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# Sanitation Upgrading as Climate Action: Lessons for Local Government from a Community Informal Settlement Project in Cape Town

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**Abstract:** In light of the increasing call for climate action, there is a growing body of literature studying the ways in which informal settlements in the Global South are adapting to the impacts of climate change. In these particularly vulnerable communities where the existing infrastructural vulnerabilities faced by residents are exacerbated by the hazards of climate change, multi-level approaches involving more inclusive forms of governance are needed for the implementation of climate action. Drawing from the case of a sanitation upgrading project in the informal settlement of Murray, located in Philippi, Cape Town, this paper adds to current understandings of multi-level rapid climate action in informal settlements by endeavouring to address two gaps in this body of literature. Firstly, this paper demonstrates a link between climate change and sanitation which has received little attention by showing that improving sanitation infrastructure makes communities more resilient to extreme weather events associated with climate change. Secondly, the paper addresses how and by whom rapid climate action can be implemented in complex socio-institutional contexts such as informal settlements where the impacts of climate change are felt particularly strongly. This paper identifies what enabled and constrained climate action in the Murray informal settlement in an attempt to provide lessons for local government from the case of the sanitation upgrading project. Bottom-up initiation of multi-level climate action is dependent on fragile partnerships which require the support and involvement of a skilled and dedicated local government. Nevertheless, co-operative and transparent engagements across levels hold the potential to contribute to transformative adaptation through the establishment of new partnerships and forms of governance which recognise community groups as legitimate stakeholders and acknowledge the importance of lived experiences and mentalities.

**Keywords:** multi-level governance; climate change; informal settlements; local government; sanitation services



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## 1. Introduction

In recent decades, the world's population has become increasingly urban, with over half of the global population currently living in cities [1,2]. Associated with this rapid urbanisation is an increase in the number of citizens living in informal settlements, particularly in countries of the Global South such as Kenya [3], India [4], and South Africa [5,6]. In most informal settlements, the roll-out and maintenance of basic service infrastructure severely lags behind that of more affluent areas, and the way in which utilities and municipalities engage with the contested concept of 'informality' is complex [7–9]. In Cape Town, South Africa, the lag in basic service delivery is largely a result of the deeply historical process of racial segregation which goes back to colonialism and the Apartheid regime. Protests, often involving the disruption of public life and the destruction of public facilities,

are used by many informal settlement residents as a way to voice their frustrations and attempt to secure infrastructure and services [10].

Inadequate access to services such as sanitation contributes to unsustainable conditions increasingly seen particularly in cities of the Global South [11]. Traditionally, achieving sustainable development tries simultaneously to balance environmental, social, and economic dimensions [12]. This understanding, often referred to as the triple bottom line, has recently been added to with the acknowledgement that governance and assets/technical dimensions are also critical for sustainable development, and are focused on in this paper [13]. However, the potential for achieving sustainable development is hampered by the impacts of climate change, which affect everything from food provision, water supply, and also sanitation infrastructure [14].

Climate change, which is referred to as an interconnected 'wicked problem' [15], exacerbates the structural vulnerabilities faced by informal settlement residents [16,17]. In urban areas, climate change has increased the risks faced by all persons, assets, economies and ecosystems [1]. The urban poor are particularly vulnerable to the hazards of climate change as their access to infrastructure and services such as water supply and sanitation is often precarious [2]. In the context of the contemporary city, marginalised communities residing in informal settlements most commonly bear the brunt of climate change related impacts [18–21]. In line with the increasing call for both rapid climate action as well as longer-term, transformative climate change adaptation, which aims to alter broader societal aspects by confronting issues such as power and justice [22,23], it is imperative to seek out the lived experiences of informal settlement residents. These residents who face climate and service delivery challenges on a daily basis are well placed to engage in finding suitable solutions for climate action.

The available evidence on climate trends from South Africa as well as greater Africa shows "increasing variability in precipitation events" [20] (p. 408). Furthermore, the contribution of anthropogenic global warming to extreme weather events such as flooding or prolonged rainfall deficits has been clearly demonstrated [24]. In the case of Cape Town, the effects of global warming can be seen in the fact that the metropole recently endured the worst drought of the last century, known as the 'Day Zero' water crisis [25,26]. Increasing number of flooding events can be attributed to more intense albeit potentially fewer rainfall events, as well as the consequences of urbanisation and surface hardening [18,19,27]. While both the effects of these climate impacts on informal settlements as well as the actions taken in response to these impacts have been studied and reported on, the link between climate change impacts and sanitation is one which has received limited attention. Discussions around climate change impacts and climate action often broadly refer to 'water and sanitation' as one area of study [2,28]. This is evident from the fact that Goal 6 of the UN Sustainable Development Goals calls for clean water and sanitation for all [29]. Thus, even though well-functioning sanitation systems are vital for human health, sanitation in and of itself is rarely seen as being directly impacted upon by climate change and is often missed or excluded from assessments of, and strategizing around, climate change impacts and adaptation [30]. However, sanitation infrastructure, and more broadly, the governing of sanitation, is indeed impacted, both directly and indirectly, by climate change.

Two of the most common forms of extreme weather events associated with climate change are dry weather with prolonged rainfall deficits and wet weather with heavy rainfall for extended periods of time. Limited water availability due to dry weather can increase pollutant concentrations in wastewater and result in clogged pipes [30,31]. In informal settlements, where water is often already in short supply and sewerage infrastructures is often failing or overburdened, this can result in highly polluted sewage overflowing into the streets at manholes and broken pipes, polluting the surrounding areas. As with dry weather, wet weather can result in the damage and loss of sanitation infrastructure as flooding increases the pressure on the combined infrastructure systems for water and wastewater [28,32]. As is commonly associated with the floods experienced during Cape Town's winter rains, sewage containing elevated faecal bacterial loads often overflows into

informal settlements, contaminating the soil and water surrounding residents' homes [20]. What the sanitation impacts of both extreme dry and wet weather have in common are the environmental degradation resulting from soil and water pollution, as well as the consequent health-related impacts [33]. Poor sanitation infrastructure in informal settlements can result in the faecal contamination of water, which causes the spread of waterborne diseases and presents a serious health hazard for local residents [31,34]. Thus, this paper argues that improving sanitation infrastructure is a form of climate action as it makes communities more resilient to the impacts of climate change by improving their access to suitable and effective sanitation infrastructure.

Having demonstrated the link between climate change and sanitation, the second area of literature to which this paper contributes is how rapid climate action around sanitation can be implemented and what roles various actors can take. While there are no off-the-shelf solutions to the impacts of climate change, it has been shown that reducing the climate risks experienced in informal settlement requires a shift towards new forms of more inclusive governance [18,35,36]. The move away from traditionally perceived state-centric, top-down 'government' towards the more bottom-up 'governance' is one which has been studied in great depth [37–39]. However, it is the more recently applied concept of 'multi-level governance', proposing a synergy between bottom-up and top-down approaches, which is increasingly seen as having the greatest potential to address climate risks such as those faced in Cape Town's informal settlements [20,40].

Research shows that multi-level governance, with participation and inclusivity in decision making, empowers and capacitates local communities, thereby increasing the chances of legitimate, transformative, and sustainable development occurring [36,41–43]. Key in the implementation of an inclusive governance approach for the sustainable provision of water and sanitation in a poorly serviced area are transparency and capacity building [36]. With the inclusion of a wider range of actors in multi-level governance, the influence of non-traditional actors such as Non-Governmental Organisation (NGOs) is growing [37,44]. Apart from formally established NGOs, community-based social movements and intermediaries who are urban poor themselves are also driving governance around issues such as service delivery [19,45]. The inclusion of communities in decision-making can enable co-operative engagement between local government institutions, communities and intermediaries in a manner which enables "the voice of the marginalized to be better heard and trusted . . . [so as to] support climate justice goals that recognize everyday risk" [46] (p. 3). This is particularly important in the highly politicized context of informal settlements, which, as is further explored later in this paper, is characterised by the consequences of historically entrenched inequality [18,47].

Although significant transformation has been achieved through engagements which involve citizens, the state and various intermediaries [36], empirical evidence shows that there are also extensive constraints to multi-stakeholder projects, which have been attempted in Cape Town with varying degrees of success [6,48]. Whether it be due to a "funding bottleneck" [49] (p. 8), a lack of support from local authorities [2,20], or conflicting convictions, flawed stereotyping, and lack of trust amongst actors [50], projects that host engagement across levels often fail to succeed. Considering the importance of the successful governing of service provision, particularly in light of the increasing hazards of climate change, it is imperative to identify how multi-level climate action is both enabled and constrained. This paper shares lessons from a sanitation upgrading project undertaken in the Murray informal settlement in Cape Town on how and by whom climate action across governance levels might best be implemented.

Notably, while discussions around climate change action often revolve around technical solutions, this paper acknowledges the fact that traditional responses to climate change frequently do not aid the urban poor [51]. In fact, local government solutions which focus solely on technical aspects often serve to entrench existing inequalities due to a lack of consideration for the complex socio-institutional context within which climate action in informal settlements is embedded [8,51]. The successful implementation of a climate action

such as the provision of sanitation infrastructure requires an understanding of the internal power struggles, priorities, and needs in an informal settlement, as well as the emotional overtones attached, particularly to services such as sanitation [19,52,53]. The different mentalities and lived realities of groups such as community organisations and even local government departments need to be acknowledged, as well as how these mentalities come together to politicize sanitation provisioning [10]. Moreover, the attitudes of different actor groups towards participatory processes and the ways in which they perceive each other shape engagements around the governing of climate action [41].

Consequently, this paper's identification of what enables and constrains climate action includes a careful reading and heightened awareness of the complex institutional and socio-political factors at play in the context of informal settlements. As in the case of the Murray sanitation upgrading project involved not only a community-based organisation and the local government but also various intermediaries, this paper also asks the question of how engagements between actors and the perceived roles of these actors influenced the relationships formed and the resultant co-operation—or lack thereof—towards multi-level governance. Because improving sanitation makes informal settlement communities more resilient to climate change, it is imperative to understand the complex processes for implementing climate action in this context. Upon presenting the methodology and findings of the research undertaken on the Murray sanitation upgrading project in Cape Town, this paper provides lessons for local government through a discussion on what enables and constrains multi-level climate action.

## 2. Materials and Methods

This paper applies a case study approach, utilising document review, transect walks, and semi-structured interviews undertaken in 2019, to shed light on a particular project involving engagement across levels, from city to neighbourhood, around the upgrading of sanitation. The focus on a single network of actors and their involvement in the provision of sanitation in an informal settlement provides a nuanced and intricate understanding into not only the technical aspects of sanitation provisioning, but also the complex social aspects. This paper is informed by the case of an informal settlement named Murray, located in Philippi, Cape Town, in which a multi-level sanitation upgrading project was initiated in 2017 by a community-based organization (CBO), the Informal Settlement Network (ISN). On behalf of the residents of Murray, ISN engaged with the non-governmental organisation (NGO), the Community Organization Resource Centre (CORC). Capacitated by the technical, financial, and relational support provided by CORC, as well as other international funding, ISN engaged in a partnership with the City of Cape Town Municipality (hereinafter referred to as 'the City') in the quest for improved sanitation infrastructure provision. Although the initial phase of the project showed signs of successful engagement and co-operation between the different groups, progress stalled in 2018, where after increasing frustration and tension became evident. Consequently, this project provides a rich case for the interrogation of both what enables and constrains multi-actor climate action in the social context of an informal settlement in Cape Town.

The research carried out for this paper was qualitative in nature, focusing on the behaviours and attitudes of research participants and the engagements between them [54]. The primary method for data collection was in-depth, semi-structured interviews during which a total of twelve participants across the various levels were asked a list of open-ended questions. An initial group interview with the regional leaders of ISN assisted in the identification of key interviewees, particularly among City officials and the members of the community-based project steering committee (PSC). As it became clear upon completion of the first few interviews that ward councillors also play an important intermediary role in the engagement between local communities and the City, two ward councillors were also interviewed as part of this study. It thus follows that representatives of all of the main groups involved in the upgrading project were consulted, providing a comprehensive

snapshot of the multi-level governance of sanitation infrastructure in the Murray informal settlement.

All interviews, with the exception of one, were audio-recorded with prior permission from the interviewees as indicated on the signed English-IsiXhosa bilingual consent forms. Audio-recorded interviews were transcribed as soon as possible upon their completion so as to enable the researchers to make note of any non-audial clues and gain a deeper understanding of the emotions and perceptions surrounding sanitation [54]. A thematic data analysis method was employed to analyse the findings by searching across the data set for repeated patterns and meanings [55]. The themes that emerged the clearest from the analysis process, and which were mentioned most frequently by the interviewees, were identified as the various enablers and constraints to multi-level climate action which are presented in the findings this paper. However, the analysis process also revealed the importance of mentalities, relationships, and engagements in the governance of sanitation infrastructure. Thus, upon presenting the case study context and upgrading events in the Murray settlement, this paper first provides a discussion around mentalities and engagements prior to presenting the enablers and constraints to climate action from which local actors may gain valuable lessons.

## 3. Results

### *3.1. Case Study Context and Upgrading Events*

The informal settlement of Murray is located in Ward 80 in the Philippi area of Cape Town [56]. Philippi is one of the largest townships in Cape Town with 191 025 residents (2011 census), only 77.4% of whom have access to full-flush toilets that connect to the sewerage system [57]. Thus, for many, the human right to basic sanitation services and the safe disposal of human waste, as provided for in national legislation by the 1997 Water Services Act, has not been realised [11,58]. Because of a lack of repair and maintenance, countless residents who, according to City reports have access to sanitation, in fact, do not [10]. Murray's residents are among those whose daily lives are hampered by a lack of service provision, as residents live in shacks with no toilets or taps, and rely on communal standpoints to access water. The residents in the settlement used to have access to communal full-flush toilets connected to the sewerage pipeline running along the settlement's northern perimeter (see red line in Figure 1). When the research for this paper was undertaken in 2019, this sewerage pipeline had been largely non-functional since 2017. Increasingly severe sewage leakages from this pipeline due to blockages, and the resultant worsening living conditions for those living alongside the pipeline, spurred the community-based organisation, ISN, into action.

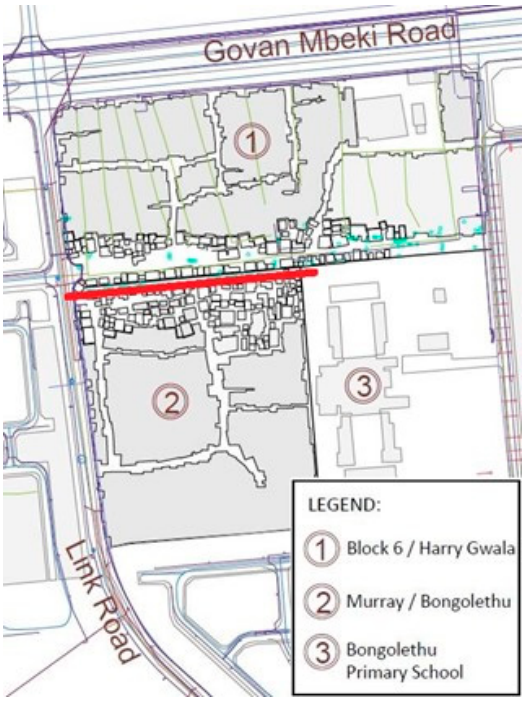


**Figure 1.** Map of the informal settlements of Murray and Block 6, as well as the Bongolethu Primary School. The sewerage line in question is indicated by the red line and connects from Link Road into the north-western perimeter of the school.

According to the local ward councillor, the informal settlement, known as 'Murray' to its residents and as 'Bongolethu' to City officials, was established in the late 1980s and has been fighting for access to water, sanitation, and electricity ever since. The provisioning of services to the settlement has, however, been hampered by the fact that the land on which Murray is situated is private property and does not belong to the City. Consequently, it has been challenging for the City to provide services inside the Murray settlement as this legally cannot be done without prior consent from the private landowner [5], and legislation hinders the budgeting or expenditure of municipal funds on land which does not belong to the government [20]. The fact that the Philippi area historically was not designed as a densely populated informal settlements further explains the struggle faced by City officials in providing services to its residents [57]. Several interviewees related the inadequacy of sewerage pipes in Philippi back to the structural segregation of Apartheid, suggesting that these pipelines were set up for a very basic level of service. As a result, the City officials whose job it is retrospectively to provide services in areas such as Murray are battling against an initial infrastructure outlay which is worse than that of the more affluent areas of the city.

Although Philippi has been poorly serviced in the past, the local government today has a responsibility to provide communities such as that of Murray with basic sanitation services [58]. The failure to provide services effectively is evident from the living conditions reported by interviewees across all levels, including City officials, noting that the settlement of Murray is characterised by extensive sewage overflow. This results in exposure of adults and children to the odours and bacteria of raw sewage, high rates of TB, and the flooding of homes by sewage-infused greywater, particularly in winter and during extreme weather events caused by climate change. It is in response to the increasingly unsanitary living conditions in the settlement that ISN, with the support of CORC as well as funding from international donors, initiated the upgrading project in partnership with the local authorities. A timeline of the major events forming part of the sewerage line upgrade in Murray is shown in Figure 2 [59].

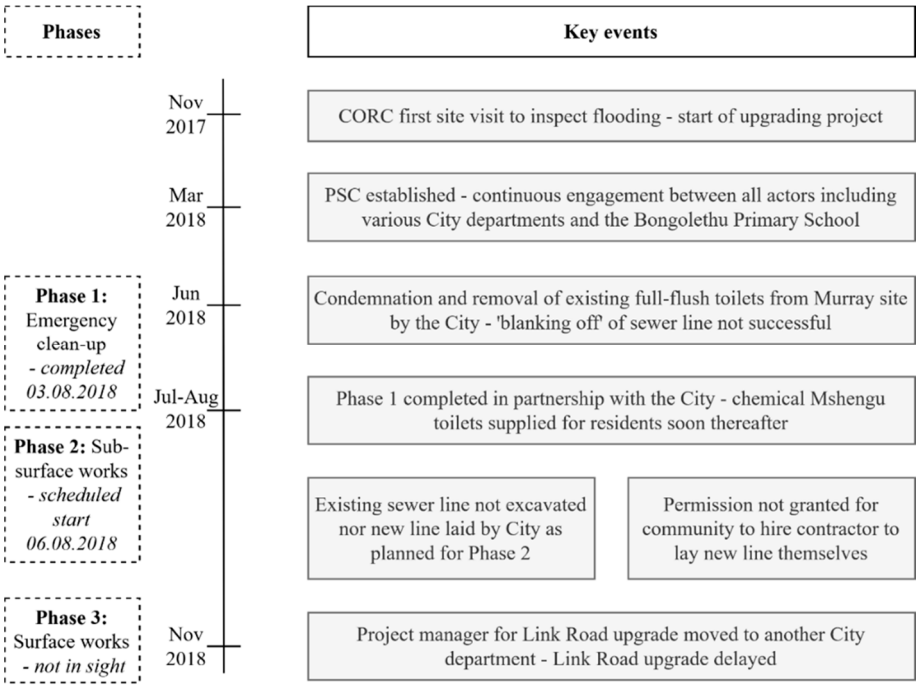


**Figure 2.** Timeline of major events forming part of the Murray and Link Road sanitation upgrading, highlighting the proposed phases of the project.

The overall aim of the ISN/CORC project in Murray was to upgrade the sewerage pipeline which runs along the settlement's northern perimeter and feeds into the larger Link Road sewerage infrastructure (see Figure 1). Prior to the upgrading project, the pipeline, which also services the adjacent Bongolethu Primary School, was functioning poorly, with sewage overflowing at manholes, pipe openings, and into the school. Consequently, the upgrading project consisted of three phases, namely (1) an emergency clean-up, (2) subsurface works to replace the old, fragile sewerage line, and (3) surface works including the installation of a series of wash stations and simple children's play structures (see Figure 2).

The project officially commenced in November 2017 when CORC conducted its first site visit, and by March 2018, plans had been developed and a project steering committee (PSC) had been established. The PSC, consisting of 12 residents from Murray and the adjacent Block 6 settlement, met weekly with ISN and CORC, with meetings open to representatives of the school and the various City departments. Although deemed by some as a contentious issue, it was decided, in conjunction with the City department responsible for informal settlements, that the full-flush toilets along the northern perimeter of Murray ought to be condemned and removed. The rationale behind this decision was that these toilets had been connected to a sewerage line intended solely for the discharge of sewage from the Bongolethu Primary School, as a result of which the capacity of the line had been exceeded, and extensive sewage overflow was occurring. In what was considered a significant contribution, the City condemned and removed these full-flush toilets in June 2018, providing the first necessary condition for the intended upgrading project. As a result of the available funding and the successful removal of the full-flush toilets by the City, Phase 1 of the project went ahead mostly as planned in July/August 2018. The northern bounds of Murray were cleaned by the community through a concerted effort of all of the involved parties. When the City further committed to delivering and maintaining chemical Mshengu toilets throughout the upgrading project, the residents, ISN, and CORC had a positive outlook and felt they "had the City on board" (Interview 6).

The Phase 2 sub-surface works were important as it was understood that excavating the existing sewerage line and laying a new one from Link Road to the school would solve Murray's problem of continued sewage overflow into the settlement itself. While the

City had committed to undertaking the necessary sub-surface works, this task was never carried out, and the team led by ISN felt that it had not been given a proper explanation as to why. The City's failure to undertake the promised sub-surface works marked a turning point in the multi-level engagements forming part of the upgrading project. It was noted by interviewees that what followed was a significant breakdown in co-operation and communication between the various groups involved.

Throughout the interview process, it became clear that the events of the upgrading project in Murray were inextricably linked to the sewerage infrastructure along Link Road (see Figure 1). Due to the historically poor roll-out of services in the Philippi area, the diameter of the Link Road sewerage pipeline was too small to accommodate the throughput it experienced. As a result, the pipeline was often blocked with sewage backing up into settlements such as Murray and overflowing at manholes and pipe openings. With plans in place to upgrade the Link Road sewerage pipeline, the City did not wish to put further pressure on the existing pipeline until the upgrade had been completed. Consequently, the promised Phase 2 sub-surface works were not undertaken as work on any lines feeding into the Link Road sewerage infrastructure had been put on pause until the completion of the Link Road upgrade. In light of this, ISN requested permission from the City to hire their own contractor using the funding available to them in order to lay a new sewerage line in Murray themselves. Although the City department responsible for informal networks offered to draw up a plan for this line, the department responsible for formal waste and water did not feel comfortable with an external contractor connecting onto public infrastructure, resolving instead to do internal investigations and installations themselves. This discord between local government departments resulted in no action taking place and no timeframes being offered to the community for the undertaking of the necessary internal City processes, leaving the community feeling frustrated and aggrieved as expressed in the following quote (Interview 1):

> *We're getting very angry now . . . [we] didn't need their money . . . [we] have our money . . . [we did] Phase 1, and . . . now, it looks like nothing had been done there because it's dirty . . . there are tyres . . . there were tyres before and now, there are tyres again . . .*

To make matters worse, the project manager in charge of the Link Road upgrade moved to another City department in November 2018. This caused the initiation of a new geotechnical investigation and a new community engagement process, as well as the postponement of the implementation timeline of the Link Road upgrade to the 2020/2021 financial year. Because of the complex interrelation between the sewerage infrastructure of Murray and Link Road, the residents of Murray were left in the lurch, with no functioning full-flush toilets, with continued sewage overflow, and without a clear understanding as to when the situation would improve. Notably, it was not only the lack of technical support from the City which caused frustration and anger, but also the apparent lack of responsiveness of the City. Furthermore, CORC, ISN, and the Murray residents felt that the City had, at times, dealt with them in a non-transparent manner, not allowing them to become involved in the governing of sanitation in their settlement. Thus, it became clear that complex socio-political factors and historically ingrained mentalities had affected the multi-level engagements which dictated the outcomes of this upgrading project.

### *3.2. Mentalities and Engagements among Actors and Levels*

The successful implementation of climate action requires a level of relational capacity between the groups involved to be drawn on when necessary [46], which was not always evident in the case of the Murray upgrading project. The engagement between the community of Murray and the local government was frequently characterised by an 'us against them' mentality where the residents, whether involved in leadership or not, saw themselves as a homogenous 'community' unit standing against a similarly homogenous 'City' unit. Although some City officials and departments were highlighted by community members as having been either particularly helpful or unhelpful throughout the upgrading process, most mentions of 'the City' were in the form of predominantly negative blanket-referrals

thereto. Residents harboured significant frustration towards the City, accusing City officials of being the stumbling block for the project as they were "playing hide and seek" with the community (Interview 1). Furthermore, several members of the PSC and of ISN felt that, instead of involving residents in decision making, many City officials made decisions with little participation and input from the ground up. Requests for greater transparency were met with unexplained postponements of meetings and deadlines, as well as referrals to other City officials to handle the matter. As a result, the community displayed a lack of trust in the City, feeling as though they had done everything in their power, even contacting the Mayor for support, yet had little to show for their efforts. Their disappointment is clear from the following statement made by an ISN leader (Interview 5):

> *We have a relationship with the City . . . a partnership [between] ISN, CORC, and the City . . . but I don't think this partnership is working. Most of the time we get difficult things with the City officials . . . so, that's a problem. The City . . . must come to the [community] leadership. I think then we can work together. But if they do these things they are doing, we can't work together.*

Although seen as a largely homogenous group by the community of Murray, the various City officials involved in the upgrading project engaged with CORC, ISN, and the residents themselves in vastly different ways. One official, whose mandate is focused on informal settlements, takes a co-design approach to community participation, inviting community involvement in the development of plans. This official was vital in the drafting of the plans for the three-phase upgrading project in Murray and received praise from the community leaders and CORC alike for the way in which he engaged with the community regarding the project. On the whole, however, City officials seemed only narrowly to fulfil their mandate in terms of community participation by offering mostly one-way, informative communication from the top down rather than interactively engaging with the community. However, passive community consultation which does not go beyond token inclusiveness is not conducive to the multi-level governance of infrastructure implementation in response to climate change impacts.

The apparent gap between 'the community' and 'the City' is demonstrated in Figure 3, which visually represents the groups involved in the multi-level sanitation upgrading project. What is also demonstrated in the figure is the fact that the City makes a provision for a vertical structure which is meant to bridge the gap between the community and the City. This structure consists of ward councillors who are partially immersed into the community and who report to their respective sub-council, which in turn reports to and communicates with the area manager and line departments. The structure is also intended to work in reverse, with City officials mandated to inform the ward councillors who, in turn, liaise with the community. While City officials rely on this structure to fulfil their community engagement mandate, this structure does not seem to be working as it should, particularly in the context of informal settlements. From the interviews undertaken, direct contradictions were noted between the City officials who claimed to have provided timelines to the ward councillor, and the ward councillor himself who claimed not to have received such timelines. Although technology may have played a part in hindering communication, the breakdown in communication along the City's vertical network was also attributed to the political affiliation of the ward in which Murray is located, which differs from that of the City government. Poor communication and co-operation within the City's vertical structure had a negative impact on the technical implementation of sanitation infrastructure and the attitudes of the involved groups towards each other.

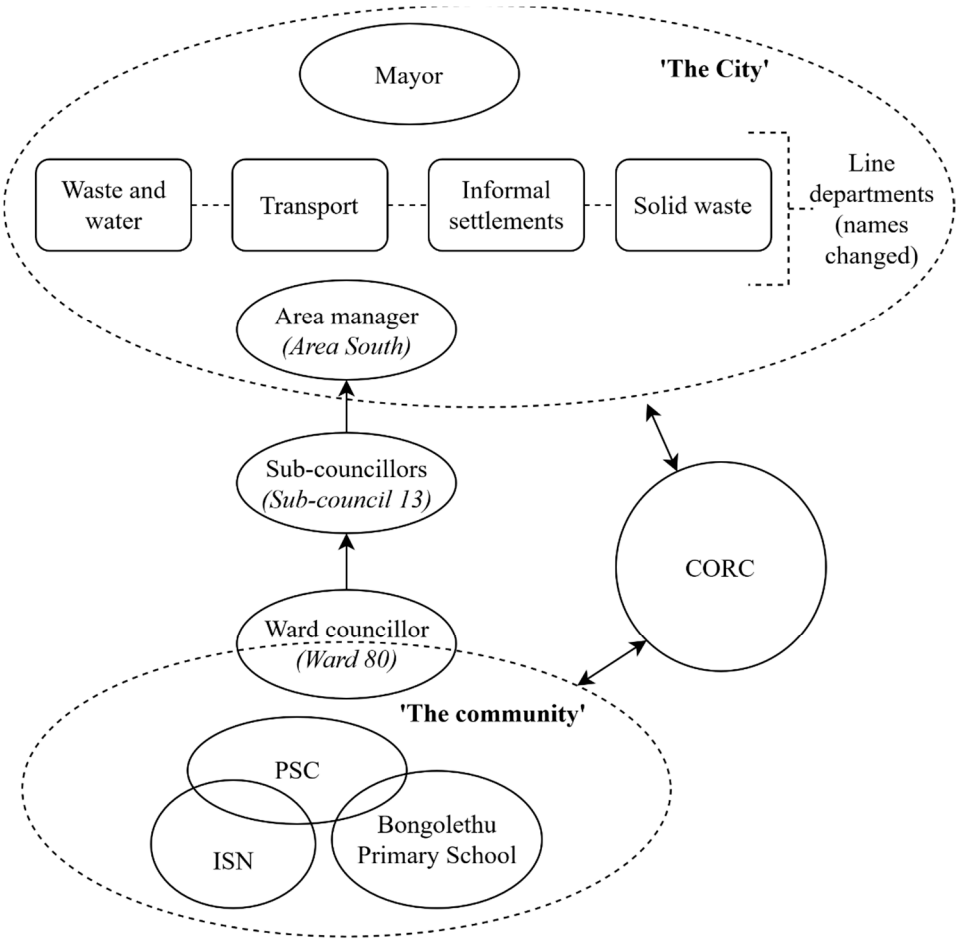


**Figure 3.** Visual representation of the groups involved in the multi-level upgrading project. It is not intended as an organogram of the City but rather represents the engagements observed between actors/levels.

### *3.3. Enablers and Constraints to Multi-level Climate Action for Improving Sanitation in Informal Settlements*

From the interviews conducted, and the thematic analysis thereof, a set of factors emerged which both enabled and constrained the sanitation upgrading project in the Murray informal settlement. Summarised in Table 1 below, these enabling and constraining factors are explored in detail in the following sections, providing lessons for groups endeavouring to undertake similar projects.

**Table 1.** Summary of the enablers and constraints to multi-level climate action in the case of the Murray sanitation upgrading project.

| No. | Enablers | Constraints |
|---|---|---|
| 1 | CORC in the role of the mediating intermediary | Lack of support and transparency from the city level |
| 2 | Strong community leadership enabling collective action | Complexities of informality hindering technical processes |
| 3 | City facilitating co-design activities | Mentalities arising from historical and political factors |

#### 3.3.1. Enabler No. 1: CORC in the Role of the Mediating Intermediary

The enabler of multi-level climate action which most clearly emerged from this study was the vital role of the intermediary, CORC, in bringing the community and the City

together. With no exception, all interviewees within 'the community' circle in Figure 3 expressed nothing but gratitude and praise towards CORC, thanking the NGO for assisting the people of Murray both technically and financially. Even among the City officials, the importance of an intermediary such as CORC was repeatedly recognised, with a specific emphasis placed on the role of CORC in helping to maintain the City's relationships with communities on the ground and keeping these communities up-to-date with the latest engagements. Beyond mediating engagements between the City and the community, CORC also pushed for progress by maintaining pressure on local government. The capacity of an intermediary to compel local authorities into action is particularly vital in the context of informal settlements where community leaders such as the members of ISN lack the voice and credibility to be heard and often do not have access to the technical assets, such as phones, airtime, or cars, which they need in order to engage effectively with City officials [17,46].

One main critique of CORC was offered by some City officials who stated that the NGO sometimes raises false hopes among community members, thereby negatively impacting on City–community relationships as promises made by CORC on behalf of the City may not be met. The challenge of maintaining the middle ground was addressed by the CORC representative in an interview as they admitted that it was sometimes difficult not to become too community-biased when faced with the deplorable conditions in which the residents live. At the same time, the CORC representative also recognized the difficult role which City officials play in navigating engagements with frustrated communities and delivering services in areas where no planned service layouts exist. It is this capacity to stand in the middle and recognize the challenges faced by both sides which makes strong intermediaries such as CORC imperative in enabling multi-level engagements to take action in response to the increasing need for improved sanitation infrastructure [37].

#### 3.3.2. Enabler No. 2: Strong Community Leadership Enabling Collective Action

Strong social movements with committed leaders are vital for the achievement of multi-level governance [39,60]. It is specifically individual community leaders whose actions are central in intermediating between often equally frustrated residents, City departments, and NGOs [19]. The community of Murray showed robust and multi-faceted community leadership throughout the upgrading project with various community groups coming together, as demonstrated in Figure 3. The creation of the PSC held the ISN leaders accountable to their community and incorporated the voices of ordinary residents in the planning of the project. This created a sense of togetherness and community spirit among the various groups in the informal settlement. The multi-faceted community engagement would not have been possible without the ISN leaders functioning as "intermediaries of the urban poor" and coordinating the community's involvement [45] (p. 12). Furthermore, with local leaders taking the first step towards collective action, this enabled other actors, such as CORC, also to take part in the action for change [48]. Amidst the complexity of informal settlements, it takes community leaders working alongside more established and well-funded intermediaries such as CORC to enable effective engagement across levels and the establishment of communication channels with local authorities [4,61]. These communication channels are vital for the implementation of climate action on the ground.

#### 3.3.3. Enabler No. 3: City Facilitating Co-design Activities

Although the City's engagement with the community of Murray is widely critiqued in this paper, it is important to recognize the largely unquantifiable yet significant time, effort, and resources which City officials contributed to the upgrading project. In interviews, the City officials recognized the unsanitary living conditions in Murray and empathized with residents' frustrations due to delays. While not all City officials acted upon their acknowledgement of the community's struggles, one official in particular invested significant amounts of time and energy into facilitating a co-design process with ISN and the PSC. This demonstrates the difference that an individual can make because of their specific skillset

and characteristics. It also demonstrates the fact that successful climate action requires the application of new forms of learning, particularly in the uncertain and politically charged context of informal settlements where it is vital for local communities to be recognised by the authorities as legitimate stakeholders [62,63].

In addition to their involvement in the Murray upgrading project, the City officials interviewed as part of this study also noted their contributions to projects aimed at tackling the broader social problems faced in informal settlements. These projects, which include, inter alia, the establishment of neighbourhood watches and the hosting of education programmes, are interconnected with the infrastructural sanitation challenges discussed in this paper. The more this broader work in informal settlements is connected to integrative co-design processes aimed at tackling particular climate change impacts, the greater the potential will be for City–community partnerships to have sustainable positive impacts. Furthermore, if both the community and the City come together, willing to communicate without cover-up strategies or flawed stereotyping [50], there is a greater chance for the transformative potential of multi-level climate action to be realised through co-designed solutions which build on the capacity and knowledge of bottom-up initiatives [52,64].

#### 3.3.4. Constraint No. 1: Lack of Support and Transparency from the City Level

While the City's facilitation of a co-design process assisted in enabling the Murray upgrading project, the fact that the City did not undertake the required sub-surface works for Phase 2 was one of the main reasons as to why the project stalled. Although this could be explained in part by technical reasons, it was equally the lack of support and transparency from the City which hindered effective multi-level climate action in the case of Murray. As has been reported in other informal settlements in Cape Town [6], the breakdown in communication to and from the ward councillor earned the frustrations of those who rely on them to be their mouthpiece to the local municipality, and to report back to them any new developments. Furthermore, the lack of clarity regarding roles and responsibilities within the City made it difficult for the members of ISN and CORC to know where in the City to turn for assistance. The importance of clearly communicated mandates is evident in literature [45,49] and was demonstrated in the case of Murray by the fact that requests from the community were referred from one City official to another. The ISN leaders thus felt that they had not been granted the spot at 'the decision-making table' necessary to effect change [17], and lacked the voice and technical equipment necessary to be formally recognised in the historically unequal and exclusive context in which they were engaging with the City.

Notably, the City's lack of transparency not only resulted in the community feeling frustrated with the City but also negatively impacted the credibility of the ISN leaders among the residents of Murray. As the residents collectively completed the clean-up in Phase 1 based on the promise that the City would thereafter undertake sub-surface works, they were angry when the Phase 2 did not commence, and the ISN leaders could not provide an explanation as to why. This study suggests that a lack of support and transparency from the local authority both directly and indirectly hinders the undertaking of a multi-level project initiated by a local informal settlement community, confirming that the effectiveness of bottom-up community-initiated climate action is limited without the state's support and involvement [19,20]. The successful engagement in a multi-level partnership such as that in Murray requires the local authority to be open to continuous change and improvement which involves participation from the ground up [36].

#### 3.3.5. Constraint No. 2: Complexities of Informality Hindering Technical Processes

Informal settlements are unique and challenging spaces for the implementation of sanitation infrastructure [8,10]. In many informal settlements, communities have settled on non-city land, which complicates the roll-out of services in those areas. Furthermore, for settlements such as Murray, there is no proper planned service layout and the established best practice methods intended to guide service provision are difficult to apply. This

hampers the ability of City officials to effectively govern these areas. Moreover, high levels of crime in informal areas discourage City officials from entering informal settlement communities as they fear being robbed. However, as much as the nature of informal settlements itself hinders the implementation of multi-level climate action, it is also the City's approach to informal areas which undermines effective partnerships between the city and neighbourhood levels. For example, in response to high crime rates, the interviewed community leaders urged officials to inform them of impending site visits so the leaders could be present in order to protect the City representatives. However, instead of adapting their methods to these opportunities for co-operation with informal settlements, many City officials reported sticking to traditional approaches and forms of communication, such as emailing ward councillors, which are not always easily accessible to the informal communities. Thus, the hindrances which are already present due to informality are compounded by a lack of adaptation to these hinderances by City officials and a lack of willingness to adopt the "new forms of learning" previously mentioned [46] (p. 3). It has been shown in literature that the solutions proposed by local governments are often technical in nature, ignoring, or even exacerbating the complex socio-political problems faced specifically in informal settlements [52,60]. This is evident in the case of the Murray upgrading project, in which a lack of understanding for—and adaptation to—the social complexities of informal settlements hindered the implementation of technical solutions and the multi-level governance of local climate action.

#### 3.3.6. Constraint No. 3: Mentalities Arising from Historical and Political Factors

Although it is evident that historical and political factors play an important role in shaping the governance of sanitation in informal settlements [20], these aspects are difficult to assess due to their subjective nature which depends on differing mentalities [10]. Historical injustices tracing back to the Apartheid regime have left residents and ISN leaders alike with a sense of despondency, frustration, and mistrust in the formal City system due to, in part, a lack of inclusion in decision making [19,20]. This threatens efforts for collaboration between the City and informal settlement communities, and it has been shown that poor City–community relationships significantly constrain the multi-level governance of the provision of services in informal settlements [6].

As multi-level climate action interferes with conventional processes and methods, partnerships such as that attempted in the case of Murray can feel threatening to those in local government positions [65]. Thus, City officials fear making promises they cannot keep due to the historically tense relationship with informal settlement communities, making them enter a defence mode in which they shy away from transparency. The City's use of 'cover-up strategies' is also built on mistrust as it stems from an unwillingness to show doubts and internal struggles in order to avoid facing disappointments [50]. This speaks to the fact that City officials would like to work more closely with informal settlement residents to improve their living standards, yet instead of involving residents in decision making, many take on a "decide-announce-and-defend" method [66] (pp. 9–10).

The mentalities of both the community and the City generally serve to enlarge the divide between them, constraining multi-level climate action for improving sanitation infrastructure. Overcoming this constraint to enable more inclusive governance requires engagement with these mentalities and with the general political context of informal settlements in which power is highly contested [67].

## 4. Discussion and Conclusions

Drawing on literature around sanitation infrastructure in informal settlements and the need for multi-level climate action in the Global South, this paper contributes to current understandings around climate action by providing lessons for local government from a sanitation upgrading project in Cape Town. In theory, upgrading sanitation makes communities more resilient to climate change by improving their access to suitable and effective sanitation infrastructure. In Murray, the upgrading project was mostly unsuc-

cessful in bringing about this anticipated result, largely due to the three context-specific constraints outlined in this paper. Thus, it is imperative to understand how and by whom climate action can be implemented in the complex socio-institutional context of informal settlements.

The collective action and site-specific local knowledge of the residents and ISN leaders in Murray were fundamental in bringing about the successful completion of Phase 1 of the sanitation upgrading project. In their efforts to alter positively the service provisioning in their settlement, the residents, led by ISN and with the support of CORC, demonstrated a significant amount of agency and social capacity, which is fundamental in driving local climate actors [39,68]. While this considerably enabled the multi-level governance initiative, the success of the project was hindered by technical/infrastructural challenges as well as a lack of transparency and co-operation on the part of the City of Cape Town. This demonstrates that as much as the social capacity of non-state actors is vital, the chances of achieving the desired outcomes are limited without the support and involvement of a skilled and dedicated local government with high institutional capacity [19,20,38,39]. Local authorities play a central role in the implementation of policies and interventions which provide the infrastructure and services necessary in order for residents to be resilient in the face of increasing climate change impacts [1,2,69]. Thus, without reciprocated efforts from the local government, informal settlement residents often do not have the necessary capacity or resources to govern events and improve sanitation infrastructure, despite significantly contributing their own agency and even external funding [42].

Although challenging, inclusive multi-level climate action is needed to implement projects which bolster the resilience of informal settlements such as Murray in the face of climate change [2,9]. However, this cannot be undertaken independently at either the City or the community level. Instead, it requires co-operative and transparent engagement across levels in order for the full transformative potential of multi-level governance to be reached in the upgrading of informal settlement infrastructure [36,64]. Undoubtedly, the infrastructural challenges associated with informal settlements, such as the poor quality and insufficient capacity of existing pipelines along Link Road, hindered the success of the Murray upgrading project. Nevertheless, this case study supports the finding that one of the key barriers to the multi-level governance of infrastructure, particularly in informal settlements, is the socio-economic and political contexts in which the technical aspects of sanitation infrastructure are embedded [20,60]. This is evident from the fact that the three constraints outlined in this paper all relate to the historical and current socio-economic circumstances of the residents of Murray.

The communication methods employed by some City officials, such as emails to the local ward councillor, often failed to take into consideration the context on the ground and the fact that many community members would not have access to the technology necessary for information to be disseminated in this manner. Furthermore, even with the vital financial and technological support from CORC, the ISN leaders felt that they had not been recognised as legitimate stakeholders by the City [40] and that the implementation of the technical solution which they were proposing was dependent on a socio-institutional domain in which their voices went largely unheard due to, in part, the mentalities of City officials [10,41]. This implies that it is necessary for the groups involved in multi-level climate action to confront the socio-political context within which they find themselves by acknowledging each other's lived experiences and being aware of each other's mentalities, vulnerabilities, and histories [35,63]. By bringing together various groups with different lived realities and different forms of knowledge, multi-level governance can provide a space in which the complex socio-political dynamics currently hindering technical processes can be unpacked and addressed [49]. However, this contradicts the technocentric approach currently employed by many City officials which hampers the ability to recognise and engage with social and political dynamics such as power relations [70]. Future research into multi-level climate action is thus encouraged to shed further light on the ways in which

projects such as that in Murray can be enabled within their specific socio-institutional contexts.

Particularly in the context of informal settlements such as Murray, where poor communication and engagement in the past has resulted in despondency and mistrust, inclusive multi-level engagement has the potential to improve significantly not only infrastructure provisioning, but also City-community relationships as a whole. However, as noted by Adegun [20] (p. 417), "community-initiated bottom-up thrusts should . . . be seen in their true form—as potential", the realisation of which depend on a CBO's successful establishment of partnerships with NGOs and, importantly, with local government. Even if successfully established, these partnerships across levels are often fragile [71], and expectations of their effectiveness should be realistic, considering the contested context of informal settlements and the coming together of groups with vastly different mentalities and resources available to them [40]. Yet, it is in this complex socio-institutional context of informal settlements that the implementation of multi-level climate action is particularly important as it assists with more than only the implementation of rapid, short-term climate action such as the upgrading of a sewerage pipeline. Multi-level governance approaches hold the potential to contribute to transformative adaptation by addressing underlying social development challenges through the establishment of new partnerships and lines of communication which recognise community groups as legitimate stakeholders [23,71].

The three enablers outlined in this paper are good practice recommendations. These recommendations from the case of the Murray upgrading project should be tested in other socio-economic contexts to work towards building stronger multi-scalar partnerships. If these lessons are successfully put into practice in similar projects, this may lead to a broader transformation of the contested power relations and politics in informal settlements which currently stand in the way of their longer-term resilience to the impacts of climate change.

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