EXAMINING CHALLENGES TOWARDS EFFECTIVELY ADDRESSING CONTINUAL AIR POLLUTION REDUCTION SINCE DEMOCRACY IN THE SOUTH DURBAN INDUSTRIAL BASIN, KWAZULU-NATAL

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Dedication

To the community of South Durban

UNISA college of agriculture and environmental sciences

Declaration

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Abstract

The South Durban Industrial Basin is known for being the industrial hub of Durban in KwaZulu-Natal, South Africa. Racial zoning during the apartheid era resulted in environmental racism where residents living in this Basin were exposed to increasing levels of air pollution due to industrial development. These residents vocalised their concerns by calling for air pollution reduction strategies and mobilisation of the community and experienced limited, unsuccessful engagements with major polluting industries. This study aimed to identify the challenges that prevail post 1994 in addressing air pollution in the Basin including to what extent local governance held polluting industries accountable and how key stakeholders (i.e. civil society, government and industry) worked collectively to address air pollution. The study used a qualitative research approach by making use of semi-structured interviews with key participants from industry, local government and civil society. The study revealed that civil society has been instrumental in their fight against air pollution since the 1960s and since democracy had prompted the implementation of meaningful air pollution monitoring and reduction strategies such as the Multi-Point Plan. They have, however, been met with numerous challenges from local government and industry that stood in the way of collectively addressing air pollution risks. The results revealed that lack of political will and poor governance have led to the deterioration of air quality in the SDIB, especially since 2010, exacerbated by industry's lack of willingness to engage with the local community to reduce air pollution. Without meaningful communication and collaboration between local government and industry towards SDIB communities and civil society generally, these stakeholders may not collectively address air pollution risks.

Key words: South Durban Industrial Basin; Industrial development; Air pollution; Environmental racism; Civil action; Continued pollution.

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Abbreviations

$\mu g/m^3$	Micrograms per cubic metre
ANC	African National Congress
APPA	Atmospheric Pollution Prevention Act
AQA	Air Quality Act
AQMS	Air Quality Management System
BRA	Bluff Residents Association
CAER	Community Awareness Emergency Response
CBD	Central Business District
CBO	Community-Based Organisation
CO	Carbon Monoxide
CO_2	Carbon Dioxide
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs Tourism
IPWM	Integrated Pollution and Waste Management
ISO	International Organisation for Standardization
GIS	Geographic Information Systems
KZN	KwaZulu-Natal
LA21	Local Agenda 21
MEC	Member of Executive Council
MRA	Merebank Ratepayers Association
NEMA	National Environmental Management Act
NEMA:AQA	National Environmental Management Act: Air Quality Act
NGOs	Non-Profit Organisations

NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxide
NP	National Party
O_3	Ozone
PM	Particulate Matter
PM_{10}	Particulate matter less than 10 microns
$PM_{2.5}$	Particulate matter less than 2.5 microns
ppb	Parts per billion
SAAQIS	South African Air Quality Information System
SAPREF	South African Petroleum Refinery
SDCEA	South Durban Community Environmental Alliance
SDIB	South Durban Industrial Basin
SDG	Sustainable Development Goals
SEA	Strategic Environmental Assessment
SO_2	Sulphur Dioxide
SoE	State of Environment
VOC	Volatile Organic Compounds
WDF	Wentworth Development Forum
WHO	World Health Organisation

Definition of terms

Air Emission Licences: An Air Emission Licence indicates the pollution limits allowed for each activity within an industry whose operations results in emissions being emitted (eThekwini Municipality, 2011)

Air Quality Act: This act was established in 2004 under the National Environmental Management Act. This act represented a major shift in governments role in air pollution control (Naicker et al., 2012)

Air Quality Management System: This was set up as part of the Multi-Point Plan a strategy to identify and understand different sources of air pollution. The Air Quality Management System includes a monitoring network with meteorological monitoring, dispersion monitoring and emission inventories (Department of Environmental Affairs [DEA], 2007)

Atmospheric Pollution Prevention Act: This act was established in 1965 by the apartheid government to protect against air pollution (Tshehla & Wright, 2019)

Civil society: Within the context of the current research, reference is made to two components of civil society: local and external civil society. Local civil society refers to local residents, community leaders, community-based organisations and local representatives. External civil society refers to media representatives, NGOs, legal institutions, academics and developmental consultants (Leonard & Pelling, 2010).

Integrated Pollution and Waste Management: This policy was developed by government with the aim of reducing pollution and focusing on waste minimisation.

National Environmental Management Act 107 of 1998: This act was promulgated in 1998 as a response to the emerging environmental crisis in the country. The purpose of NEMA was to provide a framework for decision-making for government, individuals and industries. The 'polluter pays' principle is a fundamental component of NEMA that has been internationally accepted (Fig, 2005)

Schedule trade permits: are stringent legal guidelines issued by the local government to industries with specific requirements such as stack monitoring and emission limits to ensure environmental compliance and monitoring (DEA, 2007)

CHAPTER 1
INTRODUCTION

1.1 Introduction and background

Air pollution, defined by the International Organisation for Standardization (ISO), as the expulsion of harmful materials into the Earth's atmosphere (WHO, 2019), has a significant effect on the environment by contributing to climate change and changing weather patterns (D'Amato et al., 2010). Very importantly, it has also affected the health of many people (Wight & Diab, 2010) and animals (Lin et al., 2020). According to the World Health Organisation (WHO), nine out of 10 people inhale poor quality air and global air pollution has contributed to the deaths of seven million people (WHO, 2019). Air pollution has resulted in an increased incidence of allergic respiratory diseases and bronchial sensitivity in citizens of industrialised countries (D'Amato et al., 2010; Kistnasamy et al., 2008; Global Asthma Report, 2018). Over the last 20 years in the United States, the rate of asthma in children has increased by 150% and 56 countries participating in the International Study of Asthma and Allergies in Childhood in 2002 reported an increase in asthma rates from 4.5% to 28% (Kistnasamy et al., 2008). A more recent study in China revealed that exposure to various pollutants, meaning particulate matter smaller than 2.5 microns ($PM_{2.5}$)[1], nitrogen dioxide (NO_2) and ozone (O_3) directly contributes to asthma mortality (Ding et al., 2017). Health impacts of air pollution are not restricted to developed countries as up to 2 million people are affected by pollution in developing countries such as South Africa (Lan et al., 2016).

In 2009, South Africa was the highest emitter of carbon compounds in Africa and ranked 12th in the world for air pollution (groundWork, 2014). A Global Burden Disease study found that exposure to particulate matter[2] led to 1 800 deaths in South Africa in 2012 (Altieri & Keen, 2016). Air pollution such as CO_2, particulate matter (PM), sulphur dioxide (SO_2) and volatile organic compounds (VOCs)[3] contribute to the deaths of 20 000 South Africans each year (Kings, 2016).

[1] $PM_{2.5}$, known as fine particulate matter, is particularly important to monitor as the particle size may have a longer residence time, which leads to greater health impacts (D'Amato et al., 2010).
[2] Particulate matter is generally observed near the surface, mainly from fuel combustion, and causes serious effects on lungs and respiratory organs when inhaled (D'Amato et al., 2010).
[3] Volatile organic compounds are gases that are emitted into the air from various process such as diesel emissions, wood burning and industrial processes (Duigan & Sivakumar, 2017)

South Africa has a middle-income economy but is burdened with inequality, poverty and the consequences of environmental injustice, due not only to the historical impacts of apartheid but also to the democratically elected ruling party engaging in a macro-economic development path prioritising industrial development and expansion (Leonard & Pelling, 2010). As a result, many families continue to live close to industries and are exposed to a range of toxic pollutants. One of the areas that has suffered the effects of the racial segregation and environmental injustice is the South Durban Industrial Basin (SDIB), KwaZulu-Natal (KZN) (Leonard & Lidskog, 2020).

The SDIB is located in the south of Durban, the third-largest city in South Africa. It houses the busiest port in Africa and encompasses many industrial activities (Mentz et al., 2018). Research in the early 2000s showed that SO_2 emissions decreased in the SDIB due to action taken by industry management (Guastella & Mjoli, 2005) largely resulting from pressure from civil society (Kasavel, 2010). However, the prevalence of other types of pollutants is still a cause for concern and has not been adequately addressed. Industries are not the only source of air pollution as an increased volume of vehicular traffic runs through South Durban to produce vehicle emissions from old or poorly maintained trucks that increase air pollution (Maharaj, 2017). The levels of benzene pollutants have also increased so that in 2010, air benzene levels were found to be higher than the WHO standards [4] of 5 $\mu g/m^3$ at most sites in South Durban (DEA, 2007). A study conducted by Adebayo et al. (2013) also revealed that an industry in the SDIB had underreported emitting in excess of 12 tons of SO_2 a day for five years. In 2019, a toxic waste facility (Thor Chemicals) burnt down, releasing 30 tons of mercury into the air near KwaXimba in Cato Ridge, KZN to risk this mercury gas being deposited into the Inanda Dam in Durban (Savides, 2019). Incidents such as these contribute to the city's air quality being ranked as the worst in the province (Magubane, 2017) and the build-up of chemicals in and from the SDIB prompted this area as recently being declared an environment pollution hotspot in the Environmental Outlook Report (DEA, 2018).

With the transition from apartheid to a democratic government in 1994 in South Africa as well as from increased mobilisation by community organisations against environmental issues, laws and regulations were developed to deal with the problem of air pollution and its impacts on societal health (Leonard, 2010). For example, the Constitution of South Africa that was passed in 1996,

[4] Micrograms (one-millionth of a gram) per cubic meter is the concentration of an air pollutant (groundWork, 2014)

provided all citizens the right to a clean environment that does not compromise their health (Constitution of the Republic of South Africa, 1996). The National Environmental Management: Air Quality Act (AQA) was promulgated in 2004 to address air pollution issues that may affect the health of citizens and may degrade the environment. This Act is aimed at providing norms and standards to regulate and improve air quality thereby preventing ecological degradation and pollution, and consequently ensuring sustainable development (National Environmental Management AQA, 2004). This Act adopted a holistic approach to air quality monitoring and shifted away from focusing on source-based emissions and also provided the public with education on ways to reduce emissions, promoted access to air quality information, set standards for ambient air quality and provided incentives for implementation of mitigation measures and management of pollution sources (Tshehla and Wright, 2019).

Despite the Air Quality Act being passed in 2004, studies have shown that air pollution remains a problem in the SDIB (Nzimande, 2012; Vissers, 2010). Thus, environmental rights have not necessarily been translated into a reality for many South African citizens (Firmin, 2019). This study, therefore, focussed on the challenges experienced by community organisations, government departments and industry when trying to implement anti-pollution initiatives and to identify how key stakeholders have worked hand in hand to address air pollution in the SDIB since the new democracy in South Africa in 1994. Results from this study could provide information that emphasises challenging aspects or obstacles to air pollution reduction strategies and concentrate attention on these aspects in an attempt to recommend solutions to address air pollution in South Durban.

1.2 Background

1.2.1 The apartheid legacy of air pollution in the South Durban Industrial Basin

The development of South Durban as an industrial zone began in the 1930s and the subsequent increase in industrialisation as well as poor land use contributed to an increase in air pollution in the SDIB (Scott, 2003). The National Party then introduced apartheid in South Africa in 1948. However, segregation was established during the British Rule before the National Party came into power (groundWork, 2014), apartheid separated the development of different racial groups,

keeping 'non-white' - or black - citizens separated from white citizens (Refer to Figure 1.1)[5]. Apartheid not only caused political injustices but also environmental injustice (Niranjan, 2005). The SDIB is occupied by heavy petrochemical refineries, waste dumps, fibre plants and hazardous chemical storage facilities (Jaggernath, 2010). The Group Areas Act (Act No. 41 of 1950) resulted in Coloured, Indian and African communities being forcibly moved to the SDIB where they provided a cheap labour workforce (Chari, 2008) for this industrial hub within easy access to their workplaces (Peek, 2002). Black South Africans living in overcrowded townships that were often situated close to refineries, sewage treatment plants, toxic dumps and small industrial sites (Jaggernath, 2010).

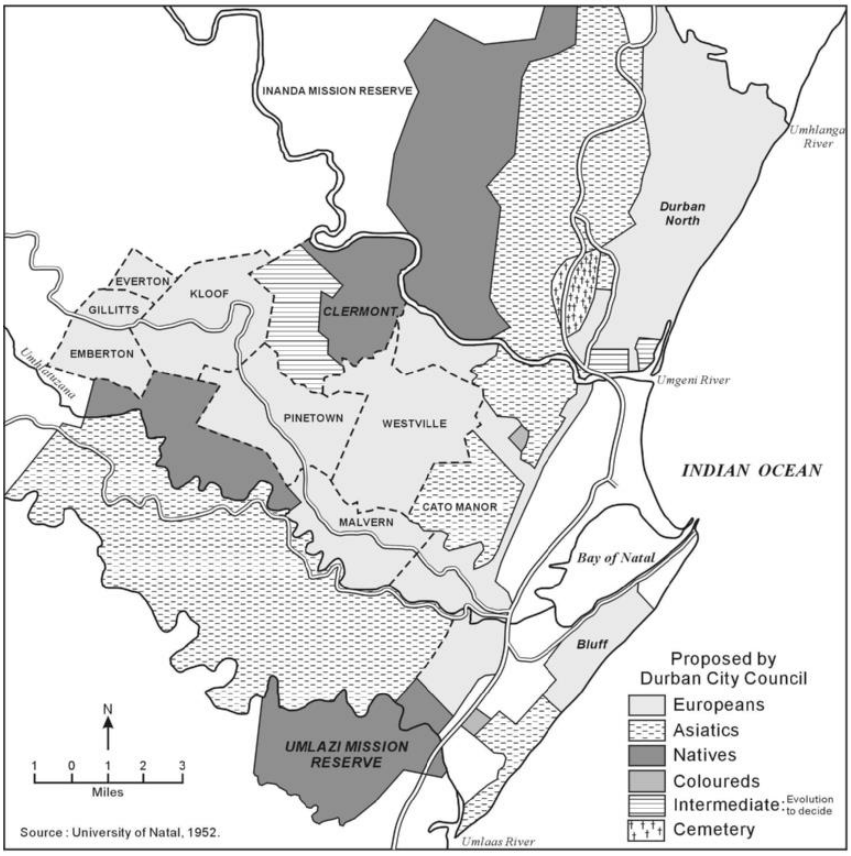

Figure 1.1: The 1944 racial zoning plan for separation of citizens in Durban (Leonard et al., 2008).

[5] Black South Africans refer to people of colour, namely Indian, coloured and Africans (Maharaj, 1997)

Figure 1.2: Photograph showing an explosion that occurred at the Engen refinery in December 2020 (groundWork, 2020)

Figure 1.3 Photograph showing children playing outside their homes whilst toxic fumes are emitted from the refineries behind their homes (Carnie, 2020)

The rate at which hazardous substances were expelled into the atmosphere during the apartheid years was 10 times greater than in parts of Great Britain and America (Niranjan, 2005). Consequently, the SDIB was nicknamed Cancer Valley as the rate of reported leukaemia cases was 24 times higher compared to other areas in South Africa (Jaggernath, 2010). To control this pollution, the Atmospheric Pollution Prevention Act No 45 of 1965 (APPA) described legislation regarding air emissions but had little impact on reducing pollution as it gave polluting industries the right to draw up their own permits and only mandated a maximum fine of R500 on a polluting company. Thus, the APPA was seen to be more as a voluntary approach to negotiate pollution non-compliance particularly because violation by permit holders theoretically meant cancellation of their certificates – something that rarely happened (groundWork, 2002).

As a result, communities became more anxious about the growing SDIB that saw more people fall ill, particularly with respiratory problems. Community mobilisation grew quickly with the

formation in 1964 of the Merebank Residents Association (MRA)[6], a community-based organisation (CBO) which complained about unresponsiveness from Engen Refinery management regarding environmental pollution. Communities grew irate as in 1990 a memorandum forwarded to the refinery management to address concerns about air pollution was ignored. This caused tension to intensify between the community and the refinery (Maguranyanga, 2001). Consequently, the laws governed under apartheid proved inadequate and had to be revised to incorporate proactive management when the apartheid regime fell in 1994 (Diab & Motha, 2007).

1.2.2 Air pollution since democracy in the South Durban Industrial Basin

Since the 1994 elections and South Africa becoming a democratic country, focus was placed on human rights. Section 24 of the Constitution states that:

> *Everyone has the right —to an environment that is not harmful to their health or wellbeing and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development' (Constitution of South Africa, 1994).*

Following apartheid, the SDIB was perceived by local and national government as an area of economic opportunity (Barnett & Scott, 2007) with investment potential particularly in the manufacture of paper, plastic and petrochemicals (Jaggernath, 2010). According to Barnett & Scott (2007), a post-apartheid South Africa was developed according to the neoliberal Growth, Employment and Redistribution framework that was imposed from the national level through to smaller, local government departments, while aimed at ensuring that the basic needs of individuals were met. While economically it has been beneficial, these developments have not been able to contain the side effectss of environmental risks (Leonard & Lidskog, 2020). The chemicals released into the atmosphere have been known to cause kidney, heart and liver damage, which make the residents living close to industries extremely susceptible to health complications (Altieri & Keen, 2016; Mngoma, 2014). Thus, following apartheid, investments into its economic growth

[6] The Merebank Residents Association formed during apartheid to protect the rights of ratepayers and later began their activism role against environmental injustice in the SDIB (Sparks, 2004)

caused the SDIB to become a site for much democratic conflict as civil society pressure groups emerged due to the industrial pollution (Scott & Barnett, 2009).

Residents within the SDIB called for better pollution management and mitigation measures to be implemented due to the profound negative impact of pollution on their health (Vissers, 2010). Civil organisations such as the South Durban Community Environmental Alliance (SDCEA)[7], groundWork[8], community representatives and non-government organisations (NGOs) brought attention to the air pollution within the SDIB. The SDCEA has been at the forefront of the environmental struggle for clean air, urging government departments and industries to come together to try and combat this issue (Nzimande, 2012). Despite a reduction in air pollution involving certain chemicals, air pollution has continued to affect the health of SDIB residents.

In 2000, two teachers at the Settlers Primary School in Merebank in the SDIB fell ill with chronic laryngitis and respiratory problems. Students at the school also complained of burning eyes, headaches, sore throats and nausea (groundWork, 2003). A health study conducted at this school in 2002 found that 52% of the learners had asthma - the highest rate recorded in scientific literature (Robins et al., 2002). Teachers from this school complained of strong odours emanating from nearby refineries and stated that the absentee rate amongst children increased when the wind blew in a southerly direction (SDCEA, 2007). Durban south/north studies conducted in 2004 and 2005 found that cancer-causing chemicals such as benzene and chromium were highest in the southern parts of Durban. Study results also showed that chemicals such as PM_{10} (particulate matter less than 10 microns), SO_2, nitrogen dioxide (NO_2) and nitrogen oxide (NO_x) aggravated the lung function of children who already suffered from asthma and that these chemicals were more prevalent in the south of Durban than the north (Naidoo et al., 2013).

A recent report described the emission of toxic gas from the Safripol plant in Mobeni East. Residents complained that when the wind grew stronger they could smell the gas from Wentworth along Woodville Road, Major Calvert Street, Hime Street, Assegai, Austerville roads as well as

[7] The South Durban Community Environmental Alliance has been active since 1995. They are an environmental justice organisation made up of 19 affiliate organizations. Their goals and objectives include clean air, water, and soil and a reduction in environmental racism (groundWork, 2014)

[8] GroundWork is a non-profit environmental justice service and development organization. Their focus is on climate and energy justice, coal and environmental health (groundWork, 2002)

parts of Merebank (refer to figure 1.4). There was also no public announcement responding to this incident nor an immediate emergency evacuation plan. Residents with new-born babies and the elderly complained of burning eyes, rashes, itchy throats, difficulties breathing and vomiting (Mthembu, 2019). The SDCEA has also recently confirmed in 2019 that the cancer rates in South Durban are still high in residential areas such as in Bluff, Wentworth and Merebank (Nzama, 2019). Members from the SDCEA have also previously been in court proceedings regarding the demolition of of the Clairwood Racecourse, which has been developed into a logistics park (*South Durban Community Environmental Alliance v MEC for Economic Development* 2020). The SDCEA opposed this development because of concern that it would exacerbate air pollution issues within the SDIB. Additionally, the Clairwood Racecourse, which was demolished and reconstructed, was declared by the city of eThekwini as an assembly point during evacuations during industrial incidents (Maharaj, 2017). It is evident from studies (Kistnasamy et al., 2008; Naidoo et al., 2013; Vissers, 2010; Nzimande, 2012) that post-1994 air pollution remains a prominent issue. However, no recent research has been conducted to identify challenges regarding air pollution in the SDIB and this motivates the need for the current study.

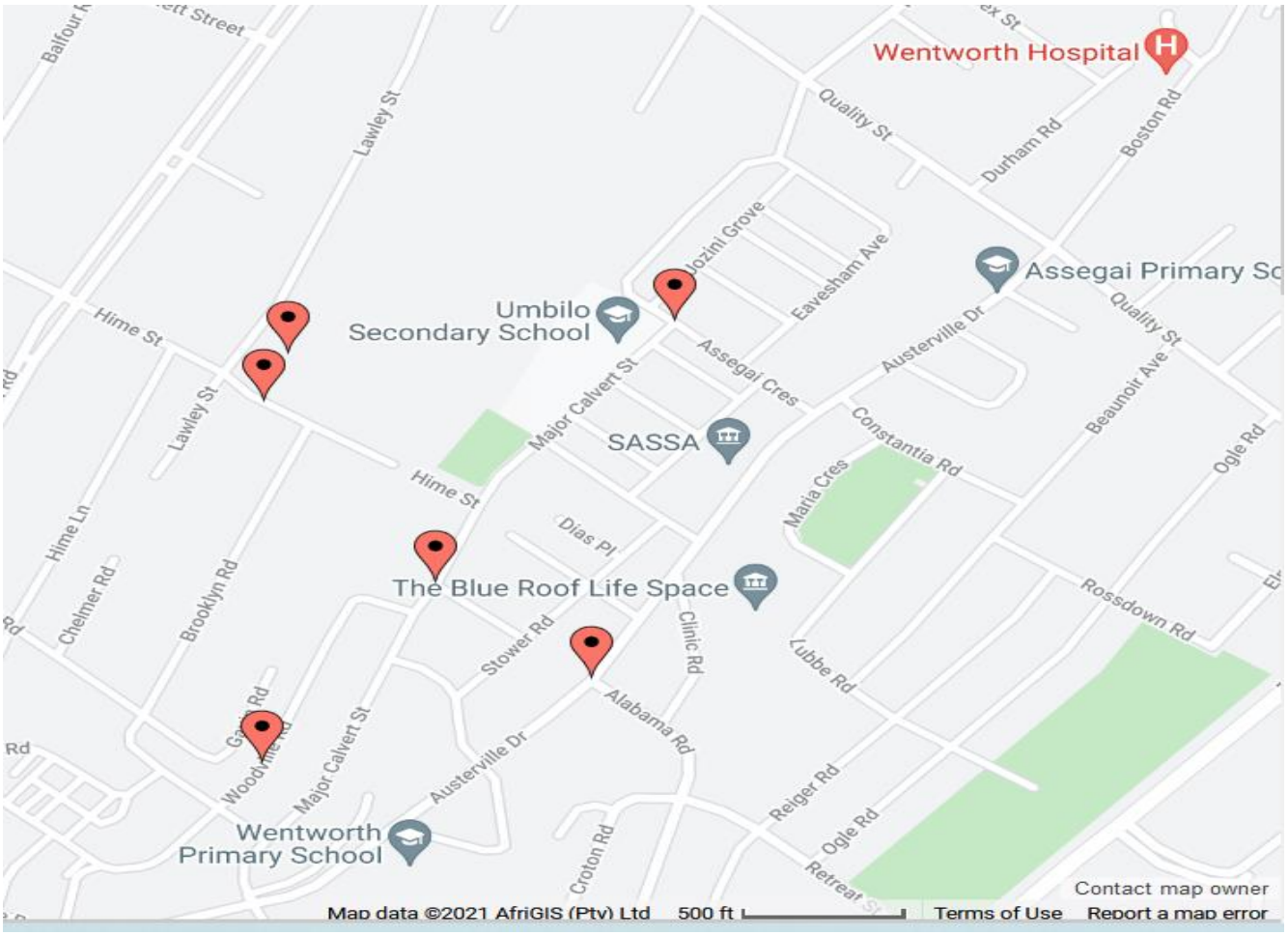

Figure 1.4 Map depicting roads in parts of Wentworth (Google Maps, 2021)

1.3 Problem statement

Since the 1960s, residents of the SDIB have issued numerous complaints concerning health issues relating to odour and emissions emitted from industries in the area (Jaggernath, 2010). However, Durban has suffered a low rate of economic growth since the 1990s and to counter this, reindustrialisation was embarked upon in South Durban. Despite existing air pollution and concerns raised from by communities of South Durban, upgrades to the industrial zone continued (Scott & Barnett, 2009). In spite of the SDIB being demarcated for decades as a hotspot regarding air pollution, residents continued to live in a hub of air pollution (Barnett & Scott, 2007; Jaggernath, 2010; Leonard & Lidskog, 2020; Nzimande, 2012; Vissers, 2010). In addition to their

health being compromised by air pollution, such communities also protested against brown issues[9] but received no response from either government or industry. Their protests were then reframed into environmental struggles (Scott & Barnett, 2009).

A study conducted by Nriagu et al. (1999) to determine the prevalence of asthma and other respiratory diseases in individuals in South Durban found that 10% of children and 12% of adults reported that they have been diagnosed with asthma. In addition, 40% of the sample population reported to have suffered from wheezing and a shortness of breath. Previous health studies conducted in this area showed that people suffered from various health conditions such as lung disease, asthma, cancer and other respiratory disorders (Scott, 2003). The health situation appears to be deteriorating as a more recent study conducted by Naidoo et al (2013) revealed that 16% of parents with children under the age of 17 reported some type of respiratory illness.

Although some air pollution reduction was made post-1994 and industries have transitioned from fuels to gas, included sulphur recovery and scrubber units (Diab & Motha, 2007), there are still many health implications for those living in the SDIB (Singh, 2020). From 2000 until 2017, over 55 major incidents were reported in the SDIB and an average of 37 major fire incidents occurring each year (Nkgadima, 2017). Unfortunately, government has caused much anxiety among community-based organisations (CBOs) as it continues to undermine the community by weakening emission regulations to further exacerbate the situation in the SDIB (Singh, 2020).

The sulphur dioxide pollution guideline suggested by the WHO and the national standard limit of the Department of Environmental Affairs and Tourism of 19 ppb of sulphur dioxide SO_2 was exceeded from 1996 till 2001 in the Southern Works, and from 1996 till 1999 in Wentworth, showing the high concentration of toxic chemicals in the atmosphere in the SDIB (Guastella & Mjoli, 2005). Recent air pollution statistics confirm over 250 incidents where the national air quality standards for PM_{10} have been exceeded in the first nine months of 2020 at the Ganges Secondary School in South Durban (Carnie, 2020). Data from national air quality monitoring stations, however, show no such incidents regarding PM_{10} (refer to Table 1.1), suggesting that air pollution monitoring stations are not fully functional. The communities of Merebank and the

[9] Brown issues relate to quality of life in one's living environment such as waste removal, transport, education, housing and open space provision (groundWork, 2002)

greater part of South Durban experienced an explosion at the Engen Petroleum refinery in late 2020 that caused several injuries (Leonard, 2020). Despite protests from communities, industry has allowed many small-scale projects to be carried out simultaneously to large-scale industrial processes leaving the neighbouring communities leaving nearby residential communities exposed to further air pollution (Carnie, 2020). As a result, residents have demanded answers from refinery management as frustrations have been heightened over the affect air pollution has had on them, culminating from 66 years of continuous air pollution incidents in the SDIB (Nair, 2020).

Table 1.1: Daily PM_{10} exceedances (eThekwini Municipality, 2020)

Station	Parameter	Valid data %	Average	Maximum	Minimum	Daily Maximum
City Hall - Durban	PM_{10}	100.0	28.23	10.24	58.66	0
Ganges	PM_{10}	91.3	28.17	12.92	53.50	0
Settlers	PM_{10}	100.0	28.50	12.08	55.04	0
Wentworth Reservoir	PM_{10}	80.9	33.48	10.17	63.38	0
CBD - RBCAA	PM_{10}	98.7	10.58	3.94	21.89	0
Airport - RBCAA	PM_{10}	0.0				0

Communities continue to express their concern regarding air pollution (Jaggernath, 2010; Magubane, 2017; Pillay, 2018), testimony to ongoing challenge regarding air pollution

contributing to the smell in the area that appears not to have improved for decades and that mainly affects the elderly and children (Xolo, 2020). Although many air quality-monitoring stations in the SDIB were active and producing results post 1994, many are no longer effective, reflecting ineffective monitoring of air pollution levels. Thus, of the 28 monitoring stations situated in KZN, only five are currently functional. According to the Department of Environmental Affairs, the main challenge with the monitoring stations is limited capacity, vandalism and limited budgets (DEA, 2019). As a result, although the purpose of monitoring equipment is to detect levels of pollution, this function has not been exercised, leading to a systemic failure as pollution exceeding PM_{10} were discovered in 2020 but technicians did not alert authorities (Carnie, 2020). Air pollution issues have been made public for decades within the SDIB via community protests, independent testing of air quality to bring awareness to government and industries, public meetings to mobilise the local affected community and various media articles published about continuous pollution accidents (Mthembu, 2019; Nzama, 2019; Pieterse, 2019). However, environmental incidents at industries within the SDIB are an ongoing challenge.

There has been no empirically assessed research post-1994 to understand why addressing air pollution still poses a challenge in the SDIB. Thus, the aims of the current research were to discover challenges to reducing air pollution and its health impacts, how (local) government departments addressed air pollution risks and, finally, how industry and civil society have worked collectively to address air pollution in the SDIB. Considering that South Africa is a member state of the United Nations and party to the 2030 Agenda for Sustainable Development with a plan of action for the people, planet and prosperity (Leonard & Lidskog, 2020), it is imperative that a study such as this is undertaken to assess air pollution reduction in the SDIB and in support of United Nations Sustainable Development Goals (SDG) 2030. Specifically addressed goals include SDG 3, promoting good health and wellbeing through substantial reduction in the number of deaths and illnesses from hazardous chemicals in the air; and Sustainable Development Goal 11, creating sustainable cities and communities by reducing the adverse *per capita* environmental impact of cities, including by paying special attention to air quality.

1.4 Aims and objectives

1.4.1 Aim of the study:

Considering that air pollution is still an issue in the South Durban Industrial Basin 27 years post democracy in South Africa, this study aims to address challenges regarding air pollution by identifying what efforts and strategies have been employed by local government, industries and civil society in trying to reduce risks, and by assessing how effective these interventions have been. In addressing this aim, the following objectives were formulated for this study:

i. Objectives of the study:

1. To identify what strategies have been implemented since democracy to address air pollution risks in the SDIB by local government, industry and civil society and the effectiveness of these interventions.
2. To explore local governance (strategies) towards addressing air pollution in South Durban and holding polluting industries accountable
3. To understand contemporary developments about how local government, industry and civil society have worked collectively against air pollution risks and what have been the challenges to solving pollution problems in the SDIB.

ii.Research questions

1. What initiatives and strategies have been implemented since democracy by local government, industry and civil society to reduce air pollution risks in the SDIB and to what extent have these interventions been effective?
2. How has local governance intuitions addressed air pollution in South Durban and held polluting industries accountable?
3. How have the civil society, industries and local government departments worked together to combat air pollution?

1.5 Study area

This study was conducted in the southern region of the Durban city known as the SDIB, in the province of KZN. Durban is the third-largest city in South Africa (See Figure 1.5), and falls under the eThekwini municipality which has a population of 3 442 361 and 956 713 households (Stats

SA, 2019). The SDIB is the economic hub of KZN and contributes 8% to the gross domestic product (Naidoo et al., 2013).

The SDIB is located along the coast of KZN and falls within the eThekwini municipality. **Figure 1.5** indicates that the SDIB is made up of many areas including Wentworth, Bluff, Merebank, Lamontville, Clairwood, Umlazi, Amanzimtoti, Isipingo, Jacobs and Umbogintwini (Vissers, 2010). The SDIB comprises five industrialised belts with at least 120 industrial units. It runs from the Durban Central Business District (CBD) for 24 kilometres to Umbogintwini on the eastern coastline of South Africa (Chetty, 2005). Along these 24 kilometres, there are numerous industrial activities, such a paper mill, sugar refinery, two oil refineries and chemical industries.

Figure 1.5: Map of Durban, South Africa (Leonard et al., 2008).

The SDIB is the second-largest industrial hub in South Africa (Wright & Diab, 2011) and includes the busiest port in South Africa (Chetty, 2005). The SDIB is also famous for having major transportation routes such as highways, harbours and previously an airport (Barnett & Scott, 2007). There are on average 1 500 storage tanks which contain substances such as benzene, acrylonitrile or vegetable oil (SDCEA, 2007). These industrial activities are close to residential areas and the SDIB is characterised as being a severely polluted area resulting from effluent and pollution from various industrial processes (groundWork 2003). Poor planning and industrial development has left the SDIB vulnerable to air pollution issues and increasing traffic contributes to vehicular emissions and further air pollution. Geographical factors intensify the problem particularly in winter months, due to complex topography and meteorological factors causing vertical and horizontal dispersion of pollutants (DEA, 2007).

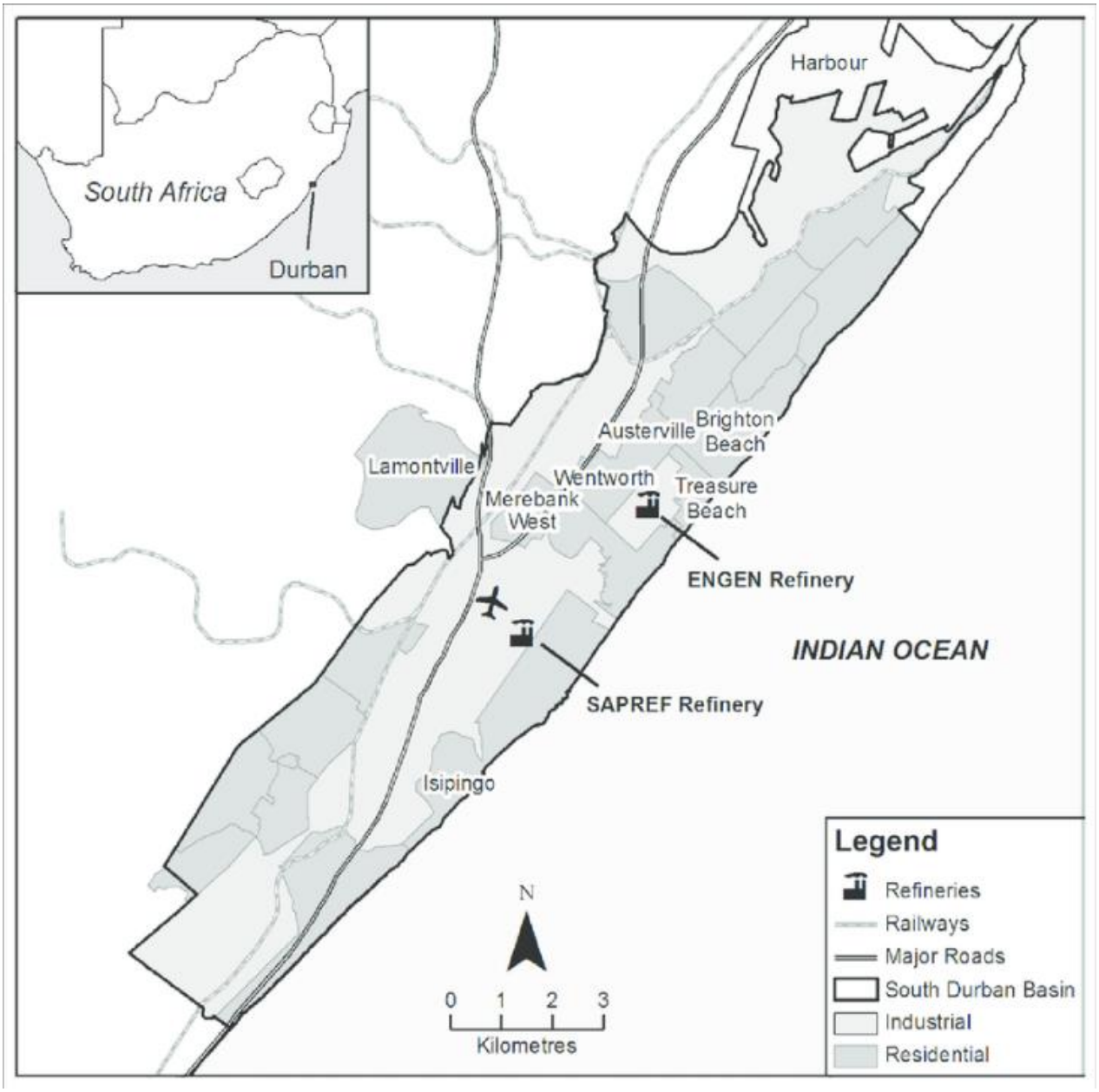

Figure 1.6: Map of the SDIB (Brooks et al., 2010)

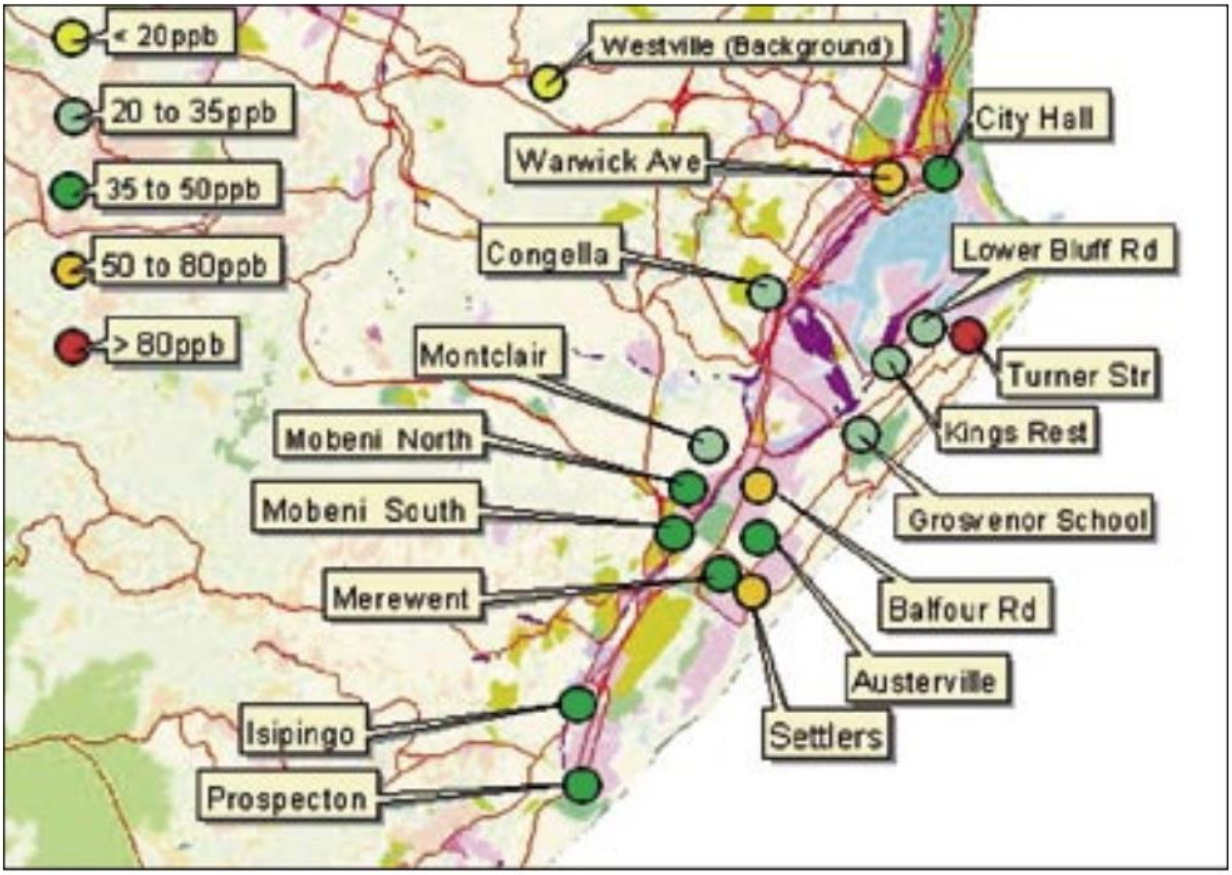

Figure 1.7: Map of South Durban Suburbs (DEA, 2007)

1.5.1 Demographic and socio-economic factors

The SDIB is the economic hub of KZN and contributes 8% towards the gross domestic product. The SDIB houses roughly 400 000 residents (Naidoo et al., 2013) living within the Bluff, Wentworth, Merebank, Jacobs, Mobeni, Isipingo, Lamontville and even extending towards Athlone Park. The SDIB is made up of 200 000 households and 5 000 businesses (Nzimande, 2012). The total employment in the SDIB amounts to 47% of the total population however they earn less than R15 000 per annum, increasing the rate of poverty. Most of the population in the SDIB consists of Africans and Indians, the number of Coloured individuals having decreased over the years. The number of white citizens has declined considerably as most have relocated to other areas around KZN (Kasavel, 2010).

1.5.2 Expansion of South Durban Industrial Basin

The SDIB has been expanding since the 1950s as the demand for goods and services has risen. The SDIB already houses several industrial activities such as oil refineries, a paper mill, chemical storage facilities, sewage works (DEA, 2007) and over 600 small food and beverage businesses (Diab & Motha, 2007). A new megaproject, the expansion of the port of Durban, poses its own risks and challenges. This US$25m project will result in the South Durban port being the largest in sub-Saharan Africa (Desai, 2015). South Durban is already heavily saturated with pollution. Expanding industries will continue to compromise the situation, some believing that it would cause irreversible environmental consequences (Bond, 2015). The development of the Clairwood Racecourse into a logistics park in the SDIB was met with resistance from community organisations such as the SDCEA and by means of protests and holding public meetings in order to try to prevent this development. However, these efforts were not successful (Maharaj, 2017).

The expansion of the SDIB has, however, led to many positives for the city but also negatively affected the residents located in close proximity to the industrial basin (Dodson, 2002). Air quality is still one of the pertinent challenges in the SDIB. Therefore, this study will focus on why this is still the case in the new democracy. This includes what local government departments, industries and civil society have done to try to address air pollution and to ensure that the constitutional right to a clean environment is realised for South Durban residents.

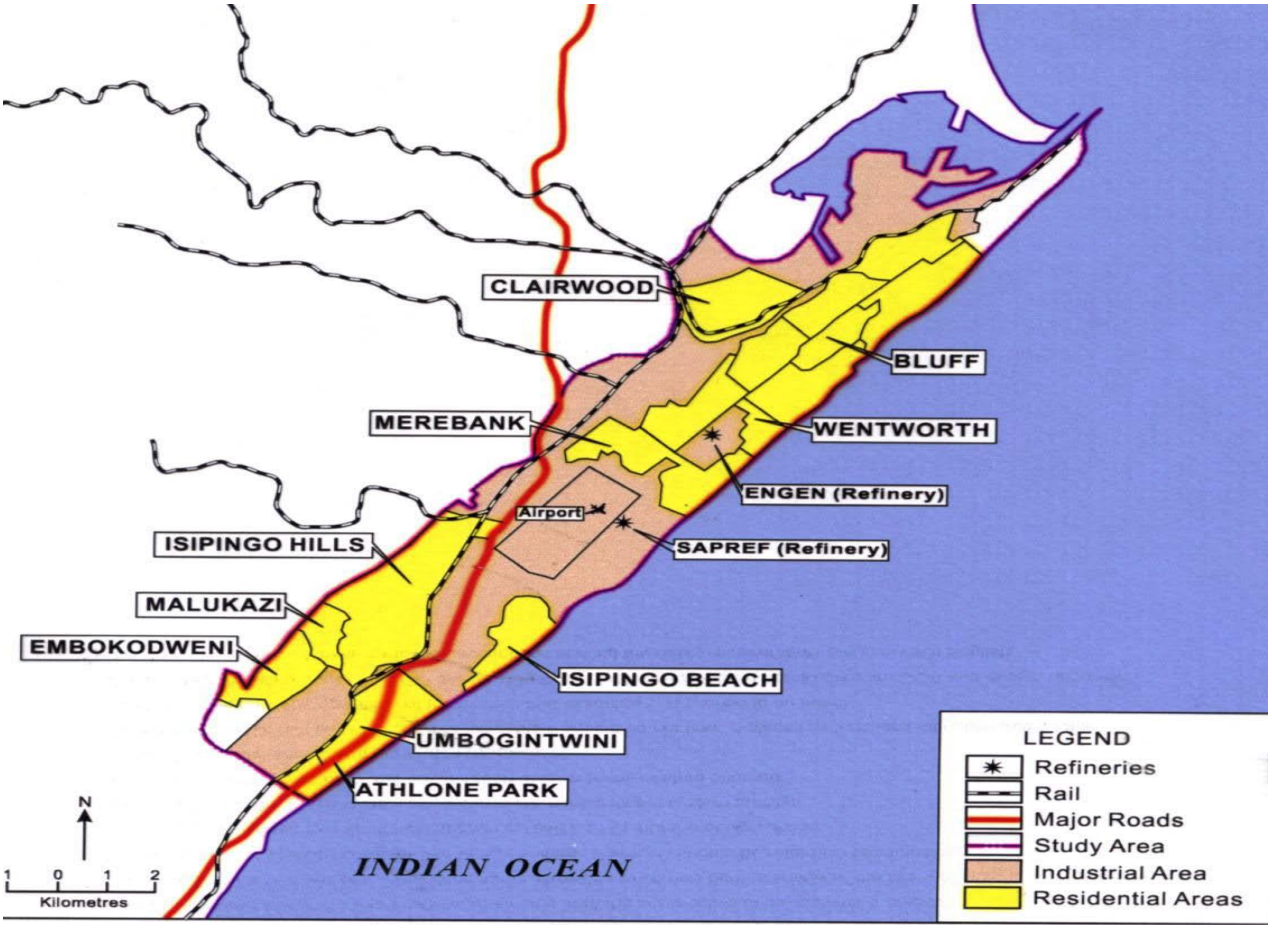

Figure 1.8: Map showing SDIB in location to industries (Scott, 2003)

1.6 Chapter summary and structure of the dissertation

Chapter one provides a background outlining the research problem, the importance and relevance of the study, the research aims and objectives and the study location.

Chapter 2 is a detailed literature review exploring different themes pertaining to the study topic and engages with various sources.

Chapter 3 provides a comprehensive breakdown of the methodology used to conduct the study as well as the limitations.

Chapter 4 presents the study results and discusses these according to various themes generated from data analysis.

Chapter 5 presents the conclusion and recommendations for the study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Air pollution affects at least 2 million people worldwide each year in developing countries such as South Africa (Lan et al., 2016). The South Durban Industrial Basin (SDIB) in KwaZulu-Natal, South Africa has provided an opportunity for economic growth but at the expense of environmental degradation and human health (Leonard & Lidskog, 2020). Increasing levels of air pollution in the region called for mitigation measures to be implemented by industry. With the apartheid regime in South Africa being ousted and the transition into democracy in 1994, air pollution issues have continued around the SDIB with citizens in the area being vocal about its impact on their health. In order to understand what has been done to reduce air pollution and health risks, literature needs to be examined to understand which initiatives were introduced by various role players to reduce air pollution affecting the environment and communities in and around the SDIB. Understanding how key role players influence change and enforce environmental regulations in the SDIB is vital in order to underpin future improvements in monitoring and reducing air pollution.

Section 2.2 of the literature review discusses air pollution at an international context, followed by section 2.3 where the use public participation in a democracy is analysed. In section 2.4, the important role trust plays in public participation and democracy is outlined followed by the role that national, provincial, and local governance plays in a democracy to address challenges such as air pollution in section 2.5. Section 2.6 of the literature review discusses air pollution during the apartheid era in the SDIB, followed by section 2.7 which outlines the current levels of air pollution in the SDIB. Section 2.8 explains the governance approach to air pollution risks and regulations which have influenced air pollution reduction strategies. In section 2.9 initiatives implemented by industry to monitor and control air pollution are discussed, followed by section 2.10 where anti-pollution initiatives put forward by civil society and organisations such as the South Durban Community Environmental Alliance (SDCEA). In section 2.11 a short summary and conclusion of the chapter is given.

2.2 International Studies

Air pollution is a major contemporary challenge that many countries face. Rapid industrialization, booming urbanisation and an increase in anthropogenic activities play a major role in the contribution to air pollution. In India, Particulate Matter (PM) was found to be the third leading causing of death in 2017 and air pollution has accounted for 1.1 million premature deaths in India in 2017. Many management strategies have been implemented such as air quality modelling, emission inventories, monitoring the concentration of pollutants and source apportionment studies (Gurjar and Ojha 2016). Although these mechanisms have been put in place, there is uncertainty surrounding atmospheric concentrations. This is due to a lack of transparency and availability of data which contributes to the long-standing air quality issue facing India (Gurjar, 2021).

Similarly, China's air pollution challenges have been well documented and published. In 2017 there were 1.2 million premature deaths related to air pollution (Health Effects Institute, 2019). China has implemented a number of top down and bottom-up approaches to address air pollution. Top-down governance measures used satellite ground monitoring data, facility level emission inventories and casual inference studies which has proven to achieve improvements in China's national air quality. Some of these measures included the use of end-of-pipe pollutant removal technologies within the heavy industry sector and power sector. Despite the fact that China has passed its worst air pollution episodes, majority of the China's cities are still experiencing high concentrations of air pollution at certain months of the year. Therefore, there is still a need for more stringent and effective policies in order to have long term, consistent nationwide reductions of air pollution (Wang, 2021).

2.3 Public participation and democracy

Participation can be defined as a process that involves groups or organisations, individuals, and stakeholders in the decision-making process of activities that affect them (Reed, 2019). Public participation is a tool that is used to address challenges and issues within the community and involves interested and affected parties regarding environmental projects as well as ongoing public projects (Mngoma & Dlamini, 2014). Public participation plays a vital role in a democratic country and has been declared to increase commitment to sustainability. Public participation has been renowned for its ability to address economic inequalities as well as social and political issues. This

aids in addressing climate change issues such as air pollution (Aylett, 2010). Public participation is the foundation on which democracy exists. It enhances democracy by serving to ensure improved decision-making and strengthening politicians' accountability to the people. Public participation makes certain that there is a strong democratic parliament, which in turn plays a key role in ensuring peace, development and respect for human rights (Inter-Parliamentary Union, 2015). Maharaj (2017) argues that public participation occurs too late in the environmental assessment process and therefore does not effectively address a full range of impacts and alternatives. Public participation has been criticized on for being unable to address air pollution issues effectively by engaging superficially with stakeholders. Another issue is that key stakeholders are deliberately alienated from participatory meetings and forms where important discussions pertaining to air pollution control are discussed (Ayett,2010).

Participation includes public meetings, advisory committees, interviews and focus groups (Nzimande, 2012). Participation has a broad definition and can be interpreted differently by different groups of individuals or organisations. Public participation has become important as it is hoped that by engaging with interested and affected parties, industries understand their concerns better. When the public interests and concerns are taken into consideration during the initial stages of a project, this may inform the design of the project and increase the probability of local needs being met. This only works if there is a two-way participation process between industry and the public (Wouters et al., 2011; Kidd, 2002). Engaging with the public gives the community a better understanding of the project and its benefits. According to Webler et al. (2001), understanding what the public requires from this process is also important in developing a process that is meaningful. Public involvement is hoped to facilitate collaborative thinking between stakeholders who all share varied interests regarding the natural environment, resources and local communities.

Stakeholders include any persons who have a direct effect on the development, either positive or negative, such as government officials, businesses, researchers, industries and NGOs. Stakeholder participation refers to long-term involvement in a project and includes those who have a stake in the project rather than involving the general public (Reed, 2019). According to Ross et al. (2016), the stakeholders need to be involved for a longer period of time rather than just at the planning phases. Stakeholder participation is seen as more of an ongoing process whereby relationships are formed as opposed to when decisions are made. Stakeholders hold a vital part of the participation

process and it is imperative that they engage on a regular basis in all stages (refer to 2.1) as this will determine the efficiency of the process. Stakeholder participation can influence the decision-making in a way that sets out to identify risks before they have occurred (Webler et al., 2001).

Figure 2.1: Stakeholder engagement cycle (UNICEF, 2018)

Stakeholder participation has been gaining momentum since the 1960s in environmental management and is also seen as a democratic right and occurs in three ways. The first type is the bottom-up approach that is led by a group of citizens or interested groups or a top-down approach that is led by those who are making the decisions. The second type of engagement is to be distinguished based on motivations and outcomes that would possibly drive engagements. The third type of engagement is an information or knowledge exchange between the public and relevant stakeholders. This will then make the decision-making process easier as it is an all-inclusive process (Reed et al., 2018). The participatory approach has inspired great hope that more than just environmentally sound practices will be established, and that local government can address issues such as climate change and development challenges. Stakeholder participation can foster a relationship built on trust and finding common ground enables citizens to appreciate the perspectives of others (Aylett, 2010).

Effective participation should be performed on the basis of informing, consulting, involving, collaborating and empowering stakeholders. Stakeholders should be kept informed of important information timeously, provide feedback to interested parties about concerns, issues and

alternatives. Working with the public is imperative to ensure that concerns and objectives are understood by all. Participation should involve collaboration with stakeholders during each phase of the project and empower them by placing emphasis on their concerns during the decision-making process. Webler et al. (2001) stated that a common language should be established to facilitate good participation and decision-making as this will encourage all participants to pay attention and be able to listen to all views. Participation should be conducted in an orderly way that respects each and every concern raised. Facilitation by a skilled professional is important to manage conflicts of interest (Reed, 2019).

An example of a successful participatory process was conducted in Albania where a community in the Elbasan municipality voiced their opinions and concerns about land, air and water pollution. They complained about respiratory problems in children which led to cardiac and lung problems. The municipality then worked together with the community to improve the environmental quality. Participation methods included meetings with non-governmental organisations (NGOs), industrial members, community authorities and members of the public. This resulted in positive feedback after submitting draft proposals to the local government. Industries adapted greener practices and there were more stringent controls on the production of emissions (Nzimande, 2012). Another example was in New England, USA, in 1988, where one million acres of forest were to be sold and tensions sparked over new ownership and future developmental plans for the forest. Using this practice of public involvement, a council was established known as Northern Forest Land Council. The council facilitated involvement with 800 people where they were able to view their concerns and ultimately citizens were heard through many public engagement meetings and reports (Webler et al., 2001). In China an awareness exists around environmental challenges has air pollution as a highlighted issue. The effect of public participation on environmental governance was evaluated using data from main polluting cities in China. The results revealed that public participation strengthens environmental governance and as a result, levels of pollutants, namely SO_2, NO_X, ammonia and chemical oxygen demand, which is used to measure wastewater and water quality, decreased in certain polluting cities in China (Zhang & Chen, 2018).

In democratic countries, citizens form an integral part of public participation through community representatives. However, in contrary to the above, public participation does not always go as planned. Participants and planners may disagree on what good participation entails (Wouters et

al., 2011). Conflict can arise about what constitutes good participation amongst those in charge of the process and this often turns the process into a battle of deeper issues which possibly could lead to mistrust and alienation. This hinders the decision-making process and causes ineffective and insufficient working practices and corruption, which limit the learning possibilities of local stakeholders (Webler et al., 2001). There are often issues with legitimacy, particularly when there is inadequate representation of the public. One of the major problems with public participation is that illiterate people are unable to comprehend risk factors and how they affect them and their receiving environment (Mngoma & Dlamini, 2014). When the public see this, it often disrupts the implementations of policies (Quick & Bryson, 2016).

According to a study conducted by Jaggernath (2010) to identify residents' concerns and perceptions towards air pollution in the South Durban Basin, 91% of the participants in the study did not attend these public participation meetings. They felt as though these meetings were unsatisfactory and insufficient information was provided. People may also feel reluctant to attend participatory meetings as there could be a power struggle. Power may determine who attends these meetings and how the meetings are conducted and could lead to unfair outcomes. It is important to identify who is conducting these meetings and their general approach in addressing the public (Webler et al., 2001). In situations where inequality exists, it is common to empower those with resources such as education, time and money to participate, leaving out the others who do not possess these attributes. Power may also be given to those politically connected and already deemed powerful which future marginalises individuals with less connections and influences. This does not lead towards inclusion of all citizens and could lead to conflicting decision-making (Aylett, 2010). It was found in South Africa that on many occasions community representatives who attended these meetings were closely linked to the governing party in a particular ward, mainly the African National Congress (ANC). This makes them an extension of the government system which could lead to biased views (Piper & Deacon, 2006). Given the history of South Africa, it is vital that citizens feel that they are heard and that local municipalities provide a flow of communication between all stakeholders. This, then, also fosters a healthy relationship between the public and authorities (Kasavel, 2010).

2.4 The importance of trust for role players in public participation and governance

Trust is a concept that has received attention in many areas of environmental management. Trust is a complex concept that could have a broad definition. (Tsang et al., 2009). A sociologist, Sztompka (1999) provided a simple definition of trust as: 'Trust is a bet about the future contingent actions of others.' He stated that on a daily basis, individuals have to make decisions and choices and take risks even though there is uncertainty around the actions of others. Trust has also been linked to expectations, performances from the past, economic conditions and trustworthiness. There are two types of trust, social and political. The first is the trust that citizens have in other citizens and the trust citizens have in society. The second, political trust, may be defined as the way government officials meet the expectations of the citizens (Tsang et al., 2009).

The issues surrounding trust have been a key concern in terms of environmental participation and community engagement. Abbas et al. (2015) argued that trust is a key component to building and maintaining relationships between communities and regulators. Public participation has been criticised for being non-inclusive of all demographics, which has had a ripple effect on trusting that individuals' needs and concerns will be addressed adequately (Aylett, 2010). An important part of participation in any discipline is political trust, as mentioned by Abbas et al. (2015). This means that communities should be able to trust that government officials will meet the expectations of the community (Tsang et al., 2009).

Trust is an essential factor in implementing stakeholder management programs. As the political climate of many countries change, trust in government declines. When trust is lost in organisations or institutions that are responsible to solve environmental challenges, fixing potential problems tends to become more difficult. Rebuilding trust in citizens comes with increasing the public involvement in decision-making (Beierle & Konisky, 2000). Limited participation among stakeholders and the public leads to a limited amount of trust between environmental management agencies and policy makers. During the public participation process, public trust is said to increase when government officials demonstrate a sense of moral code and ethics (Beierle & Konisky, 2000).

When there is an increase in social trust, this can cascade over to political trust as people may feel more confident in authoritative figures being able to influence change, this is known as bottom-

up. In the top-down situation, directors and individuals in political power can spread the trust they have in community groups and by so doing, they act as an agent of the civil organisations. Therefore, it is vital that communities and civil organisations feel a sense of trust by external stakeholders (Fennema & Tillie, 2001). Citizen's trust in government entities is paramount according to Christensen et al. (2011), especially in a democratic country. Through participation, citizens should feel that their decisions have been included and therefore trust is built, which is essential in public participation.

There is a lower level of trust experience by people of colour and by unemployed individuals who are exposed to environmental risks such as air pollution, toxic waste dumps, flooding, drought and pesticides. The SDIB has been plagued by environmental racism since the apartheid racial planning came into effect in the 1950s moving non-white citizens to South Durban to provide labour for neighbouring industries (Jaggernath, 2010). Vissers (2010) found that individuals who are economically and socially disadvantaged reported distrust in government as they are usually excluded from decision-making processes such as public participation. An industrial hub being situated in close proximity to a residential zone, has violated basic human rights compared to an environment that is not harmful to human health, as it leaves individual in the polluted environment vulnerable to environmental risks (Mngoma & Dlamini, 2014). Researchers found a common trend that people of colour express more concern over risks that affect them directly on a daily basis as opposed to white individuals who show concern for issues such as global warming and climate change (Macias, 2015).

2.5 Governance and democracy

Governance ensures that the public sector delivers the necessary goods and services to the public as well as promotes development and therefore has a different meaning to government (Lemos & Agrawal, 2006). Governance goes far beyond the government sector and includes additional actors such as businesses, NGOs and communities (CIPFA, 2013). According to Stockemer (2009), democratic countries experience better governance as there is more freedom offered to its citizens, which can influence the government and ensures responsible decision-making.

Effective governance allows for successful operations within a country. The terms governance and leadership are entwined, meaning they cannot be viewed separately. Governance means those who

are in office are exercising their leadership to make tactical decisions (CIPFA, 2013). Governance includes all structures, processes, accountability and enforcement tools and incentives with the common goal of serving the public (Masuku, 2019). Lemos & Agrawal (2006) stated that environmental governance is known as a set of regulatory processes and mechanisms through which political actors influence environmental decision-making and outcomes. Economic globalisation puts pressure on the receiving environment at local, regional and national level and so complex environmental issues such as ozone depletion, carbon emissions and climate change should not be addressed by a single nation but rather as a global issue.

Good governance is measured by the ability of public spheres to effectively respond to emerging and difficult issues by means of collective collaboration. Often a holistic approach is most suitable so that governments include all spheres of government and other agencies that encompass finance, design, promoting, steering and support. Good governance may mean different things to different individuals based on their culture, past experiences, peer perspective and present values (Rockman & Hahm, 2011). According to Masuku (2019), for good governance practices to exist, there must be efficient use of institutional resources, and this is done by stringent internal controls. It is said that in underdeveloped or developing countries, political instability is a common occurrence which effects good governance as in the case of the SDIB (Rockman & Hahm, 2011).

In South Africa, the functioning of many municipalities has declined since the birth of democracy. This has been an indication of government's failure to enforce regulations and adhere to them. With legislation and policies in place, government is still unable to attend to the social and economic crisis occurring within the country (Carnie, 2020). Tshehla & Wright (2019) explain how air pollution regulations in South Africa are unable to respond to the air pollution catastrophe sweeping the country, stating that political buy-in is needed at both national and local level as well as refocusing on societal needs, specifically environmental harm on the individual's health caused by air pollution. This shows the lack of proper systems in place to encourage and enforce regulations (Masuku, 2019).

The case of the SDIB is an example of poor governance as marginalised groups have endured the consequences of air pollution for decades. One of the key aspects of failing governance was seen when the air quality monitoring units used to identify the states and air quality was dismantled in 2010. The failure of the air quality monitoring stations' ability to provide accurate data has been

attributed to lack of funds. Good governance calls for proactive management and financial control (CIPFA, 2013), which has not been exemplified in the SDIB as state-owned air quality management equipment has been dysfunctional, allowing air quality to deteriorate further (Mngoma, 2014).

2.6 The South Durban Industrial Basin during apartheid

The National Party (NP) introduced apartheid to South Africa in 1948. Apartheid meant that individuals would be separated based on racial groups. One result of the Group Areas Act of 1950 was the forced removal of black South Africans (Barnett & Scott, 2007). This type of development is indicated in Figure 2.2.

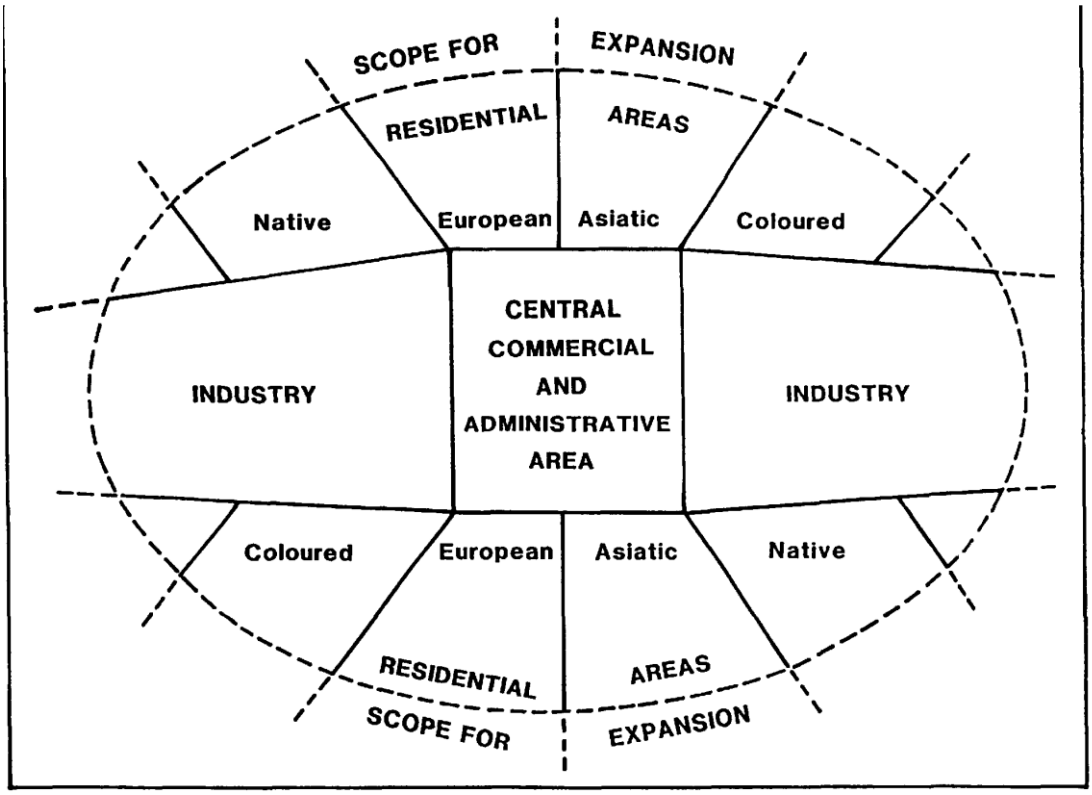

Figure 2.2: The 1950s racial zoning plan (Maharaj, 1997

At that time, heavy petrochemical refineries, a paper mill, waste dumps, fibre plants and hazardous chemical storage facilities occupied this area (Jaggernath, 2010). In the 1950s, the first crude oil refinery was developed in South Africa on a 200-acre plot of land in Wentworth. This location was seen as favourable as it was situated near the Durban harbour and railway lines and labour was

plentiful (Sparks, 2004). Black South Africans were to provide the workforce for this industrial hub as their residing near this industrial area facilitated their easy access to work (Peek, 2002). The apartheid vision resulted in poor working conditions and in addition to black communities suffering from extreme levels of poverty, these communities were subjected to industrial pollutants, something that is often overlooked (Jaggernath, 2010). As indicated in Figure 2.3, because of the zoning strategy of apartheid and particularly as they were placed in townships that were situated adjacent to industrial regions, black South Africans were subjected to unacceptable levels of pollution toxins emanating from the industrial processes.

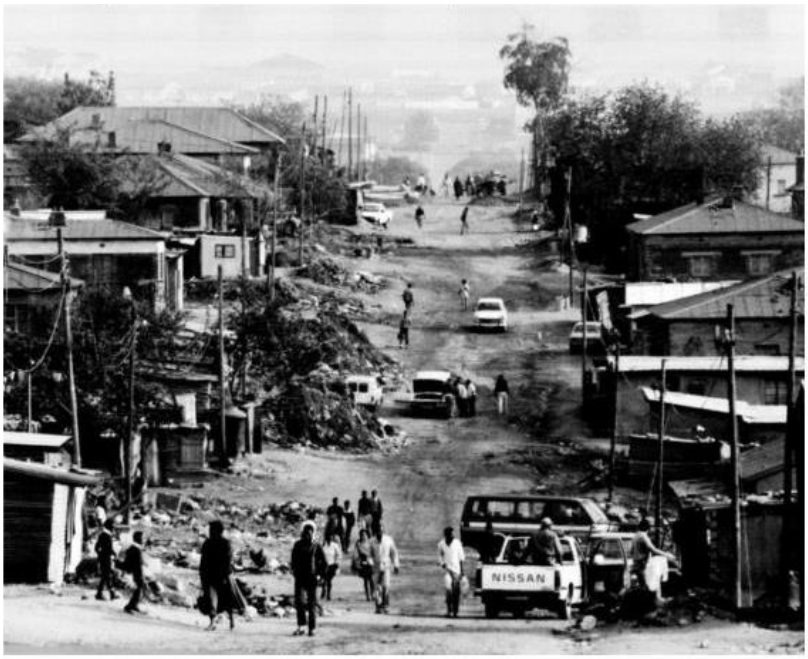

Figure 2.3: Residential areas known as townships (Espresso Stalinist, 2011)

Industrial expansion saw an increase in pollution emissions in the SDIB (Gounden, 2006). A spike in sulphur dioxide (SO_2) emissions was noted between 1958 and 1962 to a peak level of 88 $\mu g/m^3$ following the establishment of the South Durban industries. Another spike was recorded during the 1960s to 1970s when the apartheid government prioritised the supply of oil (refer to 2.4). This was followed by another rise in emissions in the 1980s into the 1990s with SO_2 levels exceeding 80 $\mu g/m^3$. These levels were much higher than the World Health Organization (WHO) proposed air quality guideline for a 24-hour average for SO_2 of 20 $\mu g/m^3$ (WHO, 2010). However, industries were seen as strategic developments and protected by legislation, which meant communities could

not access information relating to air quality (Diab & Motha, 2007). In addition, legislation such as the National Key Points Act of 1980 identified national sites requiring protection from sabotage (National Key Points Act of 1980). This, in effect, protected major petrochemical industries from pollution complaints from local authorities as well as local residents. Therefore, these industries were exempted from complying with environmental pollution laws and it was not until 1997 that government permitted local authorities access to information regarding chemicals stored in the Island View storage facility (groundWork, 2002).

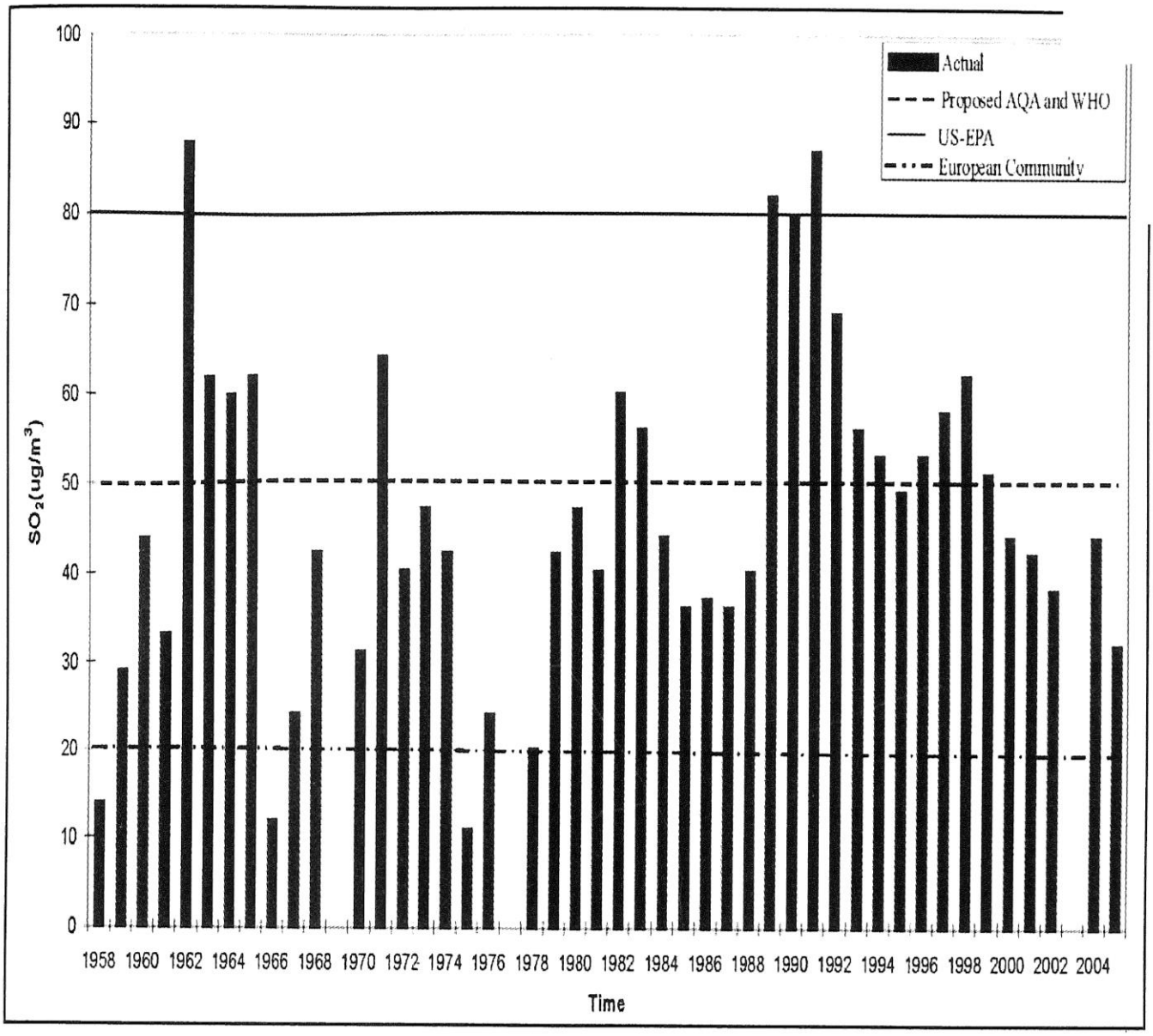

Figure 2.4: The SO_2 concentrations from 1958 to 2004 in the SDIB (Diab & Motha, 2007)

Industrialisation and urbanisation from the 1960s through to 1990 led to general air quality issues such as toxic emissions from refineries, dust fallout and vehicle fumes sweeping across South Africa, especially over the SDIB. However, the Atmospheric Pollution Prevention Act of 1965 (APPA) was deemed to be inadequate in dealing with growing pollution concerns and was criticised for being influenced by racial politics by being more responsive to white resident's

pollution concerns. It ignored factors such as increased dust, vehicle emissions and noise (Kasavel, 2010). The South African Petroleum Refinery (SAPREF) management often received complaints from pollution control officials who provided evidence that SAPREF's abatement technology was not being effectively used (Sparks, 2004). Engen Petroleum was permitted to emit 70 tons of SO_2 a day and SAPREF 50 tons per day (groundWork, 2002). Additionally, there were no regulations for other chemicals such as benzene, carbon dioxide (CO_2) and particulate matter. Citizens regarded this policy as being inappropriate, as the policymaking process was top-down, there was no inclusion of stakeholders and the development of this policy was made without the knowledge of interested parties at national level (Kasavel, 2010). Civil society groups provided a platform the community to vocalise their concerns.

The Merebank Residents Association (MRA) was formed in 1964 to focus on civil issues in the area such as housing and the provision of land (Scott & Barnett, 2009). There was a shift in focus in 1987 and the MRA began to concentrate on environmental issues. This Association had little influence due to legislative restrictions. In 1984 another community-based organisation, the Bluff Amenities Protection Association was formed which then became the Bluff Ratepayers Association (BRA). The BRA included mainly white residents from the Bluff area and focused on the environmental issues regarding refineries' air pollution (Sparks, 2004). They opposed the renewal of industry permits within the SDIB and in the 1990s this CBO presented a memorandum to industry management but received no response (DEA, 2007). During these and subsequent years, the impact that air pollution has had on the community became apparent. Residents living within the SDIB reported that air pollution from local industries caused toxic smells during the day and night and Black soot entered their homes, which cause many residents to develop skin irritations, asthma and other lung complications. Residents noted that smokestacks from industries caused dust and oil deposits to be lodged in their swimming pools, on the walls of their homes and in their clothes when left out to dry (Nurik & Johnson, 1998).

Due to poor urban and spatial planning, apartheid has left deep literal and figurative scars on the environment, which have drastically affected people's health and daily lives (Goebel et al., 2010). After 1994, South Africa became a democracy, the African National Congress (ANC) was announced as the ruling party and the South African Constitution enshrined citizens with the right to freedom of speech, clean water, shelter, food, the right to a safe, sustainable environment that

causes no harm to health (Diab & Motha, 2007). The demand for goods and services began to increase as there was an influx of people moving into cities that began to modernise - the city of Durban had become one of the most industrialised cities in Southern Africa (Leonard & Pelling, 2010). However, individuals in the SDIB began to lose patience with the continuous levels of air pollution in their neighbourhoods.

The new government was then faced with a major challenge as citizens demanded a more effective way to managing the environment (Diab & Motha, 2007). However, to date there is no clear documentation that source emitters and regulatory authorities may use to identify national norms and standards for air quality management in South Africa (Tshehla & Wright, 2019), which allows polluting industries more freedom to expel harmful chemicals into the atmosphere. From 1995, many civil organisations, the SDCEA among them, began to serve as a voice for the residents in the SDIB and act against air pollution risks.

To address South Africa's historical pollution and injustices, the new South African democratic government formulated many new laws and regulations. For example, in 1998 the National Environmental Management Act 107 of 1998 (NEMA) was passed. The purpose of NEMA was to provide a framework for decision-making for government, individuals and industries. The 'polluter pays' principle is a fundamental component of NEMA that has been internationally accepted. This principle forces industries to pay for the pollution they impose on the environment (Fig, 2005). It was hoped that this would encourage large pollution-producing industries to adopt greener production processes (Nzimande, 2012). It is thus useful to explore how governance of environmental laws and regulations have unfolded in the SDIB since democracy.

2.7 Effects of air pollution levels in the SDIB since the new democracy

Since 1994, air pollution levels have continued to be an issue in the SDIB due to increasing levels of chemicals released into the environment by industry, including vehicular emissions. There have been many incidents where refineries and factories have expelled alarming amounts of air pollution into the atmosphere, causing health complications for many individuals (Verweij, 2003). There was a rapid increase in air pollution incidents from 1998 until 2002 that resulted in mass evacuations, hospitalisation and,in some cases, death (groundWork, 2002). High pollution status depends on meteorological conditions such as wind speed and direction, stability, temperature and

topography. Wind speed plays a crucial role in ambient air pollution because it affects dispersion and the distribution of air pollution. A study conducted in 2002 revealed that SO_2 concentrations peaked during winter months, particularly in the SDIB (Diab et al., 2002; Gounden, 2006). Winds that blow from south-southwest to southwest are associated with cold fronts, which exacerbate the undesirable effects of pollutants within the SDIB. Industries in the SDIB also have an average stack height of 50 to 100 metres and this facilitates air pollution being circulated closer to the surface (Duigan & Sivakumar, 2019).

In March 2004, 20 individuals, including children, became ill due to a gas explosion that occurred at the Engen refinery after a power failure. Ambulance services had to be provided at Settlers Primary School in Merebank after many complaints from children and educators of a strong gas smell, itchy eyes and dizziness. A worker at the school became unconscious an hour after this incident (Carnie, 2004). In April 2004 there was a power failure at the SAPREF which resulted in the expulsion of large amounts of black smoke into the air, while in June that year a fire erupted and in October communities complained of a strong gas smell that lasted for two hours after a loud bang was heard from the SAPREF plant (Nkgadima, 2017). The situation continued despite the National Air Quality Act (AQA) being promulgated in 2004 as a control strategy (Naicker et al., 2012). In January 2005, there was yet another fire explosion and complaints of strong gas smell coming from a nearby industry plant.

Results from the Settlers Primary School monitoring station showed that in March to April of 2005, Engen Refinery had 64 SO_2 exceedances when they were allowed only thirty five 10-minute SO_2 exceedances. Exceedances mean that SO_2 concentrations exceed the norms of 57 ppb (parts per billion) for a specific period. A similar situation was discovered when the SDCEA found 21 SO_2 exceedances related to Mondi Paper Mill from May to August 2005, and again 10 exceedances were identified by the SDECA in July to August of 2005 (Pfeffer et al., 2013). As shown in 2.5, in November 2008 a major storage tank fire occurred with flames reaching 60 to 80 metres in height that blocked off many residential roads. Residents close to the fire complained that there has never been an emergency evacuation plan nor a disaster management plan discussed with them (Naidu, 2007). Activist Desmond D'Sa from SDCEA stated that in August 2008 they undertook their own sampling which found 28 pollutants (Refer to Table 2.1) some of which have carcinogenic properties (Corcoran, 2008).

Figure 2.5: Picture of the Engen refinery fire in South Durban in 2007 (Corcoran, 2008)

Table 2.1: Airborne chemicals detected over the SDIB since 1994 (SDCEA, 2018)

Chemicals in the Air in the South Durban Industrial Basin since 1994				
Sulphur Dioxide	Potassium	Carbon monoxide	Octane	Methane
Nitrogen oxide	Sodium	Promethium	Carbon dioxide	Liquid asphaltene
Nitrogen dioxide	Sulphate	Arsenic	Methyl tert-butyl ether	Aluminium oxide
Benzene	Aluminium	Calcium carbonate	Bitumen	Platinum
VOCs	Cadmium	Zinc	Hydrogen Sulphide	Rhodium
Methyl mercaptan	Iron	Sulphuric acid	Poly-aromatic hydrocarbons	Vanadium oxalate

Chemicals in the Air in the South Durban Industrial Basin since 1994				
Ammonia	Lead	Mercury	Liquid petroleum gas	Polyethylene glycol
Nitrate	Manganese	Ammonia	Polyethylene Terephthalate	Isocyanates
Calcium	Flourine	Particulate matter	Crude oil	Polyurethane - polymers
Diethanolamine	Propylene	Methylpropanol	Carbonate	Epoxy resin
Texanol	Coal	Heavy fuel oil	Nitrogen	Ethylene
Ethane	Toluene	O-xylene	Toluene m&p-xylene	Xylene
Ethanol	Tert-amyl methyl ether	Ammonium chloride	Sodium nitrate	Sodium hydroxide

In 2013, Ganges, a southern site located in Merebank, showed exceedances over the guideline of 75 µg/m^3 for more than 24 hours of particulate matter less than 10 microns (PM_{10}) on a total of 37 separate occasions. When compared to the national norms of PM_{10} in 2015, Ganges has six annual exceedances (Duigan & Sivakumar, 2017). In late August of 2019, residents threatened legal action against Safripol fibre plant in the SDIB and complained that they felt ill and experienced vomiting and intense eye and skin burning because of inhaling noxious fumes, particularly polyethylene terephthalate, following a chemical fire (eNCA, 2019). Data collected from the 2019 air quality monitoring reports generated by the eThekwini municipality monitoring station showed that the Ganges, Settlers and Wentworth monitoring stations experienced daily PM_{10} and $PM_{2.5}$ exceedances. A study conducted by Mentz et al. (2018) found that levels of SO_2 and nitrogen oxides (NO_X) were notably higher in children from the southern part of Durban compared to those levels in children from the north of Durban. As mentioned above, the Environmental Outlook Report for 2018 named South Durban as a hotspot for air pollution. In recent years, residents in the area still complain of rashes, itchy throat and nose despite their not being smokers (Pillay, 2018).

Table 2.2: List of air pollution-related accidents in the SDIB (SDCEA, 2017a; Verweij, 2003; Naidoo, 2020)

Date	Industry	Incident	Impact
19 May 1998	SAPREF	Explosion occurs at the alkylation unit	An explosion expelled five tons of hydrogen fluoride into the atmosphere and caused structural damage to buildings and damage to vehicles parked in the SAPREF parking lot
March 2001	SAPREF	Tetra-ethyl lead escapes due to a tear in a rusty storage tank	Exposure to tetra-ethyl lead can cause vomiting, dizziness, headaches and unconsciousness as it evaporates quickly into the atmosphere
5 May 2002	Engen Refinery	Excessive flaring causing toxic emissions expelled into the atmosphere	Children at the Settlers School rushed to hospital due to the toxic smells
17 May 2002	Engen Refinery	Pilot flare fails on start-up releasing raw VOCs into the atmosphere	Residents complained of suffocating due to the toxic smells
21 April 2004	SAPREF	Power failure resulted in a fire	Many areas in South Durban affected and residents had to be relocated due to difficulty in breathing
16 April 2006	Engen refinery	An explosion occurred at the vacuum unit that raged for 20 minutes	Explosion could be felt in Wentworth and Merebank. Residents had to seek refuge at the entrance of the Clairwood Racecourse. A worker was burnt when the fire was being extinguished
11 October 2006	Engen Refinery	An electrical shut down causes fuel gas to be sent into the flares	Residents of Merebank, Treasure Beach, received no assistance regarding their request to evacuate the area
28 October 2006	SAPREF	Fire broke out in the de-sulphurising unit	The smoke from the fire affected the entire South Durban residents. Residents had to evacuate from their homes to the Clairwood racecourse

Date	Industry	Incident	Impact
18 September 2007	Island View Storage Tank	A chemical blaze destroyed six storage containers and damaged another four	One resident died. There was no evacuation plan for residents nor emergency evacuation plan in place. Residents in Bluff sought refuge at community halls and open spaces
19 November 2007	Engen Refinery	A storage tank containing seven million litres of fuel burnt for 57 hours	Residents who evacuated to Clairwood Racecourse experienced difficulty in breathing
10 October 2011	Engen Refinery		Ten children from the Settlers Primary School sent to hospital. Oil droplets and soot were found in the atmosphere which caused itchy and burning eyes, headaches and dizziness
26 March 2015	KZN Oil	Fire broke out next to the Clairwood Racecourse	Workers as well as residents had to be evacuated to an alternative location (Clairwood Racecourse could not be used)
17 April 2015	SAPREF	A fire broke out as a result of an explosion along a fuel pipeline	Two men were killed and one left in critical condition
4 December 2020	Engen Petroleum	An explosion was followed by a fire	Communities from Bluff, Pinetown, Umlazi and Glenwood all heard a loud bang from the refinery and felt a tremor

The air quality in SDIB appears still to be compromised – the SDCEA has reported that high concentration of NO_X, nitrogen dioxide (NO_2) and SO_2 are present within the SDIB to compromise the lung function of many residents (Xolo, 2020). During the nationwide lockdown due to the Coronavirus epidemic in March 2020, residents had to live in lockdown isolation with chemical fumes slowly permeating their homes and lungs (Xolo, 2020). In late 2020, the Merebank community protested against the Southern Wastewater Treatment Works in SDIB as toxic smells were emanating from the treatment centre prevented residents from opening their windows in

summer months, making living conditions intolerable (Mthembu, 2020b). In late 2020, an explosion at the Engen Petroleum Plant (refer to Figure 2.6) also resulted in the burning down and evacuation of several homes while several people were treated for smoke-related injuries (Naidoo, 2020). Accessibility to air pollution monitoring data has also been scarce (Mngadi, 2016). With little or no available pollution data, it makes it difficult to monitor the current state of air quality. Although there were numerous complaints from SDIB residents since 1994 to date (Magubane, 2017; Mthembu, 2019; Pieterse, 2019; Naidoo, 2020), consistent data are not readily available due to a lack of government-regulated monitoring systems (Xolo, 2020).

Figure 2.6: Smoke from a fire at the Engen refinery incident that took place on 4 December 2020 (Magubane, 2021)

2.8 Governance of pollution risks: Apartheid to democracy

2.8.1 Policies and regulations

During the apartheid era, community members started to vocalise their concerns and frustrations regarding air pollution in the SDIB. In 1965 the Atmospheric Pollution Prevention Act no 45 of 1965 (APPA) was introduced. The APPA allowed a Chief Pollution Control Officer to communicate with industries on best practice standards. The legislation was condemned as it failed

to enforce strict penalties, control urban and industrial pollution or protect public health (Diab & Motha, 2007). The APPA issued top-down authorisations from national level that translated inadequately at the local level (Natal, 2007). In 2000, no penalties were issued to SAPREF when the refinery admitted to under reporting SO_2 exceedances for five years. This example demonstrated the weakness of the legislation (Adebayo et al., 2012) and in 2010, the APPA was revoked (DEA, 2017).

With the advent of democratic rule in South Africa, policy changes were needed. The Constitution of the Republic of South Africa was introduced in 1996 after removal of the apartheid regime, giving all citizens freedom of speech and right to a sustainable environment. The National Environmental Management Act (NEMA) was passed in 1998 to incorporate the essence of the South African Constitution (Naicker et al. 2012). This is demonstrated by the incorporation of principles in this Act that promoted sustainable development practices involving management, reduction and minimisation of waste, environmental justice and applying a holistic approach to environmental management (DEA, 2007). This was recognised as best practice that was also used in the United Kingdom (Longhurst et al., 2009).

The White Paper on Integrated Pollution and Waste Management (IPWM) for South Africa was drafted in 2000. The paper consisted of a policy on pollution prevention, waste minimisation, impact management and remediation, which symbolised a breakthrough in South Africa's pollution control legislation. The IPWM policy addressed issues to reduce air pollution and waste problems and apply integrated environmental management. One of the most important aspects of the IPWM is achieving division of policy and responsibility in pollution and waste control (Kotzé, 2006). The policy aims to include participation of all spheres of government between authorities and corporations. Updating policy was imperative to aligning South Africa's approach to environmental management (DEA, 2009).

The National Environmental Management Air Quality Act (NEMA: AQA) promulgated in 2004 is a set of guidelines and principles that aid air pollution control and include ambient monitoring. It was developed because the APPA of 1965 was outdated. The AQA provides clear guidelines as to acceptable levels of environmental air quality (Tshehla & Wright, 2019) and represented a paradigm shift in air quality management that is continuously being updated (refer to Figure 2.7). It envisioned a shift from having limited resources to control air pollution to limiting air pollution

through imposing regulations and laws (DEA, 2007). The AQA has been improved since inception to incorporate sustainability practices through publication of the National Framework. The National Framework is an implementation plan that can be used in conjunction with the AQA. It aids all spheres of government by detailing relevant requirements, deadlines and responsibilities (Republic of South Africa, 2008).

In order to achieve air quality management, other mechanisms were needed to meet the standard. These include emission inventories, ambient air monitoring, dispersion modelling and emission reduction methods (Wright & Diab, 2011). One of the mechanisms used to do this is the Atmospheric Emission Licence (AEL), which is a regulatory framework, implemented as part of the AQA. The AEL aims to manage air pollution sources, promote best practice and abatement technologies and details emission limits for emitters (Naicker et al., 2012). These AELs are compulsory requirements under the AQA for activities that result in significant atmospheric emissions and trigger a listed activity under section 24(2) and 24D of the NEMA (WKC, 2020).

To ensure monitoring and enforcement of the AQA and that other environmental regulations are applied, environmental management inspectors are employed in each province. To ensure capacity building, reduce skills shortage, and ensure sound monitoring, the DEAT has increased environmental management inspectors from 34 in 2015 to 68 in 2017 (DEA, 2018). There are, however, some challenges in implementing the act. The AQA and the Municipal Systems Act No. 32 of 2000 stipulate that each municipality should have an Air Quality Management Plan that includes resource allocation - not effectively implemented in KZN municipalities that include the SDIB (Tshehla & Wright, 2019). A challenge that local government experiences with implementing the AQA is funding necessary to maintain monitoring equipment, train staff for technical duties and obtain samples. When funding is limited, it makes it difficult for the AQA to produce the necessary results (Naicker et al., 2012). The Department of Environmental Affairs, Forestry and Fisheries was criticised in 2019 for the limit increase of SO_2 to 1000/Nm^3 particularly as there were calls to reduce SO_2 emission limits to 500/Nm^3 (Xolo, 2020). This was also done without consultation with the public, which is in contravention to the law (Bega, 2019).

Figure 2.7: Timeline showing evolution of laws in South Africa that influenced air pollution regulations (Naicker et al., 2012)

2.8.2 Local government interventions

Local government during apartheid also played a role in the formation of many committees (Diab & Motha, 2007). The Clean Air Consultative Committee was formed and the formation of the Sulphur Dioxide Technical Liaison Committee followed during the late 1960s. This committee represented local and national government and the top three highest SO_2-polluting industries in the SDIB but excluded local communities and civil society. The Sulphur Dioxide Technical Liaison Committee became the South Durban Sulphur Steering Committee in 1994 due to the need for more precise data collection. This committee was responsible for modelling and monitoring of air pollution in the SDIB (Department of Environmental Affairs and Tourism [DEAT], 2007). This was an all-encompassing committee representing all spheres of government, industry and community members (SDCEA). Monitoring stations eventually were set up at Settlers Primary School in 2000 after the locations were changed many times (DEA, 2007).

The acceptance of Local Agenda 21 (LA21) in 1994 was another initiative by local government. The LA21 was a community-wide effort to establish an action plan through participation for environmental protection, community wellbeing and economic prosperity in a local jurisdiction (Nurudin et al., 2016). The LA21 was integrated into a State of the Environment Report which was published in 1996. There were two phases to this agenda. This first phase was the State of the Environment Report (SoE) which declared the SDIB as a hotspot which needed immediate attention. Then, the South Durban SEA was initiated by local government and undertaken by the CSIR. The final outcomes of the South Durban SEA were that the development of petrochemical industries would be the best development path for the future with the possible relocation of

residents. This was not accepted by the SDECA and protest rallies began to increase (Naicker et al., 2012).

After the completion of the SEA in 1999, many articles were published in local newspapers that highlighted the health impacts caused by industrial development in the SDIB. As a result, the SDIB was named 'Cancer Valley' and gained even more media attention which then prompted the Minister of Environmental Affairs to establish a new plan in November 2000, the Multi-Point Plan (MPP). The MPP was developed as a result of community activism and outrage against high levels of air pollution in the SDIB. The MPP formed the basis for the development of the AQA (No. 39 of 2004) (Kasavel, 2010).

The MPP was a participatory plan developed in 2000 by the eThekwini municipality in conjunction with community members through their activism and included representatives from industry, with overall aims to try and reduce air pollution and health risks. The MPP was one of the first of its kind to be developed in South Africa as a five-year plan to collaborate with all spheres of government, industry and community to improve the air quality. The objectives of the plan were to integrate decision-making for pollution management at local government level, reduce air pollution and improve quality of life (Naidoo et al., 2007). The plan was split into two with R9m provided to establish an air monitoring network and R7m provided for a health and safety plan. There were also 12 new air quality monitoring stations (refer to Figure 2.8) set up around the SDIB; five of these were meteorological stations and three were background stations. These monitoring stations were to generate information on how much air pollution was produced in a particular area, identify where the most significant sources originated and to measure the air quality against compliance standards (Guastella & Knudsen, 2007; groundWork, 2014). Priority pollutants such as SO_2, PM_{10}, NO_X, ozone (O_3) and CO were monitored. The expected benefits of the MPP were to improve the city of Durban, reduce air pollution levels, promote businesses and serve as a template for solving air pollution problems in other parts of South Africa (DEA, 2007).

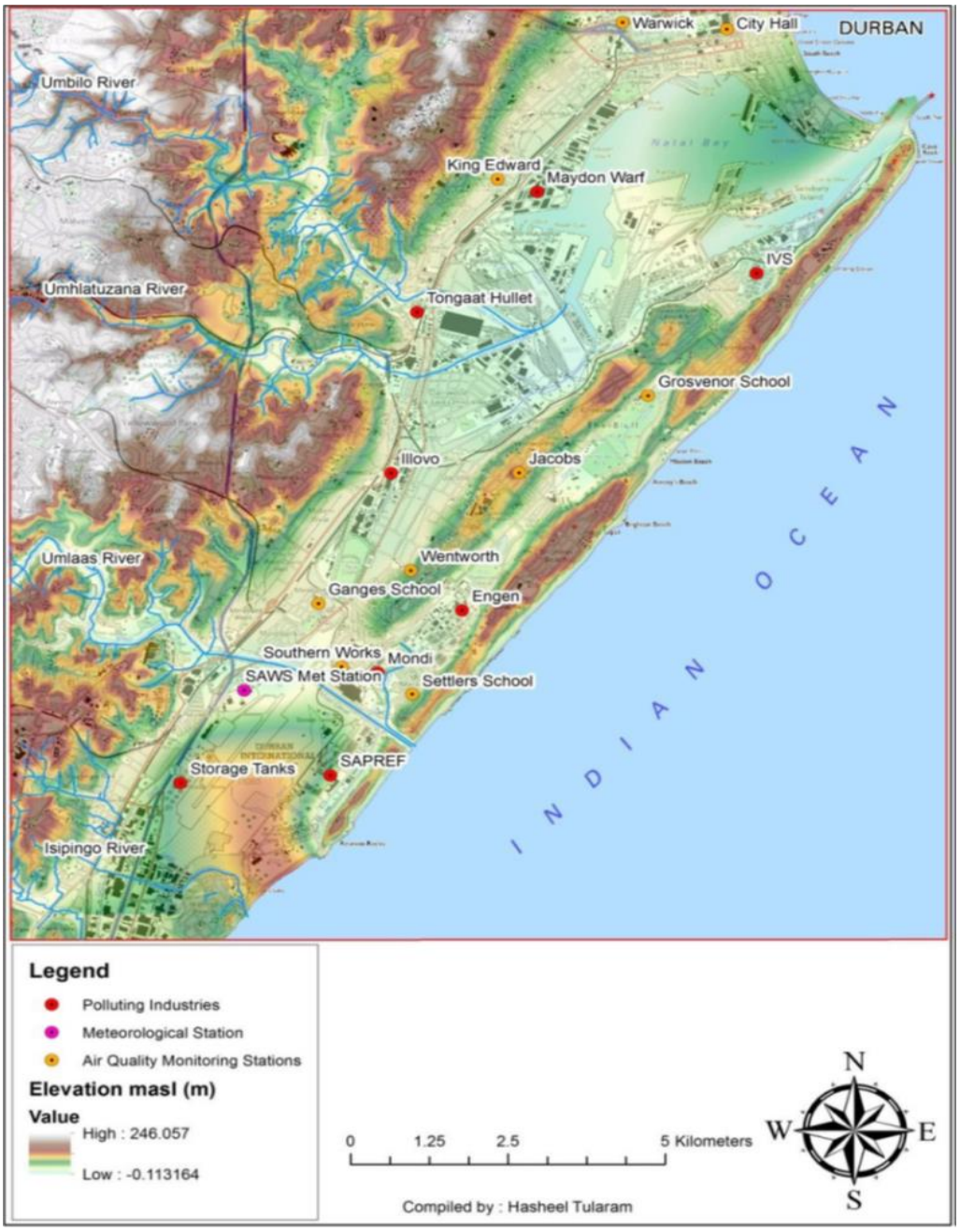

Figure 2.8: Topography of South Durban Basin and air quality monitoring stations (Tularam, 2013)

Results showed that the main contributors to air pollution included industrial activities, transport, domestic fuel burning and biomass burning. In terms of SO_2 emissions, there has been a 40% reduction within the SDIB (Chetty, 2005). An agreement made between the SDCEA and an

industry in 1998 reduced SO_2 emissions by 65%. Another industrial company reduced its SO_2 permit in 2003 from 50 tons per day to 20 tons per day in 2004 (DEA, 2007).

Although air pollution data were intended to be collected from various stations, not all functioned to full capacity. In addition, the gathered information did not prompt any legislation change for polluting companies. The SO_2 data was available via the website but more interpretation was needed for communities to understand and draw conclusions from the numbers. There were also suspicious data quality control checks which questioned the integrity of the system (DEA, 2007). Results from the monitoring stations also revealed that five stations were producing excessive levels of air pollution. However, there were no interventions or mitigation measures for the affected areas and community members felt as though they were excluded and there was little collaboration when it came to the decision-making process. Results showed that the process was not democratically inclusive and failed to ultimately address the problem (Kasavel, 2010).

There was a dismantling of the pollution control and risk management unit which lead to the resignation of the eThekwini's head member in 2010. This meant that the air quality monitoring also collapsed as staff moved to other departments which were seen at the time as being more important. Thus, the air quality monitoring system failed to produce the data that it was intended to generate, deeming the project unsuccessful in controlling air pollution (groundWork, 2014). Only three of the 15 monitoring stations were functional, and data were not provided for some years (Mngadi, 2019). There were and still are no annual stack monitoring and annual reports being generated. During the time of the MPP, benzene levels were within the WHO guideline limits of 10 $\mu g/m^3$ at all monitoring stations. By 2010, after the MPP had fallen away, the benzene levels exceeded the WHO guidelines. The highest concentrations were noted at Settlers Primary School monitoring station (DEA, 2007). Numerous air pollution-related complaints started surfacing after the dismantling of the MPP with SDIB residents complaining of black soot covering everything in their homes. The South African air pollution levels were higher than world standards (Hanekom, 2013).

2.9 Industry interventions

In 1958 industries heard the complaints of the community members and realised it was time to implement mitigation measures. A sulphur recovery unit was installed at a refinery in 1958 and

additional units added in 1974 and 1993. These units were used to eliminate high sulphur concentrations being emitted from fuel. A similar industry followed suit as they saw the need to implement mitigation measures and the installation of the recovery plant reduced SO_2 by 45% (DEA, 2007). In December 1998 other industries also converted from heavy fuel oil to fuel gas. In 2000 an oil boiler was converted to a gas boiler at an industry within the SDIB (DEA, 2007). There was an Environmental Improvement Programme agreement between a local refinery and the SDCEA in 1998. This agreement led to a 65% reduction in SO_2 emissions (DEA, 2007). With President Mandela visiting a refinery due to upcoming expansions, industries used this an opportunity to improve public relations and show consultative arrangements (Chetty, 2005).

Industries then met with members of the local community, and this marked the first step in the formation of the Community Awareness Environmental Response (CAER) Committee. This committee was established to promote communication between community members and industry. No legally binding regulations were to be passed by the formation of this committee. There were a few challenges as industries chose representative consultants of their own who set the agenda of meetings. Community members opposed this and wanted to have full access to the meeting's agenda (eThekwini Municipality, 2006).

The introduction of democracy in 1994 focussed the need to update environmental management. An important component of pollution control was to incorporate section 24 of the Constitution in 1996. A holistic approach was adopted in 1998 called the NEMA that informed decision-making related to environmental issues. Subsequently, the NEMA: AQA was developed in 2005 and encompassed air quality management as a control measure. The AQA allowed local authorities to be included in air pollution control matters. Hereby, industries had to implement on-site air pollution monitoring to evaluate the quality of air being expelled as a result of their operations. The SAPREF pledged to reduce emissions to 37 tons per day and to spend over R10m in doing so. They also announced that they would allow independent air quality specialists chosen by the community to test the air quality (Robinson, 2000). Engen have also begun in-house monitoring of certain pollutants such as SO_2, NO_X, and benzene, toluene and xylene (BTEX) (Engen, 2019; SAPREF, 2018).

2.10 Civil society and the South Durban Community Environmental Alliance initiatives to combat air pollution in the new democracy

By highlighting challenges that residents face and the health risks surrounding air pollution, civil society has played a crucial role in the struggle against environmental racism[10] in the SDIB. It is therefore important to examine the various initiatives that civil society have presented to address air pollution challenges in the SDIB since 1994.

Earlier initiatives taken by organisations such as the MRA and Wentworth Development Forum (WDF), a civic organisation that includes residents from Wentworth and focused on housing issues, included using the Community Awareness and Emergency Response (CAER) initiative set up by Engen Petroleum in response to the democratic elections in 1994 to urge industries to reduce their emissions (Sparks, 2004). In 1995, through persistent pressure placed on industry, civil society developed the Good Neighbourhood Agreement (DEA, 2007). This agreement set out to implement black economic empowerment (BEE), make plans to reduce emissions of sulphur and carbon and reduce production of toxic chemicals, implement workplace monitoring, provide medical treatment for those affected by air pollution, encourage energy conservation, promote environmental planning and encourage industries to release emission information. Industries, however, refused to make any legally binding commitments (Naidoo et al., 2007).

In late March 1995, President Nelson Mandela attended the ribbon cutting ceremony marking the expansion of the Engen Petroleum Refinery. He was greeted by protest action organised by the WDF against the expansion due to air pollution from the refinery (groundWork, 2014). The Deputy Minister of Environmental Affairs was then ordered to convene a meeting, known as the South Durban Multi-Stakeholder Environmental Management Meeting, between civil organisations and refinery representatives (Sparks, 2004). This led to the formation of the SDCEA (groundWork, 2014). In 1997, Engen Petroleum finally succumbed to the intense pressure put on it by local civil

[10] Environmental racism is a term that is used to describe the way minority group neighbourhoods, in particular people of colour are burdened with a disproportionately number of hazardous conditions such as air pollution, toxic waste dumps, foul smells and other environmental relates issues that lead to a poorer quality of life (Jaggernath, 2010).

society groups such as the MRA, WDF and the newly formed SDCEA and agreed to reduce their SO_2 emissions (Sparks, 2004).

2.10.1 The SDCEA initiatives to address air pollution

The SDCEA is the largest and most influential environmental CBO in South Africa, comprising 16 civil and residential organisations (SDCEA, 2017b). It is useful here to briefly discuss the formation of this organisation before exploring how it has acted against air pollution risks. The SDCEA was founded in 1997, after then President Nelson Mandela listened to protests outside the Engen Petroleum Refinery from residents who complained about air pollution issues and impacts on community health. The aim of this organisation was to join all racial groups to present a coherent voice to address environmental issues (Von Schnitzler, 2016). The SDCEA focuses on challenging government and local officials on the environmental issues facing the South Durban Community and on current and future developments that may affect the environment. The SDCEA has been successful for numerous reasons:

- It advocates strategies that are aimed at air pollution impacts on the health of residents and includes plans to relocate residents
- It is an organisation that actively seeks answers
- It is vocal about its causes
- It continues to research and report on environmental incidents and accidents in the South Durban region (Scott et al., 2009).

The SDCEA focuses on using community advocacy and participation to bring awareness to environmental and health issues. The organisation attributes its success to strength in numbers and diversity. It uses the continuous accidents and incidents that occur within industries in the SDIB to gain credibility and to urge all spheres of government to make changes to the laws that control pollution (SDCEA, 2017). The SDCEA has used community geographical information systems to track and locate community complaints and sources of air pollution incidents within the SDIB (Pfeffer et al., 2013).

In 1998, shortly after the SDCEA was formed, the organisation embarked on an initiative with Ecoserv, an environmental specialist company to identify 47 possible polluting industries situated

in the SDIB (Niranjan, 2005). The SDCEA used this type of information to continuously place pressure on Engen Petroleum and other polluting industries to reduce their pollution output. Through this pressure, Engen Petroleum in 1999 signed one of the first voluntary agreements between an industry and civil society called the Engen Refinery Complex Environmental Improvement Programme, an agreement to reduce its SO_2 pollution (Sparks, 2004). In 1999, the SDCEA contested the Strategic Environmental Assessment (SEA)[11] whose purpose was to look at relocating residents of South Durban to make way for industrial development. However, the SEA was not inclusive of all communities and did not acknowledge community impacts and so was seen as weak and did not adequately address the concerns of local residents. This is one of the reasons why the SEA report was not acted upon by the local municipality (Scott & Barnett, 2009).

In 2000, the SDCEA in collaboration with groundWork and Communities for Better Environment launched their air quality monitoring campaign for the SDIB known as the Bucket Brigade System. This system was developed in the United States by community organisations to acquire more scientific data on air pollution (groundWork, 2014). The Bucket Brigade System takes samples of the air at a given time by trapping the air in a Teflon bag also known as the 'grab' method (refer to Figure 2.9). This is a simple way for the community to test air quality (Vissers, 2010) as after the bags with an air sample are sent to laboratories for testing. This method provides an indication of what chemicals are present in the air at a specific time and location (groundWork, 2003).

The Bucket Brigade System was implemented in 2000 at two adjacent refineries, Engen Petroleum and SAPREF (Jaggernath, 2010) and showed concerning levels of SO_2, benzene, NO_X, 2-butanone (methyl ethyl ketone), carbon disulphide, ethylbenzene, methylene chloride, m& p-xylene and toluene which are all known carcinogens (groundWork, 2002). The results from the Bucket Brigade sampling showed that benzene levels were 14 to 15 times higher than guidelines issued by the WHO (Mersham, 2016). Air samples were taken from a local primary school in the SDIB, which showed that children were daily exposed to high levels of pollution. Further testing was done by industries, which showed even higher levels of toxins in the air (Kasavel, 2010). Data collected by the SDCEA were used on numerous media platforms, which allowed the organisation

[11] The local municipality commissioned the Strategic Environmental Assessment to promote sustainability and protect the rights of people and the environment (Scott & Barnett, 2009).

to gain support and momentum from the local communities and brought awareness to the challenges faced by communities in the SDIB (Roemer-Mahler, 2006). Therefore, the Bucket Brigade System helped mobilise activism surrounding air pollution in South Africa. The work of the Bucket Brigade System, according to Desmond D'Sa from SDCEA, is what brought about the Multi-Point Plan (MPP) (Kasavel, 2010). Following the results from the Bucket Brigade System, the SDCEA led mass protest actions in Durban that included affected residents and schoolchildren (groundWork, 2014). This underscores the important role that community mobilisation plays in reducing air pollution.

Figure 2.9: Members of civil society conducting the Bucket Brigade test (groundWork 2014:21)

The SDCEA has used community protests, environmental education, media articles, and engaged directly with industry and monitoring programs to bring about changes surrounding air pollution. In addition, the SDCEA has engaged formally and informally with government to present the air quality data and to persuade government to critically analyse the data received from industry. Through continuous activism and community participation the SDCEA played an important role in shaping air quality legislation (Roemer-Mahler, 2006).

The SDCEA continued their activism in 2002 when they opposed Mondi Paper Mills' attempt to develop a multi-fuel boiler system. This campaign received much media support and attention

from the community protesting at the gates of Mondi Paper Mill in South Durban (Newman, 2002). The SDCEA claimed that Mondi's practices were a continuation of the apartheid era regulations – this won them the support of the Global Alliance for Incinerator Alternative's Appeal[12] and local support from the MRA. In 2004, groundWork also submitted an appeal to Mondi, stating their concerns and strong opposition to the development. This was unsuccessful, despite mass protest action called upon by groundWork, SDCEA's petition gaining over 5000 signatures and public appeals and resistance from international organisations. Mondi still operates their multi-fuel boiler that was completed in 2006 (Schils, 2011).

One of the important derivatives from the MPP was to conduct a study to understand the health impacts on residents in the SDIB (DEA, 2007). It was then that external civil society, the Department of Environmental Health Science at The University of Michigan and The Centre for Occupational and Environmental Health at The University of KwaZulu-Natal embarked on an epidemiology health study with 400 schoolchildren. The study results showed that schoolchildren in South Durban had a higher prevalence of asthma and other respiratory illnesses compared to children residing in North Durban (Naidoo et al., 2006). This study focussed awareness on air pollution challenges in the SDIB and provided scientific data to back up the complaints and protests by civil society (DEA, 2007). In order to attain a better understanding of the health impacts of air pollution, the SDCEA has also reached out to schools and clinics to attain records from sick children and adults (Roemer-Mahler, 2006). The SDCEA also launched a cancer registry where residents can report their illness to the SDCEA (Chiniah, 2019). They also held a cancer walk and encouraged residents to join in as these initiatives were hoped to promote a 24-hour cancer and asthma clinic in South Durban (Hanekom, 2017)

In October 2020, a youth-led protest of about 300 individuals took place. This protest was led by the SDCEA and included groundWork, Active Citizens Movement, African Climate Reality Project, African Solidarity Network, among others. The youth group embarked on a peaceful protest from King Dinizulu Park to the Durban City Hall to deliver a memorandum to the mayor's office and create awareness of the air pollution challenges facing the SDIB. Included in the

[12] Global Alliance for Incinerator Appeal is made up of over eight-hundred non-governmental organizations in ninety countries that advocate for a toxic free environment free from incineration (Schils, 2011).

memorandum was a request that government move towards renewable energy, hold polluting industries accountable for their emissions and put people's lives before profits (Mthembu, 2020a).

2.11 Conclusions

From the literature above, it is evident that the South African government and industries have tried to take steps to reduce air pollution risks, although this has been limited due to poor enforcement and governance. Organisations like the SDCEA and groundWork have been instrumental in bringing about change and have helped to be the voice for citizens who cannot always vocalise their grievances. This has facilitated and encouraged government departments and industries to make a change. However, the SDIB community still faces a huge task when it comes to mitigating air pollution risks. Air pollution remains one of the main challenges facing the SDIB community. The literature review clearly outlines the important role that participation plays in addressing environmental challenges, and how good governance is an important feature in addressing air pollution. The need for more stringent regulations to address air pollution risks is also highlighted in this section. The results from this research will identify directly from stakeholders what has been done from industry, local government and civil society since 1994. With this information, the challenges that exist can be addressed to efficiently focus on air pollution challenges, as well as enable all citizens to work together to try and continue efforts to reduce air pollution risks.

CHAPTER 3
METHODOLOGY

3.1 Introduction

South Durban has been impacted by environmental consequences due to being located within an industrial hub known as the South Durban Industrial Basin (SDIB) since the late 1990s (Leonard & Lidskog, 2020). This has caused air pollution levels to increase to a level that negatively affected human health for decades (Jaggernath, 2010). In the post-apartheid air, pollution still remains a risk factor in the SDIB. The main objectives of this study were to explore what initiatives were employed by civil society, local government and industry to address air pollution as well as discover how effective these initiatives have been. Secondly, an attempt was made to understand the local governance towards addressing air pollution in the SDIB and if polluting industries are held accountable. Lastly, the research aimed to understand how civil society, local government and industry have worked collectively to act against air pollution and what challenges they have encountered.

Section 3.2 will outline the methods used to conduct the research. This will include the tools used together with the methodological approach, the types of interviews conducted and techniques employed to engage with participants. These sections will follow with the interview techniques used, how data were collected and analysed in order to answer the research questions, followed by the limitations of the study. In section 3.3 ethical considerations are outlined.

3.2 Research methodology

Research can be categorised into two approaches, quantitative and qualitative research. Quantitative methods are expressed by using numbers and figures while qualitative research is expressed by using words and personal engagement with respondents (Eyisi, 2016). Quantitative methods were not beneficial for this study as quantitative questions are closed-ended, participants do not influence the questions that the researcher may ask and observations are structured. These characteristics do not allow flexibility, ability to describe individual experiences and participants' input (Litchman, 2006). The purpose of qualitative research is to make discoveries, explore opinions and explain or predict a phenomenon (Johnson & Christensen, 2008).

Qualitative research is based, critical andinterpretivist paradigms (Khan, 2014). A critical paradigm is focused on inequality, social change and power; an interpretivist paradigm means that a single phenomenon could have many interpretations; and a positivist paradigm means that human behaviour could be understood through observation (Ryan, 2018). Qualitative research is conducted to understand and interpret social interactions using words, numbers and images to describe a phenomenon (Litchman, 2006). A qualitative approach is regarded as unique based on the retrieval of information. By providing non numerical primary data such as pictures and words, this method is seen as suitable for providing factual information. A qualitative approach covers a wide range of the phenomenon and studies human behaviours such as reasoning, thoughts and holistic interactions (Eyisi, 2016). The qualitative approach allows the researcher to collect multidimensional descriptions of individual's experiences. These factors support why a qualitative approach was used for the current research as it draws on individual's experiences, perceptions and challenges relating to the research problem (Mack, 2005). By using the qualitative approach stakeholders were free to express their own experiences and understanding of air quality challenges in the SDIB and enabled the researcher to gain a deeper sense of understanding of the research problem.

3.3 Research methods and tools

3.3.1 Recruiting participants

This study focused on stakeholders from government, industry and civil society. Key stakeholders were contacted such as government officials from the eThekwini Municipality local government, Department of Environmental Affairs (DEA) environmental officers, engineers, and safety and health officers from the South African Petroleum Refinery (SAPREF), Sappi paper mill, a water treatment plant, Eskom, Engen Petroleum as well as key personnel from community-based organisations (CBOs) and global non-profit organisations (NPOs) based within the SDIB who deal with environmental injustice issues.

The CBOs and industrial officials were contacted through electronic mail or telephonically to receive consent to take part in an interview. Individuals chosen from civil society consisted of an environmental health campaigner from groundWork, environmental officers from the South Durban Community Environmental Alliance (SDCEA), and Greenpeace SA, a chairman of the

Anti-Pollution Watchdog non-profit organisation and Merebank Residents' Association (MRA) as well as volunteers and educators within the SDIB who had first-hand experience with air pollution-related struggles. The head of the Occupational and Environmental Health department at the University of KwaZulu-Natal was contacted but declined the interview. Environmental officers and engineers were interviewed from SAPREF, Sappi paper mill, Eskom and a local water treatment plant in the SDIB as they could give an in-depth understanding of past air pollution trends, mitigating measures actively employed within industries and challenges that were experienced within industries to reduce air pollution. Requests to conduct interviews were also sent to Mondi paper mill and Engen Petroleum but no response was received after two follow-up calls. It was important to undertake purposive sampling with individuals unequivocally related to the research topic to extract as much valuable information from the field to answer the research questions (Tongco, 2007).

Government protocols (gatekeeper protocols) were followed to receive consent from government officials for an interview. Gatekeeper protocols entailed sending electronic documentation of an approved proposal to Mr Collin Pillay at the eThekwini municipality, ethical clearance, current registration and permission to conduct research from the College of Agriculture and Environmental Science. The research intended to interview various government officers including the eThekwini senior manager for pollution control and the Atmospheric Emission Licensing officer. It must be noted that officials ultimately did not respond to communications made, which led to government stakeholders being under represented. It was surprising that the eThekwini senior manager for pollution control responsible for the SDIB noted that this research fell outside the scope of the informants' work and the response is questionable.

In total 35 informants were contacted, permission was granted for 13 respondents, eight from civil organisations, four from industry and one participant from local government. A letter of consent was sent to each informant to be signed when telephonic interviews were conducted and the consent form was signed on the day of the interview with face-to-face informants. Telephonic interviews were conducted due to the Coronavirus epidemic outbreak in South Africa that led to a nationwide lockdown from 26 March 2020. This lockdown only permitted essential workers to leave their homes and prohibited any social gatherings and therefore no face-to-face interviews were conducted for this study from this time. Semi-structured interviews were conducted with each

informant. **Table 3.1** shows a summary of the informants, the dates upon which they were interviewed and their position held within their organisation. Due to strict confidentiality their names could not be mentioned.

Table 3.1: Informant data

Participant	Organisation	Position Held	Date interviewed
A	MRA	Secretary	28 February 2020 & 13 August 2020
B	Settlers Primary School	Educator	20 March 2020
C	Green Peace	Durban Volunteer	30 March 2020
D	MRA	Council member	16 April 2020
E	groundwork	Environmental Health Campaign manager	19 March 2020
F	Anti-pollution Watch Dog NPO	Chair of a CBO	6 April 2020 & 25 August 2020
G	SDCEA	Air Quality/GIS & Youth Development Officer	28 February 2020
H	SDCEA	SDCEA Environmental Project Officer	22 May 2020
I	Eskom Holdings	Environmental Manager	28 February 2020
J	SAPREF	Environmental Manager /engineer	24 March 2020
K	Sappi	Environmental Officer	22 April 2020
L	Veolia Water Technologies	Environmental Engineer	23 March 2020
M	Democratic Alliance	Councillor	28 March 2020

Although 30 participants were contacted, only 13 agreed to be interviewed. Potential participants contacted from Mondi and Engen Petroleum initially agreed to conduct the interview, but permission was required from senior management of the respective industry, no response was

provided to the researcher from either potential participant after this stage. Securing interviews with the government sector was challenging as although careful consideration was made to only contact individuals within the local government who had a position within air quality/management or control, each contacted potential participant handed the interview over to a colleague stating that the questions did not lie within their description of work. Recruiting participants from local and international CBOs and community activists proved to be easier than securing interviews from the private sector. Although numerous attempts were made to contact individuals from government and private organisations, ultimately interviews could not be secured. The Coronavirus pandemic exacerbated communication challenges.

3.3.2 Interview techniques

Various in-depth semi-structured interviews were conducted with participants from local government, industry and civil society organisations. The interview process is discussed in detail below starting with the semi-structured and face-to-face interviews followed by one-on-one interviews.

3.3.3 Semi-structured interviews

Semi-structured interviews consisted of a mix of structured and unstructured questions. The use of semi-structured questions assists the interviewer with questioning each participant and allowed the interviewer the opportunity to stay on topic while still sanctioning flexibility (Opie, 2019). Semi-structured interviews are focused but enable a conversational two-way communication between the interviewer and the participant that allows rich data to be collected (Drew, 2014; Pathak & Intratat, 2012). An advantage of using semi-structured interviews is that the researcher may also collect additional information relating to the research topic. Due to the open nature of semi-structured interviews, new information was discovered, and thus new information could be added to the study that was of relevance. This enriched the quality of the research. Three sets of interview guidelines were used for each group being interviewed (Appendix A, B and C).

3.3.3.1 Face-to-face interviews

Face-to-face interviews are beneficial as they allow a critical discussion and the development of rapport and a natural encounter between the researcher and the participant (Irvine et al., 2013). According to Shuy (2003), 'face-to-face interaction compels more small talk, politeness routines,

joking, nonverbal communication, and allows people to fully express their humanity'. Face-to-face interviews were most suitable for this study as they allowed the interviewer to have an in-depth conversation and to clear up uncertainties and observe any nonverbal interactions from the informant (Khan, 2014). Face-to-face interviews are advantageous for this type of research as social cues can be noted, such as tone of voice, body language and intonation.

3.3.3.2 One-on-one interviews

One-on-one interviews were used to guarantee that detailed information was gathered. In a one-on-one interview the respondent may feel at liberty to answer openly opposed to a group interview when one person could overshadow other participants. There could also be bias from a group interview, whereas in a one-on-one interview any thoughts good or bad will not influence the next participant's answers (Palmerino, 2006). All interviews were conducted on a one-on-one basis either telephonically or face to face.

3.3.4 Snowballing sample method

Non-probability sampling methods were used for the purpose of this research project. Non-probability sampling involves using samples that are available to the researcher at a given time (Showkat and Parveen, 2017). When using the snowball sampling method all members of the population do not get a chance to participate in the study as mentioned above. There are many types of non-probability sampling methods such as quota sampling, convenience sampling, self-selection sampling and snowball sampling. The snowballing technique was used for this study. Snowballing is also known as accidental sampling, whereby interviews were conducted at the researcher's convenience. This method is used when accessing participants is challenging. This method is commonly used as it is cost effective and convenient for the researcher as additional respondents are usually recruited through this method (Acharya et al., 2013). By using this technique existing participants tend to recruit other subjects who will be relevant to the research topic. Participants were recruited until data saturation has been achieved, whereby the same answers are received from different participants (Naderifar et al., 2017).

The researcher first contacted local civic organisations within the SDIB for interviews, from there participants from these organisations referred the researcher to other potential participants from government who could provide relevant information. From there the researcher was referred to

multiple potential participants from industry such as environmental officers and engineers who were then contacted.

3.3.5 Drafting semi-structured questions

In the process of drawing up questions for the semi-structured questionnaire, special attention was paid to the research problem, research questions and ultimately the objectives of the study. It was important that the questions did not result in one-word answers. The aim of the semi-structured interview was to probe participants' answers and allow them to explore each question deeply. Careful consideration was taken to ask questions that did not require participants to name any industries or companies, which could lead to respondents feeling uncomfortable. The questions asked used words and language that was understandable by all races, ages and education levels. The interviews were conducted in English and no challenges were encountered as all participants were well versed in the language.

Three sets of questions were drawn up for each stakeholder group, namely local government, industry and community, presented as Appendices A, B and C, respectively. Most of the questions were similar for each stakeholder group. All three sets of questions dealt with regulations and compliance from industry and government. This was addressed by questioning stakeholders on the involvement from industry and political buy-in. Questions also focused on their opinions on how air pollution affects the residents, collaboration with the three spheres, methods already used to address air pollution and recommendations for government and industry. Although all three groups of respondents were asked similar questions, very different responses were provided.

3.3.6 Data Collection tools

The research questions and objectives generally inform the type of tools needed to collect data (Canals, 2017). For the purpose of the current study a digital recorder was used to ensure that all important information mentioned was recorded and was then replayed for data analytic purposes. The use of a digital recorder allowed the interviewer to focus on the participants' answers rather than writing down each answer. This ensured that accurate information was collected (Sekaran & Bougie, 2013). The interviewer also had a diary and took notes of important points provided by the participant. Utilising a digital recorder for each interview facilitates movement between

interviews when searching for data (Tessier, 2012). The duration of the interview depended on the participant's response (Khan, 2014), and each interview took between 30 and 45 minutes.

3.3.7 Types of data used

This study consisted of two types of data collection. Primary data collection included face-to-face interviews. Secondary sources of data included information that has already been published. Secondary sources of data include newspaper articles, magazines, transcripts, interviews already conducted and literature that can be found in journals and books. Secondary data were collected during the literature study to identify what has already done relating to the topic and what are some of the gaps that can be filled with the current study (Vaughn et al., 2019). Some of the key words were used such as air pollution, South Durban, industrial expansion, human health risks, democracy, participation and racial zoning.

Interviewing the local community was vital as these individual's form part of the population that is directly affected by air pollution and have acquired real life experiences. The data collection process was conducted using the questions described in Appendices A, B and C. The participants were given a brief background of the project and the purpose of the research. The participants were also asked to sign a consent form in order to participate in the research.

Table 3.2: Secondary sources used in the current study

Title of secondary source	Author/Institution	Year of publication
SDCEA South Durban Basin: Ambient Air Quality Monitoring Report	Apex Environmental	2017
Engen to list on the JSE next year - sources	Loni Prinsloo, Fin24	2019
A comparative study of responsible care and ISO 14001 as an effective environmental management system in the chemical and allied industry in South Africa	Dwarika, R.	2015
Community groups from Southern Africa join forces in South Durban for the launch of the Bucket Brigade campaign to collectively challenge industrial pollution.	groundWork	2001
As noxious air puts kids in hospital, council disputes alarming pollution data	Tony Carnie, Sunday Times	2020
Methyl Mercaptan (CH_3SH) CAS 74-93-1; UN 1064	Agency for Toxic Substances and Disease Registry	2014
Legal fight over R4.5bn logistics park in Durban	Tania Broughton, News24	2017
Local Government the Weakest Link	Corruption watch	2013

Title of secondary source	Author/Institution	Year of publication
Cancer Ally: Pollution Maims and kills,	Joanne Groom, The SDCEA	2020
Producing Cleaner Fuels	Top business portfolio	2016
Collaboration and partnership development for sustainable tourism	Sonya Graci	2013
SA's refineries may be beyond salvage	Keith Bryer, IOL news	2012
Outrage after Engen Refinery blast	Duncan Guy, IOL News	2020
Engen refinery gas leak has some South Durban residents 'gasping for air'	Zainul Dawood	2020
Sustainability report: a report for our shareholders	SAPREF	2018
Reminder to Industry to submit applications for (AELs)	eThekwini municipality	2011
Southern African Bucket Brigade takes to the streets	Suwol, R.	2002
Benefits of the ISO 9001 and ISO 14001 standards: A literature review	Tarí, J.J., Molina-Azorín, J.F. & Heras, I.	2012
South Durban chokes as Engen refinery starts up	Paddy Harper, Mail and Guardian	2020
Why a Healthy Environment is Essential to Reducing Poverty	Economic Co-operation and Development	No Date
An Environmental Hero	groundWork	2007
Durban's environmental pariah claims massive emission reductions'	Margie Inggs, Creamer Media - Engineering News	2018
Participatory democracy against industrial risks: Environmental justice in Durban, South Africa	Llewelyn Leonard	2014
SDCEA celebrates 21 years	Lauren Walford, Berea Mail	2016
Stakeholder participation for environmental management: a literature review. Biological conservation	Reed M.S.	2008
Environmental groups take eThekwini municipality to court	Sowetan Live	2015
Activist challenges to deliberative democracy. Political theory	Young I. M.	2001
Contesting the urban industrial environment in South Durban in a period of democratisation and globalisation	Wiley D., Root C. & Peek S	1996
The BiodivERsA Stakeholder Engagement Handbook.	Durham E., Baker H., Smith M., Moore E. & Morgan V	2014
Deliberating in the real world: Problems of legitimacy in deliberative democracy	Parkinson, J.	2006
'#HumanRightsDay: Many South Africans are still not enjoying basic rights'	Sandra Liebenberg	2019
SAPREF upgrade central to BP's R5.5bn investment plan for SA	Terence Creamer, Creamer Media - Engineering News	2013
Mondi told to clean up its act	Latoya Newman, IOL news	2002

Title of secondary source	Author/Institution	Year of publication
Clean air vs industrial development: Durban court case explained'	Mluleki Marongo	2018
'Cat urine' stink too much	Mpume Madlala, IOL "News	2012
Oil refinery meets eThekwini's trade permit requirements'	Brindaveni Naidoo, Creamer Media - Engineering News	2010
How technology and renewable energy is curbing air	Opus Energy	2017
Air-sampling highlights health risks near Durban refinery	Creamer Media - Engineering News	2000
Community takes on big polluters	The new humanitarian	2008
BP Pledges to Go Carbon-Neutral—How Remains an Open Question'	Benjamin Storrow, Scientific America	2020
SAPREF flames alarm residents	Candice George, The Rising Sun	2017
Oil refinery affecting air quality – study	Gosling, IOL news	2013
Refining: Uncertainty grips South Africa's Clean Fuels Program	Oirere, S. Hydrocarbon processing	2017
Call for safe, sustainable energy after Engen refinery explosion	Singh, O. Times Live	2020
Participatory spatial knowledge management tools: empowerment and upscaling or exclusion?	Pfeffer, K., Baud, I., Denis, E., Scott, D. & Sydenstricker-Neto, J.	2013
Sick residents take refinery to court	Nomfundo Xolo, Maverick Citizen	2019
Citizens' perceptions of trust relationships in the environmental management process in North Lebanon	Abbas, N.H., van der Molen, I., Nader, M.R. & Lovett, J.C.	2015
Engen is 'still killing us', says Durban community body after explosion at refinery	Desiree Erasmus, Daily Maverick	2020
Good governance in South Africa: A critical analysis. Technical Report). Stellenbosch, South Africa: Stellenbosch University	Prinsloo, F. C.	2018
Man injured in fire dies	Pillay, M., IOL News	2015
Mondi pollution down but more monitoring urged	Tony Carnie, IOL News	2011
South Durban Communities Push on with Legal Action Against KZN MEC'	Natasha Adonis.	2017
Qualitative research method: Grounded theory.	Khan, S. N.	2014
The cost of air pollution in South Africa	Altieri, K. & Keen, S.	2016
National Environmental Compliance and Enforcement Report	DEAT	2018
Air Quality Self-Help Guide (Part 1) – AEL – What? Why? When?	WKC	2020

Title of secondary source	Author/Institution	Year of publication
Durban fails to monitor air pollution levels	Arthi Sanpath, IOL News	2011

3.3.8 Data analysis

Data were analysed using the grounded theory approach. The grounded theory allows analysis of data and patterns to deduce a theory based on the data collected (Pandit, 1996). The grounded theory focuses on human experiences and values the interactions that individuals have with the phenomena being studied (Baker et al., 1992). Sociologists defined the theory as one that is grounded based on the data collected (Khan, 2014). Furthermore, content analysis was used to identify similar patterns which could then be split into relevant themes. Content analysis has advantages as it made it easy to identify common words or concepts throughout the dataset (Erlingsson & Brysiewicz, 2017).

The data collected via interviews were transcribed manually by the researcher into an electronic Word document from the digital recordings and stored on a private computer. Each interview was then analysed separately and thereafter cross comparisons were made to identify similarities and differences amongst the responses. Once this was done similar responses were coded to develop a broad theme. A coding system makes data easily accessible by reducing large amounts of empirical information, ensures data validity and transparency (Linneberg and Korsgaard, 2019). By employing the method of coding, data can be easily retrieved and there can be a better understanding of the data. Once similar themes were generated, they were checked by a supervisor who ensured that the themes identified were appropriate. In this way data credibility was achieved. Three main themes were generated; (1) Initiatives to address air pollution in the SDIB pre- and post-1994; (2) continual lack of governance addressing air pollution reduction strategies and (3) collaboration and engagements between local government, industry and civil society to address air pollution reduction strategies.

3.3.9 Limitations of the study

Due to the fact that the research project had to be completed within a specific time frame, the data collection period was limited. However, similar responses were identified through consulting

various secondary sources, which ensured data validity. Interviews with government officials were difficult to secure, which was a limitation of this study. Government officials either declined to be interviewed or did not provide feedback to set up interviews, despite many follow-up calls and emails sent. One of the main limitations of this study included the South African Coronavirus epidemic which prohibited the researcher from travelling to the study area to conduct interviews. Although face-to-face interviews were conducted, once the nationwide lockdown began on 26 March 2020 the researcher had to rely on telephonic interviews. With telephonic interviews nonverbal data and visual cues are limited (Irvine et al., 2013). Due to the epidemic and individuals working remotely from home, participants to be interviewed were not reachable on their work telephones and personal contact details were not available. The research had to conclude with the field work as the nationwide lockdown period was extended, and further potential participants could not be reached for interviews.

3.4 Ethical considerations

Ethical clearance was received from the ethical committee of University of South Africa (ethical clearance reference number: 2020/CAES_HREC/026) from the project proposal, data collection and until the completion of the dissertation. Permission was granted from the relevant community participants, government department and industries before any data collection took place. Permission was granted from each participant before the interview commenced. It is important that all participation was voluntary. It was also important to inform the stakeholders of the research being conducted even if they did not wish to participate. Participants were asked to sign a consent form before answering any questions and advised that their protection would be prioritised. The consent form stated that the identity of the participant would remain anonymous, information would be kept secure by the researcher, there would be no sharing of information, there would be no compensation or direct benefit from the interview and information may be used for future research. To maintain the highest standard of integrity the interview was conducted with the intended purpose and in line with the methods and design of the research as recommended by Leech & Onwuegbuzie (2007).

According to Bryman & Bell (2008), participants that are being interviewed should feel safe and their information should be kept confidential at all times. Participants were asked at the beginning

of each interview for their consent to record the interview via audio recordings. Participants personal information remained anonymous and the interviewer always maintained a professional tone, and discriminatory or offensive language was avoided (Khan, 2014). The interviewer approached the interview with a professional non-judgmental, non-biased attitude and exhibited excellent listening skills (Opie, 2019). Participants were informed that the outcome of the research would not be communicated with them directly, but through a community feedback session and a summary report.

CHAPTER 4
RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the findings relating to the challenges that exist in trying to reduce air pollution risks in the South Durban Industrial Basin (SDIB), by addressing each objective of the study and using the literature review in Chapter Two to justify or objectify these findings. The objectives of this study were to explore what initiatives were implemented by civil society, local government and industry to address air pollution since 1994 as well as the effectiveness of these initiatives. Secondly, an attempt was made to understand local governance towards addressing air pollution in the SDIB and if polluting industries were held accountable. Lastly, an attempt was made to determine which of the stakeholders worked jointly to act against air pollution and what were the challenges they encountered. Additional secondary resources such as journals, media articles, industry, civil society organisations and government websites were consulted and used in developing the results, together with the respondent's responses. As mentioned in Chapter One, civil society is defined in two terms: local and external civil society. Local civil society refers to local residents, community leaders, community-based organisations (CBOs) and local representatives. External civil society refers to media representatives, non-governmental organisations (NGOs), legal institutions, academics and developmental consultants (Leonard & Pelling, 2010).

There was no time delay in response when conducting face-to-face interviews and answers tended to be more natural (Opdenakker, 2006). Face-to-face interviews were conducted with six out of the 13 participants. Unfortunately, the remaining seven participants were interviewed telephonically, due to the Coronavirus epidemic in South Africa which led to the National lockdown on the 26th of March 2020 which prohibited social interactions. The disadvantages of conducting telephonic interviews were that social cues could not be determined and the interview process was more formal, which limited a comfortable flow of conversation that featured in the face-to-face interviews. This results chapter is structured into three main themes. Theme 1 (section 4.2) discusses initiatives by the three stakeholders to address air pollution; theme 2 (section 4.3) outlines the lack of governance as a challenge to addressing air pollution in the SDIB; followed by theme 3 (section 4.4) which addresses collaborative efforts between local government, civil society

and industry to address air pollution risks and the challenges encountered. The results revealed that all respondents were extremely aware of air pollution in the SDIB and that health impacts were profound and were the cause of much anxiety.

4.2 Theme 1: Initiatives to address air quality in the SDIB before and after 1994

Understanding the measures and strides already actioned in trying to reduce air pollution forms an important part of this study. Theme 1 is divided into three sub-themes which analyse the initiatives put forward by civil society, industry and local government since 1994 to address air pollution. It is evident from the study that civil society has been the pioneer in the fight for clean air in the SDIB through community activism, independent testing and government lobbying to address air pollution. However, they experienced challenges during the process as they received little support (like financial, human resources, lack of communication) from government and industry when trying to address air pollution. The study revealed that after 1994 industries began to implement initiatives such as the International Organisation for Standardization (ISO) 14001 like scrubbers and boilers aimed at addressing air pollution as they were facing pressure from civil society. However, these initiatives were implemented poorly and without motivation to reduce air pollution. The response from government showed that industries have tried to improve their operations to reduce air pollution, but it has not been very successful in effectively addressing air pollution which remains an ongoing challenge in the SDIB. Political challenges such as limited influence over air pollution issues from opposition parties to affect change were noted from local government as a factor limiting the implementation of strategies to reduce air pollution in contemporary settings. These challenges are discussed below.

4.2.1 Civil society initiatives to address air pollution

Civil society was instrumental in acting on and condemning industry both during apartheid and during democracy for air pollution risks to health and environment. It is therefore important to determine civil society initiatives to address air pollution and the challenges faced in addressing air pollution. The general consensus from all civil society respondents (local and external) was that CBOs, such as groundWork and the South Durban Community Environmental Alliance (SDCEA) showed passion and commitment in their fight against air pollution by holding rallies, participating in and organising protests and even going as far as to take polluting industries to

court. Civil organisations such as groundWork, an environmental justice non-governmental organisation, the Merebank Residents Association (MRA) a local CBO that fights environmental injustice, Greenpeace, an international non-governmental environmental organisation and the SDCEA, a community-based environmental justice organisation felt that despite their efforts industries still seemed to contribute to the deteriorating air quality in the SDIB and government were not fully committed to tackling the issue.

4.2.1.1 Initiatives prior to 1994

The SDIB has been a heavily polluted area since the 1950s due to industrial pollution caused by industries, especially by the two refineries (South African Petroleum Refinery [SAPREF] and Engen) which began operations in 1954 and being situated in close proximity to residential areas. The industrial expansion overlooked the environmental impacts and socio-economic inequalities of the communities suffering from health complications due to the pollution emanating from these refineries. The results below revealed that prior to 1994 the formation of CBOs such as MRA was a crucial factor in bringing awareness to air pollution in the SDIB. It was also clear that civil society experienced challenges when acting on air pollution risks in the SDIB as a result of the racial divide in South Africa. A resident activist (personal communication, 16 April 2020) highlighted the local community response and actions to industrial pollution before and during apartheid, but also continued into the new democracy:

> *"The community have been fighting these industries for years. They started protesting even before the abolishment of the apartheid government. It is sad that those that were affected and still affected are a community of non-white people. Because of the 1950s racial zoning plan we [non-white citizens] had to move into areas like Merebank, Clairwood and Wentworth which was close to all these factories which are the polluters. I think even though communities protested nothing changed but we supposed to have equal rights now."*

Residents of South Durban, particularly individuals of colour, became vocal in their opposition to developing refineries since the 1950s, opposing the opening of industries such as the Standard Vacuum Oil Company (Pty) Ltd, an oil manufacturer and the Mondi paper mill (Sparks, 2004) but were silenced by the state (groundWork, 2002). According to Bullard & Johnson (2000), people of colour and those who experience economic hardships are vulnerable to environmental challenges such as air pollution. The MRA was one CBO which was formed in the 1960s to address

concerns of residents over social issues, but later on extended to addressing environmental issues. Previously known as the Merewent Ratepayers Association, this organisation played a substantial role in being a voice for the Indian communities in Merebank. The MRA is one of the first organisations in South Africa to take on metropolitan environmental issues raising anxieties about industrial development and intensifying pollution levels in the area (Kasavel, 2010). The MRA had been active in representing the voices of residents in Merebank since 1964, although to a much lesser extent during the last decade. A resident activist (personal communication, 28 February 2020) highlighted the important role the MRA played in fighting against environmental injustice:

> *"MRA have been active since the 1960s, they have been present in Merebank as an organisation that is the voice for the locals, especially when it comes to fighting against any environmental injustice issues. Although they began their activism objecting social problems like the development of houses for Indian residents and other social issues, they eventually started their activism against environmental problems as the air pollution became so bad. People could no longer ignore the effects that air pollution had on them and MRA had to try and put a stop to it. They opposed the development and expansion of many refineries in South Durban."*

The year 1960 marked one of the MRA's first disputes with the municipality over the opening of the Mondi paper mill. The MRA decided that the opening of another industry would add to the cumulative effect of air pollution which was a prevailing issue in South Durban. Upon presenting these concerns from the community to the local municipality, the MRA was unsuccessful in its attempt to halt the development of the Mondi paper mill (Sparks, 2004). These results show the challenges encountered during the apartheid era as the MRA's actions to prohibit expansions of the Mondi paper mill were unsuccessful despite taking non-violent action. An environmental manager at a local refinery (personal communication, 24 March 2020) explained some of the earlier objections that came from Bluff residents:

> *"Once the Stanvac refinery began operating in the 1950s, residents from Bluff (white) who consisted mainly of white residents at the time, started writing letters to the authorities. They wrote in their letters their experience with strong smells and difficulty breathing because of the smells coming from the refinery operations."*

Issues of pollution although impacting mostly on people of colour had no boundaries and also travelled to the nearby Bluff community who also began to raise concern to local government over

air pollution. Sparks (2004) confirms that residents from the Bluff began writing strongly worded letters to the local municipality explaining the challenges they had to endure due to the refinery. They also went on to explain that air pollution has the potential to effect on pregnant mothers and their unborn children and young children. Respondents from industry commended the numerous efforts put forward by residents within the Bluff and Merebank area to try and put a stop to air pollution from refineries. An environmental manager at a national industry (personal communication, 28 February 2020) added*:*

> *"I know various objections to these refineries occurred in the early 1970s and 1980s. These objections came from the community of Bluff, Merebank and sometimes Wentworth in the form of compliant letters and gaining community support. They complained about the chemicals affecting their health and the operations at the refineries. They began to question industries and started demanding answers from these refineries on the air pollution they were expelling which also brought attention to other industries."*

As mentioned above, during the 1970s there were various complaints regarding air pollution from the Engen refinery that led to disputes with local authorities. Following this the MRA complaints to local government about a death of a man from Chrome Chemicals, a chrome manufacturer, increased awareness and brought attention to other polluting refineries in the area (Wiley et al. 1996). In 1984 the MRA opposed the renewal of SAPREF and Engen Petroleum's (then known as Mobil) permits which was overruled. During the late 1980s MRA began to mobilise the communities as the unresponsiveness from industry regarding air pollution complaints began to increase. As there was an upsurge in momentum from the community, MRA used this to demand action from industries (Diab & Motha, 2007).

4.2.1.2 Democratic transition: Formation of new CBOs acting against air pollution

Although civil society has been active during apartheid in trying to address issues of air quality and industrial pollution (like protesting to bring awareness to industrial pollution, initiating agreements with industry), there was renewed sense of hope and actions to address air pollution issues in the SDIB with the materialisation of the democratic transition objections came from marginalised groups who previously had restricted power to influence decision-making regarding environmental inequalities (Leonard, 2014). The Constitution of South Africa was a key aspect that drove the momentum by civil organisations in the fight against air pollution and allowed

freedom for all citizens to express their opinions (Adebayo et al., 2012). Certain sectors of local civil society (i.e. MRA and SDCEA) were committed to helping the residents of the SDIB to address air quality issues that affected the health of residents and to hold industries accountable. To garner a more collective position against industrial air pollution across racial lines, the community in 1995 formed the SDCEA-as an environmental justice CBO. A local councillor (personal communication, 28 February 2020) explained how the SDCEA formed and the impact they have had on the fight against air pollution in the new democracy:

> *"The formation of the CBOs [SDCEA] was driven by the environmental injustices experienced by the community that was brought on by apartheid regime. They worked with other residential groups to form an alliance and I think without them there wouldn't be such great activism in the area. They have inspired people to voice their opinions. They incorporated all racial groups in their fight against environmental degradation."*

However, although the statement made by the local councillor is correct, the SDCEA formed alliances with White, Coloured and Indian residents, but failed to gain the support from the African townships of Durban, namely Lamontville, and Umlazi, that were strongly government affiliated (Leonard & Pelling, 2010). Thus, they excluded an important racial group and potential stakeholder in air pollution negotiations due to the political culture in these areas being tightly affiliated with the African National Congress (ANC). The SDCEA has been highly criticised by ANC ward councillors for being an anti-growth organisation and unrepresentative of all communities (Barnett & Scott, 2007). A resident activist affiliated to the SDCEA (personal communication, 25 August 2020) gave additional information regarding the formation of the SDCEA:

> *"We have joined alliances with the South Durban Community Environmental Alliance who have established a big following within the community of South Durban. The South Durban Community Environmental Alliance have been fighting environmental injustice issues for decades and have tried to include as many racial zones as possible. They have experienced many wins in terms of bringing awareness to air pollution and getting certain industries to acknowledge the problem."*

Their premise has been to counteract the environmental injustice issues that residents have to endure within South Durban, whilst refusing to accept any funding from government entities and industries. The SDCEA has chosen to join forces with various environmental injustice groups and

other NGOs in order to drive the momentum around environmental injustices in the SDIB. In 2000 they joined forces with groundWork, an environmental justice NGO, to conduct air quality testing using the Bucket Brigade tool to challenge industries on the levels of toxic pollutants in the air (Kasavel, 2010). The SDCEA also encourages all citizens from South Durban and beyond to join in their campaigns and protests to highlight the challenges faced by the communities in the SDIB (SDCEA, 2017b). According to Walford (2016) "the organisation pays tribute to the many activists, from housewives to academics, who all contributed to its achievements over the past two decades". The SDCEA advocates for environmental injustices across local, national and international levels. The SDCEA members range from educated individuals, some with limited literacy levels, educated and unemployed individuals and both genders (Mngoma & Dlamini, 2014).

The SDCEA has been active in the struggle against clean air in South Durban by challenging industry and government to address the issue (Scott & Barnett, 2009). The SDCEA continuously applied pressure to industries since their formation in 1995 and in 1997 Engen Petroleum succumbed to the pressure by finally agreeing to legally reduce sulphur dioxide emissions (Sparks, 2005). Following the formation of the SDCEA, in 1999 an environmental (sister) organisation called groundWork was formed to link concerns nationally. groundWork places emphasis on helping previously disadvantaged and marginalised groups of people who have been affected by environmental injustices. When resident activists and members from community organisations were questioned about initiatives implemented after the democratic dispensation and the effectiveness of these initiatives the following responses were received. An environmental manager at a national industry (personal communication, 28 February 2020) explained how groundWork formed:

> *"I think in 1999 groundWork formed on the basis to protect communities that suffer from a range of environmental injustices they saw in South Durban. Some of it being uncontrolled emissions from refineries, and other environmental related problems. They have had a strong presence amongst SDCEA to challenge industries and government to reduce air pollution. These groups have really been the voice for the community in our democratic country."*

As these organisations formed (SDCEA and groundWork) and fought for environmental justice, they focussed attention on polluting industries. A resident educator (personal communication, 28 March 2020) mentioned that residents had asked for industries to be relocated due to the health

impact: “Residents fought against these industries for years and asked for them [industries] to be relocated, there was even talk of relocating the residents from Merebank.”

Nzimande (2012) mentioned that these organisations were active campaigners against air pollution in the SDIB, proposing that residents be relocated, or refineries be evicted from the area. Neither of these actions took place, suggesting that communities were not heard. This shows how the wellbeing of the community have been ignored for decades by government and industries in order to prioritise profits. A resident activist (personal communication, 28 February 2020) highlighted the Good Neighbourhood agreement as attempt for civil society and industry to discuss air pollution concerns:

> *“There were and still are committees and forums that were set up to try and hear the community out and bring industries to the attention of the community. I remember the Good Neighbourhood Agreement [which] was one of the things that came out of protest actions. I don’t think it accomplished much. Industries did not agree to come out with any emission data and basically did not sign any agreements.”*

In 1994 the African Explosives and Chemical Industries established the community awareness emergency response committee (CAER). This programme fostered engagement between industries and communities over air pollution monitoring. However, tensions ran high between industries and communities when it became apparent that industry had set up this forum to create the perception that industry was engaging with the community. This led to the Engen refinery becoming the focus of communities with the help of external civil society (like the United States community-based activists) (groundWork, 2014). The “Good Neighbourhood agreement” was thus drafted between community representatives in 1995 (Hanekom, 2013). This agreement called for Engen to disclose important information regarding pollution, to agree to plans to reduce sulphur emissions and to implement workplace monitoring among other measures. However, the ‘Good Neighbourhood agreement’ was not fruitful as Engen management did not agree to any legally binding commitments, stating it was unacceptable. An environmental manager at a national industry (personal communication, 28 February 2020) added the Good Neighbourhood agreement was a decent attempt in the fight against air pollution but ultimately it failed to come to any resolution as industry did not agree to any major reductions. This suggests that without partnerships and collective participation from industry with civil society, addressing air pollution

was a challenge. This indicated a continuation of non-engagement and transparency from industry with civil society from apartheid and into the new democracy.

Although local and external civil society engaged in a combination of spontaneous actions (like rallies and protests) and strategic actions (engaging with industry and government; signing petitions) to address industrial pollution issues (Leonard & Pelling, 2010), they have continued in the new democracy to be met with substantial challenges by industry and government to robustly address air pollution risks. Activist of an international NGO (personal communication, 20 March 2020), resident activists (personal communication, 16 April 2020; personal communication, 6 April 2020) stated that they held rallies and protests against polluting companies and mobilised the community, but these actions tended to fall on deaf ears and seemed futile in forcing industry to address pollution risks. A resident activist (personal communication, 6 April 2020) added to this by stating that protest action and rallies seemed to be inefficient in causing major industries to address pollution risks and therefore more strategic actions such as court actions were undertaken to hold corporations accountable:

> *"CBOs hold rallies and protest but a lot of the time it just falls on deaf ears. CBOs give out a memo and give the government and industries time to present feedback usually within 14-21 days and if nothing is done then court action is the next step. We [Anti-pollution watch dogs] normally rally around polluting companies and when we do that, we make a clear statement that we need a fully-fledged cancer or asthmatic clinic in the area so that people can get proper medical care but to date it hasn't happened."*

Despite these protest actions to try and bring attention to these pollution issues, industries often did not comply and therefore CBOs took court action against the industries with the assistance and support of external civil society (Xolo, 2019). As confirmed by the literature review in Chapter 2, Stockemer (2009) explains that citizens in democratic countries have a greater chance of influencing the ruling party. These results show how human rights have been overlooked despite the democratic transition in the country and residents have been unable to gain support from the local government despite constant resistance to polluting industries.

As mentioned above civil society during democracy has resorted to taking court action when industry have been unresponsive to requests on air pollution and due to incidents occurring within the SDIB. Another court case took place 25 years after democracy against a local industry in 2019

when the SDCEA took action against Safripol, a plastic manufacturing company. Safripol was responsible for a vapour leak in the SDIB causing many residents to fall ill. Civil society took the company to court as they felt their efforts and protests were not heard and yet again another accident happened which caused distress to the residents (Xolo, 2019). A resident activist (personal communication, 25 August 2020) added that:

> *"We have a few court cases pending due to elevated sulphur dioxide (SO_2), illegal dumping of toxic waste but there is so much corruption within these industries like Sappi and with the government because industries pay such a large portion of taxes, they tend to always get away with polluting."*

This suggests that civil society tried to engage with industries to address pollution risks but since there was a lack of industry response, court action was employed as an alternative to try and address air pollution risks.

According to Xolo (2020), corruption within local government has meant issues surrounding air pollution have been left unattended for many years and residents are continuing to suffer unacceptable consequences. As an activist of an international NGO (personal communication, 20 March 2020) mentioned:

> *"In the past and even now there has been so much corruption within the local government and those higher up in power. I mean these residents have been already poor and suffering but because they [industries] and government officials are friendly and are offering government some type of compensation, government does not act on these [air pollution] problems."*

Due to the fact that the SDIB was and still is a key component of South Africa's economic development, industries were provided with exemptions from many air pollution regulations, which has allowed polluters the power needed to operate without consulting the law (Kasavel, 2010). In recent years there have been occurrences where local officials from development, planning, environment and management department within the eThekwini Municipality have been accused and charged for accepting bribes (Singh, 2020). This indicates that there has been a close relationship between industry and local government which has resulted in poor enforcement and continual air pollution challenges.

4.2.1.3 Air quality testing by CBOs

It was in 2000 that the local civil society (SDCEA) engaged in networking with international activists to learn about how to test air quality in their communities and use the results to lobby government and industry for change (Diab & Motha, 2007). The use of the Bucket Brigade testing brought awareness to the additional chemicals in the atmosphere and resulted in a decrease in certain emissions. This method was and is still used to monitor air quality by local residents (i.e. SDCEA). The bucket sample takes a snapshot of air pollution at a given time by collecting air samples in a bucket using a Teflon sampling bag (refer to **Figure 4.1**) (groundWork, 2001). However, civil society encountered challenges with involving industry in testing and noted that industry was extremely uncooperative when trying to engage with them.

Figure 4.1: The Bucket Brigade sample setup and instruments used (SDCEA, 2012).

Civil society has been forced into conducting independent sampling due to the lack of information provided via government and industries (groundWork, 2003). This method gave and continues to give local civil society the power to understand pollution levels and the ability to respond to government and industry accordingly. A resident activist (personal communication, 6 April 2020) explained the reason why the Bucket Brigade sample is still used to test air quality:

> *"Even if you [are] looking for data for gases released, when you phone [government departments or industries] they give you a reference and when you call back [to follow up] they just tell you there is nothing in the air and there is no concern. So, what we do is we use the Bucket Brigade samples which allows us the control to actually see what is in the air."*

The above indicates that due to poor governance and industry response, this created a lack of trust about chemicals in the air and has resulted in civil society finding alternative means to find out what chemicals have been present in the air. A resident activist (personal communication, 28 March 2020) further explained by using the Bucket Brigade testing additional harmful pollutants were found, which was important as it highlighted the inconsistent testing and monitoring of pollutants by industries:

> *"I know the CBOs in the past have used the Bucket Brigade sample method to test air quality. The Bucket Brigade System showed higher results than the results that industry showed. The samples found other chemicals other than sulphur dioxide like benzene and certain other cancer- and asthma-causing chemicals. By conducting these independent tests, it allows the community to take back control of their environment and actually shows government as well what is happening in the area."*

The above statement is correct as in 2000 when SDCEA and groundWork conducted the Bucket Brigade sample, results exhibited higher level of toxins in the air than results from air quality testing received from industries (Kasavel, 2010). As confirmed in Chapter 2, once the air was tested, additional harmful pollutants were also found to be present in South Durban (no author, 2000). The Bucket Brigade testing found not only high levels of SO_2 but also dangerous concentrations of benzene, a cancer-causing agent (Suwol, 2002). Other chemicals such as methylene chloride, carbon disulphide, 2-butanone, toluene, ethylbenzene, m- and p-xylenes, and o-xylene were also found (no author, 2000). The Bucket Brigade testing has been instrumental in lobbying and convincing industry and government to invoke change regarding air pollution issues. Since the first air samples were taken in 2000 using the Bucket Brigade method by the SDCEA, industry has adopted some significant changes. An environmental engineer at a local industry (personal communication, 24 March 2020) mentioned the changes adopted by industry as a result of the Bucket Brigade results:

> *"When communities started testing the air themselves and found highly toxic chemicals in the air, industries have invested over 40-million dollars in efforts to strengthen their environmental performance. We have switched from burning fuel oil to gas to reduce SO_2 fitted all furnaces with low nitrogen oxide burners and introduced a sulphur recovery unit which reduced SO_2 emissions by 45%."*

SAPREF were commended for their investments into abatement technologies. In 2010 the SO_2 emissions dropped by 70%, particulate matter less than 10 microns (PM_{10}) by 86% and Volatile Organic Compounds (VOCs) dropping by 50% (Carnie, 2011). These initiatives put forward by industry have yielded positive results (refer to **Figure 4.2**), there were reductions in SO_2 emissions. For similar trends to prevail these initiatives have to take precedence and commitment from industry.

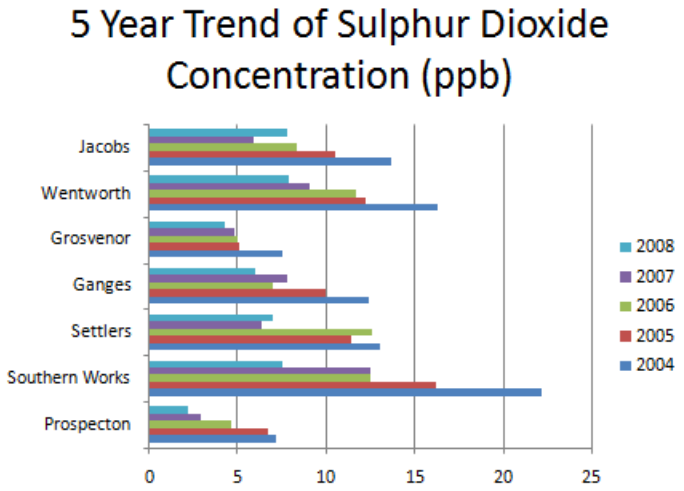

Figure 4.2: Five-year trend of sulphur dioxide concentrations (Vissers, 2010)

Although the Bucket Brigade has been successfully used to monitor air chemicals and lobby industry and government to reduce emissions, it has not been easily understood by the larger community. A resident educator (personal communication, 28 March 2020) who complained that air quality results taken by SDCEA are not easy to understand and this disadvantages the local community:

> *"Most of the time we as the community do not know what the results mean; it's great that they are testing the air quality but if they would make it understandable then at least the community would understand if there is a problem or not. We don't know now if industries are reducing their pollution. I mean go onto the SDCEA website and tell me if you understand what the bucket samples mean, I doubt you will understand. in Merebank especially those people who are not very educated and unemployed and come from poor households. In this [South Durban] area it is known that this is a low-income area so obviously residents are not going to attempt to understand the data."*

This indicates that the SDCEA should work on education and awareness of residents on air pollution data and build support for holding government accountable over air pollution. Vissers (2010) found men from minority groups in the USA did not understand air pollution information, similarly this is seen from the results above as the respondent mentioned there is a lack of understanding from those who are socio-economically challenged. These findings are consistent with what was found in the literature review, that interpretation was needed for communities to understand and draw conclusions from the numbers. These results suggest that in order to get more support from the community, CBOs such as SDCEA could look into simplifying the results to layman's terms as results available on CBO website are highly technical. Testing the air quality however still is a critical tool in being able to challenge industry and government to reduce emissions.

4.2.1.4 Industry resistance to civil society

The civil society organisations such as SDCEA and groundWork have made great progress in testing the air quality independently. However, they encountered challenges when wanting to involve industry in the testing. A resident activist (personal communication, 28 February 2020) mentioned that they are constantly trying to get into contact with big industries in the SDIB, but this is challenging. They have asked industries for air quality results but have not receive any results. Furthermore, a resident activist (personal communication, 25 August 2020) explained that industry feel civil society should not be in possession of their data:

> *"Industry have completely ignored our request to obtain information regarding their emissions. They state that they cannot just give this information to anyone, although they know that we are not just anyone we are working for the good of the community and we are also educated about environmental issues. I explained that to the guy who works at Sappi in Umkomaas … I told him I did not like him undermining my intelligence and that I am an educated and able to understand the data."*

This suggests that not only are industries showing disregard for community members in their operations but are unwilling to cooperate with the community and provide basic information. Industry therefore do not see civil society as equal partners in a new democracy and able to address air pollution. Industry should be willing to display their air pollution data for input from civil society on industrial risks if they are within regulations and should not be deviating from

submitting them to civil society. An environmental manager of a national industry (personal communication, 28 February 2020) added:

> *"Industries need to be more open to working with communities and willing to present data as that is the only way forward. When there are incidents they are obligated to provide the community with the relevant information."*

A resident activist (personal communication, 28 February 2020) explained how they have been met with resistance from industry when trying to gather air pollution information which had led to independent sampling:

> *"MRA set an alliance with SDCEA to measure the benzene levels near Engen on Badulla Drive. We also called for a meeting with SAPREF for them to present their data on the air quality and for them to explain to us what is in the air and they have not come back to us. Engen on the other hand did not agree to this meeting at all. They often dismiss us and say they are government regulated and are within standards."*

A resident activist (personal communication, 13 August 2020) mentioned that:

> *"The community have been trying to get hold of Engen refinery due to a gas leak in July [2020] and [they] have not been able to get any feedback from them, which aggravates the community who are suffering."*

By industries not providing support to the local community, it has implications for trust between industry and civil society (Aylett, 2010). According to Carnie (2020) in the last decade not only has there been a decline in air quality, but residents and activist groups have had difficulties accessing air pollution data. In order to protect the environment there needs to be cooperation from all levels of stakeholders (Abass et al., 2015). This is not being demonstrated between industries and civil society in the SDIB, whom both form an integral part of the multi-level stakeholder structure.

4.2.1.5 Civil society financial constraints to test air pollution

The results below that revealed two respondents from civil society attributed financial constraints as a challenge encountered when trying to address air pollution. Despite the community being empowered to continue their activism through the democratic transition, they experienced new issues. Community-based organisations (CBOs) are responsible for sourcing their own funds for

air quality testing in order to maintain community mobilisation (Leonard, 2014). The local community did not have enough financial resources to continually test air quality in South Durban. As mentioned by a resident activist (personal communication, 6 April 2020): *"That, [testing] however, is costly and needs to come from our own pockets as an organisation which relies on donations mostly from the community or private companies."*

Although the bucket sample costs approximately R850 to conduct the experiment, the samples taken have to be couriered to an accredited laboratory. This puts strain on many community organisations (groundWork, 2003). A resident activist (personal communication, 30 March 2020) further mentioned:

> *"The local community organisations have to come up with their own funds to do air quality testing due to lack of government and industry involvement. We depend on donations and sponsors from the community and the general public and with these funds we conduct these tests and are able to track air pollution."*

According to Vissers (2010), official air pollution data is often not credible or comprehensive enough and industries are not willing to supply air pollution data which forces CBOs to ensure reliable air pollution data is provided. Funding is a very important part of community organisations, funding has allowed them to carry out these samples and use them as leverage to fight these industries and government (SDCEA, 2017). The SDCEA and groundWork both state that they are non-profit organisations (NPOs) that rely completely on funding from the general public for donations to provide environmental justice services to affected communities (SDCEA, 2017b; groundWork, 2020). The SDCEA also used geographic information systems (GIS) to map air pollution but due to a lack of funds there was a period of dormancy in producing these results (Pfeffer et al., 2013). These results suggest that civil society groups such as SDCEA and groundWork are conducting air quality tests without much assistance from government and industry who have an obligation to uphold the Constitution of South Africa to protect the citizens and the environment. Due to poor governance and monitoring of air pollution by local government and industry, civil society has had to take up the role of watchdogs and hold industry and government to account.

4.2.1.6 The Multi-Point Plan (2000-2010)

All respondents agreed that the development of the MPP saw a decrease in certain emissions such as SO_2, however they also noted that there were many outstanding issues and highlighted the challenges that existed within the MPP. In response to continued efforts and complaints by civil society to try and address air pollution, in 2000 the Multi-Point Plan (MPP) was initiated by civil society, which brought local government, industry and civil society together to address air pollution. As mentioned by an environmental engineer at a local industry who previously was a local government official responsible for air pollution and formed part of the MPP team (personal communication, 23 March 2020):

> *"Due to civil society action government in the democratic order was forced to take action. One notable action was the Multi-Point Plan. I happened to have been the programme manager for this plan. This plan unleashed lots of actions and instruments to reduce pollution."*

This plan was intended to reduce air pollution to meet air pollution standards and improve the life of the community (DEA, 2007). An Air Quality Management System was set up to monitor priority pollutants and to measure the compliance of these pollutants in South Durban. Further actions included strengthening of the inspectorate, reviewing vehicle emissions and priority pollutant standards together with phasing out dirty fuels. As the environmental engineer (personal communication, 24 March 2020) explained how the MPP was derived:

> *"In the early 1990s they [civil society] took the complaints to Mr Vali Moosa [the then Environmental Affairs minister]. The complaint was that air pollution is affecting the health of the residents in South Durban. Once the community started taking independent air samples it was evident that there were high levels of SO_2 and other chemicals in the air. So the local authority was required to take air quality assessments in the SDIB and did that with the MPP."*

It was continuous complaints, protesting and scientific results of pollution found in the air by means of the Bucket Brigade sampling that led to a national response to the issue. Ultimately these initiatives motivated the development of the MPP as pressure from community leaders began mounting as mentioned above. The Minister of Environmental Affairs and Tourism, Mr Valli Moosa announced the formation of the South Durban 'Multi-Point Plan' on the 27th November 2000 as a measure to address the hotspot area in terms of air pollution (Nzimande, 2012). The

environmental engineer at a local industry (personal communication, 24 March 2020) further highlighted the intended aims of the MPP:

> *"The MPP was a strategic design that monitored ambient air quality which looked at criteria pollutants from the health study, nitrogen oxide (NO_x), ozone (O_3) and SO_2 at ground level concentrations and world health standards. Communities saw a great improvement in the quality of air and felt that they could breathe easier."*

The MPP monitored not only NO_x, O_3 and SO_2 but also nitrogen oxide (NO), nitrogen dioxide (NO_2), carbon dioxide (CO) and PM_{10} and the outcome of the MPP saw long-term concentrations of SO2 decrease by 40% (DEA, 2007). A resident activist (personal communication, 16 April 2020) added that: *"The development of the MPP reduced SO_2 levels quite a bit and the community started to feel like the government were doing something to protect them and the environment."*

Interviews conducted by the eThekwini municipality to determine the impressions the MPP had on stakeholders confirmed this as there was community satisfaction regarding flares and toxic smells from industries in the SDIB after the conception of the MPP (DEA, 2007). The environmental engineer at a local industry (personal communication, 24 March 2020) added that the MPP received many awards such as the most sustainable project in South Africa in 2004, the best teamwork in the eThekwini municipality City's Star competition as well as recognition from international air quality experts on the state-of-the-art monitoring and data retrieval methods. The local and international recognition of the MPP brought suggest that it was a practical solution at addressing air pollution and if continued appropriately and building on limitations, a reduction in air pollution many have been a reality in the SDIB. It is important to note the important role that civil society has played in provoking local government to initiate the MPP. The environmental engineer at a local industry (personal communication, 23 March 2020) further explained that although the MPP was successful in reducing sulphur emissions, many outstanding issues remain:

> *"The MPP was successful on its own; however, the [new] local government [administration since 2010] was not able to continue the momentum. For example, Metro is unable to respond to the following emerging issues such as proliferation of vehicle emissions, dust emissions from logistics activity, informal waste combustion, chemical emissions from plethora of industry, poor transparency in air quality reporting, lack of public reporting which led to the failure of the air quality monitoring network established under the MPP."*

Emphasis needs to be centred around not only SO_2 emissions but also dust plumes, vehicle emissions and other chemicals that are being spewed into the atmosphere (DEA, 2007). These results suggest that although there were some government support and political will for a period of time to address air pollution, the air quality monitoring network has since 2010 lost its integrity and reliability and there is a lack of transparency in the reporting system. In 2019 the dysfunctional air quality monitoring systems in South Durban were only able to produce half the air pollution data to the public via the state-owned South African Air Quality Information System. This shows the major gap air quality monitoring from 2010 when the MPP fell apart till 2019 when partial air quality data was accessible (Carnie, 2020). In addition to this a resident educator (personal communication, 28 March 2020) stated that:*"…the bigger industries may be inspected and forced to report to authorities but who is monitoring the smaller industries which also [have] a cumulative contribution to the air pollution"*.

This information reveals the MPP was a concrete plan, but many gaps existed within this plan that were unable to be filled. Nzimande (2012) found that all the emphasis has been placed on larger industries, but smaller industries also contribute to the air pollution and also need to be regulated. There needs to be more involvement and commitment from government to address these gaps which would lead to a functioning and cohesive plan, thus addressing air pollution.

In 2010 when the MPP was dismantled, this led to the breakdown in communication and engagement between industry, local government and civil society. A resident activist (personal communication, 22 May 2020) highlighted how disassembling of the MPP broke down meaningful communications between industry, local government and civil society: *"This [dismantling of the MPP] was created to defy the open and transparent channel of communication, also to stop the free flow of information that held industry accountable."*

During the days when the MPP was active regular meetings were held where stakeholders were able to discuss concerns (Kasavel, 2010) and with the MPP dismantled this platform disappeared. A resident activist (personal communication, 28 February 2020) added to this by stating that air pollution was not seen as a priority at the time by government. They felt that money should be spent on health care for citizens, yet only 4% of the country's total gross domestic product in 2018/2019 was spent on health care services (UNICEF, 2018). Furthermore, the respondent stated that the government needed to look at how much they actually spend on medical care for residents

suffering from asthma, cancer and other respiratory related illnesses that could be reduced if the focus was put back on addressing air pollution. The reasoning to reduce staff in the air quality control unit to focus on primary health care was unsound, as the data showed that the risks for people diagnosed with cancer were 250 times higher for residents in South Durban (groundWork, 2007). These results are important as they confirmed findings from literature review conducted by Kasavel (2010) and groundWork (2014) reported in Chapter 2. The literature indicated that MPP failed to effectively address the problem of air pollution in South Durban and there were many gaps that needed to be addressed but was could not be as the MPP was dismantled (groundWork, 2007).

4.2.1.7 Other civil society initiatives to address air pollution

As the air pollution accidents and incidents continue without any legal enforcement acting on this, civil society continued their activism to fight against air pollutions issues. Air quality monitoring stations utilised during the MPP to monitor air pollution from source emitters were unable to provide credible data as there was no maintenance of these machines, which meant air pollution was not accurately monitored for many years (Xolo, 2020). However, not surprisingly, perspectives from those representing industry differ from other groups of respondents. An environmental engineer at a local industry (personal communication, 24 March 2020) and an environmental officer at a local industry (personal communication, 22 April 20200) stated that they felt air pollution in the SDIB improved and there are fewer complaints than there were in the early 1990s. An environmental engineer at a local industry (personal communication, 24 March 2020) mentioned that their refinery received many complaints about flaring events during the apartheid era, however in recent years, should they receive one complaint a month, this indicates there is an air pollution concern which is then appropriately addressed:

> *"In the old days [before 1994] the SDIB had experienced those complaints. We saw about 240 flares per month. Now, if we get one complaint a month there is a problem. The complaints from the community and the numbers that we had versus now show that we are improving."*

However, research conducted by Leonard & Pelling (2010) into community activism in South Durban during democracy have shown that residents have struggled with new issues since democracy such as increased poverty and unemployment, which have had implications for

community activism. Nevertheless, the information shared via the media depicts a different picture than that of the informant quote above. Complaints from the local community of Merebank and Wentworth have resurfaced after refineries began production after the nationwide lockdown restrictions eased after the Coronavirus outbreak in South Africa in March 2020. Although refineries received constant complaints from the community, and civil society have continued with protests and rallies the problem persists (Harper, 2020). Communities have and continue to raise their frustrations over the complaints they have laid for many years falling on deaf ears. A resident educator (personal communication, 28 March 2020) explained how residents have suffered emotional trauma due to ongoing industrial incidents:

> *"There are emotional and physiological impacts as well as physical impacts that we have to endure. In recent years when there is a flare or explosion at a refinery or factory elderly people become fearful. They think that their homes are going to be burnt down. This is not fair to people who already suffer from high blood pressure and heart diseases... The community activists have continued to fight against this issue with letters to the government and industries and continuing their protest action."*

Residents are in emotional distress due to their ongoing health complications. Industries and government have also heard the plight of the community through protests, complaints and letters issued to certain industries in the SDIB but, have not been able to lower emissions to a safe level where individuals are not affected (no author, 2020). A resident activist (personal communication, 25 August 2020) highlighted industries lack of concern pertaining to the community: *"The bottom line is that industries do not care about the wellbeing of the community. It is always profits over people."*

It is evident from these findings that industry have shown little consideration for the community since the disbanding of the MPP. It is important for industries to understand that physical health is not only impacted but residents also experience psychological trauma.

4.2.1.8 Medical initiatives and medical health studies

A significant challenge and emotional response revealed from civil society respondents was the need for a cancer and asthma clinic. A resident activist (personal communication, 28 March 2020) described the lack of proper health care that residents of the SDIB received:

> *"They [residents] have no medical aid and rely on government hospitals for medical care which is a challenge we having. We have been asking industry for this for years for a clinic situated in South Durban where residents can go for respiratory illnesses. The problem is that sometimes the government facilities just give them generic medication. There is no proper health care. There are clinics around but whatever they got you just have to manage with that. Because it is a low-income area, they lack good medical care which is the biggest challenge we are facing."*

As mentioned by a resident activist (personal communication, 28 March 2020) and resident educator (personal communication, 28 March 2020) to date there is no clinic available for residents suffering from air pollution-related illnesses in the SDIB. Furthermore, it was mentioned that industry will look at accommodating a clinic. Industry has not responded positively to these requests although there is a need for such a facility. Naidoo et al. (2006) and Naidoo et al. (2013) found that children who lived in the southern parts of Durban, particularly near industrial exposure had a higher chance of developing asthma and airway hyperactivity,[13] than children living in the northern parts of Durban away from industrial activity. When questioned about medical facilities an environmental engineer at a local industry (personal communication, 24 March 2020) and environmental manager at a national industry (personal communication, 28 February 2020) both stated that when there is a flare or an explosion that occurs the responsible party (meaning the industry liable) usually covers medical costs for the injured and sick. According to Xolo, (2019), residents who became ill after a fire broke out in August 2019 at a local industrial plant, had to pay for their own medical bills after being transported to the hospital which was arranged by the industry. The high unemployment rate in the SDIB further exacerbates the health status of residents as they are unable to afford medical care. Additionally, young individuals are already burdened by chronic bronchitis and asthma and do not qualify to work at these refineries, increasing the poverty levels (Xolo, 2020). Industry needs to arrange more than transport for their victims. Without these incidents occurring residents would not be burdened with large medical bills which industry should be accountable for.

[13] Airway hyperactivity means a person experiences increased sensitivity and reactivity of the airways to numerous types of stimuli (Brannan & Loughead, 2012)

4.2.2 Industry initiatives

The results from this section have shown different perspectives from each stakeholder group as to how effectively mitigating measures implemented by industry have been working. Respondents from the industrial sector have stated that initiatives put forward have been successful in reducing air pollution, not without declaring that financial constraints limit the implementation of mitigation measures. Government, although underrepresented, stated initiatives have not been efficacious in reducing air pollution. Furthermore, literature is used to support claims from civil society that industry have not been able to adequately address air pollution issues.

4.2.2.1 Strategies used by industry to reduce air pollution emissions

Respondents (although limited) representing the industrial sector were extremely forthcoming regarding the mitigation measures that have been implemented to reduce air pollution and confidently stated that measures have been successful in addressing air pollution in the SDIB. Three out of the four respondents from industry stated that their respective industries and industries in general within the SDIB have introduced measures since 1994 that have successfully reduced air pollution within the SDIB. However, four respondents from civil society noted that mitigation measures have not been successful in reducing emissions. An environmental engineer at a local industry (personal communication, 24 March 2020) added that they have introduced the following measures to mitigate air pollution:

> *"Implementing ISO 14001:2015, sulphur recovery units, leak detection and repair units, double seals on the roof tanks, flaring management, improving reconfiguring fuel and a R2m drone to pick up on any leaks. These interventions have been very successful in reducing air pollution."*

It must also be remembered from previous sections on the MPP introduced by civil society, that the MPP was a catalyst for industries to begin reducing sulphur dioxide emissions and other air pollutants and due to the Bucket Brigade monitoring of air pollution. However, the statement made by respondents from industries about reducing emission levels was also part of the abolition of apartheid in 1994 when South Africa could trade internationally. This meant implementing an internationally recognised standard known as 1SO (International Organisation for Standardisation)14001 (Dwarika, 2015). The ISO is a set of guidelines developed by a panel of

professionals in the appropriate field. The goal of ISO 14001 is to have an effective environmental management plan that ensures consistent and proactive environmental protection (Tarí et al., 2012). In 2008 Engen refinery was applauded when they were awarded ISO 14001 certification. SAPREF had also been ISO 14001:2015 certified. As mentioned by the environmental engineer at a local industry (personal communication, 24 March 2020) industries invested in drones which inspected hard to reach places that could potentially lead to injuries especially when chemicals are involved (SAPREF, 2018. Naidoo (2010) stated that in 2009 SAPREF also claimed to have reduced their sulphur dioxide emissions by 70% through abatement technology and changing to more expensive low sulphur crude oil. SAPREF have reduced their emissions from a self-imposed emission limit of 20 tons a day to emitting 12 tons of sulphur dioxide a day, a considerable amount in terms of international standards (Carnie, 2011; Top Business Portfolio, 2016). In California, through stricter environmental regulations a similar industry is permitted to emit only seven tons of sulphur dioxide a day (Gosling, 2013). In order to see a positive effect on the environment and people SAPREF can still further reduce their emissions and align with international standards.

According to an environmental manager at a national industrial company (personal communication, 28 February 2020) industries that implement ISO 14001 and receive certification internally, may be able to manage their impacts on their own, alleviating the strain on government capacity to monitor them. However, a concern was raised by resident activist (personal communication, 20 March 2020) who mentioned: *"Industries are guided by a standard like ISO 14001 where they cannot deviate from international standards and norms yet there are still stories from the community about air pollution affecting them."*

This suggests that despite industries operating under international standards such as the ISO 14001 certification, this has not addressed the issue of air pollution effectively. As the environmental officer at a local industry (personal communication, 21 April 2020) further explained regarding the additional measures implemented which are aimed at tackling air pollution:

> *"We have changed the way we work to become more sustainable and green. We have phased out of dirty fuels – The combustion of dirty and high sulphur fuels results in the emission of high volumes of particulates and SO_2, along with NO_x, un-burnt hydrocarbons, particulates and CO. We began controlling chemical and fugitive emissions. The aims were to investigate the status of volatile emissions, to improve the measurement of fugitive emissions and to develop guidelines for reducing emissions. To this end it was first necessary to identify the*

spatial distribution of VOC concentrations in the form of BTEX [benzene, toluene and xylene] The key elements of this strategy are listed in the eThekwini municipality Air Quality Management Plan, 2007. We implemented continuous Emissions Monitoring (CEM) such as SO_2 analyser, ClO_2 [Chlorine Dioxide Monitoring] analyser on stacks. Electrochemical sensors [Sniffers that detect gas concentrations in the mill], Dust monitor (Particulate matter), Oxides of Nitrogen (NO, NO_2 and NOx) monitors on stacks. Ambient monitoring stations around the mill and early warning gas monitors."

As confirmed in the literature review in Chapter 2, sulphur recovery units were added in the 1950s by industries as well as processing modifications to reduce emissions (Diab & Motha, 2007). These findings were also consistent with Wright & Diab (2011) who stated that monitoring and phasing out of dirty fuels was to be implemented by industry and intensified after 1994 and during the MPP. A consequence of these mitigating measures should see reduced volumes of emissions escaping into the atmosphere as an environmental engineer at a local industry (personal communication, 22 April 2020) mentioned raw materials are expensive and gases should not be escaping with the practices mentioned above. A large portion of the mitigation measures mentioned above were components derived from the MPP, however with the MPP inactive since 2010 and from the ongoing complaints from communities it is evident that these measures are inefficient or not being implemented appropriately.

A resident activist (personal communication, 30 March 2020) explained that air pollution is still a concern despite interventions by industry:

"Air pollution may have decreased since the MPP and since Engen Petroleum and other industries have tried to limit their pollution, but it is still evident that there remains a problem or else the community would not be complaining. The smokestacks are so low and people who live in flats are higher up are more affected."

Industries have shown a concerted effort to implement certain strategies to address air pollution during the MPP as it was a legal obligation, and all eyes were placed on industry to do so. However, since the MPP came to an end that effort diminished drastically, as industries were not coerced into reducing their emissions and reverted back to polluting the atmosphere as mentioned by a resident activist (personal communication, 19 March 2020):

"Industries were basically forced to reduce their emissions under the MPP and when this stopped the air pollution began increasing."

As mentioned above emissions are being expelled into the atmosphere and the low stacks built to accommodate the old airport further exacerbate the problem. This suggests that although mitigating measures are in place, industries continue to experience exceedances which should be addressed. An environmental engineer at a local industry (personal communication, 24 March 2020) and an environmental officer at a local industry (personal communication, 21 April 2020) mentioned they are being environmentally conscious and sustainable. However, continued incidents and media articles pertaining to gas and chemical leaks does not reflect this practice. A resident activist (personal communication, 13 August 2020) gave accounts of an incident that left residents struggling to breathe:

"The community have been experiencing breathing problems again as soon as Engen Petroleum and SAPREF have started operating [after the nationwide lockdown due to Coronavirus outbreak in 2020 in South Africa]. Engen had a flare in July [2020] that lasted more than a day without anyone resolving this."

A gas leak of methyl mercaptan released into the atmosphere on the 27th July 2020 left Merebank residents struggling to breathe (Dawood, 2020). Methyl mercaptan is a gas that causes irritation to the eyes, skin and upper respiratory tract. It can also cause serious headaches, nausea, dizziness and in extreme cases vomiting, a coma and even death (ATSDR, 2014). These results show that there is a substantial gap in sustainable practices exercised by industries despite an environmental officer at a local industry (personal communication, 22 April 2020) mentioning that they consider their environmental impacts to gain monetary value and good financial standing amongst banks and investors:

"They have ensured that they are environmentally friendly, Banks, stakeholders and shareholders want to invest in companies that cares about the environment. The raw materials that are used in producing gases such as sulphur dioxide and chlorine dioxide gas are expensive and hence they should not be allowed to escape to the atmosphere. Industries are employing consultants once or twice a year to monitor their emissions by means of sampling and report to the authorities the findings."

The results suggest that if industries show commitment to reducing air pollution, it is not only driven by civil society contesting the pollution affecting their health. They try to remain sustainable to ensure they can attract investors, and in doing so are forced to introduce measures to reduce air pollution. According to Creamer (2013), SAPREF invested R2.5bn in upgrades to the refinery which was said to increase investors' confidence in commitment to sustainable growth. However, it is unclear from the research if that amount was indeed spent on the refinery and what the upgrades entailed , considering that air pollution continues to be an issue in contemporary South Durban setting. A resident activist (personal communication, 19 March 2020) raised the point that there is no management and monitoring of particulate matter less than 2.5 microns ($PM_{2.5}$): *"A big blind spot is the fact they [industry and government] do not deliberately monitor measure $PM_{2.5}$ which is an important pollutant."*

Fine particulate matter less than 2.5 microns ($PM_{2.5}$) are particularly important to monitor as the particle size can travel deep into the respiratory tract reaching the lungs. Monitoring of $PM_{2.5}$ was recommended by civil society (groundWork) to monitor and had been found via community testing (groundwork, 2014). Engen and SAPREF refineries air quality management report and sustainability reports did not account for monitoring of $PM_{2.5}$ (SAPREF sustainability report, 2018: Engen, 2019). Furthermore, the resident activist (personal communication, 19 March 2020) further stated that there is no live benzene monitoring:

> *"We are not optimally monitoring benzene, there are no known live, real-time benzene monitoring. Benzene is a known carcinogen listed by the internal cancer association. The association with benzene and cancer is well documented. Industries need to stay on top of this."*

Clearly not enough has been done by industries in South Durban to monitor for carcinogenic pollutants.

Although claims that there is no benzene monitoring, the SAPREF website states that they conduct independent external monitoring for BTEX chemicals. As per the SAPREF sustainability report benzene in 2018 found on fence lines was below the National Ambient Air Standard of five micrograms per cubic metre. Information viewed from the Engen website in 2020 stated six BTEX monitoring stations have existed around the refinery since 2003 that are audited independently and

were within national standards (SAPREF sustainability report, 2018). Results from Engen Petroleum show that benzene levels are within national standards since 2012 (Engen, 2019) indicating the benzene has been monitored by industries. This statement made by the resident activist could be more biased against industries given the position of the respondent in relation to industries but could also be due to lack of information since the industry has not shared information and engaged with civil society in a transparent manner. However, as mentioned above there is no live benzene monitoring by industries, although the SDCEA conducts its own independent benzene monitoring (refer to **Figure 4.3**). Benzene levels for 2017 viewed from the SDCEA website were higher than legal standards, which shows inconsistent results from Engen and SAPREF websites, with industries being dishonest about emission data. Live monitoring of benzene is important as the health impacts of benzene exposure include excessive bleeding, cancer compromised immune systems and aplastic anaemia (WHO, 2010). Securing interviews with officials from the eThekwini municipality and the pollution control government department was fruitless and therefore no first-hand information was received pertaining to monitoring of benzene and other pollutants.

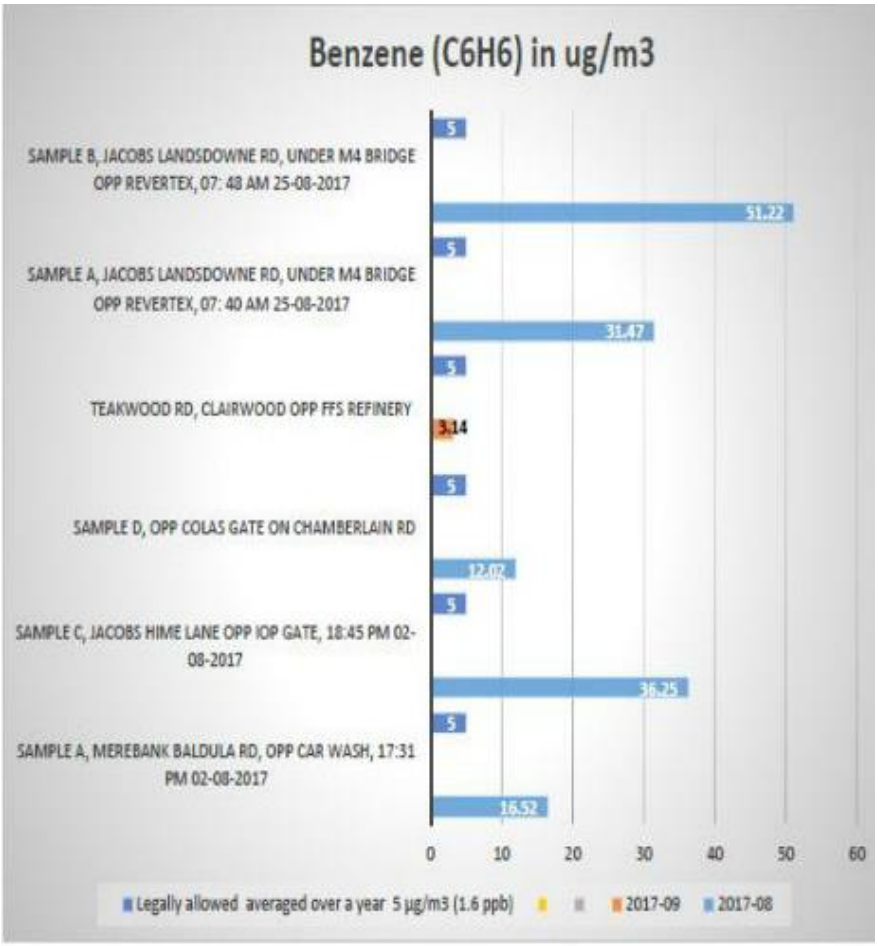

Figure 4.3: Benzene monitoring report from the SDCEA (SDCEA, 2018)

According to a local councillor (personal communication, 28 March 2020) controlling emissions is generally difficult:

> *"Some emissions are uncontrollable and there are unforeseen circumstances that bring about more emissions … they have to let some steam and pollution out when this happens. But I think they [government and industry] need to improve on their mitigating measures to avoid this. People's lives are more valuable than anything else."*

As mentioned above, unforeseen situations cause uncontrolled emissions. However, lack of maintenance and upgrades to plants have resulted in many malfunctions that have caused devastating effects on the local community and environment (Guy, 2020). The Engen Petroleum refinery was built in the 1950s and is considered to have ageing infrastructure, is outdated and needs considerable investments to meet the latest fuel specifications that would safeguard the

environment and its people which has not been a priority for the owners (Bryer, 2012). It is not only treacherous but also irresponsible to allow emissions to be expelled into the atmosphere based on the fact that uncontrolled circumstances occur. All circumstances need to be accounted for during any industrial process to minimise the risk to the environment and residents.

4.2.2.2 Challenges faced by industry to reduce air pollution

The results below revealed that two respondents from industry noted financial constraints as a challenge in addressing air pollution, however two resident activists and two respondents from industry regarded this as a weak response. Respondents representing industries noted that they are implementing strategies to reduce air pollution effectively and as a result the air quality is improving, as mentioned by an environmental manager at a national industry (personal communication, 28 February 2020). Although mitigation measures such as scrubbers, ISO 14001, controlling fugitive emissions and emission monitoring were noted to be in place, respondents highlighted the challenges that industries experience. An environmental engineer at a local industry (personal communication, 24 March 2020) felt that finances are an issue with implementing mitigation measures as many of the air quality monitoring stations needed are costly to operate and in certain instances have a negative impact on production. An environmental manager of a national industry (personal communication, 28 February 2020) explained how industries have included a mechanism to reduce emissions but are constrained financially: *"Some industries have adopted ISO 14001: 2015, implemented flue gas conditioning equipment, sulphur dioxide injectors and scrubbers. However, they tend to be limited by finances as some of these instruments and machines are costly to operate."*

A report in 2016 on South Africa's petroleum industry said that the countries refineries are reluctant to switch to cleaner technologies as making this investment would come with a substantial cost implication and it would be cheaper to shut down their plants altogether than to upgrade them (Oirere, 2017). A resident activist (personal communication, 19 March 2020) explained threatening to close down a refinery is a poor excuse due to the revenue they make:

> *"Refineries have threatened to close their doors due to financial implications when asked to reduce air pollution. That is an excuse because we all know how much money they make. Government will never let this happen because of the tax implications and shares they have in these industries. Maybe they [are] just saying this to get government and communities off their*

backs…or if they spend money on reducing emissions it would mean less money in their pockets."

As mentioned by Prinsloo (2019), industries make a substantial amount of profit annually. In 2018 Engen generated a net income of R82bn and announced plans to list on the Johannesburg Stock Exchange in 2020, showing they generate a substantial profit. Industry needs to uphold the values of the constitution as everyone has the right to an environment that is not harmful to their health and wellbeing. If industry is unwilling to implement cleaner technology due to finances, it shows the wellbeing of citizens and the environment have been compromised over profits. Industries that are concerned with the people and environment tend to have an admirable reputation, whereas the industries such as Engen Petroleum and SAPREF are met with anxiety and panic (George, 2017).

Local civil society respondents and one respondent from a local water treatment plant were vocal about their lack of confidence in industries to implement mitigation measures to address air pollution successfully. A resident activist (personal communication, 6 April 2020) and an environmental manager at a national industry (personal communication, 28 February 202) noted that industries are lacking the will power to implement measures and industries still have a long way to go to become more environmentally sustainable. An environmental engineer at a local industry (personal communication, 23 March 2020) explained how certain industries run the risk of impacting neighbouring communities:

"Conscientious industries adopt air pollution monitoring such as ambient and in-stack instrumentation, including visual observations and complaints feedback mechanisms. Other industries do absolutely nothing they basically they run to fail [they fail to implement any air pollution reduction strategies] and impose their air pollution load onto the receiving environment and people. There are several cases of such practices in the SDIB of recent."

This information can be verified as the air quality in parts of South Durban exceeded the national requirements stipulated in the National Ambient Air Quality Standards. The city, including parts of South Durban, frequently exceeded the $PM_{2.5}$ and PM_{10} concentrations of one-millionth of a gram per cubic metre. Monitoring stations in Settlers were 16 times higher than the National Ambient Air Quality Standards in Ganges, and 18 times higher in Wentworth (Goba, 2019). This indicates that regulations are not being enforced as they should. These industries show lack of duty of care provision S28(1) for the environment in terms of NEMA Act No. 107 of 1998 and their

interest to promote a healthier environment by only acting on air pollution risks when an incident occurs (Kasavel, 2010).

4.2.2.3 Challenges in migrating towards greener technologies

It is clear that government also needs to assist and promote cleaner technologies in order for industry to adopt these changes, which has not been done in the SDIB. A local councillor (personal communication, 28 March 2020) stated that government has not done much to motivate industries to switch to cleaner technologies. According to Erasmus (2020) when industries such as Engen Petroleum are placed under pressure they threaten to shut down and government tend to give into their demands. This shows that industry holds power over government and there is a lack of strong governance being exercised within the SDIB. This is a challenge that needs to be addressed by enforcing environmental regulations and exerting pressure on industries to move towards greener technologies through strong and diligent governance. An environmental manager at a national industry (personal communication, 28 February 2020) added that sustainable development is not a priority in South Africa, making the switch to cleaner technology challenging:

> *"The current economic climate does not allow industry to invest in cleaner technology. Another challenge is political and economic systems in South Africa is more focused on development and growth that climate change. When this happens industrial activities, construction and development of more industries are prioritised, and environmental impacts usually take a back seat."*

A resident activist (personal communication, 16 April 2020) highlighted industries' reluctance to implement change:

> *"They [industries] only take action when there is an accident or incident occurs. I don't think they would take initiative to do anything if the community were not so vocal, even knowing that they are causing harm to the environment and us. If they don't have to make changes to their operations and become more environmentally friendly, then that means more money for them."*

The SDIB community do not feel safe in their homes as at any time there could be an explosion. Engen Petroleum alone had two major fires (refer to **Figure 4.4**) at one of their units in 2020 alone (Singh, 2020) indicating that sustainable practices and routine maintenance have not been

conducted. SAPREF has a long history of transgressions and conducting their business in an irresponsible manner that would be unacceptable in European countries. They need to live up to their promises of being open, honest and people centric (Mersham, 2016). A resident activist (personal communication, 6 April 2020) explained how industries should look at moving towards zero emissions:

> *"They have implemented a few items but ultimately it's not successful because there still are complaints and health issues. It all boils down to the company and the management team. If you [are] looking at other companies that are similar to the ones found in SDIB, overseas the owners live near the refineries therefore there is zero emissions going into the air by having certain equipment to find where they can absorb the emissions. The greed has made companies do this because they don't worry about the people living in the community maybe because this is a poor community. They have to move to zero emissions."*

Figure 4.4: SAPREF flaring in 2017 event (George, 2017)

Big oil companies have also been known to operate differently in European countries compared to third world countries like South Africa. Emissions from refineries in SDIB were 60 times higher than in a refinery in Europe or North America (Mngoma & Dlamini, 2014). Development and industrialisation cannot always take precedence over wellbeing of citizens. This indicates that management teams at refineries need to hone in on operations as it is possible to reduce emissions.

A resident activist (personal communication, 6 April 2020) mentioned that international companies have plans to reach zero net emissions by 2050. Big oil companies such as BP, Royal Dutch Shell PLC, Total SA and Equinor ASA, all specialising in the oil and gas industry, have recently pledged to reduce greenhouse gases but made no commitments to reach zero emissions (Storrow, 2019). This contradicts what a resident activist (personal communication, 6 April 2020) mentioned. It is important to note that the respondent is an activist within SDIB and may perceive industries in a negative manner, which could result in the highly critical response.

There is a lack of drive to enforce environmental sustainability as poverty alleviation is the centre of attention of most developing countries (OECD, n.d.). The poorer demographic in developing countries is often those that suffer the most from a degraded environment, which is seen in the case of the SDIB. On 4 December 2020 Engen Petroleum had an explosion that displaced six families due a fire outbreak. Although Engen Petroleum covered the costs for these families for six days, the concern was that following those days these families have been stripped from their homes with nowhere to go (Erasmus, 2020). By addressing climate change and environmental related issues such as air pollution, it will in turn alleviate poverty, homelessness, hunger and ease the strain on medical care (OECD, n.d.). Results revealed that major industries such as oil refineries have been reluctant to robustly implement measures to reduce air pollution in South Durban, since economic benefits have superseded protection of people's health and the environment.

4.2.2.4 The way forward for industries to reduce air pollution risks

Results gathered from respondents revealed mixed reactions regarding the gaps in addressing air pollution risks by industry. Respondents from local and external civil society noted that industry have a long way to go in order to effectively address the air pollution challenges in the SDIB. Respondents stated that industry should make investments into utilising cleaner technology. A resident activist (personal communication, 30 March 2020) mentioned: *"If they were [trying to reduce their emissions] they would try to move away from fossil fuels to cleaner technology or change the way they operate. As far as we have been seeing its business as usual and the complaints continue to come in."*

The explosion at the Engen refinery on 4 December 2020 is a clear indication that industries need to look at moving towards sustainable energy solutions such as wind, solar and hydroelectric power (Singh, 2020). South Africa needs to invest in cleaner technologies that would lower the need for fossil fuels as in the UK. In 2017, the UK reached its lowest level of carbon intensity due to moving from coal to gas (no author, 2017). As noted by a resident activist (personal communication, 28 February 2020) one of the ways industries can reduce emissions is by incorporating Best Available Technology (BAT): *"CBOs are asking for BAT technology used in developed countries where they have close to zero emissions emitted from their industrial processes. Industries can afford this, but they need political will to enforce this which is lacking."*

Best Available Technologies (BATs) has been used in the Californian Chevron manufacturing plant which yielded a profit of R62bn. Similar practices have been encouraged in Cape Town's Chevron plant which could be implemented throughout South African industries (Gosling, 2013). Furthermore, an environmental officer at a local industry (personal communication, 24 March 2020) and an environmental manager at a national industry (personal communication, 28 February 2020), mentioned that if all industries would incorporate ISO 14001: 2015 standard into their practices, this would ease the strain on government capacity. ISO 14001: 2015 is an internationally recognised standard that ensures environmental performance requirements are met within an organisation (Dwarika, 2015). A local councillor (personal communication, 28 March 2020) explained that industries need to re-evaluate their methods to reduce air pollution and implement new changes that will cut into profit but prove successful in reducing air pollution in the long term:

> *"I believe that for companies to make the change it will cost a lot to their bottom line. The changes that the companies are making are small because they still need to make a profit and balance their expenditures. They are changing certain equipment but at a small rate and pace and maybe only when they need to do repairs or when machines are problematic and need updating. The cost of changing to cleaner processes is costly."*

These results suggest that industries need to focus not only on the receiving environment but largely on the affect that air pollution has on residents. Far too many families have been displaced from their homes, lost loved ones from cancer, respiratory illnesses and cardiovascular disease. In order to address air pollution risks effectively, industries need to invest in cleaner sustainable technologies that eliminate the harmful chemicals. At the same time industry needs to genuinely

engage with civil society as equal partners by including them in communication/decision-making and sharing so that they can be informed and have a say in how industrial risks may be addressed.

4.2.3 Government interventions

In 1994 when South Africa became a democratic country the constitution of the Republic South Africa was passed, followed by the National Environmental Management Act (Act 107 of 1998) (NEMA), and. the National Environmental Management Air Quality Act (AQA) (39) of 2004 (DEA, 2017). An environmental manager at a national industry (personal communication, 28 February 2020) discussed the NEMA as a mechanism to control air pollution:

> *"South Africa has very good environmental regulations as a tool to control air pollution. Under the NEMA there is the National Environmental AQA which ensures that potential polluting companies have strict guidelines that they cannot deviate from. This is effective in reducing and maintaining air pollution standards."*

There were other strategic interventions initiated by local and national government that shaped the air quality in SDIB post 1994 that will be discussed below.

4.2.3.1 The Multi-Point Plan

When questioning the respondents about government interventions all respondents mentioned the MPP as a successful start to addressing air pollution however two respondents from civil society highlighted the deterioration of air quality when the MPP was dismantled. The MPP was a strategic plan initiated by civil society (discussed under section 4.2.1.5), but which led government to implement many components of air quality monitoring. This saw commitment from the city health in addressing air pollution within the SDIB through monitoring of priority pollutants via monitoring stations and regulating licenses issued to industries. The results revealed that with the dismantling of the MPP in 2010 there was a great disappointment among civil society organisations as air pollution began to deteriorate once again. A resident activist (personal communication, 19 March 2020) gave accounts of the initiatives from government:

> *"When you look at SDIB, you think of the days of the MPP from about the year 2000 till 2010, when monitoring pollutants was very good and there was a dedicated team within the health department that was responsible for licensing and monitoring air quality, which made a difference to the air quality in SDIB. Government was more dedicated to helping the citizens of South Durban as they saw air pollution as being a real problem. Also, with the new*

democratic government in power everyone had a different energy and were excited to invoke change."

All respondents that were interviewed felt that there was a very good monitoring system in place by government from 2000 until 2010, the MPP, which was aimed at monitoring priority pollutants and addressing air quality in South Durban. This indicates the positive outcomes of the MPP from the community and industry. The aims of the MPP were seen as a response to understanding, alleviating and mitigating air pollution in the SDIB (Kasavel, 2010). Local government used this participatory process to develop an Air Quality Management System for the SDIB. The MPP encompassed investing money on a health study and setting up monitoring stations to evaluate the air quality as well as reducing SO_2 (DEA, 2007). An environmental engineer at a local industry (personal communication, 23 March 2020) gave details about the MPP:

"The MPP involved conducting health studies (risk and epidemiological), setting up an air quality monitoring system supported by modelling, setting national air quality standards, setting up a system of by-laws and improved permitting system, setting up government and stakeholder consultative [sessions] for a reporting on progress, investments in the plant (some R30m in 2002-2006), interventions by industry to reduce Volatile Organic Compounds, SO_2 and particulate matter with investments amounting to over a billion rand."

Carnie (2020) mentions that the effects of the MPP were most clearly seen in the reduction of SO_2 emissions. Furthermore, a resident activist (personal communication, 19 March 2020) and a local councillor, (personal communication, 28 March 2020) stated that the MPP also improved the schedule trade permit system and reduced emissions. Schedule trade permits are stringent legal guidelines issued by the local government to industries with specific requirements such as stack monitoring and emission limits to ensure environmental compliance (DEA, 2007). However, a resident activist (personal communication, 19 March 2020) noted that in recent years it is unclear if industries are in keeping with schedule trade permits since the information is not made available by government with civil society:

"They [industries] need Atmospheric Emission Licences, they have to have schedule trade permits. So, there's two tiers of licences. One national in terms of AQA and the regulations alongside the AQA listed in section 21. There are also schedule trade permits at the local/municipal permits or licenses. Now we are not sure if industries are in keeping with these permits because government do not allow locals to view these permits and air pollution is still quite bad in South Durban."

The above statement suggests that whereas government leadership under the MPP was open to engaging with civil society, as they also brought industry and civil society together to address pollution issues, the new government leaders have not shared information with communities or taken the lessons from the MPP forward into existing operations. As mentioned above, schedule trade permits are unavailable to the public therefore the general public cannot verify if industries are in keeping with the environmental regulations. This leaves much speculation around whether air pollution is being monitored appropriately. According to the local municipality, schedule trade permits cannot be viewed by civil society as they contain trade secrets that could jeopardise industries' business (Carnie, 2020). The AQA clearly stipulates that all applications for emission licence and trade permits be made available, indicating that the local municipality are in contravention of the law (No author, 2015). The MPP closely monitored these permits but sadly was dismantled in 2010 and a resident activist (personal communication, 16 April 2020) explained the reasoning behind dismantling the MPP which was unwarranted:

> *"When the MPP was dismantled there was a lot of chatter about why this happened because it was showing promising results, but you see we as the community and residents always get left in the dark. I think focusing on health care is important, but they also did not realise that air pollution causes health impacts so the logic behind scrapping the MPP seems more political … Maybe at that time the person in charge did not understand this."*

The reasoning for dismantling the air quality monitoring centre was seen as being unjustified by activist's groups such as groundWork. The reason for the reduction in capacity of the air pollution section within government since 2010 is unclear but air pollution was not a priority at the time for the new City Health Chief. This change in leadership also led to the resignation of the MPP project manager (groundWork, 2014). The results revealed that with the dismantling of the MPP there was a great disappointment among civil society as air pollution began to deteriorate. This shows that there is a need for policy makers to take more of initiative and reintroduce strategies that have proven to be successful. It must also be mentioned that the researcher was unable to secure an interview with the senior manager for pollution control from eThekwini municipality. The responsible employed re-routed the interview to the city health as the respondent mentioned that the research topic did not fall within the employee's scope of work. This was surprising as one would expect that the pollution officer would directly be involved in air quality issues in the SDIB. This lack of local government leadership on air quality issues in the South Durban area has resulted

in poor enforcement and management of industries, which has resulted in industry not engaging with civil society on pollution issues.

4.2.3.2 Air Emission Licences

A respondent from industry noted that AELs is a legislative component initiated by government to effectively addresses air pollution, however, four respondents mentioned that AELs are unsuccessful in addressing air pollution. A key component of the AQA are AELs that are a requirement for all polluting industries. Respondents representing civil society replied negatively towards the effectiveness that air AELs have on reducing air pollution in the SDIB. In terms of the NEMA: AQA, all polluting industries are required to submit an AEL. An AEL indicates the pollution limits for each activity within an industry whose operations results in emissions being emitted (eThekwini Municipality, 2011). The umbrella under which the AQA falls requires many stringent regulations to be implemented and cooperation from stakeholders to be effective and achieve the goals it is set out to accomplish, AELs are one of them. An environmental officer at a local industry (personal communication, 22 April 2020) said the following about AELs:

> *"With municipality issuing Atmospheric Emission Licences to companies, they are forced to monitor their emissions closely. The AEL do indicate the required limits and should a company deviate, they are fined and compelled to provide measures that are to be implemented to prevent recurrence and date by which measures will be implemented."*

This statement could reflect a biased view in favour of government as the ongoing pollution incidents (Carnie, 2020; Naidoo, 2020; Xolo, 2019) in the SDIB are indicative that monitoring as well as legal action against transgressors is not occurring.

Although AELs are in place to protect the environment from polluters, these licences are not made available to the public (Centre for Environmental Rights, 2020). An activist from a global NGO (personal communication, 30 March 2020) mentioned that this also has to do with government protecting information regarding emission licences. This means that industries have free reign to emitted emissions above national regulations if these licenses are not available to the public.. A local councillor (personal communication, 28 March 2020) added to this by mentioning that the AELs are not successful in keeping emissions within the regulated standards, especially if the public do not know the content of the emission licenses. The government and industry need to be

transparent with this information in order for the public to feel satisfied and know that industry is abiding by the laws. A resident activist (personal communication, 19 March 2020) said: *"Government are not fining industries when they are in violation of the laws. This means that they know there are no consequences and will continue to violate all the laws."*

A contravention of NEMA has a penalty not more than R10m. However, in 2005 when Engen exceeded the SO_2 10-minute level on 35 occasions, as well as six exceedances of the 24-hour guideline, no penalties were imposed (Vissers, 2010). This information shows that although legislation is in place, it is seldom implemented effectively which means that air pollution risks cannot be addressed. As mentioned in the literature review in Chapter 2, Masuku (2019) points out that for good governance practices to prevail, there has to be efficient use of the institutions resources and this is done by stringent internal controls which has not been exercised within the local municipality. A resident activist (personal communication, 6 April 2020) added that government have not been able to respond to air pollution challenges due to the poor management:

> *"Whatever licences or regulations the government have in place, if these are being implemented why are we still seeing flaring events, explosions and fires occurring at these plants? Government need to revoke these licences when this occurs to actually show that they are committed to helping the citizens of the country and not only profit driven. Everything starts with a good management system and we have a very poor management system in South Africa. Despite this country being a democracy, many citizens still live like they living in apartheid because they subjected to these awful events just because of where they live. It's unacceptable."*

With the continued accidents and incidents that have been occurring in recent years, residents are still experiencing environmental injustices despite South Africa being a democratic country for more than 25 years (Nzama, 2019; Pieterse, 2019; Pillay, 2018), as seen from the results this is due to poor management from local government. Every citizen deserves to experience democratic rights and the results shows gaps in proper monitoring and enforcement. Government has a responsibility to make this a reality for all citizens through enforcement of the AQA (Tshehla & Wright, 2019).

4.2.3.3 Air Quality Management System

The Air Quality Management System (AQMS) was an important initiative set up by the government after 1994 and during the MPP, to try and control air pollution. The AQMS was

established to track specific air pollution sources. It consisted of various components namely a monitoring network at strategic locations (refer to

Figure **4.5**), a record of emissions emitted within the SDIB and a health study to understand the impact of pollution on the health of residents (DEA, 2007). An environmental officer at a local industry (personal communication 22 April 2020) stated the following regarding the AQMS:

> *"An Air Quality Management System was established by government with the aims to estimate where specific air pollution sources are within the South Durban. The AQMS connects emissions through dispersion to air quality and measurements of air quality to exposure and effects. The AQMS comprised of an air quality monitoring network, including meteorological monitoring, emission inventories, dispersion modelling, exposure modelling and assessment of health effects. Providing enforcement means reviewing of standards for priority pollutants. On a national level this falls under the current responsibility of Department of Environmental Affairs."*

The results suggest that the aims of the AQMS were not realised, which has raised much frustration from civil society respondents. An environmental manager at a national industry mentioned that government's limited capacity has led to failure of suitable monitoring of industries. Respondents from industry and local civil society note that the AQMS has failed to respond to air pollution challenges in the SDIB by allowing monitoring stations to become dysfunctional and failing to provide important information to the South African Air Quality Information System (SAAQIS) which keeps track of air pollution trends.

Figure 4.5: The monitoring stations around South Durban (Apex Environmental, 2017)

The AQMS was developed as a response to the civil society outcry over poor air quality in the SDIB. The AQMS was set up as a component of the MPP to monitor air pollution emissions and manage all source emitters (DEA, 2007). The AQMS incorporated an air quality monitoring system to locate pollution sources and to manage source emitters (Tshehla & Wright, 2019). However, there are many challenges that exist in trying to implement the AQMS such as providing valid and accurate data, maintaining monitoring stations and monitoring capacity (Pieterse, 2019).

Monitoring stations

A resident activist (personal communication, 28 February 2020) and an activist from an international NGO (personal communication, 30 March 2020) further mentioned that a significant challenge in reducing air pollution is that monitoring equipment and stations used during the MPP are poorly managed and maintained by the current government. There were often times when no data was produced from these stations. A consequence of government not monitoring and maintaining air quality in the SDIB , it has caused unrest amongst civil society as a resident activist (personal communication, 19 March 2020) stated:

> *"The air quality monitoring stations stopped reporting results to the SA weather service, which are the custodian of the South African Air quality information systems, and many of the monitoring stations aren't operating. The air quality stations data were considered to be invalid and not good enough. A lot of the monitoring stations are not SAAQIS regulated and serviced. What used to be a good monitoring system in Durban has now diminished to something that is not functional."*

According to Mngadi (2019), by dismantling the air quality unit local government has failed to provide air pollution information required to identify and fine perpetrators. Air quality could not be measured accurately(Mngoma, 2014. The respondent's statements are in keeping with the reality of poor management and maintenance of air quality monitoring equipment which has raised frustrations among civil society. Nzimande (2012) noted that environmental regulations have very little influence in the SDIB. The challenge lies in the fact that without regular scientific evidence from these platforms, addressing air pollution issues is difficult. If no real-time data is present and comparisons cannot be made which show how local government has blatantly ignored one of the main metropolitan issues in the SDIB. Furthermore, a resident activist (personal communication, 28 February 2020) added that the reason from the city as to why no data has been recorded is due to procurement issues within local government:

> *"The mayor of the city and the eThekwini municipality have left these R1.5m machinery to become dysfunctional. The city says that they are missing instruments that are needed and there also is procurement issues with purchasing this. These are simple things that need to take priority. There are few monitoring stations that are functional right now."*

A resident activist (personal communication, 25 August 2020) added that the local municipality have been blaming bad air quality results on the dysfunctional monitoring stations. According to data released by parliament by the environmental minister in 2020, the SDIB has recorded the worst air quality but the eThekwini Municipality have blamed this on the monitoring stations being out of order (Carnie, 2020). Local government need to prioritise maintaining air quality monitoring stations to ensure that proper air pollution data can be collected.

These findings have been consistent with literature confirming that air quality monitoring stations been unable to deliver the results due to government lacking funds for the upkeep of these machines (Naicker et al., 2012; Mngadi, 2019). The Ganges monitoring stations appeared to be

operational as data was provided for all pollutants. The SO_2 data has been available in all stations in the SDIB; however, the monitoring of other pollutants such as NO, NO_2, NO_X, CO, O_3 and benzene was absent in Settlers and Wentworth monitoring stations (DEA, 2020). It is evident that certain monitoring stations have been dysfunctional and procurement issues have not been expedited to ensure consistent monitoring. Therefore, taking action against polluters is difficult because the city has little conclusive data to show air pollution levels for years, making the link between health issues and air pollution flawed (Mngadi, 2019). Furthermore, a resident activist (personal communication, 28 February 2020) argues that government information is unreliable: *"How can we trust the data from government websites when we are living here and can see, feel and smell when there is the terrible quality of air?"*

In recent years, incidents have continued to increase as a result of poor monitoring and enforcement of mitigation measures by industry and government. Media articles (Dawood, 2020; Madlala, 2012; Nkgadima, 2017) reported repeated incidents occurring within the SDIB which continue to affect the health of residents. In 2018, the Environmental Outlook Report named South Durban a hotspot due to alarming air pollution levels that have been measured over the years. Despite this, there has been a decrease in SO_2 emissions in three monitoring stations, namely Settlers, Wentworth and Southern Works (refer to **Figure 4.6**).This questions the accuracy of air quality data supplied by government departments and does not align with community experiences. Dysfunctional monitoring stations and incorrect air pollution information communicated by local government makes it difficult to assess the air quality in the SDIB, therefore making it difficult to address it.

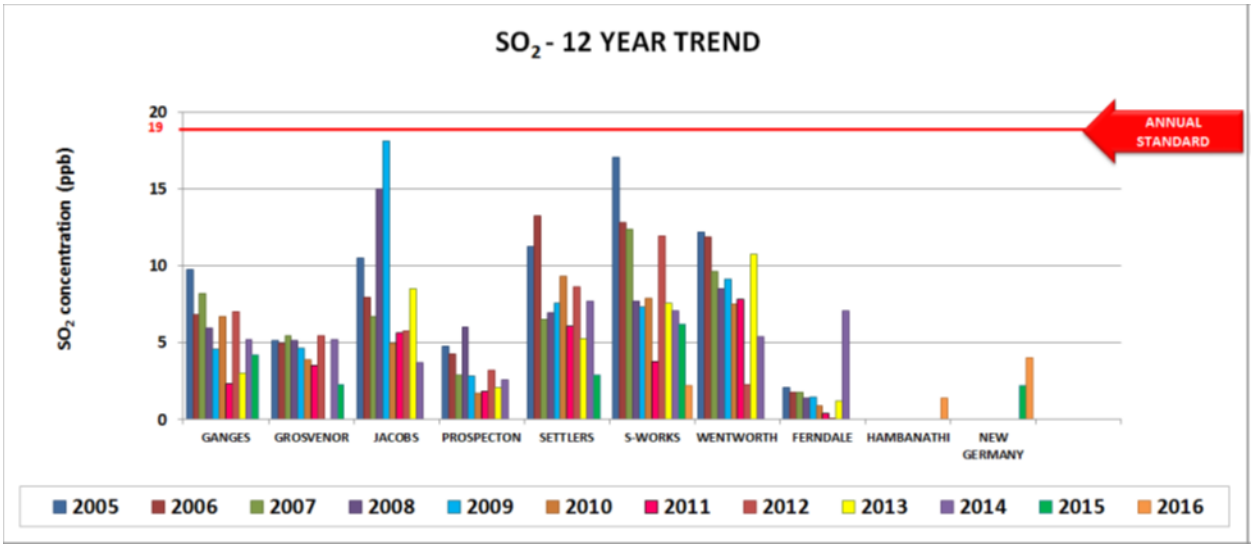

Figure 4.5: Sulphur dioxide trends over a 12-year period in South Durban (DEA, 2018)

i) Strengthening the inspectorate

Local government also established an initiative known as strengthening of the inspectorate. As mentioned by an environmental officer at a local industry (personal communication, 22 April 2020):

> *"There has also been strengthening the inspectorate. The aim was to improve cooperation between the City Health Department and DEAT so that the enforcement of air quality legislation and guidelines would be strengthened. Inspectors were to come out and manage the schedule trade permits to ensure that everything is above board. This meant that there was supposed to be clear guidelines on what the emission limits are, and I think it assisted in reducing some emissions."*

This initiative put forward by government was successful when the MPP was active. As a result of strengthening of the inspectorate there was a reduction in emissions as the schedule trade permits came with stringent monitoring requirements that ensured industries are within national norms (DEA, 2007). An environmental manager at a national industry, (personal communication, 28 February 2020) and an environmental engineer at a local industry (personal communication, 24 March 2020) both agreed that although this initiative was set up there still remains a lack in capacity and monitoring of industries, along with many outstanding issues pertaining to enforcement of regulations.

ii) Skills shortage

An environmental engineer at a local industry (personal communication, 24 March 2020) agreed with other respondents by stating that: *"There is limited capacity from government who monitor industries, they [government] need to focus on capacity building and people who are enforcing regulations need to have proper training."*

There has been a serious skills shortage within the eThekwini Municipality's air quality unit. Staff members who have been trained to operate the air quality monitoring systems are no longer working with the municipality (Mngadi, 2019). Tshehla & Wright (2019) stated that the issues within the regulatory framework give industries an opportunity exceed pollution limits without being penalised. There is need for improvement from regularity authorities as staff capacity is lacking. This has allowed industries to pollute the atmosphere and has restricted civil society from taking them to task over non-compliances. A resident activist (personal communication, 22 May 2020) explained that local government should improve the AQMS:

> *"Government needs to ensure that there is strict monitoring of air pollution, fully functional monitoring stations that are calibrated regularly, ensuring that real-time data can be accessible to those requesting it on a public platform. This puts power in the hands of community to hold industry and government accountable for the incidents/accidents/explosions and day to day operations. This will also ensure that industry and government cannot tamper with data and readings of emissions. Therefore, they can prosecute industries when the have an accident/incident/explosion."*

Once air quality monitoring stations have been repaired, it is anticipated that valuable data will be gathered which will save many lives and fine offenders (Mngadi, 2019). However, it was argued by Nzimande (2012) that this was notusually not an optimal way of controlling air pollution as fines are imposed once the environmental damage has already taken place. Once irreparable harm has occurred this will not be required by fines. (Mngoma & Dlamini, 2014). In keeping with this information, a local councillor (personal communication, 28 March 2020) expressed that government's imposing fines is not the solution to the problem and government needs to put pressure on industries to move towards cleaner technologies:

> *"Fines are not the answer because you can impose as many fines as you like but profit before people is something that one should understand because a life is invaluable and there is no many that can bring back a life. They should look at systems on their plants like in Denmark*

where they have high technology that controls the pollution. That to me is the solution. But government need to encourage industries to make the transition because they won't do this on their own."

It is clear that there is adequate legislation in place that governs environmental regulations such as air pollution in the SDIB, but the implementation and monitoring has failed to mitigate against air pollution risks. Government needs to prioritise on capacity building needed to enforce stricter regulations and controls onto polluting industries as well as maintain and monitor equipment that provides vital air quality information that makes it easier for perpetrators to be held accountable.

4.3 Theme 2: Continual lack of governance addressing air pollution reduction strategies

Governance is the process of making decisions and either implementing these decisions or not at an international, national or local level. According to Sheng, (n.d.) good governance includes strategies that ensure corruption is minimised, and increasing transparency, accountability, responsiveness and practices that include all levels of society in decisions including those most vulnerable. The findings from this study revealed that there has been a lack of good governance in addressing air pollution in the SDIB, especially since 2010 with new local government leadership, and as a result air pollution has had a detrimental effect on the community. Respondents highlighted the abdication of government responsibility such as allowing further development in the SDIB that will add to the cumulative effect of air pollution and failing to address community concerns. These issues will be discussed in this section.

4.3.1 Destruction of the last green lung in South Durban

When respondents were asked if local government have played a part in increasing risks to air pollution, the development of the Clairwood Racecourse into a logistics park was highlighted by both industry and civil society groups. The Clairwood Racecourse was considered the last green lung of the SDIB but was declared by local government as a favourable location for the development of a logistics park (Maharaj, 2017). The development of the Clairwood Racecourse into a logistics park was met with much resistance from civil society. Unfortunately, despite civil society opposition to the development of a logistics park and court actions by civil society to halt the development due to increased air pollution and social impacts, the development went ahead anyway (Leonard & Lidskog, 2020). A resident activist (personal communication, 28 February

2020) explained that government have failed to include the public in the development process of the new logistics development:

> *"The government has allowed that [Clairwood Racecourse] to be developed into a logistics park. Government is not playing their part …There are also no boards to say who the developers are and who the contractors are which by law they should have but I think government have a hand in this. They also did not take what the community had said into consideration and just dismiss their concerns about this development."*

As mentioned by the respondent, minimal communication took place between the community and the city authorities. The racecourse was sold to the developers without consultation with the local community who often visited the racecourse for its natural beauty such as the gardens (Khan, 2019). Respondents argued that government did not play a significant role in trying to protect the last green lung of Clairwood from industrial expansion which led to public protests (refer to Figure **4.5**) as mentioned by an environmental manager at a national industry (personal communication, 28 February 2020):

> *"The public were outraged by the fact that government allowed the development of the Clairwood racecourse into a logistics park. From what I know it seems like most of the community's activism went in vain because the city did not really take into consideration the impacts and the concerns they had."*

Ignoring residents' grievances an ongoing challenge in the SDIB affecting governance, participation and democracy. Respondents expressed that the development of the Clairwood racecourse into a logistics park would put further pressure on the SDIB which is already a heavily polluted area.

Figure 4.5: Public protests against the development of the logistics park at the Clairwood racecourse (Adonis, 2017)

Although there was a public participation meeting, it was said to be one-sided and did not allow for the opinions of civil society to be included (Maharaj, 2017), which led to a court case between the SDCEA and the Member of Executive Council for Economic Development, Tourism and Environmental Affairs KwaZulu-Natal Provincial Government (No author, 2015). It was argued that the quality of the Environmental Assessment Report was compromised, and the High Court ignored SDCEA's request (Marongo, 2018). A resident activist (personal communication 28 February 2020) added:

> *"The government has allowed that [Clairwood racecourse]to be developed into a logistics park. Government is not playing their part. There is court case against the government because of this. CBOs are saying that the public was not informed about this construction. When they started developers offered Merebank and Wentworth civic organisations R1m each to take this money and be quiet about this construction. The SDCEA went to court and lost the case and then it was appealed and the judge stated that they can take it to appeal court. There are also no boards to say who the developers are and who the contractors are which by law they should have but I think government have a hand in this."*

According to Leonard & Lidskog (2020), risk and social impact assessments were completed for the purpose of checking a box to get approval for construction rather than to sincerely understand

social concerns. Additionally, the sample size for the social impact assessment was seen as weak as it only included 102 residents when there are 285 000 people in the SDIB community. It was also questionable how the development was approved as 8% of the sample population cited air pollution as a concern. By developers offering money to civil society to prevent them from opposing the development shows unethical behaviour. This example of the Clairwood Racecourse shows how poor governance and oversight from authorities influences the community negatively. An environmental officer at a local industry (personal communication, 24 March 2020) reiterated the point that social concerns were not appropriately considered despite public demonstrations:

> *"Residents feel that risk assessments were not carried out effectively and did not look at the real impact this development will have. They [civil society] feel that with this development there will be a considerable amount of toxins in the air as we all know trucks pollute the atmosphere. I think if they developed this in another area that would ease the strain of the South Durban area and also reduce anxiety on the residents. They have conducted various protests to bring attention to this issue, but I guess it comes down to who can make the most money."*

Addressing air pollution will continuously prove to be a perplexing task if government do not allow inclusion of all stakeholders and eradicate corrupt activities as mentioned by the above activist. A core principle of good governance means ensuring that all opinions are heard and included, particularly those of marginalised groups (Prinsloo, 2018). A neoliberal paradigm places the economy and society above sustainability needs. Government bodies need to become more transparent, responsible and accountable in their quest to achieve sustainability (Marongo, 2018). This practice is not seen during community engagements within the SDIB. A resident activist (personal communication, 19 March 2020) highlighted that the cumulative negative impacts the logistics park had been overlooked by the local government:

> *"There are so many trucks in the SDIB, and the government just let more and more construction take place. The Clairwood racecourse has now being turned into a logistics park which is ridiculous because of the amount of CO_2 that is going to add to the basin. Government did not consider the health impacts that this will cause and only the monetary value it will add. The concerns were not adequately addressed during the authorisation process. Government glorify the need for developments but fail their citizens at the same time saying that there is no direct link to air pollution and bad health."*

According to Broughton (2017), the MEC of economic development overlooked health studies when approving the logistics park development and asked civil society to present recent air pollution health studies to back up their arguments which civil society claimed is not their job. The MEC rejected arguments that air pollution has a direct effect on health of individuals as studies to prove this are limited. A resident activist (personal communication, 16 April 2020) mentioned: *"It seems silly for a government official to ask the local community to provide health stats on whether air pollution causes health impacts. That is not our job."*

According to Altieri and Keen (2016), there has been an abundance of research linking air pollution to compromised health in North America, Europe, and China. However, in South Africa, and Africa as a whole, a developing continent, epidemiological studies have been scant. The above statement suggests that government has not been able to respond to the community and environmental needs effectively but rather favoured economic development. It is evident that the data from Ganges shows non-compliance with ambient air pollution standards over a period of eight years (refer to **Figure 4.6**) which was attributed to vehicle traffic from the southern freeway (DEA, 2018). If vehicle traffic is causing significant increase in air pollution, additional traffic from the logics park would only exacerbate the situation.

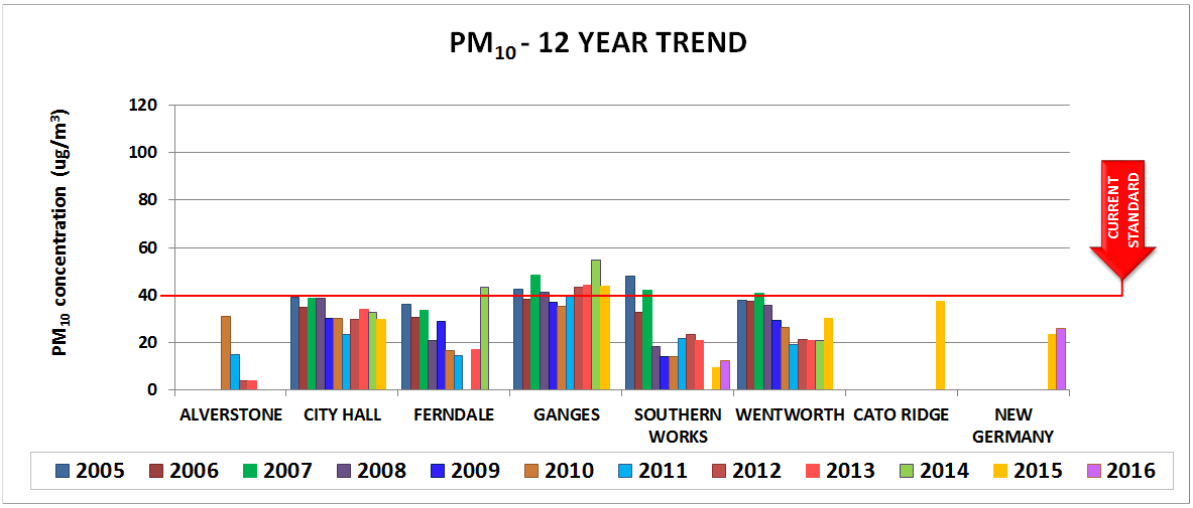

Figure 4.6: PM10 trend at various locations over 12 years (DEA, 2018).

Furthermore, a resident activist (personal communication, 19 March 2020) went on to say that the Clairwood Racecourse has been for many years the emergency evacuation point for residents. By

taking this away and not providing any information as to where the next evacuation location is, government have shown that they have not considered the local community once again and the impact that potential incidents pose to residents. A local councillor (personal communication, 28 March 2020) explained how government have not prioritised residents by removing the emergency evacuation point:

> *"They have taken away the Clairwood racecourse and have not provided an alternative area should there be an explosion or fire at a refinery which has occurred many times in South Durban and was poorly attended to. The MEC was supposed to provide answers on this but I have not heard anything yet. It cannot always be money over people. Government need to do their job which is govern the people and now this is example of them leaving their people stranded should be there be an emergency in South Durban."*

In 2007 when the Engen refinery exploded igniting 7-million litres of fuel, the situation was handled poorly by the local municipality. Due to the lack information provided residents fled their homes, causing panic, due to there being no clear instructions from authorities (Mersham, 2016). The example of the logistic park development indicates that government have disregarded resident's health and safety and chosen to place the economic needs of the country above them. There has to be a balance between social and economic development. Government has a responsibility to ensure planned activities and developments are sustainable which has not been exercised with the logistics park project (CIPFA, 2013). Compliance and enforcement of environmental regulations was a major problem.

4.3.2 Compliance and enforcement of environmental regulations

The results revealed that although South Africa has good environmental regulations, industries' compliance with these regulations is uneven. When questioned about compliance status with environmental laws, civil society and industry respondents both mentioned that industries have not been compelled to comply with regulations as a result of government's lenient nature by which they have not prioritised protection of the environment. This indicates the lack of interest and political will from government to enforce these regulations appropriately. Although a few respondents representing industry argued that industries in the SDIB are within regulations, an environmental manager at a national industry (personal communication, 28 February 2020) mentioned that industries are not complying with environmental regulations:

"I don't think industries are complying with regulations. The problem is that historically industries were able to pollute in order to build up South Africa's economy. Industries were allowed to negotiate the air emissions with the chief air pollution officer. That was a signed document that could be very difficult to change and government may have a difficult time taking them to court. They could be complying to old standards and regulations. If they are complying with the new regulations, we should be seeing some type of reduction in emissions and a greater acceptance by communities which we don't."

In order to build South Africa's economy, industries were given protection from the apartheid Key Points Act, which allowed them to pollute without stringent restrictions (Groom, 2020). According to the National AQA 39 of 2004, all possible polluting industries are compelled to follow AEL guidelines. Hence industries should not be operating under apartheid laws, such as the Atmospheric Pollution Prevention Act (APPA). These findings could suggest that government has not enforced the new post-apartheid legislations correctly if communities feel that there has been very little to no improvement in air quality. i. It is therefore government's duty to ensure that that every polluting industry be held accountable. A resident activist (personal communication, 19 March 2020) mentioned that industry could be disregarding pollution regulations and government have allowed this to happen: *"They [industry] disregard the air pollution laws. The emission standards need to be negotiated with government, CBOs and industry."*

This statement was confirmed by a study conducted by Nzimande (2012) to evaluate the compliance status of industries in the SDIB which concluded that little attention was focused on protection and management of the environment by industries. Government-regulated air pollution standards were criticised as on April 1st 2020, the minimum emission standard for sulphur was changed to 1,000 milligrams per cubic metre, despite calls for a firmer ruling of 500 milligrams per cubic meter. These regulations were seen as being too relaxed by a community activist and air quality specialist (Xolo, 2020). By allowing industries to double their SO_2 emissions, government was intensifying the situation and ignoring environmental harm this will cause and the health effects on the already vulnerable community (Bega, 2019). In contrast to these findings, not surprisingly an environmental officer at a local industry (personal communication, 22 April 2020) mentioned that industries are in compliance with environmental regulations:

"The AEL do indicate the required limits and should a company deviate from this, they are fined by government and compelled to provide measures that are to be implemented to

prevent recurrences and also asked to provide a date by which these measures will be implemented accordingly to rectify the problem."

As part of the AQA, AELs have been implemented to ensure that every polluting industry abides to strict environmental regulations. This is done in order to regulate emission sources from polluting activities (WKC, 2020). However, civil society organisations have taken the eThekwini municipality to court as they have been denied access to the Engen Petroleum and SAPREF AELs. According the AQA of 2004, all applications for licences should be made public (No author, 2015). This shows that the local municipality has been in contravention of the law. As the availability of information is limited and difficult to access and with the continuous accidents occurring at local industries (Nkgadima, 2017) it is challenging to understand if industries are in compliance with emission standards or if environmental regulations are not stringent enough. A resident activist (personal communication, 22 May 2020) stated:

"Stringent methods are basic regulations that are adopted by most countries. South African regulations are lacking good air quality monitoring stations with accredited operators and failing to give massive fines for environmental accidents and incidents. Our government is even more relaxed as they allow postponements on AQA in section 21 regulations. They are allowing big industries to get away with murder, literally. When will we see Air Emission Licences being revoked or industries being put on suspension for gassing out communities and sending them to the hospital?"

Frustration arises when polluting parties are not penalised for their transgressions. According to Sanpath (2011), with the resignation of senior staff, monitoring stations used to calibrate air quality were left unchecked, which led to the further deterioration of air quality in the SDIB. This suggests that it is essential for government to pay more attention to procurement of equipment and capacity to enable air quality monitoring as well as revisiting the penalties for polluting industries according the NEMA 108 of 2004. A resident activist (personal communication, 22 May 2020) highlighted the fact that there have been numerous incidents where government have failed to address this problem:

"In our community there have been significant incidents that have exceeded air pollution standards, due to a lack of enforcement, prosecution and dysfunctional monitoring stations. Therefore, there has been limited convincing evidence that proves industries are contributing

largely to air pollution, making it difficult to take industry to court nor has government intervened in this regard."

In the SDIB there have been multiple incidents that occurred where communities have complained for days of foul smells emanating from nearby refineries and source residents had to be hospitalised. There has been no record of penalties imposed on the perpetrating industries (Harper, 2020; Kings, 2016; Pillay, 2018). This makesair pollution reduction strategies a futile task if there are no serious consequences. The risks of being prosecuted by the eThekwini Municipality are relatively low, which makes it easier for industries not to comply (Nzimande, 2012). A resident activist (personal communication, 6 April 2020) explained this:

"Without independent sampling industry could be fabricating results to indicate they are within regulations; communities are doubtful that the results produced are in fact true. These industries know that they can get away with it because not often are they fined."

A resident activist (personal communication, 28 February 202) mentioned that the authenticity of the local municipality has been raised concerns during community meetings:

"There have been numerous occasions where government has painted a glorified picture of the situation in the SDIB. Government shy away from the fact that there is a big problem. After they present their results, we [SDCEA] presented our results and it was nothing like they had presented. Governments results showed that there is no problem in the air. They often employ people to conduct testing or manage air quality that have a stake within industries or are on their payroll."

According to the Department of Environmental Affairs the SO_2 and particulate matter levels have decreased at monitoring stations within the SDIB since 2004. However, as confirmed from the literature review in Chapter two, South Durban has been ranked the one of the worst areas in KwaZulu-Natal in terms of air quality (Pillay, 2018). By government authorities potentially underestimating or incorrectly presenting air pollution data to the community they are providing a basis for industries to continue to pollute and showing poor governance. Government authorities need to gain the trust of civil society by providing accurate air quality information that is not questioned by civil society. An environmental manager (personal communication, 28 February 2020) suggested that independent impartial companies should be conducting air quality tests:

> *"Government should utilise independent individuals to carry out air quality samples to avoid potential[ly] bias[ed] views. Even if NGO and other organisations based in South Durban conduct these tests they could always give a bias view or inflate a few results here and there because they are very passionate about stopping industry. I think its best that these environmental companies that specialise in air quality conduct these tests and then submit to government."*

Employing scientific experts associated or linked to industry to carry out various air pollution tests and studies raises questions of government's legitimacy in enforcing regulations and could suggest a biased view in favour of industry (Leonard & Lidskog, 2020). A resident activist (personal communication, 28 February 2020) added that:*"if they [CBOs] lay a complaint with a local councillor not much can get done if they are not from the ruling party"*.

These political struggles within the government make complying with air quality regulations challenging and the ones left to suffer the consequences of this are the residents in the SDIB who are already marginalised due to their socio-economic status (Mngona & Dlamini, 2014). As mentioned previously, securing interviews with pollution control officers and city health officials from eThekwini Municipality was difficult; therefore, minimal contribution from government could be used to justify the findings. Access to information was a major problem.

4.3.3 Lack of access to information

Respondents highlighted the challenge in accessing air quality data over the years. Respondents showed concern that government and industry have refused to share vital data with communities concerning air quality. A resident activist (personal communication, 6 April 2020) explained:

> *"Every time that we [CBOs] request data from industry they tell us that government are monitoring us and we can get the information from them. Speaking with anyone from government is a waste of time because they don't know what is going on themselves. They almost never provide any information to us. The government websites are also not helpful."*

Leonard & Lidskog (2020) found that government departments have been unable to provide air quality data to civil society and have not taken an interest in requests from these organisations. This information suggests that government and industry should make air quality information readily available as information sharing is important to bridge the gap in addressing air pollution risks. Additionally, a resident activist (personal communication, 30 March 2020) mentioned that

with: *"SAPREF as a National Key Point attaining information about leaks, fires and other incidents is difficult as they are protected by this act."*

According to Pillay (2015), information after a fire broke out at SAPREF on 17 April 2020 was problematic as the refinery was protected by the National Key Points Act. Since the refinery has this protection from government, civil society faces a daunting task in challenging the refinery. In late 2020, an explosion at the Engen refinery in South Durban caused panic amongst the community. To make matters worse the general manager did not respond to calls, text messages and voice messages sent through by the media and the communications manager at Engen stated that he was not authorised to provide any information (Carnie, 2020). By conducting themselves in this manner they have not been able to provide basic information that the community has a right to during emergency situations. The constitution clearly states that every citizen has a right to an environment that is clean, healthy and sustainable, so industries cannot be an exception to this rule. South African's have fought long and hard to become a democratic country where everyone has the right to freedom of speech and the right to information. Industries cannot be exempt from these declarations. Major air polluting industries choosing not to engage with the local community and presenting their air pollution information speaks volumes about their disregard for local communities and the environment. Furthermore, securing interviews with government air pollution control officers was difficult, which indicated the challenges in accessing information from local government. The fact that the senior pollution control officer declined to conduct an interview, demonstrates the lack of interest in addressing air quality risks and also backs up the findings from respondents who mention that contacting local authorities is usually futile. If it is difficult to access information from local authorities, civil society cannot understand if air pollution is being addressed on at a municipal level.

4.3.4 Implications of monetary trade-offs between local government and industry

It is widely understood that the industrial development in the SDIB was a strategy to address South Africa's economic crisis while ignoring the potential human and environmental impact (Scott & Barnett, 2009). Respondents alluded to the fact that large industries operating in SDIB provide a huge monetary value to the country but is not used for the intended purposes by local government officials. This leads to industry and government performing a trade-off which allows industries to pollute the atmosphere (Nzimande, 2012). A resident activist (personal communication, 28

February 2020) noted that local government is not committed to effecting change for the benefit of the community. Local government has been known for allowing industries to get away with polluting the atmosphere by exempting them from the AQA minimum emission standards (Carnie, 2011). In the event that local government upholds strict regulations, industries would have to lower their emissions which in turn would result in a significant drop in production which would ultimately affect the profit generated, as mentioned by a resident activist (personal communication, 16 April 2020):

> *"They[government] are not enforcing regulations effectively and not in par with the community. They are more for the industries because of the revenue the government receives. If they start to penalise these polluting industries that would mean their pockets shrinking as well. So they rather allow them to pollute the air and affect the poorer people who they know can't really do anything about it. It's sad to see this happen especially when everyone thinks we are a democratic country, and all citizens have equal rights."*

These results suggest that not all South Africans have been able to enjoy the benefits of clean air during the democratic transition This has been attributed to governments lack of commitment to combating air pollution and prioritizing economic development. Furthermore, a resident activist (personal communication, 6 April 2020) added that government officials having shares in these industries makes it challenging for stricter regulations to be implemented:

> *"It comes down to greed and just about money. If you [are] looking at our government such as our president who has shares in Mondi, and all oil companies and mines in South Africa so that is an advantage to these polluting companies because they know they have the backing of the president and there won't be serious consequences or their actions. When it comes to the government having shares in the industries will always mean reducing air pollution will be an uphill battle for us."*

This suggests that there is a profit over people mindset that is limiting the efforts put forward by civil society to address air pollution. Nzimande (2012) found that environmental regulations remain on paper in South Africa, but industries compensate government in exchange for lax enforcement. When this happens regulations and governance tend to fall short. In 2018 Mondi and Sappi paper mills announced a multi-billion-rand investment into South Africa's government to boost the economy: it is unclear how these funds have been utilised. Mondi also has a long-standing partnership with government around land reform (Dludla, 2018). A possible the reason

why addressing air pollution has been a challenge is government not wanting to jeopardise their close relationship with industry due to fiscal gains. An environmental manager at a national industry (personal communication, 28 February) explained how internal corruption leads to poor enforcement:

> *"There is a lot of internal governmental challenges that exist that make enforcement of environmental laws an uphill battle. Many of these challenges lie within the lines of corruption and often bribery for personal gains. This means that enforcing environmental regulations takes a back seat and polluting industries have free rein to pollute knowing that government will do very little, especially if they can gain monetary value."*

There have been many cases within the eThekwini Municipality in the past and in recent years, of misconduct and corrupt activities that involve bribery, nepotism and authorisation of funds illegally (Benjamin, 2012). Government needs to acknowledge that it is their constitutional duty to ensure that every citizen lives in an environment that is not harmful to their wellbeing and they ensure sustainability for future generations (Vissers, 2010). Strong political guidance and eradication of corruption is needed to ensure that good environmental management exercised in the SDIB. As mentioned above, corruption in South Africa has been and still is a significant challenge in addressing air pollution. Out of 278 municipalities audited in 2013, only 18% showed favourable results in terms of finance and zero corruption rates (Corruption Watch, 2013). The eThekwini Municipality spent R502m irregularly which benefited 10 local councillors who had business dealings with the municipality (Maharaj, 2017). It is evident that government needs to refocus its political agenda and demonstrate good governance through efforts to reduce corruption, increase trust and transparency within citizens and serve the people of South Africa. A related issue is the inefficient monitoring of smokestacks.

4.3.5 Inefficient monitoring of smokestacks

A recurring complaint from residents during the interviews was the emissions from smokestacks at night. Residents have been complaining for years that they wake up to a blanket of smoke covering their furniture and windows in the morning. The smell in the air is also toxic, which makes breathing challenging. The reason for this is that refineries are emitting fumes and poisonous gases into the air when they are asleep (George, 2017). A resident educator (personal communication, 28 March 2020) stated:

> *"Residents notice that smokestacks are emitted from 6 pm to 6 am. When you wake up in the morning you can sometimes see black dust on your surfaces after the smoke and soot has settled. It usually makes it difficult for us to breathe especially in elderly and kids who already have health challenges like asthma."*

Emitting fumes into the atmosphere seems to be a strategic method that industries use to hide emissions by releasing out pollutants when people are generally asleep, according to the respondents. An environmental engineer at a local industry (personal communication, 24 March 2020) stated that smokestacks emit on rare occasions and do not usually cause any harm. However, accounts from activists depict contrasting information. A resident activist (personal communication, 25 August 2020) explained how industries released emissions from smokestacks at night to conceal them from the residents: *"Industries deliberately let out emissions at night when people are fast asleep. They think that when we wake up in the morning we cannot see and smell that they have been letting out toxic gases."*

Furthermore, a resident activist (personal communication, 19 March 2020) mentioned that the reason why smokestack emissions occur at night more often than during the day is not only because it is less visible but also it is an attempt by industry to turn air pollution control units off in order to save on electricity. According to Sparks (2004), residents openly discussed that at night refineries often switched off the safety component, allowing soot to be emitted from the stacks. These results suggest that the SDIB community have been compromised due to a lack of local government intervention and poor management from industries. A resident activist (personal communication, 19 March 2020) mentioned:

> *"There is no annual monitoring for smokestacks. There needs to be some control as these refineries are emitting a large portion of gases and fumes at night. When people wake up in the morning they often find black smoke on windows and furniture in their homes. What is being done to control this? Government need[s] to step up and intervene here as communities have been complaining for too long and government have not forced industry to do anything about this. They need to ask industries to increase the height of their smokestacks."*

There are over 150 smokestacks within the SDIB that emit lethal emissions into the atmosphere (Firmin, 2019). Smokestacks were previously at a height of 50 to 100 m in order to accommodate the old airport. In 2010 the airport was relocated, but industries were not asked to raise their smokestacks (no author, 2020). Government needs to ensure that smokestack emissions at night

and during the day are regulated and monitored. The results show that there is a lack of mitigation measures and monitoring by local government to ensure that smokestacks at night and early parts of the morning are addressed. This study explored the potential for collaboration between local government, industry and civil society to address pollution challenges.

4.4 Theme 3: Collaboration and engagement between local government, industry and civil society to address air pollution reduction strategies

It is important to analyse engagements that have taken place between local government, industry and civil society to address air pollution. In doing this it will be easy to understand if there are limiting factors that prohibit successful engagement and collaborative efforts to try and address air pollution risks in the SDIB. Collaboration between local government, industry and civil society is important as industry and government may tailor mitigation measures and legislations to fit the needs of the community, in this way becoming more effective in local contexts leading to beneficial outcomes for all (Durham et al., 2014). The results revealed that collaboration may have existed during the MPP. However, the complex relationship between local government, industry and civil society has come at the expense of increasing pollution levels and conflict amongst the community. Both local government and industries' refusal to conduct an interview for the purpose of this research study shows their lack of commitment and interest in addressing air pollution.

4.4.1 Collaboration and engagement between industry and civil society after the democratic transition

. All respondents highlighted the lack of response from industry when civil society (SDCEA and MRA) have attempted to make contact to discuss air pollution risks. A resident activist (personal communication, 28 February 2020) mentioned they had asked for a meeting with SAPREF and Engen Petroleum, requesting them to present air quality reports, however no reports from either industry were presented to the CBO. According to Harper (2020), Engen Petroleum had agreed to meet with civil society organisations such as SDCEA to discuss their grievances, but did not fulfil this promise and instead issued a lawsuit against the CBO. These findings depict the hostile relationship that exists between industry and civil society organisations after apartheid as industries refuse to engage meaningfully with civil society. An environmental manager at a national industry (personal communication, 28 February 2020) stated:

> *"The relationship between industry and communities is still a very hostile one that needs serious work. Both industries and civil organisations have to stop seeing each other as the enemy and need to try and work in a pragmatic way where compromises can be made."*

Mersham (2016) explained that in the SDIB the health crisis experienced by residents has been a long-fought battle which has been characterised by a lack of initiative taken by industry towards conflict resolution with civil society. According to Parkinson (2006), for collaborative efforts to be successful both parties need to develop a clear and mutual understanding and respect for each other that includes the ability to compromise. Additionally, free flow of communication is needed to allow stakeholders to discuss opinions openly and convey information to one another. An environmental manager at a national industry (personal communication, 28 February 2020) added that industries engage with communities only when there are complaints or concerns raised by the community:

> *"Industries do engage with communities as they become aware and concerned about attention being brought to their organisation by rallies and protests. Although they engage with them, I don't think these engagements are meaningful enough. The engagements between them are generally not extremely successful and the relationships between them is very confrontational and defensive. Industry just wants communities to almost get off their backs. Communities have complained that industries do not really consider them [civil society] and in some instances present threatening remarks. If this continues there will be no resolution to the problem."*

Industries' resistance to engage with civil society further amplifies their tense relationship. When relationships are hostile, this makes it difficult to work together (Mersham, 2019). This shows industries lack of commitment and interest to address air pollution. Keeping in mind that industries are one of the main contributing factors to air pollution (Carnie, 2020). Additional hostile behaviour was seen in December 2020 when there was an explosion at the Engen Petroleum refinery. A meeting had been scheduled between community activists and Engen representatives, but Engen refused to allow certain activists on the premises due to an interdict regarding a separate matter in 2018 (Erasmus, 2020). Furthermore, a local councillor (personal communication, 28 March 2020) mentioned that instead of engaging with civil society and government proactively, certain industries have threatened to shut down their plants if they are forced to make drastic changes and if communities continue to petition against them.

Engen Petroleum threatened to shut down the refinery in South Durban when they came under scrutiny from government and civil society for continued air pollution violations. The refinery stated that if they were unable to operate efficiently with continuous pressure from government and the community, shareholders would consider shutting down (Carnie, 2011). Industries have demonstrated a defensive approach that does not allow for meaningful engagements between the stakeholders. By threatening to shut down, industries are placing government in a position where they are forced to suppress complaints (Carnie, 2011). Industries need to understand the importance of a collaborative approach opposed to a defensive and threatening strategy. A resident activist (personal communication, 28 February 2020) added that communities need to be kept informed regarding any upgrades done to plants in the area which is something that has not been done:

> *"Communities want to be included in industries' plans, renovations and shutdowns because it all affects us somehow. Industry don't communicate these things with us because they don't care. There is no information sharing with communities which is wrong. Communities have the right to know what is going on in their back yards because we have been living here for decades."*

According to Leonard & Lidskog (2020), information sharing between certain industries and communities have been lacking in the SDIB. Industry needs to prioritise the sharing of important information with civil society, paying attention to future developments, upgrades to refineries and other plants, expansions of industry and shutdowns. Sharing this information will give civil society a sense of trust and will be able to build a relationship with industry (Reed et al., 2018).

4.4.1.1 Community liaison forums to address air pollution

Industries developed community liaison forums for the purpose of including civil society in discussions pertaining to industry activities after the democratic elections in 1994 (Sparks, 2004). The results revealed that these forums did not fulfil the purpose of facilitating engagements between civil society and industry and do not address industrial risk issues. An environmental engineer at a local industry (personal communication, 24 March 2020) explained the formation of the community awareness and environmental response forum:

> *"Initiated by Engen was the Community Awareness Emergency program as pressure starting mounting from the community. Engen intended for this committee to facilitate engagements*

between the community to try and bring about some type of positive output where the community felt included in what was going on at the refineries and for them to feel heard by industry. However, there was some hostility within the group and I think holding meetings twice or three times a year is not sufficient. There needs to be a very close relationship within these committees."

Engen Petroleum viewed the CAER forum as a voluntary initiative but this, however, was met with disdain from civil society such as the Wentworth Development Forum (WDF) who demanded legally binding emission reductions (Sparks, 2004). Civil society also felt that industry wanted to take the reins of the forum but community organisations challenged this by demanding that their representative chair these meetings and the agenda of the meetings made available for their review (DEA, 2007). By doing this civil society organisations were able to have some control over the forum. Sadly, this forum was unable to address the communities' concerns (Vissers, 2010) and have become disingenuous as a resident activist (personal communication, 22 May 2020) noted:

"There now is the community liaison forums that exists to discuss pollution issues, but we [CBOs] do not sit on this platform as they don't address the communities' problems. Majority of the people that sit around this table are on industries' pay which they often provide funds to [Individuals that are present at community forums work for industry]. They allow these schools and community organisations to use this money for social development and school funding. But that does not help because they are not discussing environmental issues such as air pollution."

Civil society organisations contended that community liaison forums such as the SAPREF Community Liaison Forum are not the correct tool to address air pollution as it does not allow for proper engagement and consultation between industry and communities. This was confirmed by Leonard & Lidskog (2020) whose findings suggested that these forums are not actively addressing environmental risks such as air pollution but rather focusing on social development by providing funds to the community, which has been highly criticised. There is a serious lack of discussions surrounding environmental risks, issues regarding flaring and exceeding emission levels. According to Graci, (2013), for collaborative forums between two or more parties to be successful there needs to be willingness from both parties to make meaningful changes and for there to be equal inclusion of all parties. Certain CBOs have also been criticised for accepting money from industry, which questioned the . credibility of these organisations. (Leonard & Pelling, 2010). A resident activist (personal communication, 28 February 2020) added:

"The community liaison forums have been very unsuccessful and toxic because the industries call the shots. They just hold strategic meetings to act like something will be done but in fact little action is taken from industry, they do not want to hear the real issues."

If industries are steering these meetings they are not conducted in a democratic manner (Kasavel, 2010) that allows all opinions to be heard, which defeats the purpose of these engagements.

4.4.2 Collaboration between local government, industry and civil society to address air pollution

All respondents felt that there is insufficient collaboration between civil society, industry and local government .Civil society was rarely included in meetings between industry and government. In 1995, the national government initiated the Indaba known as the South Durban Multi-Stakeholder Environmental Management Meeting, which promoted engagements between community groups, Engen and the Deputy Minister of Environmental Affairs & Tourism, Mr. Holomisa. The meeting was initiated with the hopes of renegotiating the Good Neighbourhood agreement as communities wanted a legal commitment from Engen Petroleum to reduce sulphur emissions, as mentioned by a resident activist (personal communication, 28 March 2020):

"There was a meeting held between all three parties [government, industry and civil society] in the early 1990s. This meeting came about because residents started getting irate over air pollution issues. This meeting involved Engen representatives, Department of Environmental Affairs and I think the SDCEA was also invited to join. The intentions were for Engen to commit to reducing toxic fumes and spilling their toxins on the residing community."

A resident activist (personal communication, 28 February 2020) added that although Engen Petroleum did not agree to make any legally binding changes, they agreed to sulphur reductions during the winter months. As there were no legally binding commitments to reduce emissions, civil society continued their activism which led to the MPP which fostered communications and interactions between local government, industry and civil society (SDCEA, n.d.). A local councillor (personal communication, 28 March 2020) explained that in recent years' collaboration is initiated through ongoing incidents that occur:

"All three do not engage with each other and hold public meetings to discuss the issues. The issues come about due to the activists within the community that bring the challenges

to the front and then government and industry are reactive to the problems instead of being proactive."

These results show that while industry and local government engage with the community, it is only when there is of an accident or incident that there are calls for further investigation. By this time, it is too late for the underprivileged communities who continue to suffer the consequences of environmental harm (Mngoma & Dlamini, 2014). Their resistant and negligent behaviour from both industry and local government has allowed for air pollution in the SDIB to worsen. As a result, there is contested relationships between the industries and civil society (Nzimande, 2012). An environmental manager at a national industry (personal communication, 28 February 2020) stated that engagements between the three stakeholders do not happen organically but rather to protect a public image:

"There is awareness that industries have engaged with government and communities as they concerned about public protests, rallies and boycotts etc. This way they are forced to engage with the CBOs to avoid bad advertising. However, I am not aware of any that have been very successful. There still seems to be a very confrontational approach between industries, government and CBOs. The relationship needs to be worked on and communication needs to be improved to make for a healthy relationship between government, industry and community organisations."

These results suggest industries are moreconcerned about the company image than the community and health impacts of pollution.The focus on communication with civil society is to avoid rallies, protests and any other negative media attention brought to the industry. This shows that industry does not prioritise and consider the community's challenges but focus rather on profits. Sadly, on 4 December 2020, at the Engen Petroleum refinery there was an explosion that left seven people with severe burns who needed hospitalisation. Not only did media articles (Naidoo, 2020) state that Engen Petroleum were uncooperative and arrogant towards the community but hid these facts in a press statement, stating that there were no injuries with the hope of protecting their public image (Erasmus, 2020). A resident activist (personal communication, 16 April 2020) added: *"The chain of communication is poor between government and communities. There were talks from government about a new platform to discuss air quality issues last year, but nothing has been done yet."*

On 23 May 2019, the city health department had agreed to hold quarterly meetings with community representative groups to discuss air quality, non-compliances by South Durban industries and to table lack of responses related to concerns and complaints. To date there has been no response from the city health as to when these collaborative meetings will be held (SDCEA, 2020). As mentioned by Reed (2019) in the literature review in Chapter 2, in order for progress to be made there needs to be strong participation between all those who have a stake in the subject. If there is a three-way relationship between the community, industry and local government each can better understand concerns and needs which has not been the case in the SDIB as civil society organisations have been excluded from meetings and engagements made between industry and government. A resident activist (personal communication, 6 April 2020) explained how community organisations are excluded in meetings between government and industry indicating that there is a gap in effective engagement:

> *"Government and industry have their engagements and meetings whereby they probably discuss important air pollution stats [statistics] and issues surrounding air pollution as well as if progress has been made within industries to reach certain targets and new developments. We [CBOs] are never included in this. I think we are left out on purpose as they feel communities cause too much trouble."*

It must be noted that the local air pollution control officer could not be reached for an interview, so there were no first-hand accounts from government as to how they have worked with industry and civil society to address air pollution. Leonard & Lidskog (2020) also found that industry officials meet with local government to discuss industrial development projects and civil society are excluded from these meetings. Civil society organisations are excluded based on economic and political power. Without frequent monitoring and tracking of air pollution sources holding the perpetrating industries accountable is challenging. Although it is perceived that industry and government have a close working relationship, there are challenges that civil society are not aware of. It is clear from these results that government need to address their skills shortage which will enable them to engage meaningfully with industry and provide necessary information to civil society. In the past the MPP has been used as a tool to facilitate engagement between industry, civil society and local government.

4.4.3 The Multi-Point Plan as a collective forum for collaboration between local government, industry and civil society

A dominant theme that emerged from the results was that during the days of the MPP (2000-2010) there was an opportunity for open communication and a closer working relationship where all three parties, local government, industry and civil society could table their concerns. All respondents mentioned that during the MPP communication formed a fundamental part of the platform. However, participation and consultation quickly diminished when the MPP was dismantled in 2010. This was confirmed by Kasavel (2010) who found that communication lines were open and transparent, and all stakeholders were informed about meeting dates, times and participation was highly encouraged through emails and telephone reminders. When this platform dissolved it made working together challenging and addressing air pollution risks were not seen as a priority issue, and there was no large-scale platform that allowed meaningful discussions. A resident activist (personal communication, 22 May 2020) stated that the MPP fostered communication between all three stakeholders:

> *"The first process that allowed government and community to sit around the table and discuss air pollution was the Multi-Point Plan. This required industry, community and officials [government] to discuss pollution-related issues that all the parties agreed to. Once industry came up with the divide and rule tactic this platform was destroyed, not only between industry and community but also with the relationship between community and government."*

As mentioned during the days of the MPP there was an opportunity for communities, local government and industry to deliberate concerns and work towards solutions. Once that was disbanded in 2011, the communication between government and CBOs has diminished as an environmental engineer at a local industry (personal communication, 23 March 2020) explained: *"During the days of the MPP there was a close working relationship and communication between all three parties but now it is more tenuous."*

The MPP was a holistic strategy as there was a multi-stakeholder collaboration from all spheres of government, civil society and industry (Kasavel, 2010). As the MPP saw a successful reduction in SO_2 levels, it is clear that for there to be a meaningful change in air pollution levels, a close relationship between all three stakeholders is mandatory (DEA, 2007). However, with the dismantling of the MPP in 2010 there was lack of communication and collaboration between

government, industry and civil society as a resident activist (personal communication, 28 February 2020) mentioned:

> *"CBOs used to meet with industry during the MPP days and used to communicate with [Informant X] from government. There is a lot of pushback from the industry when we [civil society] are trying to engage with them. They feel as though CBOs are a threat, but CBOs believe in constructive criticism and engagement. It is difficult to engage with them because the heads of departments have shares in these industries. There need to be strong people who need to stand up to industries and government. There are many environmental officers and engineers working for the government, but they lack that drive and passion to make a change ... maybe they have it when they come out of university but as time passes they lose it working for government."*

In order for government, industry and civil society to collaborate, it seems that there is a need for a legally binding agreement such as the MPP, where mandatory scheduled meetings are held (DEA, 2007). Government also needs to focus on the quality of environmental officers.

4.4.4 Inclusion and collaboration of stakeholders through public participation

Three respondents expressed concern about the public participation process conducted by industry as it does not effectively address the issues that civil society raises and ignores public concerns. An unequal distribution of power during these meetings ignores community concerns. A resident activist (personal communication, 28 February 2020) mentioned how ineffective public participation has been in the SDIB:

> *"There is public participation, but it is a fruitless exercise that usually does not result in any meaningful decision being made. The community are not taken into consideration and we cannot trust that government and industry will take communities concerns seriously. It is basically a tick the box exercise that they do to fulfil regulations. Government basically allow industry to hold to power so whatever they say goes"*

As mentioned by Naicker et al. (2012) in the literature review in Chapter 2, a flow of communication with industry and civil society is needed to address complex problems. However, Kasavel (2010) highlights that government hold the power and will unfairly steer public engagements with the community. A key example where community concerns are not addressed was seen when government approved the Environmental Impact Assessment regardless of the communities' objections to Engen Petroleum's proposal to increase production from 125 000

barrels a day to 150 000 barrels a day (Mngoma & Dlamini, 2014). Young (2001) explained the social and economic inequalities was a challenge to democracy as privileged groups hold more power during the deliberative processes.

Contrasting views were presented from an environmental engineer at a local industry (personal communication, 24 March 2020) who claimed that in the new democracy, through public participation community concerns are understood and always addressed:

> *"Through public participation there is involvement with the community as well. In the pre-apartheid days' industry and government would not consider the local communities but now since they have become so vocal, and we could also see the impacts that industries pose on their health we have to engage with them. We take what they say into consideration through meeting with them regularly and encouraging community meetings also through the public participation process should there be any changes to operations or incidents."*

According to George (2017), during a flaring incident at the SAPREF there were many calls from residents complaining about fumes and bad smells. A representative from SAPREF was scheduled to address this via engagements with the SDCEA representatives and by visiting the affected homes. However, SAPREF representative did not show up. This which invalidates the statement made above and is emphasized by resident activist (personal communication, 19 March 2020) view that public participation has not been able to address the concerns of the public because it is not emphasized enough by local government. Reed (2008) places emphasis on the fact that participation also fosters awareness and education. If public participation were emphasised around these industrial developments the community would feel more empowered and have the knowledge to engage with local industries about pollution and environmental challenges (Leonard & Lidskog, 2020).

For complex subjects such as addressing air pollution, a top-down approach is seen as ineffective and joint collaboration is necessary as mentioned by a resident activist (personal communication, 16 May 2020):

> *"They [government and industry] need to try and work with the community organisations and engage with residents of South Durban and listen to communities as they are the ones that are suffering and not just tell them this is what's going on and basically you have no say. The government need to provide answers and take action to help the community."*

This type of approach is seen as being top-down which does not facilitate genuine engagements between stakeholders which is implied from the results gathered. This top-down approach limits participation from stakeholders and seen as inappropriate as decisions cannot be made exclusively by government (Kasavel, 2010).

4.5 Conclusion

This chapter highlighted the challenges that exist in trying to address air pollution, and the strides that have been made by civil society, industry and local government to address air pollution since 1994. The results revealed that civil society have been at the forefront of environmental activism trying to address air pollution struggles in the SDIB. However, have been challenged by a lack of governance and commitment from both industry and local government to implement change. Although industry and local government have tried to implement measures to address air pollution, this has been done with little tenacity. In a post democratic country, it was evident that there is an unequal distribution of power awarded to local government which has further exacerbated air pollution in the SDIB.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The aim of this study was to identify the challenges that exist in addressing air pollution post 1994 in the South Durban Industrial Basin (SDIB), situated in KwaZulu-Natal (KZN). There were three main objectives of the study. The first objective was to identify what initiatives have been implemented in the SDIB since the birth of the democracy in 1994 and how effectively these initiatives have been or are working. Additionally, challenges in realising these initiatives were uncovered. Secondly, local governance towards addressing air pollution was explored. Lastly, the study aimed at identifying how various social actors, community-based organisations and nongovernmental organisations (CBOs and NGOs), industry and local government have been able to work together to try and address air pollution risks in the SDIB.

From the literature consulted in Chapter 2, little has been done to understand why air pollution continues to be pose a threat to human health and the environment in the SDIB. There have been no studies which identified what the challenges are in addressing air pollution. This study will therefore make a contribution in academic science debates to highlight the challenges that exist and can be used to further investigate how these challenges can be overcome.

In concluding this research study, the three study objectives will be individually addressed.

Objective 1 was to identify what strategies have been implemented since democracy to address air pollution risks in the SDIB by local government, industry and civil society and the effectiveness of these interventions. In addressing this objective, theme 1 from the study follows in section 5.2.

5.2 Theme 1: Initiatives to address air pollution in the SDIB

5.2.1 Civil society initiatives to address air pollution

It is evident from the results of this study that civil society has been leading the fight for clean air in the SDIB and has been the voice of the community through its ongoing efforts in trying to get industry to reduce emissions and local government to enforce stricter regulations. Local and

external civil society have teamed up and employed methods such as independent air quality testing, protesting, holding rallies and even taking court action to bring awareness to air pollution risks in the SDIB. However, the results suggest that they have been met with many challenges such as major resistence from local government, unresponsiveness from industry and financial constraints that have hindered their efforts.

The racial divide in South Africa was one of the limiting factors in addressing air pollution in the SDIB before 1994. The apartheid government often dismissed the complaints coming from Indian and Black residential areas such as Clairwood, Merebank and Wentworth. Kasavel (2010) explained that the Atmospheric Pollution Prevention Act of 1965 (APPA) did little to protect the environment and residents against the harmful effects of air pollution and officials were more responsive to White residents' complaints and ignored marginalised groups. Local civil society and respondents from industry recognised that protesting against air pollution has been a long-standing mechanism that began before 1994 to bring awareness to the problem of air pollution in the SDIB. The formation of CBOs such as the Merebank Residents Association (MRA) was a significant initiative that brought awareness to the air pollution issues in the SDIB. However, their efforts to halt the opening of the Mondi Paper mill in the 1960s and the opposition to the renewal of SAPREF and Engen Petroleum's (then known as Mobil) permits was overruled as a result of their limited political power to influence change. As mentioned by Kasavel (2010), citizens of the SDIB have very little power to act against air pollution within their community which results in them living in a highly polluted condition.

Community liaison forums such as South Durban Community Environmental Alliance (SDCEA) contributed largely towards mobilising the affected community to fight against air pollution and other environmental injustices in the SDIB. The study results suggest that although the SDCEA was a monumental and historic formation, they failed to reach the voices of those in African townships of Durban namely Lamontville, and Umlazi being strongly government affiliated (Leonard & Pelling, 2010). Nevertheless, the SDCEA's tireless actions employed through the 1990s to address air pollution, through encouraging all citizens from the South Durban and beyond to join in their campaigns and protests highlighted the challenges faced by the communities in the SDIB (SDCEA, 2017b). As confirmed by the literature, Roemer-Mahler (2006) mentioned that civil society has been instrumental in shaping legislation and regulations to protect residents

against environmental harm. The results revealed that since the SDCEA formation in 1995 they have actively applied pressure on Engen Petroleum and finally won the battle when Engen Petroleum agreed to make legally binding SO_2 reductions.

The results revealed that CBOs have been the pioneers in the fight for clean air, despite many battles lost with either industry or local authorities, when asking for relocation of industries or residents from the highly polluted zone. Despite the community awareness emergency response (CAER) and the Good Neighbourhood agreement initiated to foster communication between CBO and Engen, tensions often ran high in these meetings and ultimately industry were not committed to make any changes. Engen refused to make any changes that were requested from CBO such as disclosing important information regarding pollution, to agree to plans to reduce sulphur emissions and to implement workplace monitoring among other measures. This indicated little change from the apartheid regime to a democracy and depicted a lack of transparency and engagement from industry. Activism in the form of rallies, protects marches and petitions in the SDIB b fell on deaf ears as both local government and industry showed little concern. Therefore, more strategic action was taken such as court actions during the democratic era.

In 2000, the SDCEA and groundWork, with the help of external civil society structures, resorted to testing the air independently, using the Bucket Brigade method, as industry was unresponsive to calls for them to provide air quality results. It was mentioned that this, however, also placed financial strain on civil society organisations who depend on public funding, who sometimes had gaps in monitoring data as a result of financial constraints (Pfeffer et al., 2013). Respondents from civil society emphasised the importance of the Bucket method as it found not only high levels of SO_2 but various other dangerous cancer-causing chemicals such as methylene chloride, carbon disulphide, 2-butanone, toluene, ethylbenzene, m- and p-xylenes, and o-xylene. However, respondents felt that understanding the results was challenging. The SDCEA was criticised for highly technical presentation of results that could not be understood by the greater community. Education and awareness should be provided by the SDCEA to build support to hold industries accountable. A similar trend was found by Vissers (2010) where minority men in the USA had difficulties understanding air pollution data and thus could not understand the environmental risks.

It was evident from the results that the Bucket Brigade testing along with continued protest action against air pollution led to the Multi-Point Plan (MPP) being initiated in 2000. The results

suggested that the MPP was a positive effort in trying to address air pollution as SO_2 emissions were lowered by 40% (DEA, 20017). This was a brief period of political goodwill and government support to address air pollution. However, it was noted that once this plan was abolished in 2010 air pollution began to worsen. The dismantling of the MPP, according to respondents, disrupted the communication between local civil society, industry, and local government. The MPP highlighted the important role that civil society can play in bringing awareness to risk factors that affect the environment.

Research previously conducted by Kasavel (2010) and groundWork (2007) both stated that the MPP was unable to effectively address air pollution as many outstanding issues were not dealt with before the MPP was dismantled. It was also evident from the results that industry had responded negatively to the civil society organisations who have asked for better health care facilities. These results suggested that post-1994 industry and government have shown little consideration towards the affected community despite various efforts employed by local and external civil society to engage with them to address air pollution. One of the main challenges was the pushback and disdainful responses from industry and local government regarding air quality. It was a similar trend that civil society experienced during the apartheid regime, indicating that there were remarkable continuities during transition to democracy. It was evident that if industry and government showed more of a commitment to the residents in SDIB, meaningful changes can be made. Respondents also mentioned that industries should look at investing into best available technology (BAT) as a way to be able to operate sustainably.

5.2.2 Industry initiatives

There were contrasting responses from interviews with each stakeholder group regarding the initiatives put forward by industry to address air pollution. Civil society argued that industries have implemented certain mitigation measures but not to the full extent where a difference could be seen in a reduction in emissions. The results showed that respondents from industry were confident that measures such as employing ISO 1400, sulphur recovery units, leak detection and repair units, double seals on the roof tanks, flaring management, improving reconfiguring fuel and since 1994 a R2m drone to pick up on any leaks, have seen satisfactory results in the reduction of air pollution. It must be noted that community pressure and the MPP were an initiative motivated by civil society which compelled industries into making changes to their processes to address and reduce air

pollution (Diab & Motha, 2007). Additionally, the new international trade laws motivated industries to invest in cleaner technologies as they have attracted international investors which was pointed out by industry respondents. This indicated that industries did not see the community health effects as a reason to operate in an environmentally sustainable way, but rather that monetary gains prompted this behaviour.

Resident activists highlighted the fact that despite industries implementing mitigation technology, air pollution incidents are still occurring, calling into question the implementation of these measures. This suggested that despite phasing out dirty fuels, controlling fugitive emissions and monitoring benzene, toluene and xylene (BTEX) and implementing ISO 14001, they were unable to effectively address air pollution in the SDIB. It was evident from local and external civil society responses that industry needs to be motivated to reduce their emissions. The MPP was a platform that ensured this was done to some extent. It is concerning that in recent years, especially after the abolishment of the MPP, there has been various chemical leaks, explosions and flaring events which represents industry as a collective group who have dismissed environmental concerns. A common concern raised by local civil society was that during the nationwide lockdown due to the Coronavirus epidemic in March 2020 in South Africa, they could breathe easily and felt the air quality had improved as production slowed down. However, once the Covid-19 lockdown had been lifted in June 2020, a gas leak occurred at Safripol manufacturers occurred which left residents struggling to breathe again. This information indicated that industries do have a negative effect on the environment and resident's health and mitigation measures have not been effectively implemented.

Furthermore, as mentioned by local resident activists, two major industries in the SDIB, Engen Petroleum and South African Petroleum Refinery (SAPREF) did not monitor priority pollutants such as particulate matter less than 2.5 microns which was found via community testing and monitoring was recommended (groundWork, 2014). According to Wright et al. (2017), although it is known that air pollution has an impact on individuals, quantifying that impact is challenging particularly in Southern Africa as air pollution data are limited. However, biased views came from local civil society who claimed no BTEX monitoring has not been done. Evidence from the SAPREF and Engen sustainability reports in 2018/2019, claimed that benzene monitoring had been conducted and levels have been within national standards since 2012. The results revealed

viewed from the SDCEA website in 2017 showed that benzene levels were higher than national standards of 5µg/m^3 per year, indicating that industries have been dishonest with their air quality results. This has implications for the way the community can trust that industries. Ultimately the results suggested that industries have ageing infrastructure that needs to be updated in order to operate in a sustainable manner which has not been a concern of the owners of these industries.

5.2.2.1 Challenges encountered by industries to address air pollution

One of the main challenges noted from industry respondents was financial setbacks and the implications for production. This was widely criticised by local civil society who mentioned that industries generate a substantial profit yearly. Prinsloo (2019) stated that in 2018 Engen Petroleum generated R82bn which indicates that more than enough profits are available to invest and implement mitigation measures to lower their emissions and address air pollution. However, the wellbeing of citizens has been neglected and ignored by these polluting industries. It was interesting that a representative from local government also alluded to the fact that government have done little to nothing to motivate industries to switch to cleaner technologies and this was attributed to corrupt behaviour by local government, which suggests a substantial lack of governance. Additionally, switching to cleaner energy did not seem to be a priority to the South African government due to the political climate within the country which according to respondents from industry meant that investing in cleaner technology takes a back seat. This indicates that government also need to take responsibility to encourage industries to make the switch to utilising greener technologies. Nevertheless, local civil society were critical of industries' lack of commitment to implement greener practices and compared South Durban industries to international industries who pledged to reach zero emissions by 2050. This was seen as biased as these companies merely pledged to reduce, not eliminate, emissions by 2050 (Storrow, 2019). Highly critical responses from civil society indicated their negative attitude towards industries.

The results revealed that with the continuous explosions occurring at refineries such as the Engen fire in December 2020, the best way for industries to move forward would be to switch to sustainable practices such as wind, solar and hydroelectric power (Singh, 2020). Local government representative indicated that the changes that industries have attempted to make are too small, as they would still need to generate a profit. Local civil society explained that the industries and government should look into BAT, which has been used in the United States and has seen positive

results. Additionally, respondents from industry suggested that all small and large industries become ISO 14002: 2015 regulated. This would lessen the burden on government capacity. However, as seen above, incidents continue to occur at Engen Petroleum and SAPREF despite being ISO 14001 accredited. These results suggest that there would need to be a collective effort that involves local government, industry and civil society to address air pollution reduction strategies.

5.2.3 Government strategies to address air pollution

Since the transition to a democratic nation, local government has implemented many regulations aimed at addressing air pollution. From the results gathered via interviews, all respondents from local and external civil society and those interviewed from industry and local government noted that the MPP was a concrete plan to address air pollution and saw certain reductions in air pollution. Components of the MPP such as the health study, monitoring of criteria pollutants, setting up air quality monitoring stations, developing better reporting processes and investing money in abatement technologies by industries were all noted to have a positive effect on air quality. According to Carnie (2020), there was a notable drop in emissions, particularly of sulphur dioxide (SO_2).

However, with the plan being dismantled in 2010, the results suggest that the outcomes of the MPP have not been carried forward and local government has not followed through with monitoring industries as air pollution continues to worsen. Policy makers and local leaders should be making an effort to reintroduce platforms that proved to be successful, while engaging meaningfully with civil society. Rockman & Hahm (2011) explained that good governance is the practice of political leaders being able to respond to and address difficult issues. However, the researcher found it challenging to engage with air pollution control officers from local government, which also indicated a lack of proper leadership to address air pollution risks and speaks to poor governance within the local municipality. A serious setback is that the Air Quality Management System (AQMS) established during the MPP is currently barely functioning. All respondents could agree that this is a huge challenge as monitoring stations have been unable to produce real-time air quality data. Without this no concrete information is being generated and the air pollution cannot be managed. Sadly, local governance has done little to ensure these monitoring stations are functioning and displayed minimal urgency in procuring the necessary instruments and equipment

to ensure monitoring stations are repaired. As confirmed by a previous study (Mngoma, 2014), the poor maintenance of the air quality monitoring stations has left residents distrustful of government's ability to address air pollution.

A significant challenge highlighted by local civil society was the difficulties they encountered when trying to access schedule trade permits from industries to try and verify their air quality standards and limits permissible by law. Local civil society has been prohibited by local government from accessing these records. According to Stockemer (2009), there is better governance in democratic countries as citizens are given more freedom and allowed to exercise their rights, but this has not transpired in the SDIB. By local government creating this gap in access to information, it has created much speculation as to whether industries have been in keeping with air quality regulations. Furthermore, in terms of the National Environmental Management Act (NEMA): Air Quality Act (AQA), all polluting industries are required to submit an air emission licence (AEL). The results suggested that local and external civil society had little confidence in this process being able to address air pollution effectively. The reason for this, according to respondents, was again a lack of access to information and local government protecting industry information regarding permissible air pollution limits. Local civil society also highlighted the fact that although stringent controls are supposedly in place, incidents and accidents are still occurring. Therefore, AEL and schedule trade permits have not been able to effectively address air pollution. However, a different response was received from industry representatives who mentioned that AEL successfully prosecute transgressions committed by industries. This response could have been a biased view from industry based on the fact that media articles are constantly depicting explosions, flaring events and fires occurring at industries (Vissers, 2010). Local government has shown that transparency, accountability, management, and internal controls have not been prioritised, which indicates poor or weak governance. Together with these issues, staff capacity has drastically diminished since the MPP was dismantled in 2010. The results suggested that local government have not been able to monitor industries robustly as they have lost many staff members, previously part of the air quality unit to industry. By local government neglecting their constitutional duties to monitor and implement mitigation measures, this leaves industries at an advantage over civil society as they are unable to verify non-compliances. According to Stockemer

(2009), democratic countries experience better governance as there is freedom to its citizens, which can influence the government and ensure responsible decision-making.

When civil society holds rallies, protests and lobbies government, they are playing a vital part in bringing awareness to the problem. However, for systemic changes to occur concrete, reliable regular air quality information is needed as seen with the health study and Bucket Bridge testing done in 2000. Policymakers need to understand the urgency of the issue and use the community complaints as a basis to start making a change.

This evaluation of theme 1 supports the assertion that **objective 1 was appropriately addressed** in this study.

Study **objective 2 was to explore local governance towards addressing air pollution in South Durban and holding polluting industries accountable.**

5.3 Theme 2: Continual lack of governance in addressing air pollution reduction strategies

The results revealed that there has been a lack of good governance in the SDIB, especially since the abolition of the MPP in 2010. Local government has callously ignored the plight of the local community by allowing industries to continuously pollute the atmosphere with no consequences. Additionally, local government has allowed further developments in the already suffocating SDIB by unlawful practices that benefited political leaders which intensified air pollution and further disadvantaged marginalised groups.

5.3.1 Destruction of the last green lung

The results suggested that despite local civil society's tireless efforts to halt the construction by protests, rallies and eventually resorting to court action, the destruction of the last green lung, the Clairwood Racecourse could not be stopped. Complaints came from local civil society who mentioned that they were not included in communication and participation processes before the commencement of the development, which has shown disregard for the local community. Webler et al. (2001) explained the importance of understanding what the public require and showing that the way to do this is through effective participation. Additionally, public participation can highlight possible risks before they occur. Public participation did take place, although this was said to be

one-sided and did not allow the opinions of the community to be addressed and did not incorporate the essence of inclusivity (Maharaj, 2017; Leonard & Lidskog, 2020).

. By ignoring community complaints and asking civil society to furnish local government with air pollution statistics which is the duty of the local municipality, it suggested that local government have done little to protect and support the community in the fight for clean air, indicating poor governance. According to Marongo (2018), government needs to become transparent, reliable and accountable for their actions in order to achieve sustainability. Local civil society also raised the point that local government have not only acted poorly in protecting the community against air pollution risks but have also left residents vulnerable in the event of an emergency evacuation.

5.3.2 Compliance with environmental regulations

The results revealed that there were limited air quality regulations, and this has been attributed to poor enforcement and monitoring by local government. It appeared as if, industries were exempted from certain air quality regulations and could negotiate with air pollution officers. However, in the new democracy the numerous pollution incidents and local government's indifferent response raised questions about whether industries were abiding by the new legislation. These results were confirmed by a study conducted by Nzimande (2012) who found that little focus is placed on environmental compliance in the SDIB. Political struggles within the current administration have placed local councillors at a disadvantage as their concerns from the community were rarely acknowledged. Furthermore, the results suggested that local government has not penalised industries for their transgressions which occur frequently Furthermore, government has allowed industries to double their SO_2 emissions to 1,000 milligrams per cubic metre in April 2020. They have ignored community concerns and have shown disregard towards the health and safety of citizens.

To make matters worse, local government has been inconsistent with air quality monitoring which was a key component of the MPP. Resident activists brought attention to the fact that local municipality have also fabricated air quality results during meetings with the community. According to results put forward by the Department of Environmental Affairs (DEA), SO_2 and particulate matter have decreased, but South Durban's air quality was ranked as one of the worst areas in KZN in 2018 (Pillay, 2018). Trust plays an important role in a democratic country and

this lack of political trust can have negative effect on citizens feeling safe and included in decisions made bypolicy makers. According to Christensen et al. (2011), a lower level of trust is usually experienced by people of colour as seen in the SDIB. When trust is lost in the political leaders of a country it can become more difficult to fix existing problems (Beierle & Konisky, 2000). Another challenge that local civil society highlighted was that without reliable air quality monitoring, industries could be engineering incorrect air quality results and due to the fact that local government is not actively monitoring them, there is no way of having a true reflection of the air quality in the SDIB.

Unfortunately, these factors lead to industries having the upper hand and knowing they have exemptions from complying with regulations as they know the risk of being prosecuted by the eThekwini Municipality is relatively low (Nzimande, 2012). These factors contributing to poor air quality are indicative of a weak legal system in a new democracy that fails to implement measures in an effective manner that addresses social and environmental needs. These findings were consistent with various claims that government has not prioritised air pollution reduction strategies and through weak enforcement has allowed air quality to deteriorate (Pieterse, 2019: Pillay, 2018: Xolo, 2020).

5.3.3 Lack of access to information

As mentioned in previous sections, local and external civil society has encountered challenges when trying to access basic information such as AEL, schedule trade permits from local government and basic air pollution data from industries. Civil society is unable to request air quality data from industries as they are emphatic that government is monitoring them and that they are always within regulated limits. This, however, cannot be true as the efficacy of air quality monitoring by local government has been questionable for many years. Local government itself is not complying with air quality regulations. The results also revealed that local government have many staff members who are incompetent and do not understand the requests of civil society should they request any information.

These findings are consistent with that of Leonard & Lidskog (2020) who state that local government departments are unable to furnish air quality data and lack interest in providing information to civil society. Furthermore, SAPREF and Engen Petroleum have protection from the

National Key Points Act which makes accessing information even more challenging when fires and other incidents occur at the refinery. In recent years, the refinery has continued to be unresponsive to civil society and the community after fires had broken out (Carnie, 2020). Major industries choosing not to engage with civil society at times of crisis indicates their disregard for local communities' wellbeing. Access to information is the essence of a functioning democracy and as Section 32(1)(a) of the Constitution clearly states that everyone has the right of access to any information held by the government, which in South Africa is not being exercised with air quality.

5.3.4 Local government official's monetary gains from industry

Industrial expansion in South Africa came as a response to economic hardships, respondents mentioned that this expansion saw huge monetary gains for the company some of which fell into the hands of local government. Local civil society felt that local government is not focused on raising awareness and addressing air pollution as a substantial revenue is generated from the industrial sector. Asking them to cut back on their emissions would mean lower revenue which may directly affect local government's finances in terms of lower rates and taxes. Local government has also been known for allowing industries exemptions from the AQA (Carnie, 2011). Nzimande (2012) explains that there is a trade-off between local government and industry, which results in pollution levels being exceeded. This shows the unequal distribution of power relations awarded to government which has resulted in citizens fighting for environmental justice. This has created a money over people mindset which is exacerbated by a lenient governing body which ignores the struggles of their citizens.

Internal corruption within local government has been widely publicised, but little has been done to challenge this. Local government have embedded themselves with industries such as Mondi who have claimed to invest in the economy – however, how these funds have been spent is unclear (Dludla, 2018) and air pollution continues to be a challenge facing the SDIB. Local government officials have been accused and charged with dealings in bribery, money laundering and nepotism. While certain individuals within local government line their pockets, residents in South Durban are constantly facing the daunting reality of a toxic environment that brings new challenges each day.

5.3.5 Inefficient stack monitoring

Breathing has always been challenging for many residents in the SDIB, but several complaints came from respondents who mentioned that the problem sometimes becomes unbearable at night or during the early parts of the morning. The results suggested that industries release these gases between 6 pm and 6 am as a strategic move due to the fact that most people have returned to their homes. As as residents wake up the following morning, their furniture, clothes outside and even the walls of their homes are covered with black soot. However, respondents from industry mentioned that smokestack emissions are a rare occurrence. Furthermore, releasing these gases at night means industries can turn off their pollution control abatement technology, saving money. Although no evidence of this was noted in recent years, Sparks (2004) highlighted the fact that residents openly discussed those industries did turn off their safety components which led to elevated air pollution. If these 150 smokestacks were monitored by local government, it would be evident that industries are non-compliant. Both local government and industries are responsible to ensure that mitigation measures are put in place, which is not currently being done.

This analysis of theme 2 supports the assertion that **objective 2 was appropriately addressed** in this study.

Study **Objective 3 was to understand contemporary developments about how local government, industries and civil society have worked collectively against air pollution risks and what were the challenges to this process.** In addressing this objective, a description of theme 3 as well as a description of challenges to this process follow in sections 5.4 and 5.5 below.

5.4 Theme 3: Collaboration and engagements between local government, industry and civil society to address air pollution reduction strategies

It is evident from the findings of this study that meaningful collaboration between government, industry and civil society is scant. One of the biggest challenges gathered from the findings was that there has been a lack of cooperation from local government and industry to work together with civil society to address air pollution. The results revealed that during the days when the MPP was active, there was collaboration between local government, industry and civil society members. However, in recent years and especially after the disbanding of the MPP communication and engagement between these three stakeholders has diminished. Not only has it diminished but the

relationship civil society has with local government and industry is a very toxic, adversarial one that sometimes leads to court action. One the other hand industry has launched lawsuits against civil society and gone as far as to ban civil society protests.

5.4.1 Collaboration and engagement between industry and civil society after the democratic transition

After 1994, civil society has expressed the challenges experienced when trying to engage with industry, despite Engen Petroleum setting up CAER to foster engagements between civil society and themselves. The results suggested that this was seen as a strategic move to appear to be engaging with the community. This community forum accomplished very little, as Engen Petroleum refused to make any legal agreements and steered these meetings away from addressing community concerns. Since then, community liaison forums have become neutralised and a platform that exists to silence CBOs by providing funds for social developments such as infrastructure for schools and recreation developments but fails to address air pollution. Respondents added that these meetings avoid any conversations around the impact of air pollution on the community which forfeits the purpose of the meeting. This has also led to the credibility of CBO being questioned (Leonard & Pelling, 2010). The results suggested that industries are using community liaison meetings which are misleading to public as the true essence of addressing the concerns of the community are rarely addressed. It was suggested that for these meetings to be successful and foster meaningful engagements, it should be held in a diplomatic manner where all stakeholders hold equal importance.

It is evident from the study that, civil society has tried numerous times to attain air quality information from both SAPREF and Engen Petroleum. Their attempts were, however, unsuccessful as both parties have a history of ignoring requests from civil society. Engen Petroleum, not liking the negative attention being placed on them from civil society, initiated a lawsuit against the SDCEA in attempts to avoid meaningful engagements with civil society. Adding to this a respondent from industry mentioned that industries engage with communities, but only in the event of an accident or incident to avoid further negative attention. There has been a history of confrontational communications between civil society and industries in the SDIB, that is exacerbated by industries' resistance to finding common ground with the community. Industries threatening to shut down their refineries as they come under fire from civil society, indicates their

stance on engaging meaningfully with the community. In the apartheid era , industries had free rein to operate with minimal restrictions. However, they now need to understand what the democratic transition means, and that is the right to clean air and a safe environment for all citizens.

There has been a major setback in addressing air pollution as a result of this contentious relationship that exists between civil society and industries. Respondents mentioned that the engagements need to happen organically between industry and civil society if progress is to be made. Communities want to be heard and to feel included in decisions that industries make, such as upgrades, decommissioning, future developments and possible expansion, as they ultimately have an effect on the residents around these refineries. However, since South Africa transitioned into a democratic nation, information sharing has fallen short which highlight the weaknesses in the bureaucracy (Leonard & Lidskog, 2020). Reed et al. (2018) explain that when the affected parties are included in decision-making and planning, it can reduce the amount of conflict and allow trust to be built between stakeholders.

5.4.2 Collaboration between stakeholders to address air pollution

One of the major interventions, the South Durban Multi-Stakeholder Environmental Management Meeting took place as a result of the constant pressure placed on local government and industry. This meeting included the SDCEA, Engen Petroleum and the Department of Environmental Affairs (DEA) and was initiated by then President Nelson Mandela. As all three stakeholders discussed air pollution concerns, Engen Petroleum did not agree to any legally binding agreements but rather to reduce emissions during the winter months. As this was not seen as good enough by civil society, their continuous activism resulted in the MPP.

The study revealed that the MPP was seen as one of the most successful platforms that fostered engagements between all three parties. Due to the fact that the MPP was initiated by local government, industry, local government and civil society there was free flow of information, meetings were held regularly and there was an appointed manager to facilitate the engagements. It is clear that when parties come together to deliberate issues in a diplomatic manner, progress can be made towards reducing air pollution, which was reduced by 40% when the MPP was active. Once this platform was disbanded in 2010, there was no consultation between local government, industry and civil society. This means that instead of improving on the shortfalls of the MPP, the

city chose to abandon the initiative altogether, leaving no contingency plan in place (like communication channels for industry, civil society and industry) to address air pollution. As the MPP came to an end communication challenges between industry, civil society and local government began to mount. Civil society highlighted the fact that engaging with industry and local government is challenging as there is pushback from both parties. As mentioned in section 5.3.2 the mutually beneficial fiscal relationship between industry and local government promotes their lack of interest to address air pollution risks.

5.4.3 Public participation

One of the main concerns raised by civil society was that public participation processes do not address community concerns regarding air pollution. In a post-apartheid era, where inclusivity is paramount, this has not transitioned into disadvantaged communities. The results revealed that public participation meetings do occur between industry, local government and civil society for various projects. However, such meetings cannot address the concerns of the community, as industry and local government are not committed to understanding the concerns stressed by civil society. One key example was highlighted when civil society objected to Engen Petroleum's proposal to increase production from 125,000 barrels 150,000 barrels a day. The concerns were not addressed adequately, and Engen Petroleum was granted permission to increase production (Mngoma & Dlamini, 2014). Aylett (2010) explained that public participation outcomes are skewed in favour of those who are already deemed powerful, and vulnerable groups are alienated exemplified in the SDIB. According to Naicker et al. (2012) this defeats the purpose of public participation as it does not provide a flow of communication and leads to positive outcomes. These top-down approaches do not foster equal engagements between all stakeholders (Kasavel, 2010).

Not surprisingly, a respondent from industry mentioned that in recent years and especially after apartheid, public participation is an effective tool in addressing the community's concerns. However, there have been incidents in the SDIB that occurred where the community were left without any explanations after significant flaring events occurred, despite industry's promises to engage with them and provide the necessary information to address their concerns (George, 2017). As mentioned by Nzimande (2012), the lack of engagement could also indicate why air pollution still remains a problem. Bridging this gap by developing a close working relationship between local government, industry and civil society could result in issues being resolved.

5.5 The road towards addressing air pollution risks – implication for development and governance

The overall findings across the themes showed a need to improve development and governance to ensure that air pollution can be addressed. Poor governance adversely influenced monitoring of industry and there was a lack of mechanisms in place to ensure a reduction of air pollution risks, especially since 2010 after the dissolution of the MPP. This had implications for participation and how government and industry engaged with civil society to inform air pollution risks.

A common theme discovered from the results of the study showed that local government and industry have not prioritised addressing air pollution and civil society has been left with the task of mobilising the community to bring awareness to air pollution risks although the responsibility should be placed on local government and industry. Since the abolition of the MPP, local government and industry have distanced themselves from civil society, which has made it increasingly difficult to quantify air pollution risks. Local government and industry have provided little support to civil society when they have tried to engage meaningfully with them.

The study recognised, that vulnerable citizens are excluded from important decision-making processes that affect them. The results revealed that community members are often left out of engagements between local government and industry thus making it challenging for them to present their concerns. The community forums that are set up by industry are seen as more of a talk-shop where concerns are not equally heard from the affected community. These results were consistent with the findings of Jaggernath (2010) who explained that residents' concerns are seldom included in collaborative forums as marginalised groups are often overpowered by other stakeholders. This common theme was confirmed by Vissers (2010) who discovered that economically and socially disadvantaged individuals are usually distrustful of government as they are excluded from decision-making. Although industries have exceeded environmental regulations on many occasions in recent years, it is local government's responsibility to ensure that they are prosecuted accordingly. An act that is rarely carried out by local government is fining industries and removing AELs. In fact, these important licences that should be made public are often kept private from civil society by industry and local government. As local government do not take action on industries for their misdemeanours, industries take advantage of that while showing disregard for the local community.

The findings from the study also confirm that environmental laws are unable to respond to the air pollution risks as enforcement and monitoring is weak, which is evident from the continuous incidents that occur at various industries in the. These results were consistent with the study conducted by Nzimande (2012) who found that air pollution regulations in South Africa are not adequately enforced.

There is a lack of political will to enforce regulations and attend to urgent matters such as the maintenance of air quality monitoring stations which provide valuable information regarding the SDIB air quality and tracks pollution sources. It was evident from this study that government needs to focus on revamping the air quality monitoring system in order to hold polluters responsible. The study reveals that government tend to overlook air pollution in the SDIB and choose to prioritise economic development like the development of the Clairwood Racecourse into a logistics park, a project that would further exacerbate air pollution in the SDIB. While many South Africans enjoy the freedom of living in an environment that is not harmful to them, the same cannot be said for residents of the SDIB. A democracy means equal rights for all, but this has not manifested in the SDIB which casts doubt on Stockemar's (2009) theory that democratic countries experience superior governance.

Good governance practices include the rate at which the public sector can deliver goods and services to the public as well as enforce regulations to safeguard their constituents. Good governance includes practices that use resources to attend to challenges facing a community. In the case of the SDIB local government has chosen not to invest in air pollution reduction strategies, although air pollution has been one of South Durban's biggest challenges. Local government has focused on economic developments but overlooked environmental and health impacts of these developments. This neoliberal approach has had devastating effects on human health and quality of life for many residents in the SDIB. By ignoring the grievances of marginalised groups, local government has demonstrated that they are unable and unwilling to respond to air pollution issues. Local governments legitimacy and integrity has been questioned as irregular activities have led to state-owned air quality monitoring stations to become dysfunctional. It was evident from the study that without accurate air quality data it is difficult to understand the state of the air quality. What is lacking in the SDIB is meaningful engagements via public participation between civil society,

industry and local government to understand the challenges within the community and address them accordingly.

Public participation is a tool that is widely used to address challenges within an affected community. It is important to involve the affected parties and in the case of the SDIB, the community who are represented largely by civil society groups. In the case of addressing air pollution risks in the SDIB, public participation has been poorly exercised. During the apartheid era, community concerns were dismissed, which was due to the laws at the time. However, post 1994, this same pattern continues. The disjointed relationship between local government, industry and civil society exemplifies how participation has not been used as a tool to understand the community's concerns regarding air pollution which has resulted in poor governance. This was further expressed through local governments refusal to participate in this study despite numerous attempts made by the researcher.

Strong political influence has the potential to address community problems appropriately. In the case of the SDIB, political leaders need to understand the positive effect communication and meaningful collaboration may have on a community. Residents in the SDIB have lost trust in government's ability to address their concerns, which Abbas et al. (2015) note is important for effective participation. Local government's lack of transparency regarding air quality information has also led to civil society losing trust in local authorities.

Additionally, there have been issues with industry where there has been a constant lack of transparency with civil society about disclosing air quality information. Wouters et al. (2011) and Kidd (2002) explained that the only way to work through these challenges is by engaging with the public as it will increase the chances of their concerns being heard. Participation in the SDIB has failed to strengthen government's accountability, ensure a strong democratic parliament, and respect human rights which, according to the Inter-Parliamentary Union (2015), are key components of participation. George (2017) explained that public participation has failed to effectively address air pollution in the SDIB, which has resulted in minimal collaboration between stakeholders. If public participation were exercised meaningfully in the SDIB by local government, communities would have a chance to express their concerns in a peaceful manner as opposed to becoming disgruntled over a lack of inclusion which often leads to legal proceedings. Apart from the MPP, all three stakeholders have not been able to work collectively to address air

pollution in the SDIB. Therefore, opportunities for collaboration between local government, industry and civil society to address air pollution need to be augmented. If local government chose to be transparent, uphold their constitutional values to hold industries accountable for their transgressions and include the residents in deliberative processes, there would be community trust in the bureaucracy.

Governance needs to be strengthened within the eThekwini Municipality to enable proper distribution of funds to monitor air quality. Focus needs to be placed on building staff capacity to monitor industries regularly and make reports available. Most importantly there needs to be integrity within the local and national government to make holistic decisions that are both economical and sustainable. The reality is that without sound enforcement, getting industry to lower their emissions is a challenging task. It was evident that addressing air pollution cannot be done independently and a collaborative effort should be invoked by industry, civil society and local government.

This analysis of theme 3 as well as a strategy to overcome challenges to decreasing air pollution in the SDIB supports the assertion that **objective 3 was appropriately addressed** in this study.

5.6 Recommendations

The following recommendations have been proposed from the findings of the results:

- Collaboration and communication methods between government, industry and civil society need to be improved. There should be a platform developed (by local government) where all three stakeholders can table concerns, ideas and discuss progress regarding air pollution. This platform should be government regulated.
- Industry needs to invest in cleaner technology such as BAT recommended by respondents, as well as abide by all air quality regulations.
- Government needs to re-invest in the upkeep of the monitoring stations around the SDIB. All monitoring stations need to be fully functional. Government websites such as the SAAQIS need to provide regular air quality data from all 14 monitoring stations. These data must be available and accessible by the general public and local community.
- Government should invest in capacity building to ensure that regular auditing can be carried out on industries to ensure compliance according to international best practices.

- Medical facilities need to be provided for residents who seek care. Medical professionals and medication need to be readily available to treat those who are suffering from air pollution-related illnesses.
- Corruption needs to be eradicated within the local municipalities so that funding can be redirected into air pollution monitoring. Independent auditing is needed to identify corrupt behaviour and recover funds that can used to address air pollution risks.
- Lastly, it is recommended that the principles and essence of the MPP be re-established, while addressing the shortfalls identified. This can be integrated with the engagement platform between civil society, government and industry.

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Appendices

Appendix A: Questions for Government Officials

1. What is your understanding of air pollution risks in the South Durban Basin?
2. How do you think individuals in the SDIB are affected by air pollution? To what extent?
3. According to your knowledge what interventions have been used to reduce air pollution in the SDIB since 1994? Do you think these interventions have been successful?
4. Do you feel that government departments have been involved enough?
5. Are government officials using stringent methods to enforce environmental regulations?
6. How have government departments worked with industry and communities to address air pollution?
7. Do you feel that industries are complying with air pollution standards?
8. What do you think are some of the challenges that government officials face when trying to implement change in air pollution risks?
9. What additional measures can government implement to try and reduce air pollution risks further in the SDIB?
10. Do government officials have an emergency evacuation plan for the residents of the SDIB?

Appendix B: Questions for Industry

1. What is your understanding of air pollution risks in the South Durban Basin?
2. How do you think individuals in the SDIB are affected by air pollution? To what extent?
3. According to your knowledge what interventions have been used to reduce air pollution in the SDIB since 1994? Do you think these interventions have been successful?
4. Do you feel that industries have been involved enough?
5. Are industries using stringent methods to enforce environmental regulations?
6. How have industries worked with government and communities to address air pollution?
7. Do you feel that industries are complying with air pollution standards? If not, why?
8. What do you think are some of the challenges that industries face when trying to implement change in air pollution risks?
9. What additional measures can government implement to try and reduce air pollution risks further in the SDIB?
10. How have industries changed their practices to become more environmentally friendly since 1994?
11. What are the emergency evacuation plans in place in case of an emergency?
12. What environmental monitoring techniques are used at industry bases to avoid environmental incidents and accidents?

Appendix C: Questions for Community Organisations

1. What is your understanding of air pollution risks in the South Durban Basin?
2. How do you think individuals in the SDIB are affected by air pollution? To what extent?
3. According to your knowledge what interventions have been used to reduce air pollution in the SDIB since 1994? Do you think these interventions have been successful?
4. Do you feel that government departments and industries have been involved enough?
5. Are government officials using stringent methods to enforce environmental regulations?
6. How have community organisations been able to work with industry and communities to address air pollution? If not, what are some of the challenges?
7. Do you feel that industries are complying with air pollution standards?
8. What additional measures can government implement to try and reduce air pollution risks further in the SDIB?
9. Have you been informed of emergency evacuation plans?