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The role of civil society and good governance in effective air quality management in the South Durban Industrial Basin, KwaZulu-Natal, South Africa

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Abstract: Globally, industrial developments have continued to affect people's health with limited research in this space. The South Durban Industrial Basin in KwaZulu-Natal, South Africa, is an area where industrial activities are undertaken close to residential areas and continues to be a challenge since the democratic transition. Drawing on democratic and good governance frameworks, this paper aims to understand why addressing air pollution is still a challenge in the democratic dispensation and the role of civil society and good governance in addressing air quality. Semi-structured interviews were conducted with key stakeholders to identify practices employed since the advent of democracy to address air pollution and understand challenges that prevent air pollution reduction. Despite the efforts of civil society, air pollution continues to be a challenge due to poor local governance to enforce and monitor air pollution and establish democratic platforms to genuinely include and address citizen concerns.

Keywords: South Africa; good governance; air pollution; civil society; participation.

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1 Introduction

South Africa is ranked as one of the most polluted countries in the world (ASSAf, 2022; groundWork, 2004). According to recent air pollution statistics from 2018 to 2022 by IQAir (2023), a technology partner of the United Nations Environmental Program, United Nations Habitat, and GreenPeace, South Africa ranks 39th out of 131 countries in terms of air quality. The country, as a middle-income economy, faces challenges of inequality, poverty, and environmental injustice, stemming in part from the legacy of apartheid. One such injustice is the placement of vulnerable communities near polluting industries to provide cheap labour (Leonard and Lidskog, 2020). Unfortunately, since the end of apartheid in 1994, the focus on macro-economic development has continued, prioritising industrial growth. This has led to a troubling trend where vulnerable communities remain situated near industrial zones, perpetuating the geographic landscape established during apartheid (Leonard and Pelling, 2010) and compromising residents' health (Leonard, 2011). Proximity to polluting industrial sites can have a significant impact on the health of nearby residents. According to the International Growth Centre (2023), 27,000 premature deaths in South Africa are attributed to high levels of fine particulate matter from industrial activity, accounting for 7.4% of all deaths.

The South Durban Industrial Basin (SDIB) in KwaZulu-Natal is a densely populated area with 400,000 residents and over 120 industries (Naidoo et al., 2013; Leonard and Lidskog, 2020). Major industrial facilities in the SDIB include the Mondi paper mill and the South African Petroleum Refinery (SAPREF) (Maguranyanga, 2001). South Africa's oldest crude oil refinery, Engen, was shut down after a fire in December 2021 and is set to be converted to a new import and storage terminal by 2023 (Reuters, 2021). The SDIB is located south of the city (Mentz et al., 2019) and, as during apartheid, the communities in South Durban continue to face environmental, health, and socio-economic challenges due to pollution from nearby industries. Despite the responsibility of the local government to enforce environmental legislation, this has been largely unsuccessful (Leonard and Lidskog, 2020). In 2017, the south Durban basin was declared a pollution hotspot by the provincial government's Environment Outlook Report, which also highlighted the lack of ambient monitoring data and gaps in the monitoring of major pollutants. There are few studies on air pollution impacts in the province. Despite the lack of air quality information, Table 1 indicates the level of air pollution emission estimates from the industrial sector compared to commerce in the eThekweni region (KwaZulu-Natal Environment Outlook Report, 2017). Therefore, industrial air pollution emissions in the city are a concern.

Table 1 Emission estimates (in tons per annum) for industry and commerce

<i>eThekweni municipality</i>	<i>Sector</i>	<i>Sulphur dioxide (SO₂)</i>	<i>Nitrogen dioxide (NO_x)</i>	<i>Carbon dioxide (CO)</i>	<i>Particulate matter (PM10)</i>	<i>Volatile organic compound (VOC)</i>	<i>Benzene (C₆H₆)</i>	<i>Lead (Pb)</i>
	Industrial	13 197	5 090	2 482	2 036	5 307	68	
	Commercial	5,845	895	425	1,055	2		

Complaints and protests about air pollution from the South Durban community began in the 1970s, but were unsuccessful due to apartheid restrictions and lack of engagement by government and industry with communities (Jaggernath, 2010). Civil society pressure on industry and local government to combat industrial expansion and pollution was also unsuccessful (Sparks, 2004). Since the advent of democracy, air pollution incidents continue to harm the environment and the health of residents. In 2002, a health study found that 52% of students at Settlers Primary School had asthma. In 2006, another health study by the University of KwaZulu-Natal and the University of Michigan found that children living in the south of Durban were more susceptible to respiratory complications than those living in the northern parts of the city (Naidoo et al., 2006). In 2010, benzene levels were found to be higher than World Health Organization standards at most sites in South Durban (Department of Environmental Affairs and Tourism, 2007). Between 2000 and 2017, the SDIB experienced over 55 significant incidents, with an annual average of 37 major fire incidents (Nkgadima, 2017). For example, during a meeting convened by the Parliamentary Monitoring Group on 8 December 2020, addressing the Engen Refinery explosion in South Durban, it was underscored that the area had witnessed a significant number of major incidents from 2000 to June 2018. These incidents encompassed fires and explosions, totalling over 62 occurrences since 2000 – an average of more than three major incidents per year (Parliamentary Monitoring Group, 2020).

Unfortunately, there has been limited empirical research to understand why addressing air pollution still poses a challenge in the SDIB post-1994, and the role of civil society and good governance to address air pollution. This study sought to discover what initiatives have been employed especially by civil society and local government to address air pollution and its challenges after the democratic transition. The term ‘civil society’ in this paper refers to a group that fights for the rights of individuals and undertakes activities that benefit the community. The study considered two segments of civil society: local and external. ‘Local civil society’ encompasses residents, community leaders, community-based organisations (CBOs), and local representatives situated in close proximity to polluting industries. On the other hand, ‘external civil society’ pertains to media representatives, non-governmental organisations (NGOs), legal institutions, academics, and developmental consultants who may provide support to local communities dealing with environmental health risks (Leonard and Pelling, 2010). Although it is understood that civil society is not a homogeneous entity (Leonard, 2014) this is not the focus of this paper which explores the interaction between civil society, government, and industry to address air pollution. This paper is divided into several sections, including this introduction. The next section examines the history of the SDIB regarding air pollution challenges, before presenting some key national air pollution legislation. This is followed by a review of the literature on democracy, governance, and participation. The methodology employed is then presented, followed by the discussion, conclusion, and recommendations.

2 Background to the South Durban industrial basin and air pollution challenges

The apartheid regime deliberately exposed vulnerable communities to industrial pollution. The enactment of the Group Areas Act of 1950 led to the concentration of

non-white South Africans being located in designated areas such as the South Durban Industrial Basin (SDIB), as one of the group areas (Chari, 2008). This region was densely populated with an array of heavy petrochemical refineries, a paper mill, waste dumps, fiber plants, and facilities for storing hazardous chemicals (Jaggernath, 2010). As a result of the zoning strategy of apartheid, black South Africans were subjected to environmental toxins. There was a spike in SO₂ emissions from 1958 to 1962 when South Durban industries were being established, as well as during the 1960s and 1970s, when the apartheid government prioritised the supply of oil (Diab and Motha, 2007). This trend continued in the 1980s and the 1990s. Complaints from pollution control officials to the management of the South African Petroleum Refinery (SAPREF) indicated a deficiency in the effective use of abatement technology (Sparks, 2004). There were no regulations for chemicals such as C₆H₆, CO₂ and PM. Studies focused on health confirmed the detrimental impact of air on human well-being (Naidoo et al., 2013).

Table 2 Daily PM10 exceedances

<i>Station</i>	<i>Parameter</i>	<i>Valid data %</i>	<i>Average</i>	<i>Maximum</i>	<i>Minimum</i>	<i>Daily maximum</i>
City Hall – Durban	PM10	100.0	28.23	10.24	58.66	0
Ganges School (South Durban)	PM10	91.3	28.17	12.92	53.50	0
Settlers School (South Durban)	PM10	100.0	28.50	12.08	55.04	0
Wentworth Reservoir (South Durban)	PM10	80.9	33.48	10.17	63.38	0
Central Business District	PM10	98.7	10.58	3.94	21.89	0
Airport (Northern Durban)	PM10	0.0				0

Source: Department of Environmental Affairs and Tourism (2020)

Following the advent of democracy, civil society pressure groups emerged to combat industrial pollution and address health impacts (Scott and Barnett, 2009). Residents, recognising the health consequences, vocally advocated for improved management and mitigation measures (Vissers, 2010). Local community-based organisations (CBOs) were formed to tackle air pollution issues. The South Durban Community Environmental Alliance (SDCEA), which was formed in 1995, is the largest and most influential CBO in South Africa (Leonard and Lidskog, 2020). Its formation aimed to bring together individuals from various racial backgrounds, providing them with a unified voice to tackle environmental concerns (Leonard, 2014). groundWork which works closely with CBOs such as SDCEA is a non-profit environmental organisation; that was also formed to deal with environmental issues at the national level (Nzimande, 2012). It was established in 1999 to support communities primarily situated next to polluting industries and waste facilities and to hold government and companies accountable for pollution (groundWork, 2022). Despite some improvements in reducing air pollution from certain chemicals such as SO₂, air pollution has continued to have a detrimental impact on residents' health (groundWork, 2003). In a community meeting held by the SDCEA in 2019, residents complained that explosions could be heard at night from industries and no health officials investigated these incidents. In 2019 the SDCEA also confirmed that the cancer rates in South Durban were still alarmingly high (Nzama, 2019). Statistics from

the SDCEA cancer registry accounted for 47 reported cases of cancer in 2018 (SDCEA, 2018). Some pollution statistics for South Durban have been available. For example, previous air pollution statistics from the city confirm over two hundred and fifty exceedances of the national air quality standards for PM10 in the first nine months of 2020 at the local Ganges Secondary School in South Durban (Carnie, 2020). Comparative data from national air quality monitoring stations showed some exceedances in PM10 with the highest levels in South Durban compared to the city and airport districts (refer to Table 2).

There has been limited research conducted to identify the challenges in effectively tackling air pollution issues in the SDIB to ensure reduced health impacts.

3 Air pollution legislation in the post-apartheid South Africa

Following the establishment of a new democracy, South Africa introduced new legislation to address the widespread air pollution issues that were prevalent during apartheid. One such piece of legislation is the National Environmental Management: Air Quality Act (AQA) (Act No. 39 of 2004), which was enacted to tackle air pollution and its impact on public health and the environment. The AQA sets out norms and standards to regulate air quality, prevent ecological degradation and pollution, and promote sustainable development. It also emphasises public participation, access to air quality information, effective monitoring, and regular reporting on air quality. Despite the passage of the AQA in 2004, studies have shown that air pollution continues to be a problem in South Durban (Nzimande, 2012; Vissers, 2010), indicating that environmental rights have not been fully realised for many South African citizens. In response, the Department of Environmental Affairs and Tourism (DEAT) collaborated with the South African Bureau of Standards (SABS) to develop health-based ambient air quality standards. This collaboration resulted in the creation of two documents: South African National Standard (SANS) 69:2004 — SANS Framework for setting and implementing national ambient air quality standards, and SANS 1929:2005 – SANS Ambient Air Quality – Limits for common pollutants. The latter document includes limits for various pollutants such as PM10, dust deposition, SO₂, NO₂, O₃, CO, Pb, and C₆H₆. Both SANS documents were finalised and published in 2004 and 2005 (Department of Forestry, Fisheries and Environment, n.d.).

In 2007, the National Framework for Air Quality Management was established in South Africa to implement a more efficient and effective air quality management system. This framework aims to promote holistic and integrated air quality management through pollution prevention and minimisation at the source, providing norms and standards for all technical aspects of air quality management (National Framework for Air Quality Management, 2017). Table 3 highlights key pollutants and their emission limits linked to air quality standards. Currently, three priority areas in South Africa have been declared to have exceeded ambient air quality standards, posing a threat to human health and the environment. These priority areas include the Vaal Triangle Airshed Priority Area (VTAPA) in parts of Gauteng and Free State provinces, declared in 2006; the Highveld Priority Area in parts of Mpumalanga and Gauteng provinces, declared in 2007; and the Waterberg-Bojanala Priority Area in parts of Limpopo and the Northwest, declared in 2012 (South Africa State of the Environment Report, 2022).

Table 3 Key pollutants and their some emission limits linked to ambient air quality standards

<i>Regulation/ framework</i>	<i>Pollutant</i>	<i>Emission limit</i>	<i>Ambient air quality standard</i>
Air Quality Act	SO	Varies by sector	Ambient concentrations of sulphur dioxide (SO ₂) may not exceed: An instant peak of 500 micrograms per cubic metre (µg/m ³) measured at 25°C A 24-hour average of 0.048 parts per million or 125 micrograms per cubic metre (µg/m ³) measured at 25°C and normal atmospheric pressure
	NO	Varies by sector	Ambient concentrations of the oxides in nitrogen (NO _x) may not exceed: A one-hour average of 0.8 parts per million measured at 25°C and normal atmospheric pressure; A 24-hour average of 0.4 parts per million measured at 25°C and normal atmospheric pressure and the 24-hour limit may not be exceeded more than three times in one year;
	PM	Varies by sector	Ambient concentrations of particulate matter with a particle size of less than 10 microns (p) in size (PM) may not exceed: A 24-hour average of 180 micrograms per cubic metre (µg/m ³) and the 24-hour limit may not be exceeded more than three times in one year An annual average of 60 micrograms per cubic metre (µg/m ³)
	O		Ambient concentrations of ozone (O ₃) may not exceed: An instant peak of 0.25 parts per million measured at 25°C and normal A one-hour average of 0.12 parts per million measured at 25°C and normal atmospheric pressure; or atmospheric pressure

Source: Extracted from National Environment Management: Air Quality Act 39 (2004)

Regulation of environmental functions is divided among national departments, provincial departments, local government, and specialised regulatory bodies. The national, provincial, and local spheres of government are autonomous and cannot dictate how other autonomous spheres of government should implement their air quality management functions. For example, a municipality may create and enforce by-laws for the effective administration of matters within its jurisdiction. Air pollution is listed as a matter in which local government has authority, and national or provincial government may not compromise or impede a municipality's right to exercise its powers or perform its functions (National Framework for Air Quality Management, 2017). Despite the national and provincial government having concurrent jurisdiction with respect to 'the environment' and 'pollution control, and 'air pollution' being a local government issue, intergovernmental coordination and cooperation are crucial to good air quality governance. The government has established several structures to ensure cooperative

governance, as required by the Constitution of South Africa. The primary functions of these structures are to share air quality information, consult and learn from each other, and for national government to provide assistance and advice to ensure effective and efficient cooperative governance (Department of Forestry, Fisheries and the Environment, 2023).

4 Democracy, governance and participation

Drawing on the literature regarding democratic governance is useful in examining air pollution risks and governance in South Durban. This paper focuses on the role of civil society and good governance in responding to air pollution challenges in the post-apartheid era. A democratic country ensures equal rights for all citizens and their voices are heard by the current administration. Understanding how democratic change and effective governance may influence air pollution risks is important (Fig, 2005). Good governance includes structures, processes, accountability, transparency, enforcement tools, and incentives with the goal of serving the public (Leonard and Lidskog, 2020). Bad governance stems from corrupt activities, often due to a lack of accountability, public trust, inclusiveness of all stakeholders, and government efficiency (Rose and Peiffer, 2018; Masuku, 2009).

A robust democracy provides a stable institutional structure that realises the liberty and equality of citizens through the legitimate functioning of its institutions and mechanisms (Morlino, 2004). In such a system, both citizens and institutions have the authority to assess accountability, transparency, and leadership within the government (Masuku, 2009). Transparency allows the public to scrutinise decisions made by those in power, while accountability requires every member of the state to explain their actions and account for their decisions (United Nations Office on Drugs and Crime, 2019). A democratic government provides equal opportunities for all and eradicates all forms of corruption (Stockemer, 2009). Good governance, including accountability, trust, transparency, participation, and good leadership, may assist in tackling air pollution risk challenges in South Durban collectively.

Effective engagement with citizens through participation, consultation, and accountability by the local government in China resulted in declining emissions in heavily polluted cities (Zhang and Chen, 2018). In 2013, after public outcry over the ‘airpocalypse’ in Beijing, the national government responded with initiatives to reform China’s climate strategies (Wong and Karplus 2017). A war on air pollution was declared in 2014, and ambitious targets reduced PM_{2.5} by 15–33% in 2017. Public participation strengthens environmental governance in China (Zhang and Chen, 2018). Achieving sustainability in air pollution reduction may be possible when government agencies and public enterprises collaborate through participation. When governments practice good governance and address factors that affect air pollution, it is easier to fight corruption, implement laws and regulations, and have a cohesive voice to tackle air pollution (Wang et al., 2020). If these initiatives are monitored appropriately, they will lead to a reduction in emissions and improve environmental quality (Omri and Hadj, 2020).

5 Materials and methods

Fieldwork to examine the role of civil society and good governance since 1994 to address air pollution risks in South Durban was conducted over a three-month period from January to March 2020. This was part of a larger study to explore the challenges in addressing air pollution in South Durban. Data was collected through semi-structured interviews with key stakeholders, including CBOs, local leaders, NGOs, local government officials, and industry representatives. A total of 13 interviews were conducted with industry and CBOs. A semi-structured interview is a qualitative data collection strategy whereby the researcher asks informant s a series of predetermined open-ended questions (Ayres, 2020). The semi-structured interview questionnaire was tailored for each informant group (i.e., industry and CBOs). This strategy is useful when working with a complex issue that requires probing to deepen understanding and seek clarity (Wilson, 2014). A total of 13 interviews were conducted with industry and CBOs (refer to Table 4). It was difficult to secure interviews with government officials despite various attempts to communicate with the pollution control officers at the local eThekweni Municipality. Therefore, there was no contribution from local government, which means that an important stakeholder's view has been excluded from this study. Informed consent to conduct interviews were obtained from the informants interviewed.

Table 4 List of informants that were interviewed

<i>Informant</i>	<i>Organisation</i>	<i>Position held</i>	<i>Date interviewed</i>
1	Merebank Residents Association	Secretary	28 February 2020
2	Settlers Primary School	Educator	20 March 2020
3	Green Peace	Durban volunteer	30 March 2020
4	Merebank Residents Association	Council member	16 April 2020
5	groundWork NGO	Environmental health campaign manager	19 March 2020
6	Anti-pollution Watch dog (non-profit)	Chair of a CBO	6 April 2020 and 25 August 2020
7	South Durban Community Environmental Alliance (SDCEA)	Air quality/GIS and youth development officer	28 February 2020
8	SDCEA	SDCEA environmental project officer	22 May 2020
9	Eskom Holdings	Environmental Manager	28 February 2020
10	South African Petroleum Refinery	Environmental manager /engineer	24 March 2020
11	South African Pulp and Paper Industry	Environmental officer	22 April 2020
12	Veolia Water Technologies	Environmental engineer	23 March 2020
13	Democratic Alliance	Councillor	28 March 2020

Grounded theory was applied to analyse data and a coding system was used to identify three major (and common) themes (i.e., initiatives used by civil society to address air pollution since democracy; initiatives by industry to address air pollution since democracy; initiatives by local government to reduce air pollution since democracy).

Refer to Table 5 for main themes and sub-themes generated and presented under the results section. The purpose of grounded theory is to generate theory (i.e., themes) through the constant comparison of field data so as to identify what the common sentiments are from informants interviewed (Hallberg, 2016). The initiatives put forward by civil society, local government and industry post-1994 is one of the themes discussed in the broader study, which will be examined in this paper.

Table 5 Main themes and sub-themes generated from grounded theory analysis and presented for this paper

<i>Main theme 1:</i> Initiatives employed by civil society to address air pollution in the SDIB post-1994
<i>Subtheme 1.1.</i> Post-apartheid initiatives
<i>Subtheme 1.2.</i> Community air quality testing
<i>Subtheme 1.3.</i> The Multi-Point Plan
<i>Main theme 2:</i> Initiatives employed by industry to address air pollution risks in the SDIB
<i>Main theme 3:</i> Government initiatives to reduce air pollution
<i>Subtheme 3.1.</i> The Multi-Point Plan
<i>Subtheme 3.2.</i> The air quality management system

The research study obtained ethics approval from the University of South Africa, College of Agriculture and Environmental Sciences (CAES) Ethics Committee (Ethics Approval Number: CAES_HREC/026). All subjects gave their informed consent for inclusion before they participated in the study. The next section presents the results.

6 Results

The study presents the efforts made by various stakeholders in the post-apartheid era to address air pollution in the SDIB. It also examines the challenges that have impacted the success of these efforts. The study delves into specific sub-themes, including the multi-point plan (MPP), which was established in 2000 as a joint initiative between industry, government, and civil society to combat air pollution. Other sub-themes include community air testing, the air quality management system, and atmospheric emission licenses.

6.1 *Initiatives employed by civil society to address air pollution in the SDIB post-1994*

6.1.1 *Post-apartheid initiatives*

The establishment of CBOs such as the SDCEA brought attention to the industries in the SDIB and their impact on air pollution risks. These CBOs advocated for clean air for residents, pushing for either the relocation of industries or the residents themselves. Unfortunately, their pleas went unanswered. In 1995, South Durban residents tried to initiate dialogue between the community and industry through the Good Neighbourhood Agreement. This agreement aimed to implement black economic empowerment (BEE) and reduce SO₂ emissions. However, it was unsuccessful as an industry representative pointed out that it lacked legal binding. The Merebank Residents Association secretary

(informant 12) commented, "...I remember the Good Neighbourhood Agreement 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..."

This failure indicates that even after the end of apartheid, industries were hesitant to adapt to the new democratic era and involve residents in discussions regarding their concerns. As a result, residents were not seen as equal partners in addressing air pollution risks. Civil society argued that despite their persistent efforts to combat air pollution through protests against polluting industries and lobbying the government, the problem persists. Some scholars interpret this as a failure on the part of industries and the government, post-apartheid, to effectively engage with vulnerable communities residing near polluting industries (see, for example, Mngoma and Dlamini, 2014), indicating a governance deficit in community engagement.

6.1.2 Community air quality testing

Struggling to obtain air pollution data from local government and industry, civil society took matters into their own hands by conducting independent air testing through the Bucket Brigade. They used a Teflon sample bag to collect air samples, which were then sent for laboratory analysis. The efforts of the Bucket Brigade have been crucial in bringing about change. Their findings revealed the presence of various chemicals, some of which are carcinogenic, that had not been assessed by the government and industry (Suwol, 2002). A Democratic Alliance councillor (informant 13) emphasised the importance of residential testing, as it highlights the inconsistent testing and monitoring of pollutants by industries and local government:

"I know the community organizations 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 sulfur 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 show the government as well what is happening in the area."

Civil society successfully used Bucket Brigade testing to publicly expose industries regarding air pollution. The industry was thus forced to implement mitigation measures to reduce their emissions, as noted by an environmental engineer at a local industry (informant 10):

"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 sulphur dioxide, fitted all furnaces with low nitrogen oxide burners, and introduced a sulphur recovery unit which reduced sulfur dioxide emissions by 45 percent."

As a result of these interventions, there was a decline in SO₂ emissions (Carnie, 2020). However, despite claims that certain industries implemented mitigating technology, air pollution incidents continue to have an adverse impact on human health. The rate of leukemia is 24 times higher in South Durban than in any other part of the city (Jaggernath, 2010) and 55 major incidents caused air pollution from 2000 to 2017

(Nkgadima, 2017). Additionally, civil society faces financial strain to self-fund the Bucket Brigade testing. As a Greenpeace volunteer (informant 3) highlighted:

“The local community organizations 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.”

The SDCEA and groundWork are both non-profit organisations that rely on public funding, so financial constraints impact air quality testing (Leonard, 2011). This was confirmed by an anti-pollution watchdog chairperson (informant 6): “That [testing] however can become costly and needs to come from our own pockets as an organisation which relies on donations mostly from the community.” With insufficient support from local government and the CBOs (i.e., the SDCEA) refusing to accept money from industry, conducting Bucket Brigade testing is essential but can become challenging due to financial constraints. The results of this study suggest that government involvement is crucial, as they have an obligation to uphold the Constitution of South Africa to protect the citizens and the environment. Additionally, it is the government’s responsibility to ensure industry accountability through effective governance and enforcement measures.

6.1.3 The multi-point plan

In 2000, civil society’s persistent efforts to address air pollution in the SDIB led to the establishment of the MPP. This initiative was a result of pressure from civil society on industries and advocacy within the government (Department of Environmental Affairs and Tourism, 2007). The then Minister of Environmental Affairs, Vali Moosa, acknowledged the concerns raised by communities and announced the inception of the MPP in November 2000. The MPP aimed to conduct a comprehensive health study, monitor priority pollutants to mitigate emissions, establish an air quality monitoring system, and undertake other endeavours, as noted by an environmental engineer from a local industry (informant 10). ‘The MPP’s strategic design monitored ambient air quality, looking at criteria pollutants from the health study, nitrogen oxide, ozone, and sulphur dioxide at ground level concentrations and world health standards. Communities saw a significant improvement in the quality of air and felt that they could breathe easier.’

There MPP achieved a notable long-term reduction of SO₂ by 40%, indicating a degree of success. However, unresolved issues persisted, including the need for vehicle emission reduction, control of dust emissions from logistic activities, regulation of smaller industries, and waste combustion (Kasavel, 2010). Respondents pointed out that the MPP received numerous accolades for its cutting-edge air quality monitoring stations and data retrieval methods. The findings underscore the MPP’s significance as an initial step in tackling air pollution, emphasising the pivotal role played by civil society in addressing air quality issues in the SDIB. Unfortunately, the dissolution of the MPP in 2010 due to political disagreements within local government resulted in a breakdown of communication and collaboration among industry, local government, and civil society. This was revealed by an environmental project officer from SDCEA (informant 8): “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”. An environmental engineer from Veolia Water Technologies (informant 12) agreed: “During the days of the MPP there was much more communication between civil society, industry and local government but now this is tenuous”.

During the active period of the MPP, routine meetings provided a platform for stakeholders to address concerns (Kasavel, 2010). Unfortunately, with the dissolution of the MPP, this crucial avenue ceased to exist (groundWork, 2004). According to the chairperson of an anti-pollution watchdog (informant 6), there was minimal inclination from local government and industry to engage with the community, leading to a lack of communication between these parties. The decline in air quality in the SDIB post-2010, attributed to poor governance, was exacerbated by the neglect of state-of-the-art air quality monitoring stations, resulting in their malfunction. As previously affirmed by scholars, the MPP's noteworthy accomplishments included an enhanced air-quality monitoring network with integrated data management and the expansion of pollutant sampling beyond industry and government parameters (Leonard and Lidskog, 2020). Consequently, the breakdown of the MPP due to poor governance significantly hindered efforts to address industrial risks in South Durban.

6.2 Initiatives employed by industry to address air pollution risks in the SDIB

The activism against air pollution during the apartheid regime, culminating in its abolishment in 1994, prompted industries within the SDIB to adopt strategies aimed at mitigating air pollution.. Respondents from the industrial sector openly discussed the range of measures put in place implemented such as ISO 14001: 2015 certification. They expressed confidence in these measures to reduce air pollution effectively. An environmental officer at a local industry (informant 11) further explained the measures implemented aimed at tackling air pollution:

“We have changed the way we work to become more sustainable and green. We have phased out dirty fuels. The combustion of dirty and high Sulphur fuels results in the emission of high volumes of particulates and SO₂, 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. The key elements of this strategy are listed in the eThekweni municipality Air Quality Management Plan, 2007. We implemented Continuous Emissions Monitoring (CEM) such as an SO₂ analyser, and ClO₂ analyser on stacks. Electrochemical sensors [Sniffers that detect gas concentrations in the mill], Dust monitor, Particulate matter, and Oxides of Nitrogen (NO, NO₂ and NO_x) monitors on stacks. Ambient Monitoring stations around the mill and early warning gas monitors.”

In spite of the changes introduced by the industry, instances of air pollution persist (Nzama, 2019). Moreover, without comprehensive air quality data from local government, it is challenging to ascertain whether industries have indeed lowered their emissions. An industry respondent argued that their ISO 14001 certification ensures adherence to international standards, thereby enhancing their overall environmental performance. However, this perspective faced significant criticism from CBO representatives. They noted that although industries have put in place various mitigation measures to reduce emissions, the results indicate that community satisfaction has not seen improvement, and air quality remains a distressing issue for local communities.. A local school educator (informant 2) commented: “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”.

In recent years, numerous accidents have resulted in gas leakages and severe fires, compelling residents to either evacuate their homes or seek refuge indoors (Erasmus, 2020). During a conversation with an environmental engineer at a local industry on March 24, 2020, it was emphasised that they positioned themselves as environmentally friendly and committed to sustainability to garner favour with banks and investors. This strategic approach allowed them to secure higher revenue. It was seen as a way to project the implementation of mitigation measures for the betterment of the environment and the community. However, an environmental health campaigner from an NGO (informant 5) pointed out that industries may not be operating as sustainably as they assert: “A big blind spot is the fact they [industry and local government] do not deliberately monitor PM_{2.5} which is an important pollutant”.

PM_{2.5} particles can penetrate deep into the respiratory tract, reaching the lungs. Civil society, represented by groundWork, advocated for the monitoring of PM_{2.5} due to its presence in air samples obtained through community testing (groundWork, 2004). However, reports on air quality management and sustainability from Engen Petroleum and SAPREF refineries have not included monitoring of PM_{2.5}, despite it falling within the category of cancer-causing substances (SAPREF, 2018; Engen, 2019). This highlights a deficiency in local government enforcement to ensure that all pollutants are regulated for the community’s safety. As expressed by a local councillor (informant 13): “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”.

Historically, when industries faced pressure from civil society or government to reduce emissions, their common response was that implementing abatement technology was financially burdensome, sometimes even threatening plant closures. An environmental manager representing a national industry (informant 9) clarified that while industries have taken steps to mitigate emissions, they are often limited by financial constraints: “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 and run”.

Despite the substantial profits that industries make (Bloomberg, 2019), this illustrates the leverage that industries have gained over local governments and the impact that their monetary value has on developing countries such as South Africa.. As stated by an environmental manager representing a national industry (informant 9), South Africa, as a developing country, lacks incentive from both local and national governments to advocate for and promote investments in cleaner technologies. Instead, their emphasis tends to be on growth and development, which can result in elevated pollution levels. Nevertheless, it is worth noting that addressing climate change and environmental issues, including air pollution, can mitigate poverty, homelessness, and hunger, as well as reduce the burden on healthcare (OECD, n.d.). Therefore, industries have shown a commitment to addressing air pollution in the event of an incident, as indicated by a council member from a local CBO (informant 4):

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

The findings underscore the significance of subjecting industries to legally binding agreements like the previous MPP to guarantee a proper approach to addressing air pollution. An environmental health campaigner from an NGO (informant 5) provided the following insight: “The MPP required that sulphur levels are to be reduced. This meant industries had to invest time and money in reducing air pollution because it was coming as a legal requirement from government”. Since the MPP was dismantled in 2010, air pollution has been neglected and industries are not held to a legally binding standard (Mngoma and Dlamini, 2014).

6.3 Government initiatives to reduce air pollution

Upon the enactment of the National Environmental Management Act 107 of 1998 and the establishment of the National Environmental Management Air Quality Act 39 of 2004, it was expected that air quality concerns would receive heightened attention. This was exemplified by the local government’s implementation of the MPP.

6.3.1 Multi-point plan

The inception of the MPP arose in response to persistent air pollution incidents in the SDIB, along with ongoing opposition to local industries and a deficiency in monitoring and enforcement by local government. The MPP constituted a strategic initiative instigated by civil society, compelling the government to adopt various facets of air quality monitoring. An NGO environmental health campaigner (informant 5) described the air quality status during the period when the MPP was in operation as follows:

“When you look at the 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 the 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.”

After 2010, following the dismantling of the MPP, the dedicated team responsible for issuing permits, monitoring pollutants, and coordinating stakeholder meetings ceased to function. Both an environmental health campaigner (informant 5) and a local councilor (informant 13) acknowledged that the MPP had enhanced the schedule trade permit system, resulting in reduced emissions. However, with the dissolution of the MPP in 2010, there has been a decline in monitoring these aspects due to poor governance, contributing to a further decline in air quality. The NGO environmental health campaigner (informant 5) pointed out that in recent years, it has become unclear if industries are complying with the schedule trade permits. According to the Department of Environmental Affairs and Tourism, schedule trade permits are granted for five-year periods and come with various reporting requirements, including annual stack monitoring

to enhance the quantification of emissions, annual reporting for compliance, and providing information on new emissions (Department of Environmental Affairs and Tourism, 2007). According to the informant: “There are also schedule trade permits at the local/municipal levels. Now we are not sure if industries are in keeping with these permits because [local] government do not allow locals to view these permits and air pollution is still quite bad in South Durban”.

As mentioned earlier, the schedule trade permits are not accessible to the public, which raises doubts about the proper monitoring of air pollution. The local municipality argues that these permits contain proprietary information that could potentially harm industries’ interests (Carnie, 2020). However, it’s important to note that the National Environmental Management Air Quality Act explicitly mandates the availability of all atmospheric emission licenses to the public. By withholding this information, the local municipality is in violation of the law (Sowetan Live, 2015). This highlights the role that the MPP played in regulating emission sources. Nevertheless, the environmental health campaigner (informant 5) pointed out that the current leniency, characterised by the failure to enforce penalties, monitor, and hold industries accountable, has contributed to the deterioration of air quality in the SDIB: “Government is not fining industries when they are in violation of the laws. This means that they [industries] know there are no consequences and will continue to violate all the laws”. Industries know that local government will not hold them accountable for transgressions and therefore, they continue polluting (Vissers, 2010).

6.3.2 The air quality management system

With the dismantling of the MPP in 2010 the air quality units commissioned at that time become dysfunctional and unable to provide air quality information. This has been ignored by the local government as explained by a youth development officer at SDCEA (informant 7):

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

Monitoring stations from Settlers and Wentworth did not produce data pertaining to many pollutants such as NO, nitrogen dioxide (NO₂), NOX, CO, O₃, and C₆H₆, which in recent years have all been cause for concern over health complications among residents (Department of Environmental Affairs and Tourism, 2020). Local authorities have blamed bad air quality on inaccurate data collected and dysfunctional air quality monitoring stations and have blatantly ignored these fundamental gaps in air pollution monitoring (Nzama, 2019). Platforms developed by local government, such as strengthening the inspectorate, were intended to provide a closer working relationship between local authorities and industries to ensure accurate monitoring of regulations. This initiative achieved success when the MPP was active by clamping down on schedule trade permits, which reduced emissions (Department of Environmental Affairs and Tourism, 2007). However, owing to limited capacity, particularly after the MPP was disbanded, this initiative was no longer being implemented, according to an environmental engineer at a local industry (informant 10): “There is limited capacity

from government who monitor industries, they [local government] need to focus on capacity building and people who are enforcing regulations need to have proper training”.

The results highlight gaps in local government procurement, capacity, and political support. Air emission licenses Atmospheric emission licenses (AELs) are a key component of the National Environmental Management Air Quality Act and it is a requirement for all polluting industries to submit AELs. AELs indicate the pollution limits for each activity within an industry whose operations result in emissions into the atmosphere (Nzimande, 2012) as mentioned by an environmental officer at a local industry (informant 11): “With municipality issuing air emission licenses to companies, they are forced to monitor their emissions closely. The AELs 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 recurrences and a date by which measures will be implemented”.

On the contrary, representatives from civil society expressed skepticism about the effectiveness of AELs in mitigating air pollution in the SDIB. A Greenpeace volunteer (informant 3) went on to suggest that the government’s reluctance to disclose AELs to the public stems from their desire to shield both industry and themselves from scrutiny over lenient enforcement against polluters. According to the National Environmental Management Act 107 of 1998, a violation carries a penalty of up to R10 million. However, in 2005, Engen Petroleum exceeded SO₂ levels for ten-minute intervals on 35 occasions, and breached the 24-hour guideline six times without facing any penalties (Visser, 2010). Civil society contends that air quality data is kept confidential, despite repeated efforts to obtain it from both industry and government. Informant 3 also pointed out that this extends to the government’s reluctance to disclose information related to emission licenses: “The reason why these [air emission] licenses are kept from the public is so that government basically don’t have to account for anything. Then community organizations have to issue legal notices to attain this information”.

Civil society went to the extent of taking the eThekweni Municipality to court over its refusal to disclose AELs to them (High Court of South Africa, 2015). This underscores a critical point, when the public cannot verify that the government has enforced stringent regulations on industry, there is little incentive for industry to abide by these regulations, or for government to monitor these licences and uphold their constitutional obligations. A local councillor (informant 13) added that the AELs are unsuccessful in keeping emissions within the regulated standards, especially if the public do not have access to the content of the emission licences. Local government and industry need to be transparent with this information for the public to feel assured that industry is abiding by the laws and that government prioritises citizens’ health.

7 Conclusions and recommendations

This paper shed light on the measures undertaken by local government, industry and civil society to address air pollution in the SDIB post-1994. However, it is evident that there has been a deficiency in governance when it comes to addressing air pollution challenges in South Durban since the inception of the new democratic era. With the dismantling of apartheid in 1994, civil society organisations began to gain momentum by mobilising the community around air pollution inequalities experienced in the SDIB. Civil society started the fight for cleaner air in the SDIB. Their relentless advocacy,

urging both industry and government to institute changes addressing air pollution, played an indispensable role in the implementation of many interventions. Although civil society has used independent community testing (known as Bucket Brigade testing), held rallies and protests – and even taken court action against industries – they have been met with substantial challenges. Securing backing from both government and industry has consistently proved to be a formidable task, as community concerns have frequently been brushed aside by these parties. Under mounting pressure from civil society, the industries adopted certain superficial measures to tackle air pollution. These initiatives faced criticism for their ambiguous implementation, lack of proper oversight, and the fact that air pollution incidents persist in the SDIB. This study's findings indicate that industries primarily introduced these alterations to sidestep negative public perception. These initiatives, often seen as profit-driven, were criticised for their inadequate management and oversight by local government. The case underscores a key point in academic literature: in a democracy, there is no guarantee that citizens will have the power to evaluate accountability, transparency, and leadership within the government.

After 1994, new environmental regulations were implemented including the National Environmental Management Act of 1998, among others. However, the findings reveal that these regulations have fallen short of effectively addressing the air pollution crisis in the SDIB. This is partly attributed to governance and enforcement lapses since 2010, when new local government leaders failed to improve on the MPP initiative and integrate its lessons. Owing to various challenges such as inconsistent monitoring and control, lack of funding, skills shortage within government, and lack of political will to enforce these regulations and prosecute industries for their transgressions, air pollution has been a cause of considerable anxiety in the SDIB. In a post-apartheid era where equal rights should be experienced by all citizens, this has not occurred in the SDIB, as individuals of lower socio-economic status continue to be disproportionately affected by air pollution. A democratic transition should have inspired a cohesive voice where all citizens could experience the same privileges such as clean air. Consequently, a great deal of work needs to be done by civil society, government (and industry) to implement more intentional practices that yield positive results in addressing air pollution in the SDIB. The novelty of this paper's contribution is that it has worked to emphasise the deficits in good governance practices related to air pollution in South Durban. The following recommendations are put forth to enhance environmental governance and policies in South Durba.

Specific recommendations are made below

- Collaboration and effective communication channels between government, industry and civil society need substantial improvement. This should involve the establishment of a genuine platform, facilitated by the government as regulator, to foster collective engagement akin to what was achieved under the MPP. Civil society should be recognised as equal partner in the decision-making process. However, given the current shortcomings in governance practices, there is a pressing need for structural reforms that empower citizens who might otherwise be marginalised due to poor governance. This will require new forms of leadership within the government that actively engage in good governance and hold industries accountable for air pollution risks, all while involving local communities in decision-making.

- Government must ensure the operational functionality of air quality monitoring stations in the South Durban city. These stations should actively monitor air quality and the data collected from all monitoring points should be accessible to the public, ideally through the government's official website. This level of transparency is crucial for keeping civil society informed about air pollution levels and enabling them to have an impact on decision-making processes. It is imperative that government and industries expand the range of chemicals being monitored including PM2.5. This particulate matter has already been detected in air samples collected by the community, specifically by SDCEA through the Bucket Brigade initiative. If government and industry partner with communities this will contribute to good governance and can work to tackle air pollution as per the previous MPP. Lessons must be learned from good governance practices. Therefore, both government and industry must overcome any existing delays in addressing air pollution challenges and genuinely seize the opportunity to collaborate with local communities in mitigating pollution risks.

Informed consent statement

Informed consent was obtained from all subjects involved in the study.

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