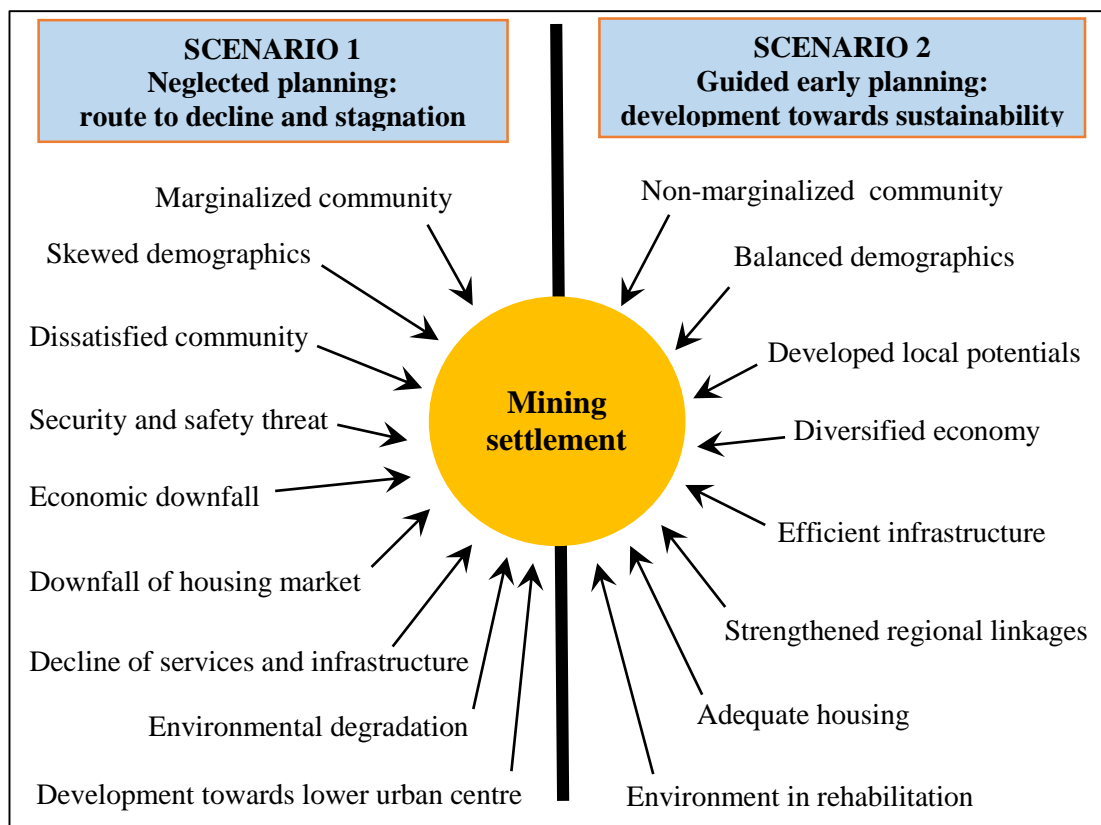


Figure 112. Possible outcomes of development applying dissimilar planning approaches.

Despite of the fact that the selected case studies represented three different mining settlements, namely i) active mining settlement Rosh Pinah, ii) the abandoned mining

settlement Klein Aub and iii) the more recently transformed urban centre Tsumeb, certain similarities amongst the three cases were observed.

Common mistakes that surfaced to be addressed prior to, during and after planning new or expanding mining settlements with urban product diversification in Namibia are:

- The cyclic nature of the mining settlement often is neglected and rarely considered in planning sustainable urban development goals.
- The mining settlement's transformation from a company town into an independent entity through 'proclamation' often experiences that a straight forward process is meeting vested interests influencing problem resolution.
- The 'planning for closure' often focuses on the closure of a mining operation and does not adequately cover the socio-economic aspects inherent in a more holistic mining development. The planning for closures is delayed and with lack of the full support of communities, indicating their little involvement in the planning for closure activities.
- The multiple facets of sustainable development goals are disregarded. Diversification of the local economy that could be sustainable beyond the mining operations is inadequately addressed; infrastructure planning mismatches people's needs and environmental care.

Essential issues that await to be addressed in planning for sustainable mining settlements in Namibia are discussed in following chapter. This opens a discourse on the i) cyclic nature of (mining) settlements, ii) problematic of settlement proclamation,

iii) closure of mining and iv) pillars of sustainable development in spatial planning. The discussion integrates components of the conceptual framework of this work into process of local and regional planning for growth and development, guided by principles underlying the dimensions of urban sustainability.

7 DIMENSIONS OF MINING SETTLEMENT PLANNING

The deliberations offered in this chapter flow from the analysis of problem formations and the presented scenarios pertaining to the three case studies. They highlight outstanding findings and experiences that acknowledge the mining industry's past flaws without refuting its contribution towards the settlements' development. Lessons learnt unfold problem solutions, matters to be redressed, principles and strategies aiming at the development of mining settlements; ultimately, perhaps more people-centred planning for the future of mining settlements in Namibia.

The following exposes potential fundamentals, the application of which might be instrumental in support for sustainable development. The deliberations are expressed in the awareness that attempts to plan and perhaps forecast sustainable outcomes pertaining to mining settlements.

7.1 Deliberation on settlements' cyclic nature

Based on empirical results evolving from the researched mining settlements, findings detected a flaw in town planning practice. Despite the understanding of the finite nature of the mining industry, the cyclic nature of mining settlements is rarely understood and considered. The study clearly displayed the interviewed stakeholders'

understanding of the anticipated event of ceasing mining activities. Without doubt, the mine labourforce, the local community and businesses along with managers of public institutions were aware of the imminent closure of the mining industry. Each constituency harboured its vision what might happen with their businesses or private lives in the case of closure of mine(s). Surprisingly, smaller short-term mining cycles were rarely considered and potential of adjustments within smaller cycles was not foreseen. The origin of the smaller cycles and their existence often was regarded as the mining industry's problem or blamed on the fluctuations of the global economy.

While it is not unusual for mining settlement to decline or rise, depending on the global commodity markets or other external pressures, the pathway of the full mine life-cycle undergoes three pre-determined and finite mining phases - development, production and downsizing (see Figure 113). Short-term mining cycles within the mining production stages cannot be pre-determined. They usually revive after every production stagnation and mining economics are a contributing factor. Potentially they are endless as long as a mine is producing. Phases of the short-term mining cycle are similar to industrial cycles described by Harvey (1982), where an economic stagnation is followed by a recovery, then an expansion, reaching the peak production, which is followed by a crash leading again to stagnation. The study observed that the settlement developers often underestimated the short-term cycles' capacity to impact on the settlement's development. During the short-term declines the community conveniently decided on the stance of 'wait and see'.

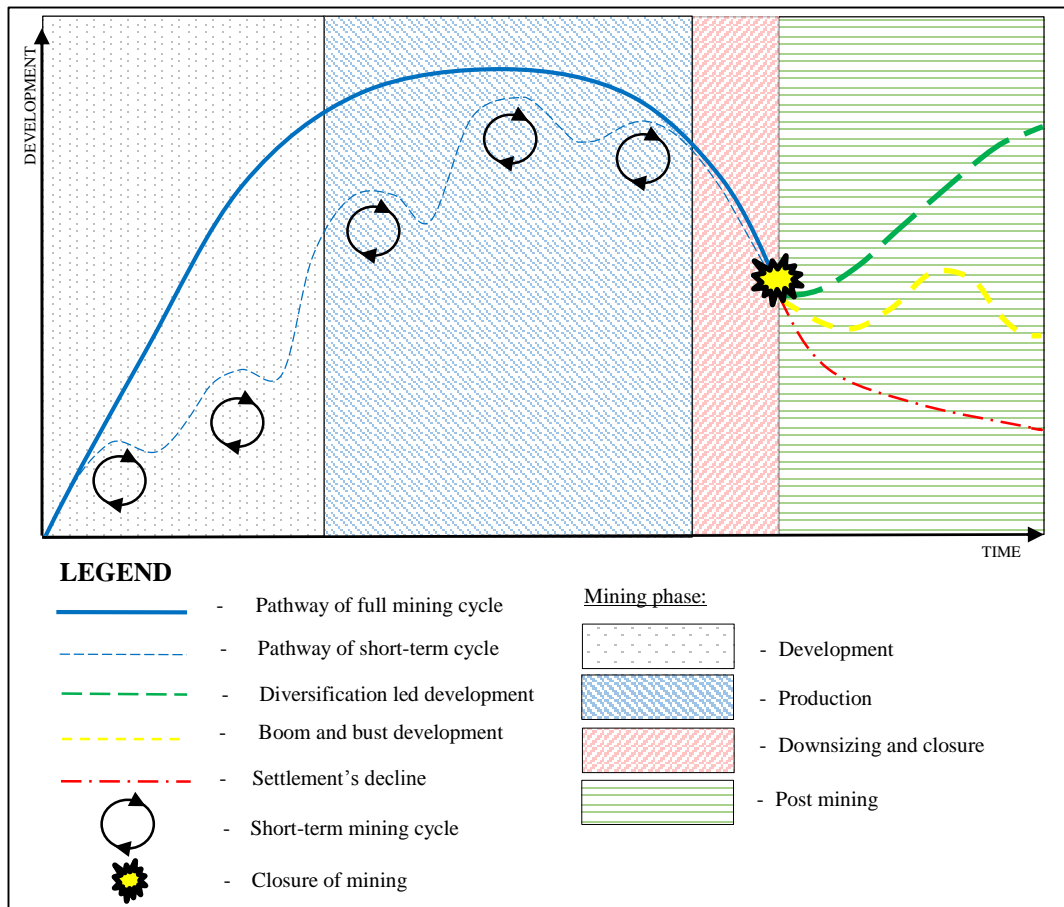


Figure 113. Pathways of different developments in mining settlements.

The analysis of the short-term cycles may reveal insights about earlier experiences and potentially assist in the preparation for subsequent 'boom and bust' cycles. Forthcoming decisions could be based on more accurate information and deeper understanding of the behaviour of short-term mining cycles affecting mining settlements.

Apparently, it becomes evident in the long run, while experiencing several cycles of growth and decline, that the mining settlement may eventually learn to survive, developing its own mechanisms to cope. Thus, one would assume that there is no need for interventions as 'Mother Nature' takes its own course of development. For

example, in the past the Tsumeb mining settlement has experienced the cyclicity of the mining industry, but gradually over time has managed to diversify its economic base and break away from the dependency on the mining industry. In times when additional resources were found, Tsumeb revived by seemingly prolonging the life-span and temporarily boosting the local urban economy. At the end of a subsequent production cycle Tsumeb's growth curve declined, facing challenges known from previous cycles' experiences. It lasted a century of fluctuation between growth and decline, until the settlement finally overcame the constraints in order to be able to sustain the local urban economy without relying on mining industry. It may be noted that Klein Aub cannot demonstrate the same experience. Its full mining cycle expanded over 21 years only and the period of time given way too short to accrue the experiences required to cope with challenges of mine closure.

In today's context of urban and regional planning, there is no need for extended periods of holding back on development, to wait for centuries to pass, in hope that one day the settlement may pick up on its development. With targeted interventions such as analysis of the current and past short-term mining cycles, monitoring could provide an insight into potential concerns, may acknowledge sensitivities of the mining settlement or its hinterland.

With reference to the three case studies, this is particularly relevant to Rosh Pinah which right now endures both, the subsequent phase of a short-term cycle and the approaching end of the mining cycle. In case of ignoring the cyclic nature of the development, either neglecting or deserting the broader proactive context of urban and

regional planning, Rosh Pinah may fail to thrive and surrender to pressures of withdrawal or closure of the mining industry, ultimately failing the urban system. The focus on planning for Rosh Pinah's future shall be on long term development without ignoring the short term cyclic fluctuations; being able to blend the partial insights of short-term cycles into an unified representation of sequential dynamics in the long term.

Every short-term cycle moves in a recursive loop from stagnation to recovery, followed by expansion, with peak and crash, leading back to stagnation. Each stage within this cycle bears different opportunities and threats on the settlement's development. For example, when social and economic growth is gaining momentum, the environment may endure increasing degradation (see Figure 114).

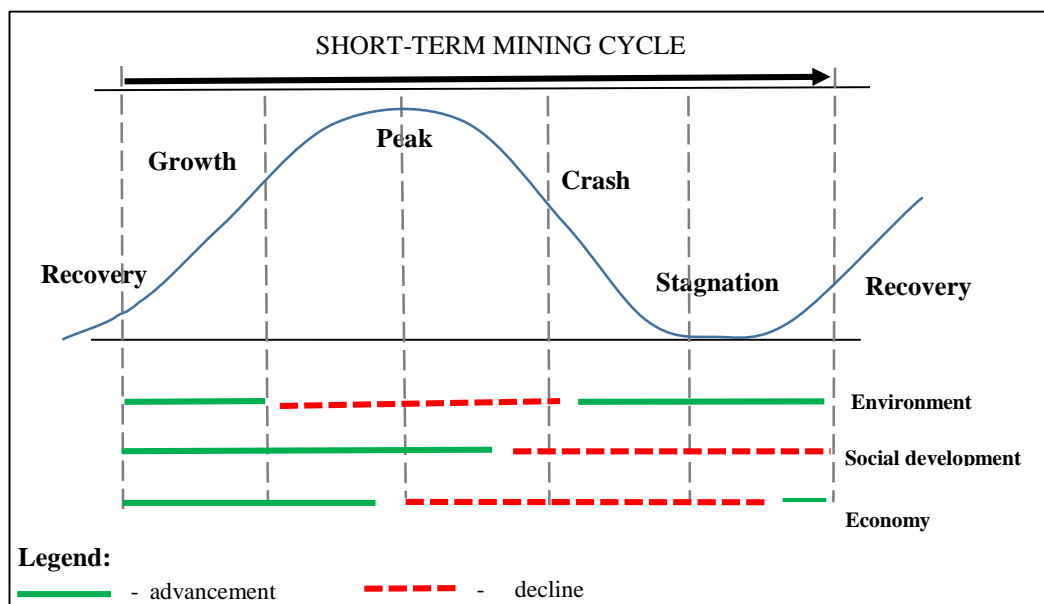


Figure 114. Insight into the recursive loop of a short-term mining cycle.

The mining industry is booming when commodity prices are high, but the environment may lose its biodiversity, following an increased demand for lower-grade ores. Mining

lower grade ore requires the extensive removal and processing of soils, energy consumption and usage of water. This leaves a greater environmental footprint in order to yield the same amount of usable ore compared to mining higher grade ore. Additionally, different constraints on the environment may occur should the mining industry simply abandon the mining site and vanish. Currently, this scenario is very unlikely in Namibia, but cannot be taken for granted.

Further, the sustainability of economic growth halts shortly before or right at the peak of the mining settlement's economic development. While the economy of the settlement is still booming, mine labour costs, borrowing rates from financial institutions and depletion of company's own capital have already affected the mining company's profit. DiBoscio (2010) stated that as soon as the mining company experiences low profits, the expenditure on non-mining activities such as meeting the social responsibility or the settlement's maintenance is reduced. Economic conditions of such settlement deteriorate and, with the onset of wide unemployment and decreased incomes, the decline of social development follows inevitably (see Figure 114).

The discussion inclines to the opinion that the recursive loop of mining cycles faces diverse issues with different capacities to achieve sustainability at any point and that is not only in the full mining production cycle, but also within the short-term cycles. This appeals mining settlement planners to carefully prioritize short term plans towards better long term outcomes in the event that unexpected commodity prices may decline. The mining industry will fluctuate during the life time of mine production.

Understanding general trends of short-term cycles, and how their parameters change within the different stages of the mining cycle and sound knowledge about unique features of the mining settlement (e.g., population size, demographic characteristics, location, economic potentials of the area, administrative organization, infrastructure) may assist to determine how the settlement could cope with pressures, learn from experiences and recommend solutions that might assist in dealing with arising problem formations appropriately. The course of progress could be directed through interventions targeted to alleviate distress emerging from undesired developments. Mining settlements require a variety of strategies to cope within different stages throughout the full mining cycle and phases of settlement expansion. The answer to the question why some mining settlements demonstrate capability of surviving the closure of a mine while others have not may be imbedded in how planners internalized the cyclic nature of the mining settlement, and how the knowledge was applied when the mining industry was in full swing. Thus, Luca's (1971) mining settlement's life-cycle model focusing on the entire mining cycle needs to be supplemented with knowledge on short-term cycles, since both show ability to influence the direction that mining settlements may take after the mine closure.

7.2 Two sides of proclamation: solution and drawback

The ultimate goal of a mining settlement is its sustainability beyond mining. Such an urban development proves to become achievable only when the mining settlement transforms itself from a company town into an independent entity of settlement administration and management, represented by local government and proclaimed as

local authority. Such proclamation is not always easily obtained and straight forward. It may be a solution for some and a serious drawback for others.

The only rationale behind proclamation is social and developmental (Littlewood, 2014), and it is encouraged only if the community in question has a diverse existing natural base or economic potential in the area accessible to them. In such cases proclamation would create favourable conditions for business and local people, through residents being able to attain home or business property ownership, be able to grow, attract investments and expand, be free to pursue their own self-sufficient future. Unfortunately, the reverse side of proclamation may not be appealing.

The proclamation could entail that the service provision to and management of the settlement could cease to be subsidized by the mine. The likely escalating cost of living and underutilized grand infrastructure built by the mines would involve financial burdens to ensure maintenance. Thus, the question arises to choose or to reject proclamation. Building upon experiences from the three case studies of this research, guidance may be offered by drawing attention to queries and matters that need to be analysed before the decision for proclamation is made.

Rosh Pinah, Klein Aub and Tsumeb were founded before the contemporary holistic planning approach emerged. These settlements developed in times when construction and operation of the mining settlement was one part of the mine planning process. While proclamation occurred in Klein Aub and Tsumeb with different outcomes, such as success for Tsumeb and disappointment for Klein Aub, the ongoing negotiations

applying for the proclamation of Rosh Pinah have been initiated over a decade ago. In absence of legitimate economic opportunities sustain the settlement beyond the mining, the delay of the final decision on whether to proclaim the community remains pending. The mining settlement has expanded urban structures and functions beyond a mining town, only accommodating the mine labour force. It is home to citizens, of whom approximately 6000 people are not related to the mining industry. The settlement surpassed expectations of mining companies and the government.

The study revealed that the influx of job seekers to Rosh Pinah who settled on outskirts of the privately owned Rosh Pinah mining settlement is generally undesired, creating obstacles to urban sprawl. The closure of Rosh Pinah mining settlement after the cessation of mines is not conceivable due to the fact that the non-mining population outnumbers the mining population. Any possibility of resolve the problem forcefully could instigate people to social uproar, which is to be seen a high risk by the mine operators tarnishing their reputation, and simultaneously challenging the Namibian government to rescue people and their livelihoods.

The mining operators claim not to be responsible for Rosh Pinah's non-mining residents. They indeed try to uplift the quality of life of informal settlers by providing and managing their services. This is implemented on a voluntary basis, but, upon the closure, they may withdraw since they are not obliged to engage in socially responsible behaviour and sustainability. The previous experiences with the proclamation of mining settlements like Uis, Arandis and Klein Aub may caution government. These

settlements displayed severe decline after the withdrawal of financial means of the mining companies, while many former residents continued to live there.

Despite the absence of alternative economic opportunities but with the non-mining residents living in Rosh Pinah, the proclamation of Rosh Pinah could be a win-win situation for all - the government, the community and the mining operators. Unfortunately, further delay of proclamation works against Rosh Pinah's urban sustainable development as a nuclear centre in the southern settlement network.

Proclamation could be a solution as demonstrated in the case of Tsumeb. Proclaimed in 1905, the town continuously received financial injections from the mining industry until stopped operation in 2008. Timely accomplished when still present in the area, mining companies may assist in the transition period of changing the ownership.

Proclamations at the end of the mining cycle miss opportunities to test and strengthen the development through smaller short-term cycles as well as to receive financial infusions from mining companies. Settlements proclaimed as a local authority early and developed through several smaller short-term cycles can learn from experiences to use any following mining boom to leverage other economic development prospects in order to provide promising diversification reducing harmful dependencies on mining. It is not overstated to note that the timing and the manner, in which the settlement's ownership is taken over, play pivotal role.

Preferably, preparation for proclamation must start early and during the production phase of the mine (see A in Figure 115) with on-going negotiations between the mine management, the government and the community. Leaving negotiations to the final stages of the mining production cycle bare few fruits. However, too early proclaiming may trail similar outcomes as delay, because stakeholders are not yet familiar with problem formations, potential needs, and likely costs and required financing. The proclamation is advised to be initiated when the mining company is in full production.

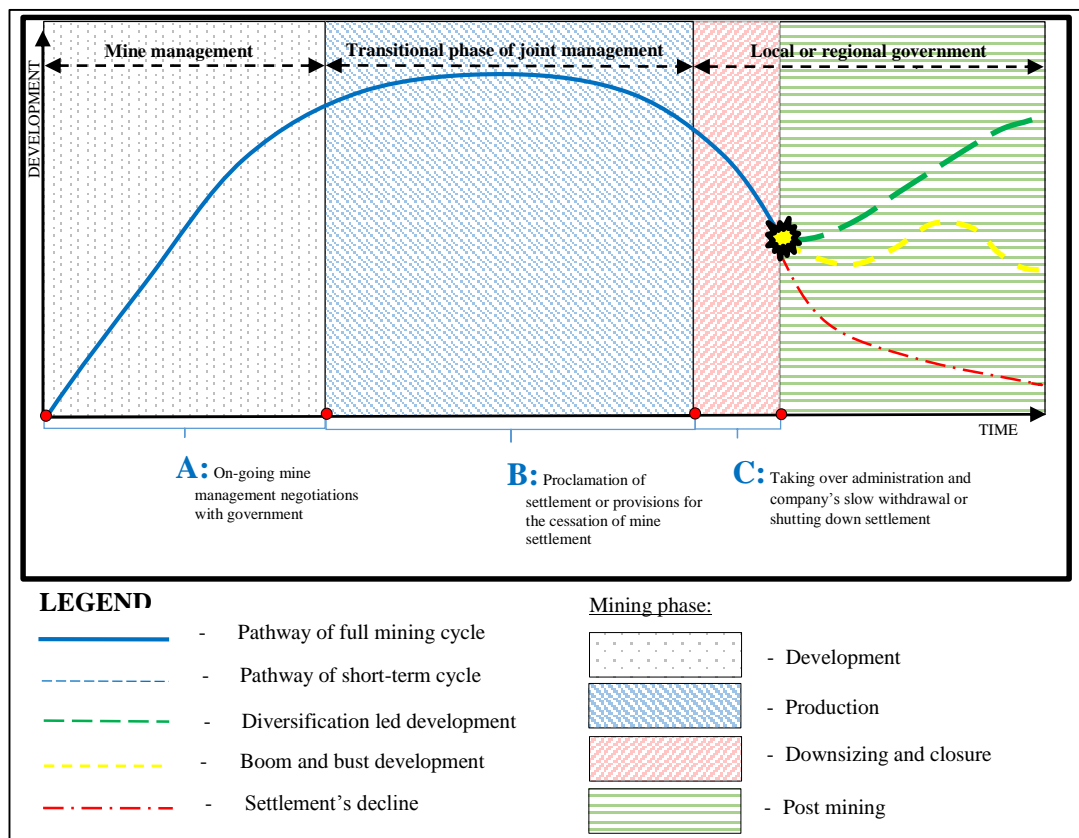


Figure 115. Timing of a proclamation in a mining settlement.

This would secure a reasonable time for transitional phase (see B in Figure 115) to prepare and hand over the ownership before the downsizing of the mining activities. Transitional phase requires the overhaul of a financial management system, provision of skills to manage and maintain the settlement's infrastructure, the gradual phase out

of the mining finances, adaptation of new infrastructure charges which should take place during the good times of the local economy.

Even in such cases where legitimate economic diversity can be identified to sustain the settlement's viability, efforts to stabilise the local economy require actions while the respective companies are still mining in the area and cascade financial assistance. An artificially created settlement like mining is not able to lead its development without exterior support until the urban system exhibits some form of self-reliance.

The period of mining industry's downsizing (see C in Figure 115) could be used for finalizing the handover of the administration where local government is already fully in charge of the settlement's administration and management.

The mechanism to transfer land ownership and the responsibility with it requires several preparatory actions which include preparation of legitimate closure plans and custodian transfer plans, identify all liabilities and plans to deal with upon the transfer of the ownership, agree on the financing of the costs of the transitional and post transfer phases which include mitigation of the liabilities that have outlived the mining. The establishment of an endowment fund is recommended or other means to provide for perpetual care if necessary. These will be difficult to achieve agreement on or after proclamation date. Should the government and the mining companies not reach a mutual agreement and understanding regarding the housing stock or other mine infrastructure that belongs to the mine, the mining operator may go to the extent of dismantling the housing and move it to another mining site as the law requires the

mining site to be rehabilitated and mine infrastructure to be removed. Housing issues must be addressed at an early stage and preferably the people employed by the mine should be allowed to buy the houses from the mining companies. From investigation of migration trends, the experience in Klein Aub demonstrated that property ownership may retain if not increase the residing population and it would stabilise the settlement's socio-demographic settings, lessen the risk of potential devastating out-migrations and most importantly it may stabilize the settlement's permanent population base (Davies *et al.*, 2012; Hernadi & Fraser, 2012). By the laws of the Central Place concept the population size will determine what kind of the urban centre it will be. Therefore, the size of permanent population may serve as a good indicator on what kind of future the settlement can achieve, what kind of urban centre it may become. Proclamation has potential to solve crucial land issues which often are the main obstacles in the way of future expansion and the willingness to invest, a prerequisite for economic diversification of the settlement. Only timely and planned proclamation will determine the success of the mining settlement's ability to attain local and regional sustainability.

7.3 Planning aspects for a mine closure

While the importance of planning for mining settlements' proclamation in Namibia often is underrated and decisions are delayed, the mine closure planning is equally insufficient. Long before the proclamation is on anybody's mind, firstly, it needs to be established whether the proposed mining development should result in an establishment of a company town or not. Many mineral rich locations in Namibia are remote, insignificant and lack the necessary economic scale to be sustainable in the

long term. There is always potential to discover additional resources in the proximity as it has happened in Tsumeb in the past, where early life span estimates of the Tsumeb mine were given only eight and a half years (Gebhard, 1999), but production with some temporal closures continued until 2008. The Rosh Pinah mine is operational already for 45 years and the Rössing uranium mine is operational for 38 years. Both constantly continue investing in exploration for more resources which would allow them to prolong the estimated life time of the mine. However, it is very rare that the original life estimates for a mine exceed 30 years. Mining companies invest into new mines only when the feasibility study confirms the existence of adequate resources to earn profits.

A similar approach to assess investigating advantages versus disadvantages could be adopted by government when determining the viability of proposed mining settlement. The construction of a new company town should be discouraged if the localities do not have any other reasonable economic potential to get the boost from the mining industry and thus sustain beyond the closure of the mine. As postulated by the Central Place concept, the distance from other urban centres and the threshold population are key factors for growth. A remote and small sized local population of settlements does not stand chances to develop. In such cases efforts should be made to utilize and add on infrastructure and employment opportunities nearby existing settlements. Albeit, in such cases, an option of long distance commuting should be considered prior the establishment of the settlement accommodating the mining industry's labour force. If the establishment of a settlement is unavoidable, the minimising of local impacts must be a priority and government should play an advisory role. The size of the settlement

and infrastructure should be kept to a minimum and the company to be required to draw up a realistic assessment and management plan representing the company's perspective on the community and mine risks, including those associated with immigration. This further needs to be incorporated into closure planning and constantly revised as "people do not plan to fail, they fail to plan!" (Robertson *et al.*, 1998, p. 2).

Once it is determined, the new mining development will result in establishing a smaller or larger settlement. The planning for the future of this settlement should start and be guided by three main principles: i) timely planning, ii) involvement of all concerned, and iii) consideration of uniqueness. The settlement may not yet be built, but the planning for its life after the mining industry has ceased to operate should begin, i.e. the planning for the future should start prior to the development of the mining project. Mining closure should not be looked at as a problem, but as the final and expected completion of a mining cycle, the planned and straightforward event (Keyes, 1992). Without doubt the settlement's transformation associated with the closure of a mine would be a difficult one. It should, however, be kept in mind that many aspects of the mine closure are similar to those created by the closure of any other industry. The effectiveness of the transformation will depend on the timing of the planning for closure. The mining settlement that was planned with thinking ahead about its future could provide better chances for sustainability than observed in settlements like Klein Aub, which was built with the intention to accommodate mine labour force, but abandoned without a vision. Rosh Pinah has already missed on benefits of early planning, undesirable problem formations described in previous chapters have already encroached the settlement.

The mine closure planning in Namibia is seen mainly as an environmental issue and socio-economic aspects often are either omitted or covered inadequately; planning for closure incorrectly focuses usually on the closure of mining operations. In future, it could be recommended that planning for closure focuses on the entire range of mining activities, starting from the initial stages of mine planning to ensure that as many stakeholders as possible are included in the planning process at early stage. Consultations should not conduct on a selective basis; the process should involve all parties with a stake in the project and the post-mining land-use. The local community involvement is particularly crucial as this will be a major benefactor from a profitable mining project locally that can be gravely affected (Veiga *et al.*, 2001; Macdonald *et al.*, 2006). Another important aspect to bear in mind is the need for understanding social sustainability in community's own terms. People's needs are unique forthcoming plans should satisfy the community (Rheaume & Caron-Vuotari, 2013). Failure to do so risks rejection. Therefore, it is important to avoid any miscommunication pertaining to a local community's expectations.

Rosh Pinah proved serious communication gaps between the ad hoc local government and the local community; particularly effecting residents of the Tutangeni informal settlement. While the local authority is of the opinion that people are passive and unwilling to be involved in planning, the survey revealed people's mistrust or little trust in local authority. The social segregation of communities between residents of the formal part of Rosh Pinah and the Tutangeni informal settlement further contributed to the social fragmentation in Rosh Pinah and the alienation of the Tutangeni residents, leading to frustration about being not involved in planning. There

is a strong sense of 'us' over 'them' with Tutangeni residents considering themselves as being intentionally excluded from the planning process for the future. Planners' task is to go beyond the daily challenges with the communities and facilitate to work together, collaborate and strengthen trust. The know-how on community involvement is equally important. Planners must respect culture and customs of communities. Small adjustments to the usual ways of organizing public consultation may make the difference. For example, the local community may be more responsive and open if the venue for public consultation is chosen more carefully. Instead of luxurious lodges and hotels, the meetings are to be held in halls of local schools or community centres where the general public feels at ease. This would augment the participation and engagement of a wider society, and the voice of people, who will own the place after the mining ceases, will be heard.

The social legitimacy comes from engagement with all members of the community through providing information on the mining settlement's current affairs, the mining company's performance and forthcoming plans, and on what may or may not happen in future to the mining settlement. This will form the basis for the common vision and objectives regarding sustainable development through mining amongst stakeholders. Appropriate strategic frameworks to reach the goal can be drawn, not forgetting to clarify who will pay for what. Trying to reach this agreement towards the end of the mine is fuelling a crisis situation unnecessarily.

Last, but not least, aspects that need to be addressed in planning for the mining settlement's future are factors of uniqueness. Issues encompassing any mine closure

may be location specific, but managing the cumulative social, economic and environmental impacts, collaboratively timing and sequencing of development options may bear best results, and their acceptance satisfactory for all.

7.4 Facets of sustainable development

The extraction of mineral resources changes the physical environment, economic organization and social structure of the local and regional milieu. Sustainability of mining settlements will depend on how these three components will be advocated and what efforts will be taken to transform a single industry company town into a diversified urban centre.

The mission of mining settlements should be to include efforts that sustain and enhance other types of economic activities than mining; vigorously pursuing economic diversification among local enterprises. The basic principle of economic development of such settlements is to identify local and regional economic potentials such as available resources that attract complementary types of businesses which will help to diversify the economy. It takes less effort to encourage the mining settlement's diversification and growth when economic potential other than mining pre-existed. However, if economic potentials are established during the planning process of the mine development and advanced further with targeted preparations, it may yield success. Planning for new economic activities towards the end of the mining cycle appears to be challenging. Diversification that contributes positively requires time to develop before it bears prosperity (CREC, 2014). To the point, mining settlements

should make every effort to plan early for an economy strong enough to withstand constant economic downturns as well as provide jobs in industries other than mining.

The potential of re-purposing or re-using the mine infrastructure often is underestimated and rarely considered in the planning of forthcoming closures in Namibia. The code of practice in Namibia would require the mine sites to be rehabilitated and returned to their pre-mine conditions. Insufficient experience with the success of closure plans and fear that many defects are not apparent or not known at the time of a mine closure amplifies reluctance to accept the advantage of existing assets that could be re-used for future purposes other than mining in order to continue valuable contributions to the local economy. It took decades for the Klein Aub local authority and residents to realize that the abandoned mine infrastructure could be re-used for other economic activities to the benefit of the community. The identification of the opportunities of re-purposing or re-using abandoned mine infrastructure would be beneficial in the case of Klein Aub. In planning new mining settlements such undertakings need to enjoy an early acceptance and the concepts could be incorporated into closure planning at an early stage.

It is essential to extend the focus on mining settlements' economic development to the region. This is particularly important in cases of remote settlements like Rosh Pinah. Local officials responsible for economic development often consider new economic activities that have capacity to create jobs locally, but undervalue the significance of boosting activities with spillover effects. The focus on urban Rosh Pinah alone as an enclave of development will not address all possible problem areas, because the

settlement is unable to sustain its life cycle as an enclave beyond the closure of mining. Thus, it needs to unfold, strengthen and expand existing linkages with its regional hinterland, broadening perspectives and incorporating larger spatial systems. When local and regional potentials of mining settlement are identified and the long-term vision pertaining to the mining settlement is clearer, the success of economic development, could, perhaps, be attained through an integration of long term programmes propelling short term changes. This could be applicable to all kinds of mining settlements (former, present and future).

Cook and Hulme (1988), Mitchells (2002), Rodriguez-Pose and Tijmstra (2007), Binza (2008; 2009), Perry (2010) and Hobson (2011) argued that diversification of local economies can be achieved through a variety of LED strategies. In most cases objectives of such strategies are job creation and capacity building within local communities to enable the mining settlement to transform to diverse urban centre. Among the crucial difficulties that emerged from the investigation of the case studies are entrepreneurial skills' development, empowerment of youth and women, attraction and retention of people with skills and tertiary education, support of advertisement and marketing of local products and services, reinforcement of preferential procurement for local firms, fostering partnerships among mining industry, local government and community, establishment of small business start-up hubs and multiple skills training centres.

Another important finding emerging from the Rosh Pinah and Klein Aub case studies was that advancement of economic development was hindered by the presence of an

enlarged informal sector economy. An enlarged informal sector weakens the economic growth of the formal sector and the formalization of such markets is an urgent problem to address. In Rosh Pinah, for example, the unregistered companies or businesses could not bid against tenders or enter into business dealings with the mines or other corporate firms. Despite, they often have capacity and skills to supply the required goods or services. The solution lies in the facilitation of these informal businesses to formalize. Formalization of informal markets would allow these enterprises to realise their potentials, expand their operations and create new job opportunities.

Promising emerging initiatives were observed in Rosh Pinah, but required additional support through advice on managing their businesses and financing outside the mining industry. The assistance could come from Community Development Trusts initiated e.g., by mining companies, other private businesses or non-governmental organizations through providing access to grants from government agencies. Organizations such as SMEs Compete and the Obib training centre already offer essential skills training, mentorship, capacity building support and advisory services to emerging entrepreneurs and enterprises. Despite, Rosh Pinah needs further support to trigger positive economic development and being able to sustain it.

However, the success of economic development in mining settlements requires more than the formalization of emerging entrepreneurs and diversification of SMEs. The study revealed that SMEs rarely had the capacity to grow and broaden their operations beyond two years since they could not cope with economic fluctuations. The support in form of incentives, creation of private public partnerships, supporting the growth of

particular clusters of businesses for locally-owned medium and large scale businesses often was neglected. Such companies are more likely to stay and invest in the area in comparison to any other medium or large scale company with their headquarters outside the region, e.g., retail chain shops, company outlets. The business survey of this study confirmed this phenomenon that Pederson (1997) explained, investigated for cities and towns in Zimbabwe. The economic development of mining settlement likely stand chances to withstand short-term economic downturns and sustain after closure of mines if support and diversification is extended to the locally-owned and locally-based medium and large scale enterprises.

The success of economic development is unlikely without infrastructure development which looks beyond the life-span of mines. Infrastructure must be able to provide for and support the current and future economic opportunities and the wellbeing of residents. As discussed earlier, the upgrading of the 160 kilometre road linking Rosh Pinah to Noordoewer and the South African border post Vioolsdrif on the banks of the Orange River, could create growth and development not only to urban Rosh Pinah, but to the wider hinterland. Rosh Pinah could be able to capture more people and business opportunities, expand markets to nearby smaller growth centres and aim at becoming a viable centre in the southern settlement network.

Caution on over-investing in hard and soft infrastructure needs to be exercised. Mining companies' efforts to invest into elaborate infrastructure may be received with excitement. The contentment about access to services that were not available earlier, however, may shadow the downside of the same investment. The inheritance of an

oversized infrastructure (e.g., hospital, school), which cannot be financed and maintained by the local community later, may contribute to an unsustainable existence of settlements. The infrastructure needs to be appropriate in such a way that it remains useful not only during the days of active mining, but serves the future population once mines will be closed. Planning infrastructure in mining settlements should take into account the future use and envisaged capacities. If the infrastructure does not match the post-mining era's supply and demand, plans for the swift re-purposing of this infrastructure must be in place. Further research should be initiated to investigate mobility and migration of people. Migration trends and the scale of potential out-migrations after the closure of mines may possibly establish the population size and indicate additional demographic features necessary for comprehensive planning of forthcoming events.

Sustainable development is unlikely without considering social aspects. While diversified economic development is essential for the socio-economic sustainability of the mining settlements by means of job creation and upliftment of the community's livelihoods, it is crucial to attend to reduction, if not eradication of social segregation that persists in mining settlements.

The spatial division of the Rosh Pinah mining settlement was an obvious characteristic, with the organized part of the settlement belonging to and operated by the mining companies and the less organized informal part, where the majority of the local community reside in an area dominated by poor housing with inadequate infrastructure. Equally important is to understand the most mobile migrant population

that chose “rural urban migration as an option to make a living at workplaces away from social networks and livelihoods at home” (Becker 2006, p. 23).

Last, but not least, the sustainability of mining settlement is not conceivable without considering environmental aspects. The impact of mining on the environment is often severe and may jeopardise important sources of livelihood for a significant proportion of the population in and around mining areas. Effects familiar to those immersed in the history of the mining are, for example, degraded air quality, polluted water resources, removed top soils and loss of vegetation, contaminated soils, abandoned mine infrastructure causing safety hazards to the public. The influence of the environmental quality should not be underestimated. Tsumeb requires different attempts to improve the town’s environmental monitoring and reclamation of degraded lands. As people become increasingly aware of dangers evolving from environmental pollution, the awareness and concern may not only escalate the residents’ dissatisfaction with the environment they are living in, but may raise perhaps tension between the public and the local authority.

Although Namibia owns a regulatory system safeguarding the country’s natural environment, the policy to provide an overarching guide on mine closure is yet missing. Individual issues often are sufficiently addressed, but the understanding of an overall, long-term system performance appears to be underrated. Environmental degradation may be underestimated even if the area is claimed to be rehabilitated. Factual impacts may emerge years after the mine was closed and the previously responsible company has moved away, leaving the burden to the local communities

and national governments. Development of comprehensive understanding is critical to the designation of the final closure measures, not to neglect the willingness of any succeeding custodian to accept liability and responsibility at the time of custodial transfer. Planning for closure should aim to ensure that the process occurs in an orderly, cost effective, timely manner, fully understood and accepted by all parties involved. The establishment of a Closure Fund for the mining settlements is an option. This fund would receive regular financial contributions that are released at closure. The objective of the fund would be to constitute a pool of financial means sufficient to top up shortfalls in the local authority's operating budget for at least five years after closure, thus contributing to an orderly transition hopefully.

Sustainability is a changing paradigm. Parametres should be constantly reviewed, monitored, adapted and revisited to accommodate new information, changing science, knowledge and public policy, altering demographics, economic situations, markets as well as organizational and community directions. Prevalent approaches to planning and management of mining settlements need to be understood thoroughly in an historic context and present dimensions to allow a versatile scenario projected into the future as distant as possible.

8 CONCLUSIONS

The empirical investigation into prospects of development of three distinctly different mining settlements in Namibia offers findings for an unexplored subject area of application-oriented mining settlement geography in the country. The research was geared to find problem-solving properties that could assist in planning growth and

development of the mining settlements in Namibia. In conjunction with secondary data, new primary data through field research and thematic mapping was collected unfolding a deeper body of knowledge about Rosh Pinah, Tsumeb and Klein Aub.

The mining industry playing the versatile role of agents of growth and development, research findings confirmed problem formations applicable to all three mining settlements. The synergy of such problem formations is often considered as not being conducive to sustainable local urban or regional progress. The potential loss of local forces required for structural and functional development continues, for example, to be connected to i) financial dependency on the mining industry, ii) absence of long-term planning perspectives and mechanisms addressing development risks cascading from short-term mining cycles, iii) nebulous ideas about urban growth beyond mine closure, iv) uncertainties on how to govern labour in-migration, irrespective effects for the settlement concerned, v) fear of mining industry's retreat, usually leading to local and regional decline accompanied by fiscal insecurities. Mining settlements are rarely driving agents of well-anchored multi-dimensional development, but indeed rather company-tied 'provision camps' webbed into factual formations of success or loss, expansion or retreat inherent in mining sites and neighbourhoods worldwide.

Findings on Rosh Pinah, Klein Aub and Tsumeb present diverse challenges, opportunities and capacities underlying each of the three forecast scenarios evaluating future development with growth or decline:

Rosh Pinah, the remote but thriving mining settlement located in southern Namibia resembles a vibrant, well-functioning insular settlement node. It would be hard to

accept that Rosh Pinah might collapse leaving modern urban structures to decay. Despite its population size sufficient for growth, residents' access to all goods and services and living with no obvious sign of concern, the data analysis discovered looming indications of decline. Rosh Pinah is yet not prepared to endure a possible downward pathway of the mining cycle. Missing horizontal diversification and limited linkages with neighbouring local and national economic activities in the region may desert this central place. Should the mining industry suddenly retreat, estimates envisage an exodus of 83% of the population, leaving probably most disadvantaged inhabitants behind. Neither skills nor capacities to sustain the settlement's infrastructure would be available, thus handing over unused assets to decay with little chance for timely urban revival. Such a bleak future might turn the development node in the south into a stagnating settlement, if not a burden to public alimentation. The community's future depends on planning and actions. Most pressing, however, is the finalization of the town's proclamation, the delay of which might hamper Rosh Pinah from future success.

The analysis of Klein Aub reveals that its proclamation at the end of the mining cycle has sheltered the livelihood of the community. Despite, the community seemingly faces quite a risk that their dependency on the mining industry might translate into the vicious circle of public alimentation in order to secure some unspecified quality of survival. The settlement's sustainability remains threatened without external stimulus. The viability modelling provided a fairly stable demographic setting. Simultaneously, the method disclosed the distraught state of the local economy, signaling potential for an unviable urban dwelling. The trivial local economy fails to cater for approximately

500 people with employment opportunities in the public service and the informal sector. People do not permanently settle in Klein Aub, but prefer renting of accommodation on a temporal basis, while they use vital public services such as educational facilities or, wait for transfer to regional urban centres like Rehoboth or the capital city of Windhoek. Klein Aub's capacity to extend its life-cycle implies substantial support and visionary economic alternatives. With planning and entrepreneurial strategies, making a living in Klein Aub ought to stand a realistic chance of developing into a functioning rural centre with a farming-centred economy in a scenic touristic hinterland.

Tsumeb presents itself as a mature urban centre that underwent several booms and busts. Today, the town offers promising potential for sustainable socio-economic stability with long-term prospects. The assessment of the settlement's reliance on the (almost hardly existent) mining industry revealed that four percent of today's population remain employed in the mining industry. The viability modelling displayed almost ideal conditions without socio-economic signals of warning currently. The result suggests indicating that the town's opportunities could essentially contribute to the making of Tsumeb the first mining settlement in Namibia with a success story in urban redevelopment and urban expansion; urgent redressing of environmental impacts surfacing from earlier mining activities included.

In response to the initial question, why some mining settlements succeed while others fail to prosper, the research methodology confirmed crucial factors generally assembled in entrepreneurial and public actor networks of the mining industry, geared

to achieve their objectives. Some corner stones of success or fail are manifested in i) the understanding of the cyclic nature of the mining industry and how it influences the settlement's growth, ii) effectiveness for the handover process of the mining settlement's ultimate custodianship, iii) planning for the mine closure, and iv) planning within the framework of all aspects of sustainable development: social, economic and environmental.

The study examined unexplored areas of mining settlements in Namibia, ultimately filling previous knowledge gaps about contemporary processes and problem formations of these settlements. Based on concepts like 'central place', 'local economic development', 'settlement life cycle' and 'migration' a complex pool of new data together with the research methodology offers a mode of conceptualizing settlements in mining areas, complemented by data on Rosh Pinah, Klein Aub and Tsumeb mining settlements. The case studies unveiled similarities, but also remarkable differences, acknowledging the uniqueness of mining settlements and thus the need for further investigations to deal with non-generic issues. The results provide a foundation for further sustainability evaluation researches and may offer assistance for decision-making processes underlying municipal management and strategic development considerations. Developments and decisions made today will influence any settlement's future, and the implementation of informed decisions remains crucial. Hence, the history of the mining settlements cannot be changed, but the future can be guided.

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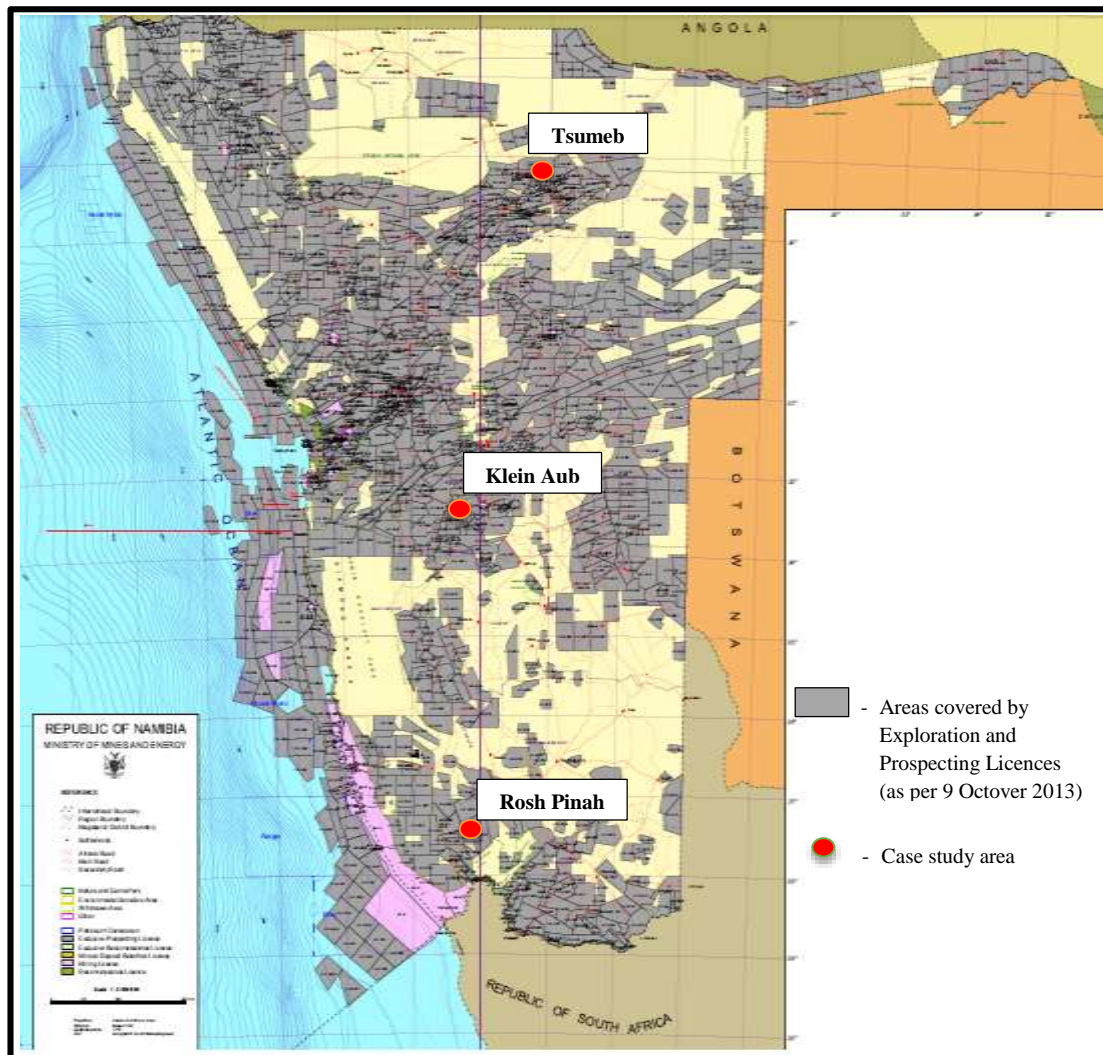
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APPENDICES

APPENDIX 1: Coverage of mining licences in Namibia (Source: Ministry of Mines and Energy, Republic of Namibia).



APPENDIX 2: Inventory of the reviewed literature.

ASPECT	ISSUES COVERED	KEY SOURCES	LITERATURE GAPS
Historic perspectives and influences.	Early settlement and ore smelting in Namibia; Historic context of the mining settlements; Mining experiences and financial achievements; Mineral rushes.	Söhnge, 1967; Smalberg, 1975; Kinahan & Vogel, 1982; Kinahan, 1991; Miller & Van der Merwe, 1994; Gebhard, 1999; Miller & Sandelowsky, 1999; Levinson, 2009; Schneider, 2009; Nujoma, 2009.	No analytical analysis; existings studies are of subjective nature; early literature biased by the political system; no empirical data to confirm.
Characteristics and context of life-cycle development of mining settlements.	Genesis of mining settlements; Local communities and mines; Social dimension of mining settlements; Development; Economy; Development through the mining cycle; Regional linkages and regional development.	Lucas, 1971; Spooner, 1981; Bradbury, 1984; Bradbury, 1985; Wilkinson, 1991; Maude & Hugo, 1992; Johansson <i>et al.</i> , 1992; Neil & Tykkyläinen, 1992; Bone, 1998; Leadbeater, 1998; Neitzer <i>et al.</i> , 1999; Cosgrove, 2001; Eggert, 2001; Musvoto, 2001; Granville, 2001; Hoadly <i>et al.</i> , 2002; Drewes & Aswegen, 2008; DiBoscio, 2010; Croitoru, 2012.	Lack of collectively accepted definition of mining settlement leads to variation of the researches that may not be correlated to each other.
Contemporary processes and trends of mining settlements.	Transformation trends of mining settlements; Fly-in/fly-out mining; Prospects of job creation; In-migrations.	Bowles, 1982; Moodie & Ndatshe, 1994; O'Faircheallaigh, 1995; Iyanda, 1999; Halseth, 1999; MiningWatch Canada, 2001; Halseth <i>et al.</i> , 2002; MMSD, 2002; Natural Resources Canada, 2003; Bury, 2004; Marchand, 2005; Kilian, 2007; O'Hagan	No local studies confirming the problem formations in Namibia.

ASPECT	ISSUES COVERED	KEY SOURCES	LITERATURE GAPS
		& Cecil, 2007; Power, 2008; Western Australian Regional Development Council, 2010; Riley, 2011a; Littlewood, 2014.	
Mine closure and its consequences on settlements.	The community responses to mine closure; Transition of the community; Preparation for closure; Alternative response models; Agenda for change; Facing the future, finding the way forward.	Keyes, 1992; Mudder & Harvey, 1998; Robertson <i>et al.</i> , 1998; Kahn <i>et al.</i> , 2001; Veiga <i>et al.</i> , 2001; Evans <i>et al.</i> 2002; Limpitlaw, 2004; Pack, 2005; Australian Government, 2006; Macdonald <i>et al.</i> , 2006; ICMM, 2008; Laurence, 2009; Sinding, 2009; Digby, 2012; Mulvey, Baker & Scott, 2012.	Literature overwhelmingly focuses on particular single cases which vary across the communities, non-existence of generalized, comprehensive outline.
From global capital flow to local economic development.	Economic growth and development in spatial dimension; Local economic development; Economic effect of mining on the region.	Perroux, 1955, 1988; Harvey, 1982; Smith, 1984; Cook & Hulme, 1988; Storper & Walker, 1989; Ross & Friedman, 1990; Krugman, 1991; Gregory, 1994; Storper, 1997; Jauch, 1999, 2001; Nel, 1999, 2001; Parr, 1999; Murdoch & Sandler, 2002; Rogerson, 2003, 2004a, 2004b; Tomlinson, 2003; Barberia & Biderman, 2005; Conningham & Meyer-Stamer, 2005; Nel & Rogerson, 2005; Rodriguez-Pose & Tijmstra, 2007; Akah, 2008; Geiseb, 2008; Peet & Hartwick, 2009; DiBoscio, 2010;	Lack of examples demonstrating the success of theoretical explanations, absence of such examples for Namibia; limited literature on the local economic development strategies in Namibia; no research into actual implication of new practices.

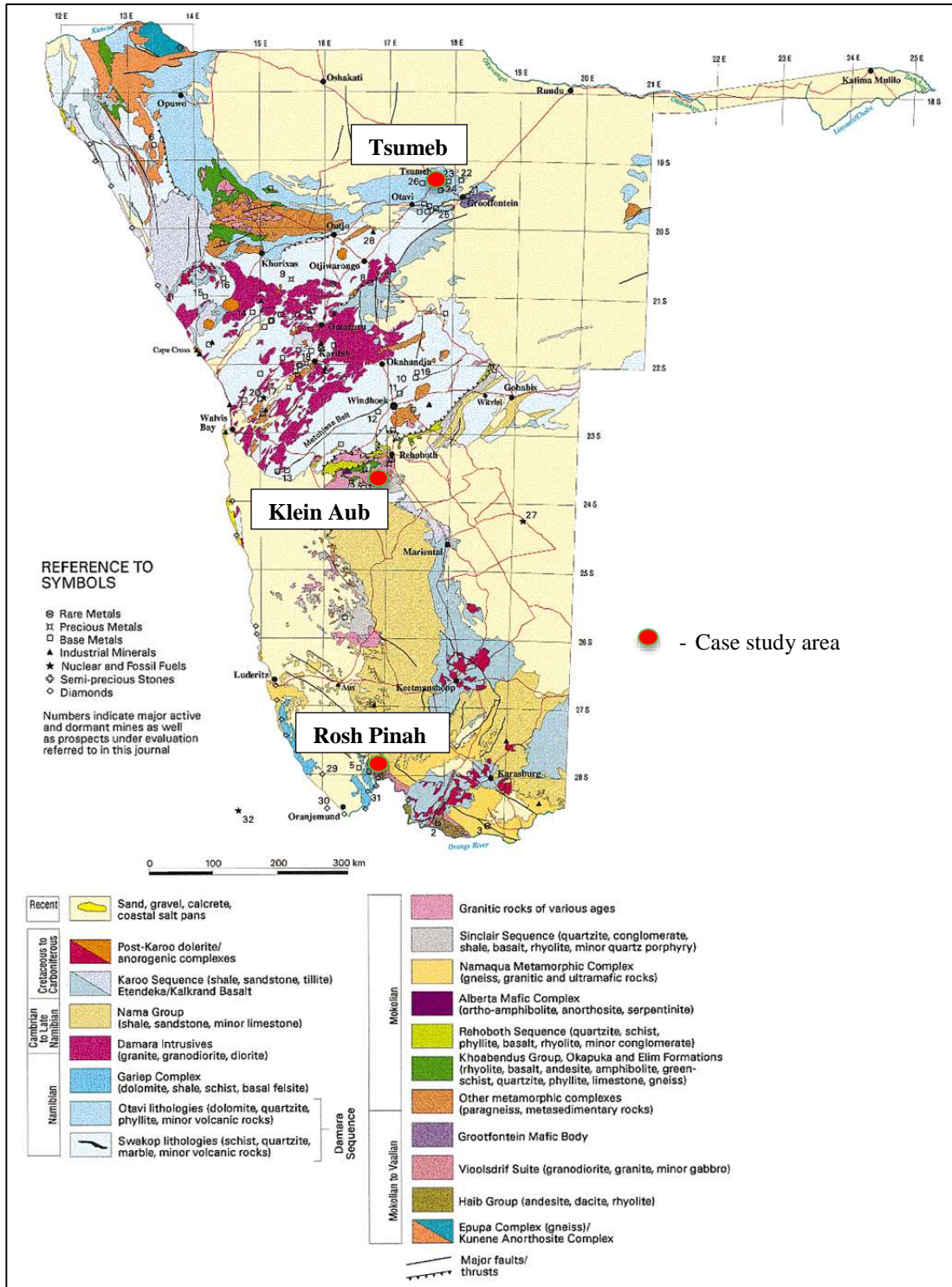
ASPECT	ISSUES COVERED	KEY SOURCES	LITERATURE GAPS
		Mahlawe, 2010; Perry, 2010; Adams-Kane & Lim, 2011; Speakman & Koivisto, 2013.	
Sustainability of mining settlements.	Mining's contribution to the development / good vs bad; Regional perspectives; Planning for sustainable future.	WCED, 1987; Auty, 1993; Von Below, 1993; Allan, 1995; Atkisson, 1996; Yakubi & Akiyama, 1996; Hoadley <i>et al.</i> , 2002; MMSD, 2002; World Bank Global Mining Department, 2002; Anderson, 2003; Natural Resources Canada, 2003; White, 2003; World Rainforest Movement, 2004; Weber, 2005; Kilian, 2008; Mudd & Diesendorf, 2008; Power, 2008; Fitzpatrick <i>et al.</i> , 2011; Laurence, 2011; Michaels, 2011; Davies <i>et al.</i> , 2012; Hernadi & Fraser, 2012.	Absence of cohesive understanding about sustainability and mining; two opposing opinions conflict with each other.
Legal aspects of mining and settlement development.	Regulatory of mining industry, environment, and mine labour related issues, local government and planning aspects, economic sustainability at the local level.	Minerals (Prospecting and Mining) Act 33 of 1992; Environmental Management Act 7 of 2007; Labour Act 11 of 2007; Local Authorities Act 23 of 1992; Decentralisation Enabling Act 33 of 2000; Foreign Investment Act 27 of 1990; Export Processing Zones Act 9 of 1995.	Absence of comprehensive piece of legislation dealing with mine closure; guidelines on specific issues (e.g., mine closure, community development) are habitually self-regulative (led by mining industry).

ASPECT	ISSUES COVERED	KEY SOURCES	LITERATURE GAPS
Methodological and conceptual aspects.	Conceptual framework aspects – Central Place concepts, settlement’s life cycle model migration concepts, mining economics, local economic development; Research methodology.	Christaller, 1933/1968; Cohen, 1968; Lucas, 1971; Schoemaker, 1993; Van der Heijden, 1996; Fahey <i>et al.</i> , 1998; Joyce & MacFarlane, 2001; Ivanova <i>et al.</i> , 2007; Kemp & Kartha, 2007; ICM, 2008; Esteves & Vanclay, 2009; Rana 2010.	Empirical studies look back to the mining settlements of the 20 th century which result in noncompliance with contemporary context and processes; absence of the comprehensive approach for investigating mining settlements.

APPENDIX 3: Selection of titles from the local newspapers on uranium developments during 2009 and 2011.

More Canadians to explore for Uranium (The Namibian, 22.07.2009)
 Chinese bid for uranium shares (New Era, 07.04.2011)
 South Korea here to talk uranium (The Namibian, 18.03.2010)
 Koreans keen on Rössing South (The Namibian, 05.02.2010)
 India after world's uranium deposits (The Namibian, 14.09.2009)
 India joins uranium exploration rush (New Era, 04.09.2009)
 Russia eyes Nam uranium industry (WHK Observer, 22-28.05.2010)
 Australia takes over Namibia's uranium (WHK Observer, 08.05-13.05.2010)
 Uranium 'rush' or 'crush' for Erongo? (The Namibian, 11.05.2010)
 Uranium will drive Namibian boom (New Era, 05.05.2011)
 Uranium: Saving or sinking Namibia? (The Namibian, 07.01.2011)
 Uranium future looks bright (New Era, 15.11.2011)
 Tough first quarter for local uranium miners (The Namibian, 26.04.2011)
 Namibia remains uranium giant (The Namibian 30.04.2010)
 Uranium production: Namibia amplified in 2009 (The Business Post)
 Chamber of Mines poised for uranium boom (New Era, 23.09.2010)
 Uranium giant promises jobs, wealth (The Namibian, 07.04.2011)
 Uranium shines as diamonds lose luster (The Namibian, 26.05.2010)
 Uranium: The future of Namibia mining, but who is benefiting? (Informanté, 17-23.06.2010)
 Nam's uranium sparkles as gems dim (The Namibian, 15.12.2009)
 Nam boosts uranium output in 2009 (The Namibian, 28.01.2010)
 Uranium shows ups and downs (The Namibian, 27.04.2010)
 Booming uranium sector faces risks (WHK Observer, 27-29.05.2010)
 Local contractors left out of uranium boom (WHK Observer, 19.02-25.02.2011)
 Black Namibians left out of uranium boom (WHK Observer, 07.08-13.08.2010)
 Uranium mining versus tourism, biodiversity (The Namibian, 12.08.2010)
 Uranium Mining: A Blessing or Curse? (New Era, 28.10.2008)
 Slump in global uranium prices pinches local producers (Informanté, 10.09.2009)

APPENDIX 4: Geographical location of case study areas within Namibia's geological setting (Source: Ministry of Mines and Energy, Republic of Namibia).



APPENDIX 5: Questionnaire of the community survey.

DATE: _____

The aim of this survey is to acquire information about insights and concerns of the local community and its future. Your answers should reflect only your own experience. Please do not write your name on the questionnaire if you do not want. Your answers will be kept completely confidential.

1. How long do you live in Tsumeb? (*Mark (X) for one that applies*)
 - I was born here (*If you were born here, please proceed to question 4*)
 - Longer than 20 years
 - 10-19 years
 - 3-9 years
 - Less than 3 years

2. Where did you live before coming to Tsumeb? (*Mark (X) for one that applies*)
 - Nearby area (*specify*): _____
 - Other area or town in Namibia (*specify*): _____
 - Other country (*specify*): _____

3. Which of the following reasons were important to you when you came to Tsumeb? (*Mark (X) for one that applies*)
 - I moved because of my employment
 - To search for better job opportunities
 - It is cheaper to live here
 - It is a good place for my children to get education
 - Low crime rate
 - I moved to be close to my family
 - I was a child when my family moved here
 - Other (*specify*) _____

4. Do you see yourself moving out of Tsumeb sometimes in future? (*Mark (X) for one that applies*)
 - In next 12 month
 - In next 2-3 years
 - Within the next 5 years
 - Sometimes in the future, but more than five years from now
 - I will never leave this town

5. If a job was offered elsewhere, would you mind moving your family out from Tsumeb? (*Mark (X) for one that applies*)
- I do not want to move
- I would consider it
- I would definitely move
6. If you see yourself leaving Tsumeb, where would you move to? (*Please specify*):
-
7. What is your age in years? _____
8. What is your gender? Male Female
9. Are you currently: (*Mark (X) for one that applies*)
- Single
- Married or in a permanent relationship
- Separated or divorced
- Widowed
10. What is your highest level of education that you completed? (*Mark (X) for one that applies*)
- Less than Grade 10
- Grade 10
- Grade 12
- Some Vocational or Technical College
- University Degree (Bachelor's, Master's or PhD)
- Other (specify): _____
11. Please read the following statements. (*Mark (X) for all responses that you agree*)
- I was offered a training course here, but I did not attend
- I attended a training course in Tsumeb
- I would be interested to attend a training course if offered (*Please specify what kind of course*)
-
- No, I am not interested in training
12. Have you ever worked in mining? (*Mark (X) for one that applies*)
- No, never worked in mining
- Still working in mining
- Worked before, but no more

13. What is your employment status? (*Mark (X) for one that applies*)
- Unemployed (*If you are unemployed, please proceed to question 16*)
 - Laid-off, looking for work
 - Student/Learner
 - Retired
 - Disable
 - Currently working
If you are working, please specify: _____
14. What best describes your current form of employment? (*Mark (X) for one that applies*)
- Working for somebody full-time
 - Working for somebody part-time
 - Working in more than one job
 - Self-employed
 - Seasonal or casual work
15. What is your approximate total income (before taxes) per month from all sources? (*Mark (X) for one that applies*)
- Less than N\$ 500
 - N\$500 to N\$1,000
 - N\$1,000 to N\$5,000
 - N\$5,000 to N\$15,000
 - More than N\$15,000
16. If you are unemployed, please specify. (*Mark (X) for all responses that you agree*)
In the past 12 months, you.....
- Have been looking for a job
 - Have been laid-off / the contract expired
 - Have been working, but resigned
 - Had some casual work in mining
 - Had some casual work not related to mining
 - Could not work because of taking care of my dependants
 - Could not work for my health reasons
 - Do not need to look for a job, my family supports me
17. Where is your housing located? (*Mark (X) for one that applies*)
- Town centre
 - Residential area
 - Informal settlement
 - Other (specify): _____

18. Which best describes your housing? (*Mark (X) for one that applies*)

- Live in my own house/flat
- Live in the company's house/flat
- Rent my own space
- Stay with my family or friends
- I am just a visitor

19. What type of amenities your house, flat, or temporal home has. (*Mark (X) for all responses that apply*)

- Access to water indoors
- Access to water outside within the premises
- Access to communal water point
- No access to clean water
- A flush toilet indoors
- Toilet outside within the premises
- Access to communal toilet
- No provision for a toilet
- A stove indoors
- Cooking outside
- Connected to municipal electricity
- Have my own electricity
- No access to electricity

20. How many people currently live in your household? (*Please write a number in the space provided*)_____

21. How many children are in your household? (*Mark (X) for one that applies and write a number of children under marked section*)

- Under 5 years of age _____
- 5 to 18 years of age _____
- 18 to 21years of age _____
- No children in the household

22. How many people in your household are 65 years of age or older? (*Please write a number in the space provided*) _____

23. What type of businesses would you like to see more in Tsumeb? (*Mark (X) for all responses that apply*)

- Big shopping centres
- Small shops and boutiques
- Fast food and restaurants
- Libraries, museums and theatres
- Sport grounds, swimming pool
- Church services
- Dry cleaners
- Vehicle repair
- Electrical or plumbing services
- Legal services / Law practitioners
- Banking
- Service stations
- Insurance brokers
- Estate agencies
- Lodges and hotels
- Government institutions
- Other (specify): _____

24. Are there any goods or services you cannot get in your town? (*Please specify all, if any, in the space provided*)

25. What would you like to improve in Tsumeb? (*Mark (X) for all responses that apply*)

- Better access to goods and services
- Improved availability of services for all residents
- Higher quality goods and services
- Larger selection and choices
- Lower prices
- Longer business hours
- Nothing, everything is fine
- Other (specify): _____

26. What are the obstacles for economic development in your town? (*Mark (X) for all responses that apply*)

- Too many people living in Tsumeb
- Too little people living in Tsumeb
- Lack of support for existing businesses to continue and expand
- Lack of support from central and local authorities

- Present laws, regulations and policies are not favourable
- Public is not involved in decision making
- Infrastructure is not good
- Mining activities are dominating
- There is no business diversification
- Other (specify): _____

27. In the past two years, is local economic development doing better?

- Yes No

28. In the past two years, there are more job opportunities in your community?

- Yes No

29. Are there any job opportunities for school leavers?

- Yes No

30. Do HIV/Aids have a huge impact in Tsumeb?

- Yes No

31. Do you have access to the following services in Tsumeb? (*Mark (X) for all responses that apply*)

	<i>YES</i>	<i>NO</i>	<i>I do not know</i>
Doctor / General Practitioner			
Specialist doctors			
Dentist			
Hospitals			
Maternity wards			
Prescription medication			
Ambulance services			
Old age homes			
Child care			
Educational institutions			
Leisure/recreational amenities			
Sports facilities			
Libraries			
Churches			
Police			
Fire department			
Postal services			
Telecommunications			

32. Which above mentioned services need to be improved the most in your town?
(Please write in the space provided) _____

33. Do you think that mining activities in your town negatively affect your health?
 Yes No

34. Have you ever had any unpleasant experience with health services in town?
 Yes No

35. Do you feel safe living in Tsumeb?
 Yes (If yes, please proceed to question 37)
 No (If no, please specify in question 36)

36. What type of crime or safety problems you have experienced in Tsumeb? (Please write in the space provided)

37. Please write any suggestion or concern you may have about how to improve services in Tsumeb.

38. Listed below are some possible environmental or land use problems. How much of a problem do you feel these are in your town? (Mark (X) for all responses that apply)

- Abandoned buildings
- Dumping along roads
- Groundwater (well-water) contamination
- Hazardous waste from mining
- Landfill sites
- River and stream pollution
- Air pollution
- Noise pollution
- Loss of rural land due to mining expansion
- Pollution from farming
- Rapid population growth
- Bad sewage systems
- Other (specify): _____
- There is no pollution in Tsumeb. (If you agree, please continue with question 40)

39. Which of the above issue is the most problematic? *(Please specify only one in space provided)* _____

40. Are you satisfied with the quality of life in your community?

- Yes No

41. Please read the following statements. *(Mark (X) for all responses that apply)*

- Currently Tsumeb depends strongly on mining activities
- When mining will finish, the town will decline
- Tsumeb has a positive future
- There is potential for new businesses and job opportunities
- Job opportunities are only in mining
- Youth are willing to stay in our community after completing their education
- Tsumeb provides adequate services only for mine employees
- Tsumeb provides adequate services for all citizens
- There is problem with prostitution, drug and alcohol abuse in Tsumeb
- Tsumeb is a clean town
- Local government cares for their residents

42. What is the most important thing you feel Tsumeb should attempt to change over the next few years? *(Please specify in space provided)*

Thank you very much for taking the time to share your opinions. If you have any final comments, please use the space below or reverse side of the questionnaire.

APPENDIX 6: Questionnaire of the business community survey.

DATE: _____

The aim of this survey is to obtain information on insights of local economy and future perspectives. Your answers should reflect only your experience. All information obtained will be treated confidentially and neither your name, nor the name of your business will be used.

1. Is your business: (*Mark (X) for one that applies*)
 - Not registered yet
 - A family owned business
 - A sole proprietorship
 - A partnership (CC)
 - A limited partnership (Ltd)
 - Other (specify)_____

2. What is the main activity of your business (*Please specify in space provided*)

3. How many years your business has been operating in Tsumeb? (*Please specify in space provided*)_____

4. Where do you sell your product/services? (*Mark (X) for all that apply*)
 - In town
 - In the region
 - Within the country
 - Outside Namibia

5. How many people do you employ in your company? (Write a number in each section)
 - Full-time _____
 - Part-time _____
 - Temporal _____
 - Other (specify)_____

6. How many males and females you employ? (Write a number in each section)
 - Male _____
 - Female _____

7. Which of the following describes the general economic condition of your business at present? (*Mark (X)* one response that applies)
- Declining
 - Maintaining itself
 - Growing and expanding
 - Other (specify) _____
8. Are you positive about the future of your business in this settlement/town?
- Yes No
9. Is your business affected by (*Mark (X)* for all that apply):
- Seasonal fluctuations
 - Economic cycles
 - Mining cycles
 - None of above
 - Other (specify) _____
10. Do you require any goods or services for your business that are not in the town?
- Yes
If yes, please specify what and from where _____
 - No
11. Where do you think is your most significant competition located? (*Mark (X)* for all responses that you agree):
- In town
 - In the region
 - In another town/settlement in Namibia
 - Other (specify) _____
12. Have you or your company applied for a business loan or other financial assistance to a financial institution (e.g., bank) in the past three years? (*Mark (X)* for one that applies)
- Yes, and it was successfully approved
 - Yes, but it was not approved
 - No, I never applied (*If not, please proceed to question 14*)
 - Other (specify) _____

13. If you or your company have applied for business loans, which of the following was the main purpose for this loan? (*Mark (X) for only one response*)
- Construction
 - Renovations
 - Office furniture and equipment
 - Company vehicles
 - To cover up operation costs
 - Goods
 - Other (specify) _____
14. Over the past year, has the number of your customers: (*Mark (X) for only one response*)
- Decreased
 - Stayed the same
 - Increased
15. Majority of your customers are from: (*Mark (X) for all responses that apply*)
- Informal settlement
 - Within the town
 - Nearby farming areas
 - Outside our community, but within nearby region/town
If it is a town, please specify which _____
 - Outside our community, but within Namibia
 - Other countries
 - I don't know
16. Why do you think your customers choose to use your services or goods? (*Mark (X) all responses that applies*)
- It is cheaper
 - They do not need to travel far to obtain our services/goods
 - We are the only suppliers of these services/goods in our community
 - We have more variety available than others in our neighbourhood
 - They are loyal to us
 - Other (specify) _____
17. Are you planning to close this business within the next three years?
- Yes
 - No (*If not, please proceed to question 19*)

18. If you are planning to close or sell this business within the next three years, what is the reason? (*Mark (X) all responses that apply*)

- Retiring
- It is not profitable
- Rent is too high
- Legal problems
- Low sales
- Crime and vandalism
- It cannot compete with other national or regional companies

19. Please read the following statements and *mark (X)* for all responses that you agree:

- I plan to increase my operations
- I plan to decrease my operations
- I plan to employ more people
- I plan to employ less people
- I plan to diversify/broaden up my activities
- I plan to change my business to other type of activities
- I plan to expand more to other areas
- I plan to relocate my business to other area. (*Please, specify*) _____
- I do not plan any significant change
- I don't know what will happen in near future

20. Do you experience problems in dealing with local municipality or other governmental institutions?

- Yes If yes, please specify _____
- No

21. What are the main constrains in business growth in Tsumeb? (*Mark (X) for all responses that apply*)

- Lack of cash flow
- Inability to obtain a loan
- Lack of space for expansion
- Lack of skilled people
- Lack of incentives from central and local government
- Unfavourable laws, regulations and policies
- There is no market for my goods or services
- Poor infrastructure
- Other (specify) _____

22. Do you think HIV/Aids has a huge impact in Tsumeb?
- Yes No
23. Are there any job opportunities for school leavers in your community?
- Yes No
24. What could be improved in your town to attract more businesses? Please read the following statements. (*Mark (X) for three most important in your view*)
- Cleanliness of town
- Public transport
- Maintenance of roads
- Safety and crime prevention
- Variety of goods/services
- Longer shopping hours
- Special events and festivals
- Quality of municipal services
- Telecommunications network
- Planning and zoning regulations
- Streets / Roads quality
- Other (specify)_____
25. Which of the following, is the most supporting in promoting local economic development in your community? (*Mark (X) for one that applies*)
- Municipality
- Private business
- Other (specify)_____
- Nobody
26. Listed below are some possible environmental or land use problems. How much of a problem do you feel these are in your town? (*Mark (X) for all responses that apply*)
- Abandoned buildings
- Dumping along roads
- Groundwater (well-water) contamination
- Hazardous waste from mining
- Landfill sites
- River and stream pollution
- Air pollution
- Noise pollution
- Loss of rural land due to mining expansion

- Pollution from farming
- Rapid population growth
- Bad sewage systems
- Other (specify): _____
- There is no pollution in Tsumeb (*If you agree, please proceed to question 28*)

27. Which of the above issue is the most problematic? (*Please specify only one in space provided*) _____

28. Please read the following statements and *mark (X)* for all responses that apply:

- Currently Tsumeb depends strongly on mining activities
- When mining will finish, the town will decline
- Tsumeb has a positive future
- There is potential for new businesses and job opportunities
- Job opportunities are only in mining
- Youth are willing to stay in our community after completing their education
- Tsumeb provides adequate services only for mine employees
- Tsumeb provides adequate services for all citizens
- There is problem with prostitution, drug and alcohol abuse in Tsumeb
- Tsumeb is a clean town

29. What are the obstacles for economic development in town? (*Mark (X)* for all responses that apply)

- Too many people living in Tsumeb
- Too little people living in Tsumeb
- Lack of support for existing businesses to continue and expand
- Lack of support from central and local authorities
- Present laws, regulations and policies are not favourable
- Public is not involved in decision making
- Infrastructure is not good
- Mining activities are dominating
- There is no business diversification
- Other (specify)_____

30. What improvements would you like to see in Tsumeb? (*Please specify in space provided*)

31. What is your position with this company? (*Mark (X)* for one that applies)

- Owner
- Owner and manager
- Manager
- Employee
- Other (specify) _____

32. How many years have you been employed in this business? _____

33. What is your age? _____

34. What is your highest level of education? (*Mark (X)* for one that applies)

- Less than Grade 10
- Grade 10
- Grade 12
- Some Vocational or Technical College
- University Degree (Bachelor's, Master's or PhD)
- Other (specify) _____

Thank you very much for taking the time to share your opinions. If you have any final comments, please use the space below.

APPENDIX 7: Questionnaire of the mine workforce survey.

DATE: _____

The aim of this survey is to obtain information about insights and expectations of the mining community and its future plans after mining is finished. Your answers should reflect only your experience. Please do not write your name on the questionnaire. Your answers will be kept completely confidential.

1. How long do you live in Rosh Pinah? (*Mark (X) for one that applies*)
 - I was born here (*If you were born here, please proceed to question 4*)
 - Longer than 20 years
 - 10-19 years
 - 3-9 years
 - Less than 3 years

2. Where did you live before coming to Rosh Pinah? (*Mark (X) for one that applies*)
 - Nearby area (*specify*): _____
 - Other area or town in Namibia (*specify*): _____
 - Other country (*specify*): _____

3. Which of the following reasons were important to you when you came to Rosh Pinah? (*Mark (X) for one that applies*)
 - I moved because of my employment
 - To search for better job opportunities
 - It is cheaper to live here
 - It is a good place for my children to get education
 - Low crime rate
 - I moved to be close to my family
 - I was a child when my family moved here
 - Other (*specify*) _____

4. In your opinion, will mining in Rosh Pinah be forever?
 - Yes No

5. Did your employer inform you about the expected lifespan of the mining operations?
 - Yes No
 - If yes, please specify how* _____

6. Do you intend to leave town after mining is finished?
 - Yes No I do not know

7. If you retire, would you stay in this town?
 Yes No
8. What is your age in years? _____
9. What is your gender? Male Female
10. Are you currently: (*Mark (X) for one that applies*)
 Single
 Married or in a permanent relationship
(*If you are married, does your family stay with you in Rosh Pinah*)
 Yes No
 Separated or divorced
 Widowed
11. What is your highest level of education that you completed? (*Mark (X) for one that applies*)
 Less than Grade 10
 Grade 10
 Grade 12
 Some Vocational or Technical College
 University Degree (Bachelor's, Master's or PhD)
 Other (specify) _____
12. What is your employment status? (*Mark (X) for one that applies*)
 Permanent
 Temporal
 Contractor
 Other (specify) _____
13. How many years you are working at the current mine site?
 Under 1 year
 Between 1 and 5 years
 Over 5 years
14. What are you earnings? (*Mark (X) for one that applies*)
 Less than N\$ 500
 N\$500 to N\$1,000
 N\$1,000 to N\$5,000
 N\$5,000 to N\$15,000
 N\$15,000 to N\$25,000
 More than N\$25,000

15. How much of your earnings do you spend in Rosh Pinah? (*Mark (X) for one that applies*)
- 0-19%
 - 20-19%
 - 50-79%
 - 80-99%
 - 100 %
16. Do you have dependants that you support?
- Yes No (*if no, please proceed to question 18*)
17. How many dependants do you have and where do they live? (*Please write a number in the space provided*)
- In Rosh Pinah _____
- In nearby region _____
- In another town or region in Namibia _____
- Outside of Namibia _____
18. What type of accommodation or arrangements for accommodation is offered to you by your employer? (*Mark (X) for one that applies*)
- Company owned house
 - Mine-owned single quarter or hostel
 - I am receiving housing allowance
 - I do not receive housing benefits from the company
 - Other (specify) _____
19. What are your working conditions? (*Mark (X) for one that applies*)
- I am completely satisfied
 - I am satisfied, but would like to see some improvements
 - I am not satisfied
20. What would you like to see improved in your working conditions? (*Please specify in space provided*) _____
21. In general, how would you describe relations in your workplace between management and employees? (*Mark (X) for one that applies*)
- Very good
 - Good
 - Neither good, nor bad
 - Bad
 - Very Bad

22. What kind of social guarantees are provided to you by your current employer?
(Mark (X) for all responses that apply)

- Medical aid
 Pension
 Life cover
 Retrenchment package
 Other (specify): _____
 I do not know

23. Have you received any training or bursary from your current employer?

- Yes No

If yes, please specify what kind of training or bursary _____

24. Do you think that mining activities in Rosh Pinah negatively affect your health?

- Yes No

25. Have you ever had any unpleasant experience with health services in Rosh Pinah?

- Yes No

26. Do you think HIV/Aids has a huge impact on mining community in Rosh Pinah?

- Yes No

27. Are you satisfied with the quality of life in your community?

- Yes No

28. Do you feel safe living in Rosh Pinah?

- Yes (If yes, please proceed to question 30)
 No (If no, please specify in question 29)

29. What type of crime or safety problems you have experienced in Rosh Pinah?

(Please write in space provided) _____

30. Are there any goods or services you cannot get in Rosh Pinah? (Please specify all, if any, in space provided)

31. In your opinion, what is the most important problem that Rosh Pinah should attempt to improve over the next few years? (Please specify in space provided)

Thank you very much for taking the time to share your opinions. If you have any final comments, please use the space below.

APPENDIX 8: Questionnaire of the former mine workforce survey (Klein Aub).

DATE: _____

The aim of this survey is to acquire information about insights and concerns of the local community and its future. Your answers should reflect only your own experience. Please do not write your name on the questionnaire if you do not want. Your answers will be kept completely confidential.

8. How long do you live in Klein Aub? (*Mark (X) for one that applies*)
- I was born here (*If you were born here, please proceed to question 4*)
 - Longer than 20 years
 - 10-19 years
 - 3-9 years
 - Less than 3 years
9. Where did you live before coming to Klein Aub? (*Mark (X) for one that applies*)
- Nearby area (*specify*): _____
 - Other area or town in Namibia (*specify*): _____
 - Other country (*specify*): _____
10. Which of the following reasons were important to you when you came to Klein Aub? (*Mark (X) for one that applies*)
- I moved because of my employment
 - To search for better job opportunities
 - It is cheaper to live here
 - It is a good place for my children to get education
 - Low crime rate
 - I moved to be close to my family
 - I was a child when my family moved here
 - Other (*specify*) _____
11. Do you see yourself moving out of Klein Aub sometimes in future? (*Mark (X) for one that applies*)
- In next 12 month
 - In next 2-3 years
 - Within the next 5 years
 - Sometimes in the future, but more than five years from now
 - I will never leave this town
12. How many years did you work in mining? _____

13. What was your employment status/occupation then? _____

14. Was the life better then than it is now?

- Yes No

15. When you were working in mining, did you know that mining is not forever?

- Yes No

16. Did your employer inform you well in advance about the expected closure of the mining?

- Yes No

17. What type of accommodation or arrangements for accommodation you were offered by your mine employer? (*Mark (X) for one that applies*)

- Company owned house
 Mine-owned single quarter or hostel
 I was receiving a housing allowance
 I did not receive housing benefits from the company at all
 Other (specify) _____

18. What were your working conditions? (*Mark (X) for one that applies*)

- I was completely satisfied
 I was satisfied, but wanted to see some improvements
 I was not satisfied

19. In general, how would you describe relations those days in your workplace between management and employees? (*Mark (X) for one that applies*)

- Very good
 Good
 Neither good, nor bad
 Bad
 Very Bad

20. What kind of social guarantees you were provided then by your mining employer? (*Mark (X) for all responses that apply*)

- Medical aid
 Pension
 Life cover
 Retrenchment package
 Other (specify): _____
 None

21. Did you receive any training or bursary from your previous mining employer?
 Yes No
If yes, please specify what kind of training or bursary _____
22. What kind of benefits did you receive when they closed operations and you lost your job? _____
23. What was a reason, why you did not leave Klein Aub after mining was finished?

24. Did the mining company contributed towards the local communities?
 Yes No
If yes, please specify how _____
25. What did change in Klein Aub since the mining has ceased? _____
26. Do you think that mining activities in Klein Aub negatively affected your health?
 Yes No
27. What is your age in years? _____
28. What is your gender? Male Female
29. Are you currently: (*Mark (X) for one that applies*)
 Single
 Married or in a permanent relationship
 Separated or divorced
 Widowed
30. What is your highest level of education that you completed? (*Mark (X) for one that applies*)
 Less than Grade 10
 Grade 10
 Grade 12
 Some Vocational or Technical College
 University Degree (Bachelors, Masters or PhD)
 Other (specify)_____
31. What is your current employment status? (*Mark (X) for one that applies*)
 Unemployed (*If you are unemployed, please proceed to question26*)
 Laid-off, looking for work
 Student/Learner
 Retired
 Disable

- Currently working
If you are working, please specify: _____

32. What best describes your current form of employment? (*Mark (X) for one that applies*)

- Working for somebody full-time
 Working for somebody part-time
 Working in more than one job
 Self-employed
 Seasonal or casual work

33. What is your approximate total income (before taxes) per month from all sources? (*Mark (X) for one that applies*)

- Less than N\$ 500
 N\$500 to N\$1,000
 N\$1,000 to N\$5,000
 N\$5,000 to N\$15,000
 More than N\$15,000

34. Which best describes your current housing? (*Mark (X) for one that applies*)

- Live in my own house/flat
 Live in the company's house/flat
 Rent my own space
 Stay with my family or friends
 I am just a visitor

35. What type of amenities your house, flat, or temporal home has. (*Mark (X) for all responses that apply*)

- Access to water indoors
 Access to water outside within the premises
 Access to communal water point
 No access to clean water
 A flush toilet indoors
 Toilet outside within the premises
 Access to communal toilet
 No provision for a toilet
 A stove indoors
 Cooking outside
 Connected to municipal electricity
 Have my own electricity
 No access to electricity

36. How many people currently live in your household? (*Please write a number in the space provided*) _____
37. How many children are in your household? (*Mark (X) for one that applies and write a number of children under marked section*)
 Under 5 years of age _____
 5 to 18 years of age _____
 18 to 21 years of age _____
 No children in the household
38. How many people in your household are 65 years of age or older? (*Please write a number in the space provided*) _____
39. Are you satisfied with the quality of life in your community?
 Yes No
40. Do you feel safe living in Klein Aub?
 Yes (*If yes, please proceed to question 34*)
 No (*If no, please specify in question 33*)
41. What type of crime or safety problems you have experienced in Klein Aub?
 (*Please write in the space provided*) _____
42. Do you think HIV/Aids has a huge impact on community in Klein Aub?
 Yes No
43. In the past two years, are there more job opportunities in your community?
 Yes No
44. Are there any job opportunities for school leavers?
 Yes No
45. In the past two years, is local economic development doing better?
 Yes No
46. Are there any goods or services you cannot get in Klein Aub? (*Please specify all, if any, in space provided*)

47. Listed below are some possible environmental or land use problems. How much of a problem do you feel these are in your settlement? (*Mark (X) for all responses that apply*)
- Abandoned buildings
 - Dumping along roads
 - Groundwater (well-water) contamination
 - Hazardous waste from mining

- Landfill sites
- River and stream pollution
- Air pollution
- Noise pollution
- Loss of rural land due to mining expansion
- Pollution from farming
- Rapid population growth
- Bad sewage systems
- Other (specify): _____

There is no pollution in Klein Aub. *(If you agree, please continue with question 39.)*

48. Which of the above issue is the most problematic? *(Please specify only one in space provided)* _____

49. Do you believe that mining in Klein Aub will restart one day?
 Yes No

50. Please read the following statements. *(Mark (X) for all responses that apply)*

- Klein Aub has a positive future also without mining
- There is future for Klein Aub only if the mining revives
- There is potential for new businesses and job opportunities
- Klein Aub provides adequate services for the residents
- Klein Aub is a clean town
- Local government cares for their residents
- There is problem with prostitution, drug and alcohol abuse in Klein Aub

51. In your opinion, what is the most important problem that Klein Aub should attempt to improve over the next few years? *(Please specify in space provided)*

Thank you very much for taking the time to share your opinions. If you have any final comments, please use the space below or reverse side of the questionnaire.

APPENDIX 9: Adjustments to the community survey questionnaire after the pilot survey.

Nr. of question	Pilot survey questionnaire	Adjustments after pilot survey
Q11	Please read the following statements. <i>(Mark (X) for <u>all</u> responses that you agree)</i> <input type="checkbox"/> I was offered a training course here, but I did not attend <input type="checkbox"/> I attended a training course in this town <input type="checkbox"/> I would be interested to attend a training course if offered. <i>(Please specify what kind of course) _____</i>	Please read the following statements. <i>(Mark (X) for <u>all</u> responses that you agree)</i> <input type="checkbox"/> I was offered a training course here, but I did not attend <input type="checkbox"/> I attended a training course in this town <input type="checkbox"/> I would be interested to attend a training course if offered. <i>(Please specify what kind of course) _____</i> <input type="checkbox"/> No, I am not interested in training
Q 19	What type of amenities your house, flat, or temporal home has. <i>(Mark (X) for <u>all</u> responses that apply)</i> <input type="checkbox"/> Access to water indoors <input type="checkbox"/> A flush toilet indoors <input type="checkbox"/> A stove indoors <input type="checkbox"/> Connected to municipal electricity <input type="checkbox"/> Have my own solar electricity <input type="checkbox"/> No access to electricity <input type="checkbox"/> Access to communal water point <input type="checkbox"/> Access to communal toilet <input type="checkbox"/> Cooking outside <input type="checkbox"/> No access to clean water <input type="checkbox"/> No provision for a toilet	What type of amenities your house, flat, or temporal home has. <i>(Mark (X) for <u>all</u> responses that apply)</i> <input type="checkbox"/> Access to water indoors <input type="checkbox"/> Access to water outside within the premises <input type="checkbox"/> Access to communal water point <input type="checkbox"/> No access to clean water <input type="checkbox"/> A flush toilet indoors <input type="checkbox"/> Toilet outside within the premises <input type="checkbox"/> Access to communal toilet <input type="checkbox"/> No provision for a toilet <input type="checkbox"/> A stove indoors <input type="checkbox"/> Cooking outside <input type="checkbox"/> Connected to municipal electricity <input type="checkbox"/> Have my own solar electricity <input type="checkbox"/> No access to electricity
Q 25	What would you like to improve in Rosh Pinah/Tsumeb/Klein Aub? <i>(Mark (X) for <u>all</u> responses that apply)</i> <input type="checkbox"/> Better access to goods and services <input type="checkbox"/> Improved availability of services for all residents <input type="checkbox"/> Higher quality goods and services <input type="checkbox"/> Larger selection and choices <input type="checkbox"/> Lower prices <input type="checkbox"/> Longer business hours <input type="checkbox"/> Other (specify):	What would you like to improve in Rosh Pinah/Tsumeb/Klein Aub? <i>(Mark (X) for <u>all</u> responses that apply)</i> <input type="checkbox"/> Better access to goods and services <input type="checkbox"/> Improved availability of services for all residents <input type="checkbox"/> Higher quality goods and services <input type="checkbox"/> Larger selection and choices <input type="checkbox"/> Lower prices <input type="checkbox"/> Longer business hours <input type="checkbox"/> Nothing, everything is fine <input type="checkbox"/> Other (specify):
	Q 26. Please read the following statements and <i>mark (X) for <u>all</u> responses that you agree.</i> <input type="checkbox"/> There are sufficient opportunities for earning an income in Rosh Pinah/Tsumeb/Klein Aub.	Question was removed and some of the responses were incorporated in Question 41. This was done to eliminate repetition of questions and responses.

Nr. of question	Pilot survey questionnaire	Adjustments after pilot survey																																																																																																																								
	<ul style="list-style-type: none"> <input type="checkbox"/> Our community has a positive attitude toward attracting new business and industries. <input type="checkbox"/> We do not have future without mining activities in the area. <input type="checkbox"/> Our leaders do not plan for future development. <input type="checkbox"/> All business activities depend only on mining. <input type="checkbox"/> I hope that mining continues, it is the only way for town to survive. <input type="checkbox"/> Country leaders are willing to provide economic support to create more jobs in Rosh Pinah/Tsumeb/Klein Aub. <input type="checkbox"/> Municipality and other private businesses should do more to create new jobs. <input type="checkbox"/> Local financial institutions provide sufficient funding for business loans. <input type="checkbox"/> Rosh Pinah/Tsumeb/Klein Aub has very good location for starting business. <input type="checkbox"/> There are not enough job opportunities in our town for everyone. 	<p>The numbering of the questions in questionnaire was readjusted accordingly.</p>																																																																																																																								
Q 31	<p>Do you have access to the following services in Rosh Pinah/Tsumeb/Klein Aub? (<i>Mark (X) for one that applies</i>)</p> <table border="1"> <thead> <tr> <th></th> <th>Yes</th> <th>No</th> <th>I do not know</th> </tr> </thead> <tbody> <tr><td>General Practitioner</td><td></td><td></td><td></td></tr> <tr><td>Specialist doctors</td><td></td><td></td><td></td></tr> <tr><td>Dentist</td><td></td><td></td><td></td></tr> <tr><td>Hospitals</td><td></td><td></td><td></td></tr> <tr><td>Maternity wards</td><td></td><td></td><td></td></tr> <tr><td>Prescription medication</td><td></td><td></td><td></td></tr> <tr><td>Ambulance services</td><td></td><td></td><td></td></tr> <tr><td>Old age home</td><td></td><td></td><td></td></tr> <tr><td>Child care</td><td></td><td></td><td></td></tr> <tr><td>Educational institutions</td><td></td><td></td><td></td></tr> <tr><td>Recreational amenities</td><td></td><td></td><td></td></tr> <tr><td>Sports facilities</td><td></td><td></td><td></td></tr> <tr><td>Libraries</td><td></td><td></td><td></td></tr> <tr><td>Churches</td><td></td><td></td><td></td></tr> </tbody> </table>		Yes	No	I do not know	General Practitioner				Specialist doctors				Dentist				Hospitals				Maternity wards				Prescription medication				Ambulance services				Old age home				Child care				Educational institutions				Recreational amenities				Sports facilities				Libraries				Churches				<p>Do you have access to the following services in Rosh Pinah/Tsumeb/Klein Aub? (<i>Mark (X) for one that applies</i>)</p> <table border="1"> <thead> <tr> <th></th> <th>Yes</th> <th>No</th> <th>I do not know</th> </tr> </thead> <tbody> <tr><td>Doctor / General Practitioner</td><td></td><td></td><td></td></tr> <tr><td>Specialist doctors</td><td></td><td></td><td></td></tr> <tr><td>Dentist</td><td></td><td></td><td></td></tr> <tr><td>Hospitals</td><td></td><td></td><td></td></tr> <tr><td>Maternity wards</td><td></td><td></td><td></td></tr> <tr><td>Prescription medication</td><td></td><td></td><td></td></tr> <tr><td>Ambulance services</td><td></td><td></td><td></td></tr> <tr><td>Old age home</td><td></td><td></td><td></td></tr> <tr><td>Child care</td><td></td><td></td><td></td></tr> <tr><td>Educational institutions</td><td></td><td></td><td></td></tr> <tr><td>Recreational amenities</td><td></td><td></td><td></td></tr> <tr><td>Sports facilities</td><td></td><td></td><td></td></tr> <tr><td>Libraries</td><td></td><td></td><td></td></tr> <tr><td>Churches</td><td></td><td></td><td></td></tr> </tbody> </table>		Yes	No	I do not know	Doctor / General Practitioner				Specialist doctors				Dentist				Hospitals				Maternity wards				Prescription medication				Ambulance services				Old age home				Child care				Educational institutions				Recreational amenities				Sports facilities				Libraries				Churches			
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Q 33	<p>Do you think that mining operations affect your health?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>Do you think that mining activities in your town negatively affect your health?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>																																
Q 35	<p>Do you feel safe living in Rosh Pinah / Tsumeb / Klein Aub?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>Do you feel safe living in Rosh Pinah / Tsumeb / Klein Aub?</p> <p><input type="checkbox"/> Yes (If yes, please proceed to question 37)</p> <p><input type="checkbox"/> No (If no, please specify in question 36)</p>																																
Q 38	<p>Listed below are some possible environmental or land use problems. How much of a problem do you feel these are in your town? (<i>Mark (X) for all responses that apply</i>)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Abandoned buildings <input type="checkbox"/> Dumping along roads <input type="checkbox"/> Groundwater (well-water) contamination <input type="checkbox"/> Hazardous waste from mining <input type="checkbox"/> Landfill sites <input type="checkbox"/> River and stream pollution <input type="checkbox"/> Air pollution <input type="checkbox"/> Noise pollution <input type="checkbox"/> Loss of rural land due to mining expansion <input type="checkbox"/> Pollution from farming <input type="checkbox"/> Rapid population growth <input type="checkbox"/> Bad sewage systems <input type="checkbox"/> Other (specify): _____ 	<p>Listed below are some possible environmental or land use problems. How much of a problem do you feel these are in your town? (<i>Mark (X) for all responses that apply</i>)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Abandoned buildings <input type="checkbox"/> Dumping along roads <input type="checkbox"/> Groundwater (well-water) contamination <input type="checkbox"/> Hazardous waste from mining <input type="checkbox"/> Landfill sites <input type="checkbox"/> River and stream pollution <input type="checkbox"/> Air pollution <input type="checkbox"/> Noise pollution <input type="checkbox"/> Loss of rural land due to mining expansion <input type="checkbox"/> Pollution from farming <input type="checkbox"/> Rapid population growth <input type="checkbox"/> Bad sewage systems <input type="checkbox"/> Other (specify): _____ <p><input type="checkbox"/> There is no pollution in Rosh Pinah / Tsumeb / Klein Aub</p>																																
Q 41	<p>Please read the following statements. (<i>Mark (X) for all responses that apply</i>)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Rosh Pinah/Tsumeb/Klein Aub is a good place to live. <input type="checkbox"/> Rosh Pinah/Tsumeb/Klein Aub has a positive future. <input type="checkbox"/> Future for Rosh Pinah/Tsumeb/Klein Aub depends on mining activities. <input type="checkbox"/> There is future for Rosh Pinah /Tsumeb / Klein Aub after mining is finished. 	<p>Please read the following statements. (<i>Mark (X) for all responses that apply</i>)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Currently Rosh Pinah/Tsumeb/Klein Aub depends strongly on mining activities <input type="checkbox"/> When mining will finish, the town will decline <input type="checkbox"/> Rosh Pinah/Tsumeb/Klein Aub has a positive future <input type="checkbox"/> There is potential for new businesses and job opportunities 																																

Nr. of question	Pilot survey questionnaire	Adjustments after pilot survey
	<ul style="list-style-type: none"> <input type="checkbox"/> More should be done to create jobs in Rosh Pinah/Tsumeb/Klein Aub. <input type="checkbox"/> There is potential for new businesses and job opportunities. <input type="checkbox"/> Job opportunities are only in mining. <input type="checkbox"/> Rosh Pinah / Tsumeb / Klein Aub should restrict population growth. <input type="checkbox"/> If there were more people in town, the community would benefit. <input type="checkbox"/> Rosh Pinah / Tsumeb / Klein Aub is a good place to raise children. <input type="checkbox"/> Quality of education in Rosh Pinah / Tsumeb / Klein Aub is good. <input type="checkbox"/> Youth are willing to stay in our community after completing their education. <input type="checkbox"/> Rosh Pinah / Tsumeb / Klein Aub provides adequate services for all citizens. <input type="checkbox"/> Rosh Pinah / Tsumeb / Klein Aub provides adequate services only for mine employees. <input type="checkbox"/> There is no prostitution, drug and alcohol abuse in Rosh Pinah /Tsumeb/Klein Aub. <input type="checkbox"/> Environment in Rosh Pinah / Tsumeb / Klein Aub is clean. <input type="checkbox"/> Local government in Rosh Pinah / Tsumeb / Klein Aub cares for their residents. 	<ul style="list-style-type: none"> <input type="checkbox"/> Job opportunities are only in mining <input type="checkbox"/> Youth are willing to stay in our community after completing their education <input type="checkbox"/> Rosh Pinah / Tsumeb / Klein Aub provides adequate services only for mine employees <input type="checkbox"/> Rosh Pinah / Tsumeb / Klein Aub provides adequate services for all citizens <input type="checkbox"/> There is problem with prostitution, drug and alcohol abuse in Rosh Pinah / Tsumeb / Klein Aub <input type="checkbox"/> Rosh Pinah / Tsumeb / Klein Aub is a clean town <input type="checkbox"/> Local government cares for their residents

APPENDIX 10: Individuals interviewed during the investigations.

Town / Settlement	Interviewed person's code	Positionz	Organization/ Institution	Date of interview
Rosh Pinah	RP001	Town Coordinator	RoshSkor	27/04/2010
	RP002	Principal	Stepping Stones Pre-Primary School	27/04/2010
	RP003	Manager	Rosh Care Clinic	27/04/2010
	RP004	Manager	StandardBank	27/04/2010
	RP005	Librarian	Library, Ministry of Education	27/04/2010
	RP006	Manager	Four Seasons Lodge	27/04/2010
	RP007	Manager	SMEs Compete	24/03/2010
	RP008	Administrator	SMEs Compete	27/04/2010
	RP009	General Manager	Skorpion Zinc	27/04/2010
	RP010	Warrant Officer	Police	28/04/2010
	RP011	Acting Manager	Rosh Pinah Zinc Corporation	28/04/2010
	RP012	Real Estate Agent	Seff Properties	28/04/2010 on phone
	RP013	Manager	NamPower	28/04/2010
	RP014		NCCI	29/04/2010
	RP015		MET	29/04/2010
	RP016	CEO	Obib Training Centre	30/04/2010
Klein Aub	KA001	Chief Controlling Officer (acting)	Settlement Office, MRLGHRD	03/06/2010
	KA002	Principal	Klein Aub Primary School	03/06/2010
	KA003	Owner	Conny's Place Restaurant and Accommodation	03/06/2010
	KA004	Warrant Officer	Police	03/06/2010
	KA005 KA006	HIV/Aids Community Councillors	Clinic	04/06/2010
	KA007	Principal (acting)	Klein Aub Special School	04/06/2010
Tsumeb	T001	Regional Coordinator	MWU	11/05/2010
	T002	Chief Doctor	MHSS	11/05/2010

Town / Settlement	Interviewed person's code	Positionz	Organization/ Institution	Date of interview
	T003	Manager	Information Centre/ Travel North B&B	11/05/2010
	T004	Economic Development Officer	Tsumeb Municipality	12/05/2010
	T005	Regional Organizer	MUN	12/05/2010
	T006	Extension Officer	MAWF	12/05/2010
	T007	Acting Regional Crime Coordinator/ Staff Officer	Police	13/05/2010
	T008	Coordinator	SME Support Centre	14/05/2010
	T009		NCCI	14/05/2010
	T010		Museum	14/05/2010
	T011	Population Officer	Ministry of Home Affairs	14/05/2010
	T012	Hon. Councillor	Regional Council	14/05/2010
	T013	Managing Director	Namibia Custom Smelters (NCS) Ltd	27/05/2010
	T014	Acting Country Manager	Weatherly	24/06/2010
Others	W001	General Manager	The Chamber of Mines of Namibia	15/04/2010

APPENDIX 11: Types of formal businesses in the case study settlements (2010).

COMMERCIAL ESTABLISHMENT	Rosh Pinah	Klein Aub	Tsumeb
POPULATION SIZE	~ 15 000	~ 500	19 500
Food related outlets			
Supermarket	X		X
Groceries and convenience shops	X	X	X
Fruit and vegetable outlets			X
Butchery	X		X
Bakery	X		X
Liquor store	X	X	X
Sweets shop			
Clothing retail			
Babies and children clothing			
Ladies clothing	X		X
Men's clothing			X
Ladies and men's clothing	X		X
Shoes			X
Dressmakers and tailors			X
Shoe repair	X		X
Fabrics and materials	X		
Household Goods			
Furniture	X		X
Bathroom ware			
Bedding and clothing	X		X
Electric appliances and electronics			X
Carpets			
Kitchen ware			X
Specialized shops and outlets			
Book shops			X
Stationary			X
Music shop			
Gifts and Crafts	X		X
Toy shop			
Jewellery	X		X
Sport and outdoors goods	X		X
Pet shop			
Florist			X
Pharmacy	X		X
Antiques			
Second hand shops			X

Computer shops			X
Nursery			X
Newspapers	X		X
Cell phones	X		X
Construction materials and equipment			
Materials			X
Hardware and paint			X
Motor trade			
Sales of vehicles			
Sales of used vehicles			
Tyres	X		X
Spare parts			X
Panel beaters and spray-painters	X		X
Auto electricians	X		X
Motor vehicle workshops			X
Service station	X		X
Car wash	X		X
Food establishments			
Restaurants, take away, café	X		X
Internet Café			X
Accommodation facilities			
Hotel			X
Lodges	X		X
B&B and Guest House	X	X	X
Camping	X		X
Financial services			
Banks	X		X
ATM	X		X
Insurance brokers	X		X
Micro lenders	X		X
Transport services			
Couriers/ Delivery	X		X
Buss services			
Taxi			X
Car rentals	X		X
Driving school			X
Air transport/ charters	X		X
Professional service			

Legal services	X		X
Accountants and Auditors	X		X
Engineer			X
Architect			
Land survey and town planning			X
Environmental consultants	X		
Estate agent	X		X
Actioners			X
General Practitioners	X		X
Specialist doctors	X		X
Dentists			X
Veterinarian			X
Optometrist	X		X
Building contractors	X		X
Specialized Services			
Dry cleaners			X
Laundry	X		X
Hairdresser and Beauty Salon	X		X
Barbershops	X		X
Travel agents			X
Kindergarten and crèche	X		X
Computer training			X
Printing, scanning and copy making			X
Electrical work	X		X
Plumbing	X		X
Carpenter	X		X
Funeral services		X	X
Event's organizers			
Video' shops			
Photographers	X		X
Security	X		X
Recreational clubs	X		X
Gambling houses	X		X
News services (local paper or radio)	X		X
Gardening services & Landscaping	X		X

APPENDIX 12: Account of selected small businesses in Rosh Pinah (2010).

With the presence of the local firm - SME Compete and the Obib training centre, an independent institution, registered as an incorporated non-profit association in Rosh Pinah, there is a considerable positive growth among the small scale enterprises, encouraged by a tangible assistance with skills training and marketing assistance by the SME Compete and the Obib training centre. Several local small registered and unregistered enterprises have received training that empowered local people to improve their chances to be employed or start a private enterprise, or to be awarded tenders from larger companies. At the time of research (2010), the SME Compete assisted 95 small companies in Rosh Pinah where 70% of them were located in the informal settlement. Among the businesses that have been boosted are small building and construction companies, caterers, upholsters and woodworkers, hairdressers, a recycling company, electrical repairs, tailors, laundry services and shoemakers. This enhances the possibilities for local residents to transform from job seekers to owners of their own small scale businesses thus uplifting the quality of life for local people and diversifying the local economy. The most prominent success stories that make the local people to be proud of their achievements are:

- **Rosh Pinah Leatherworks.** The cobbler supported by the SME Compete was originally from Okalongo in the northern part of Namibia. He moved to Walvis Bay, but after realizing there were too many cobblers, he moved to Rosh Pinah in 2007 with a vision to open a small leatherworks enterprise as there was none in the settlement at the time. Today his outlet repairs the shoes or other leather goods for the whole Rosh Pinah settlement. Previously, the residents of Rosh Pinah took

their leather goods to be repaired in Keetmanshoop or across the border to Springbok in South Africa. Today Rosh Pinah Leatherworks specializing in the repair and making of leather shoes, sandals, bags, belts and other leather goods has a solid client base in the Rosh Pinah mining settlement and nearby farming areas.



- **Hair Salon** in Tutangeni informal settlement sells a selection of different hair products, such as cosmetics, hair extensions, Oshinge braids, Oshinge pony-tails, and offers services such as the weaving and braiding of all types of hair.



- **Kazomba Timber and Products** with aspiring entrepreneur who arrived to Rosh Pinah from the north of Namibia in search for a job opportunity. His small company was identified by the Skorpion Zinc mine and in pursuit of the promotion of local economies offered him a contract to supply the mine with wooden geological surveying pegs. The mine supplies the entrepreneur with old wooden packaging crates and pallets and he in turn recycles the material to produce the pegs. In such way there is a recycling dimension to their contract. Additionally his small scale company manufactures a range of low cost furniture such as chairs, cabinets, roods, shelves, window frames, and sells them in Rosh Pinah's Tutangeni informal settlement. Starting from scratch Kazomba now trades as Kazomba Timber and Products and earns a monthly income ranging between N\$4000 and N\$6000. He plans to expand his business and create jobs for others. The only obstacle is that he cannot get a loan from the bank to buy woodworking equipment as he does not have collateral.



- **Moses Garden & Lawnmower Centre** owner came to Rosh Pinah in 2002 from the Kavango Region to look for a job opportunity. Not finding any formal job, but desperate to earn a living, he was going from house to house offering gardening and cleaning services in Rosh Pinah. With time he established his own customer base and started to employ others to help. Assisted by SME Compete, the entrepreneur attended business skills development courses and today his business is formally registered. He crossed over from being a small informal entrepreneur to an owner of a formally registered company.
- **Tutangeni Bakery** located in the middle of the Tutangeni informal settlement offers freshly baked bread to the residents of Tutangeni informal settlement and on many occasions visitors from the formal part of Rosh Pinah when visiting Tutangeni go home with freshly baked bread from Tutangeni Bakery, thus expanding its market and adding to its client base. Additionally the bakery has diversified by offering small meals next to its premises.



- **Ondje Trading Enterprise** started with a small cleaning contract that was secured with the Skorpion Zinc mine. After acquiring some experience he identified other potential business activities in Rosh Pinah and besides his cleaning contract with the Skorpion Zinc mine he negotiated a business deal with a local service station and opened a car wash facility on the premises of the only local service station. The car wash business started to grow and soon Ondje Trading Enterprise diversified away from its dependency on a Skorpion Zinc mine cleaning contract. The company purchased equipment and expanded the scope of cleaning services. The business did not stop to boom and another new successful business was opened, this time a company providing upholstery and carpet cleaning services to Rosh Pinah residents. In 2010, the diversification occurred further by the opening of the first Laundromat facility in Rosh Pinah. Today, the Ondje entrepreneur is a well-known businessman of Rosh Pinah, owner of Ondje Trading Enterprise. The settlement is proud of having a local medium size enterprise with the potential to develop further and enter a large enterprise category.



These are only some examples of success stories of some small and medium size businesses that have crossed from being informal businesses to become registered companies.

APPENDIX 13: Characteristics of Scenario 1.

ROSH PINAH	KLEIN AUB	TSUMEB
SOCIO-DEMOGRAPHICS		
Out-migration (83%)	Population growth stagnant	Stagnant population growth
Increased share of marginalized population	Influx from nearby farms	Share of poor and jobless people on rise
Low education and skills absent	Decreased sense of belonging	Education level reduced
High unemployment	Increased share of transient population	Increased income inequality
Lowered buying power	Age misbalance towards young without education and skills	Amplified willingness to move out to other urban centres
Poverty escalation	Community feels neglected	Transient population on rise
Antisocial behaviour prevail	Pessimistic outlook on the future	
Security and safety concerns on rise	Antisocial behaviour on rise	
ECONOMY		
Local economy collapsed and did not recover from the shock of closure	Private sector exceptionally weak	Development slowed down
Previously emerging business community remained without mining support	Businesses without specialization	Growth without stimulus
Businesses struggle for survival	Lack of formal enterprises	Exhausted most of capacities for future growth and expansion
Businesses reduced in size	Deficiency of clientele	Market size shrunk
Branch shops moved out	Profits are low and do not cover operations	High order retail outlets reduced and replaced with smaller businesses offering lower order goods and services
Job opportunities absent	Employment in informal sector higher than in formal	Customer power reduced
Local medium and large scale enterprise do not exist	Low female employment	Informal markets on rise
Demand and supply pattern changed towards lower order goods and services	Residents income earning capacities are low	
Shops empty or with limited stock	Government main employer	Reduced investments
Constrained baking services		Reduced public expenditure
Lack of cash flow		Lack of cooperation with the public
Businesses struggle to pay rent		PPP not bringing expected success

ROSH PINAH	KLEIN AUB	TSUMEB
Informal sector flourishes, new cuca shops and shebeens		Local business community withdrew the ambitions to diversify and expand locally, the focus redirected to Tsintsabis
Limited economic linkages		Potential developments bypass the town in favour of other urban centres
Weakening regional development		No confidence to invest
Usage of local potentials and tourism opportunities reduced		
INFRASTRUCTURE		
Decline in service provision and infrastructure	Provision and maintenance of infrastructure relies on decisions of central and local government	Relationship between community and local authority deteriorated
Dilapidated infrastructure	Income from rates and payments for services low, do not cover maintenance costs	Unresolved land issues, community became uninterested
Skills and capacities to maintain not sufficient	Elevated expectation of government to provide for residents	
	Medical care and education are considered to be main priorities	Protests in informal settlement arise due to government's failure to attend to their needs
Increased demand for private social institutions cannot be satisfied	Housing belongs to government and no potential of being released for private ownership - people cannot afford to buy	Self-help urban poor turned to urban agriculture on contaminated soil
Social infrastructure experience fiscal strain	Tenants struggle to pay their rent	
Disperse layout of the settlement	No potential to attract home buyers from outside the community	Low capacity of local authority to generate funds, reduced money spent on infrastructure and development
Municipal services too expensive and beyond the reach of households	Housing dilapidated, some un-inhabitable	Planning accommodates basic necessities
Housing market collapsed	No construction of new housing taking place	Tsumeb regional centre for government services, but its importance has been weakened in favour of other urban centres with growth

ROSH PINAH	KLEIN AUB	TSUMEB
Financial inability of residents leads to unpaid mortgage bonds, eventual loss of ownership	Disperse layout of the settlement	
Difficult to resell property due to no demand	Restricted area of inner part of settlement affecting the land zoning	
Housing sector overstocked with unoccupied houses		
Government housing is underutilized and poorly maintained		
ENVIRONMENT		
Degradation of the environment	Presence of old collapsed structures threatens the environment	Residents aware of pollution moved out
Dirty settlement - Poor waste management	Residents are in constant fear of the looming danger of sudden land collapse	Bad reputation of environmental quality discourages investments and influx of more educated people
Mine tailings in pathway of wind	Old mining site never rehabilitated	
	Residents unknowingly affected by deteriorating environmental conditions – air pollution and lack of potable water	
	Rate of lung diseases on increase	
	Derelict mine infrastructure	

APPENDIX 14: Characteristics of Scenario 2.

ROSH PINAH	KLEIN AUB	TSUMEB
SOCIO-DEMOGRAPHICS		
Population size reduced, skills and capacities remained	Outflow of people considerably reduced	No signs of demographics that are characteristic of mining settlement
Demographics balanced	Decreased share of transient population	Trend of migration changed from stopover to the choice of destination
Population size and incomes adequate	Increased satisfaction with quality of life	Educated youth return to town after completing tertiary education
Elevated education and skills, particularly among youth	Growing number of long-term residents	Overconcentration of job seekers not observed
Social upliftment	Size of the community matches economic opportunities in the area	Employment rates raised and all forms of marginalization removed
Homogeneity of community increased	More diversified community	Reduced poverty and income disparities among the residents
Community has sense of ownership over their future	Increased number of people with skills and education	Influx of people is integrated into the community
Attachment to the area increased	Decreased share of vulnerable and marginalized population groups	Residents' association with rural homes or other places of origin considerably weakened
Increased numbers of people retire in the settlement	People more determined and energetic	Sense of permanency feeling on rise
	Improved image of the settlement	Community more proactively involved in decision making
		Community spirit and togetherness augmented
ECONOMY		
Small settlement with stable and content local economy	Emerging new entrepreneurs and businesses re-energize local economy	Substantial growth of local economy
Diminished monopolistic pressures from branch outlets	Ongoing horizontal diversification	Continuous diversification and expanded employment opportunities
Empowered local entrepreneurs and businesses	Availability of local skills for services, particularly artisans available locally	New industries set in and transformed in favour of secondary and tertiary sector
Growth of local and medium enterprises	Increased number of qualified services	Local businesses involved in servicing major national projects

ROSH PINAH	KLEIN AUB	TSUMEB
Small initiatives received guided support	A few successful LED projects	Dependency on foreign investment replaced by local investments
New Public-Private Partnerships (PPP)	Guided formalization of businesses	Strengthened economic self-sufficiency, reliability and competitiveness
Good cooperation between community and local authority	Number of formal businesses surpassed informal	Trend of small enterprises transforming into medium enterprises present
Income inequalities levelled out	Diverse employment	Increased choices for financing new businesses
Varied artisan skills available and offered	Increased demand for diversified goods	Previously disadvantaged empowered
Economic potentials explored and grasped	Businesses offering higher order goods emerge	Good cooperation with the community
Informal enterprises formalized	Investments flow into area involving local people and creating business partnerships	Increased number of PPP and other LED projects
Growth and capital accumulation locally	Economic growth in tourism sector	Increased number of multi-purpose learning centres
Local profits reinvested in the area	Old mine sites rehabilitated and occupied by new businesses	Fortified collaboration and partnership between public, private and community sector
Reduced flow of goods and services from South Africa	Linkages with rural hinterland evolved and strengthened	Local government effective partner and agent in local economy
Produced goods and services offered to local markets and expanded hinterland	Economic potentials assessed and opportunities grasped	Regional linkages nurtured and boosted
Networking among the businesses locally, regionally and nationally	New projects utilizing old mine infrastructure developed	Significance of local market for agricultural trade increased
Growing tourism sector	Public sector still important	Developed into self-sufficient national and regional industrial hub
Improved road infrastructure along the Orange river secured economic growth in communities along the road to Rosh Pinah settlement and the Port of Lüderitz		Boosted road infrastructure resulted in better connectivity and new growth corridors along the roads
INFRASTRUCTURE		
Valuable infrastructure timely handed over to community, and mine funding withdrawn gradually	Access and quality of infrastructure improved	Well-planned and managed town

ROSH PINAH	KLEIN AUB	TSUMEB
Well maintained hard and soft infrastructure	Public infrastructure experienced upgrading	Services adequate to support economic activities and promote well-being of residents
Inequality of access to public services decreased	Municipality has better recovery rates for services provided	All citizens have equal access to opportunities for a better quality of services
Construction of new secondary school to serve local and regional needs materialized	Most of the housing belongs to private ownership	Uplifted social life with better choice of recreational amenities
Infrastructure adequately matches community's needs and capacities to maintain	Private ownership guaranteed better houses maintenance	More different housing initiatives, self-help programmes addressing housing needs implemented
Private house ownership materialized timely and in planned manner	No abandoned property left unoccupied for extended periods of time	Equity access to urban land implemented.
Housing stock sufficient for all income groups		Adequate housing, safe drinking water, electricity and sufficient sanitation secured
Municipal services accessible to all residents		Informal settlement serviced and formalized
		Infrastructural support extends beyond the town
ENVIRONMENT		
Mining areas reclaimed and environmental monitoring secured	Waste management solutions initiated	Environmental concerns of community addressed
No pressing environmental concerns	Behavioural change through education on benefits of clean environment	Town turned into clean, safe and aesthetically pleasing place to live
People benefit from unspoiled wilderness	Old mine infrastructural wreckages removed	People more educated and responsible towards environment
Water quantities and quality adequate	Air pollution significantly reduced	Soil rehabilitation took place and risks reduced
	Vital environmental monitoring programme in place	NCS's high responsibility towards the environment and pollution
	Old mine collapse structures stabilized and constantly monitored	