VISIBILISING EMPOWERMENT DYNAMICS THROUGH PARTICIPATORY MAPPING AND ENUMERATION PROCESSES

The housing advocacy project of "S section" informal settlement in Khayelitsha (South Africa)

A thesis submitted to the Institute of Geography of the University of Neuchâtel
for the degree of:
Doctor in Humanities and Social Sciences

Jennifer Barella

PhD Supervisor: Prof. Ola Söderström, University of Neuchâtel
PhD Committee Members: Prof. Armelle Choplin, University of Geneva
Prof. Claire Bénit-Gbaffou, Aix-Marseille University, University of Witwatersrand

Thesis defended on January 12th 2023

Université de Neuchâtel

Faculté des Lettres et Sciences Humaines
Espace Tilo-Frey 1
CH - 2000 Neuchâtel
Tél. +41 32 718 1700
secretariat.lettres@unine.ch

IMPRIMATUR

La Faculté des lettres et sciences humaines de l'Université de Neuchâtel, sur les rapports de M. Ola Söderström, directeur de thèse, professeur, Université de Neuchâtel ; Mme Armelle Choplin, professeure, Université de Genève ; Mme Claire Bénit-Gbaffou, professeure, Aix-Marseille Université autorise l'impression de la thèse présentée par Mme Jennifer Barella en laissant à l'autrice la responsabilité des opinions énoncées.

Neuchâtel, le 12 janvier 2023

Le doyen
Louis de Saussure

ACKNOWLEDGMENTS

Alongside feeling indebted to the marvellous people I mention in this section - the awareness of having benefitted of an exceptional PhD experience has also played a role in pressing me onward to get through with this academic outcome despite the major cracks in my determination. This research would not have been possible without the financial support from my host institution. I am obliged to the University of Neuchâtel (bourse Fonds des donations) and the Bureau Egalité des Chances (Subvention Egalité) for having enabled excellent work conditions for this research and for having covered most fieldwork expenses through the grants I obtained. For most scholars to get access to these conditions is a rare opportunity.

For your trust and guidance, thank you Ola (Herr Professor Doctor Söderström) for believing that in this human there was a "something", a potential, that could be nurtured through an academic journey. By offering me the PhD position, you have given me the opportunity to gain experience in spaces I would not have otherwise been able to delve into in such an immersive manner. I really appreciate our exchanges and divergences that forced me to position myself and helped me in finding my path. A massive Tack! for renewing the trust with our ongoing collaboration on the NCCR project.

To the members of the PhD committee, Prof. Claire Bénit-Gbaffou and Prof. Armelle Choplin, thank you for the time and energy you dedicated to my work. Undoubtedly, the constructive yet challenging revisions that you advised helped me to improve this thesis manuscript. But, more importantly for me personally, the process of tackling your comments sharpened my thinking and reminded me to trust my reflections and insights. You constructed the thesis committee as a space for dialogue, and with the intent to sincerely contribute to the process of knowledge production. The way you envision your role and the purpose of academia is inspiring.

A gigantic thank you to Development Action Group (DAG) and to the S section residents for trusting me and allowing me to be part of their team in 2018. This thesis would have not been possible without our collaboration. I will be forever grateful for the all the growing and questioning that this important personal and professional experience of sharing entailed. This is by far the best experience enabled by the research journey. A gigantic enkosi/thank you in particular to: Sizwe, Sihle, Akhona and Ryan for your expertise, laughter and generosity.

To a friend and previous isiXhosa teacher: ENKOSI KAKHULU Noma, unentliziyo enkulu. I fondly admire you for the way you determine your path and influence others' people lives by building bridges of mutual understanding. Travelling around Cape Town and the Eastern Cape with you (Adelia, Vuyo and Jess) has been crucial for creating a fertile soil on which my personal and research reflexions are rooted. Looking forward to meeting you again and sharing some delicious food and thoughts!

Un grand MERCI / THANK YOU / GRAZIE à la pétillante équipe de l'Institut de Géographie: pour…tout ! Pouvoir évoluer dans une ambiance de travail si bienveillante, où les efforts visant le compromis et l'écoute de l'autre sont au centre de la gestion d'une équipe, cela n'est vraiment pas donné à tout le monde. Merci à vous tous·tes, notamment aux professeur·es, qui rendez la cohésion des IGG-ens possible en garantissant une ambiance d'Institut stable et non-conflictuelle.

Une pensée particulière à tous·tes les étudiant·es que j'ai eu la chance de croiser tout au long de mon parcours d'enseignement à l'UniNe. Merci de m'avoir appris probablement plus que ce que j'ai su vous offrir pendant ces années.

For the support, the challenges, les rigolades, le sarcasme, the proofreadings, le partage, les repas, les groupes de lecture, les moments d'inconfort, la fiducia, les podcasts sur whatsapp, les moments de relax, les « délais non-contractuels », the coffee, les silences, les joggings au bordu, and for everything you taught me MERCI à / GRAZIE a / THANK YOU to [ordre alphabétique]:

> Adelia, André, Anne, Anne-Cécile, Aurora, Betty, Bojack, Chiara, Christina, Dana, Dennis, Eloise, Evan, Famille Lopez, François-Florimond, Geoffrey, Isabelle, Jens, Jess, Jonas, Julie, Katie, Laura I., Laura R., l'altra Laura R., Laure, les lacustres, Léonard, Levi, Loïc, Luc, Luca, Lynne, Marc, Marie-Cécile, Nadia, Nathy, Pablo, Paola, la mia rabbia, Raffaele P., Raffaele S., Raoul, Rosalie, Sara, Sarah, Saskia, Suzy, Talli, Tauriq, Tyrel, Valentin, Valérie, Vuyo, Yannick, Yvonne, Zappa F., Zoé.
> …et bien sûr à toi aussi / of course to you too! si maladroitement je n'ai pas indiqué ton nom (Eish !).

Ai Barella (-Baldini, e Calderari), ai Grandi (-Medici), ai Sedili (-Brughelli), ed ai loro gatti. Per essere una meravigliosa combriccola che ama la vita – e per aiutarmi a ricordare che posso esserne capace anch'io. Grazie per la rete di supporto diretto, tambureggiante o silenzioso che rappresentate con la vostra presenza. Apprezzamenti speciali al motivational coach Obs Makeba jr. che mi sveglia alle "sfamami in punto".
Fai parte della frizzante combriccola, ma ne meriti uno tutto tuo: Grazie Ivano per la tua preziosa presenza, pazienza ed immensa comprensione durante questo periodo di tesi ed oltre. Si continua a crescere insieme. (*Questa cosa che io ho scritto mi piace / E rispecchia bene questo giorno / …*).

ABSTRACT

As a result of both apartheid's socio-spatial legacy and contemporary patterns of urban inequality, a large portion of South Africa's urban population live in conditions of precarious housing and deprivation. In Cape Town, participatory mapping and enumeration process (PME) facilitated by local NGOs are a widely used tool for supporting the housing and social claims of informal dwellers. This paper-based doctoral thesis in urban geography examines the impacts of a PME project as means for empowerment through the case study of "S section", a South African informal settlement located in the Khayelitsha township.

This work is based on action-research carried out by the researcher while collaborating with a local advocacy NGO, and has implemented a variety of methods such as: participant observation, semi-structured interviews, and the analysis of a variety of data (maps, GIS data, archival material, etc). The thesis describes the setup phase of the PME project for S section informal dwellers, then analyses and self-reflects on the implementation of PME "from within" (since the researcher co-produced the research object), and explores what was left in terms of empowerment precisely when the project did not reach the main desired outcome.

At the theoretical level, this thesis develops an innovative setting by bringing together different academic fields in geography, including cartographic production through participatory mapping, science and technology studies, and urban politics in order to interrogate dimensions of empowerment in deprived local communities and advocacy NGOs. Conceptually, the thesis argues for the need to re-politicize the notion of "empowerment" as means for socio-spatial justice within critical cartography and GIS, and critical development approaches.

The research sheds light on the role of PME practices for local NGOs in a landscape where NGOs compete for legitimacy in the eyes of the residents as well as local government, in parallel to their perpetual quest for funding, and in response to the inconsistent or inaccessible data on informal settlements. With regard to the impact of PME on urban policies, the research suggests that overall these practices tend to maintain a status quo in how social and urban local development policies are elaborated and conducted in Cape Town, and also tend to reinforce the bureaucratisation of urban development.

In response to the (commonly observed) stalemate of the PME project, the research analyses the unforeseen and interstitial transformative outcomes of this experience for S section residents. Building on fieldwork observations, the thesis reframes empowerment – as "the enabling of topological resonances" – in order to encompass a wider range of empowerment patterns on multiple spatial and temporal scales, in accordance with informal dwellers' aspirations and tactics in the "here and now". This shift sheds light on overlooked empowerment dynamics enabled throughout the course of the PME process, and independent from the often idealised output of said development projects.

Overall, the research renders visible the power leverages at play during PME practices. The thesis concludes by opening up new research paths problematizing further political and relational aspects that are missing in the analysis of PME practices and which links directly to the common failure of these projects.

Keywords : participatory mapping, critical mapping and GIS, empowerment, postcolonial urban studies, informal settlements, South Africa

RESUME

Cette thèse de doctorat en géographie urbaine examine les impacts d'un projet de cartographie participative comme moyen d'*empowerment* à travers l'étude de cas de « *S section* », un quartier informel situé dans le township de Khayelitsha. En raison de l'héritage sociospatial de l'apartheid et des modèles contemporains d'inégalité urbaine, une grande partie de la population urbaine d'Afrique du Sud vit dans des conditions de logement précaire et de privation. Au Cap, les processus de cartographie et de recensement participatifs facilités par les ONG locales sont très répandus pour soutenir les revendications sociales des habitants des quartiers informels.

Ce travail est basé sur une recherche-action menée par la chercheuse en collaboration avec une ONG locale. Plusieurs méthodes ont été utilisées, telles que : l'observation participante, des entretiens semi-directifs et l'analyse d'une grande diversité de données (cartes, données SIG, matériel d'archives, etc). La thèse décrit la phase de mise en place du projet de cartographie participative pour les habitants informels de *S section*, elle analyse et réfléchit sur la mise en œuvre du projet "depuis l'intérieur" (puisque la chercheuse a coproduit l'objet de recherche), et explore ses effets en termes d'*empowerment* en particulier du fait que le projet n'a pas atteint le principal objectif souhaité.

Au niveau théorique, cette thèse développe un cadre innovant en réunissant différents domaines académiques en géographie : la production cartographique par le biais de la cartographie participative, les études des sciences et technologies (STS) et la politique urbaine, pour interroger l'*empowerment* dans les communautés locales défavorisées et les ONG de plaidoyer. Sur le plan conceptuel, la thèse défend la nécessité d'une repolitisation du concept d'"empowerment" comme moyens au service de la justice sociospatiale.

En réponse à l'impasse du projet de cartographie, la recherche analyse les résultats transformatifs imprévus et interstitiels de cette expérience pour les habitants de *S section*. En s'appuyant sur les observations de terrain, la thèse reformule l'*empowerment* - comme l''activation des *résonances topologiques* - afin d'englober un plus large éventail de modèles d'autonomisation sur de multiples échelles spatiales et temporelles, conformément aux aspirations et aux tactiques des habitants informels dans "l'ici et maintenant". Ce changement met en lumière des dynamiques d'*empowerment* négligées, activées tout au long du processus de cartographie, et indépendantes des grands objectifs idéalisés de ces projets de développement.

Cette recherche a permis de mettre en lumière le rôle de ces pratiques d'"empowerment" pour les ONG locales, dans un paysage où les ONG se disputent la légitimité aux yeux des résidents et du gouvernement local, parallèlement à leur quête perpétuelle de financement, et en réponse au manque de données utilisables sur les quartiers informels. En ce qui concerne l'impact de la cartographie participative sur les politiques urbaines, les résultats de cette recherche suggère que, dans l'ensemble, ces pratiques tendent à maintenir un *statu quo* dans la manière dont les politiques de développement urbain sont élaborées et menées au Cap – voire ces pratiques tendent également à renforcer la bureaucratisation du développement urbain.

Cette recherche permet de mettre en évidence les enjeux de pouvoir en jeu dans la cartographie participative et ouvre de nouvelles voies de recherche en problématisant cess dimensions politiques et relationnelles,

absentes des analyses usuelles de ces pratiques, en considérant qu'elles jouent un rôle essentiel dans les échecs si communs de ce type de projets.

Mot-clés : cartographie participative, cartographie et SIG critiques, *empowerment,* études urbaines postcoloniales, quartiers informels, Afrique du Sud

TABLE OF CONTENTS

ACKNOWLEDGMENTS V

ABSTRACT VII

RESUME IX

1. THESIS INTRODUCTION 9

1.1 INTRODUCTION 9

1.1.1 Nuances of empowerment – an introductory vignette 9

1.1.2 Research design overview 11

1.2 RESEARCH QUESTIONS 17

1.2.1 SQ1 – How are PME strategies for informal settlements housing claims mobilised in Cape Town? 18

1.2.2 SQ2 – What kind of empowerment is enabled through these practices? 18

1.2.3 SQ3 – What is the impact of these practices and of their output on urban policies and claims? 18

1.2.4 Articulation between research questions and publications 19

1.3. HOW TO READ THIS PAPER-BASED THESIS: OUTLINE AND PUBLICATIONS 20

1.3.1 Manuscript outline 20

1.3.2 Peer-reviewed publications and articulation with the general outline 21

1.3.3 Papers' contributions to research questions 24

1.4. CONTEXT OF THE THESIS – GENERAL INTRODUCTION 26

1.4.1 The ambiguous Mother and the scattered children 26

1.4.2 Khayelitsha 33

1.4.3 Informal settlements 35

1.4.4 S section informal settlement – quick profile 38

2. ARTICLE 1 55

RAMENER LA JUSTICE SOCIALE AU CENTRE DE LA CARTE : PROPOSITIONS POUR UN RENOUVELLEMENT CRITIQUE DE LA CARTOGRAPHIE PARTICIPATIVE AXÉE SUR L'EMPOWERMENT 55

3. RESEARCH METHODOLOGY AND KNOWLEDGE PRODUCTION 77

3.1 INTRODUCTION 77

3.2 DATA COLLECTION 77

3.2.1 Preliminary research and fieldwork organisation 78

3.2.2 Constructing a research on participatory mapping and enumeration project in an informal settlement in Khayelitsha 81

3.2.3 Participatory Action research inspired methods 88

3.2.4 Interviews 96

3.2.5 Documentation, reports, GIS data and maps collection 98

3.2.6 Data sources about Informal Settlements in Cape Town 100

3.3 DATA ANALYSIS METHODS 108

3.3.1 Fieldnotes 109
3.3.2 Discursive material 109
3.3.3 Visual material 110
3.3.4 Basic GIS analysis 110
3.4 Positionality And Ethnographic Fieldwork In Time Of Crisis 111
3.4.1 Negotiating positions and access to the fieldwork 111
3.4.2 Fieldwork in time of (a new layer of) crisis 117
3.5 Conclusion Of The Chapter 121
4. ARTICLE 2 125
Strategic and Acupunctural GIS Implementation within Community-Oriented Organizations: Evidence-Based Insights from a South African Participatory Action Research for Informal Settlement Upgrading 125
5. ARTICLE 3 149
Visibilising empowerment as topological resonances: analysis of a participatory mapping and enumeration project as strategy for active waiting for housing in Khayelitsha (South Africa) 149
ADDENDUM to 3rd paper – Conceptual clarifications 176
6. CONCLUSION AND THESIS DISCUSSION 179
6.1 Introduction 179
6.2 Answering The Research Questions 179
6.2.1 Structure of the thesis and research questions 179
6.2.2 SQ1: How are PME strategies for informal settlements housing claims mobilised in Cape Town? 182
6.2.3 SQ2: What kind of empowerment is enabled through these practices? 184
6.2.4 SQ3: What is the impact of these practices and of their output on urban policies and claims? 187
6.3 Beyond Empowerment and Directions For Future Publications 189
6.4 Other Contributions to Literature and Debates 194
6.5 Limits of The Thesis 197
6.6 Broader Future Research Paths 200
6.6.1 Intra-urban and transnational comparative studies 200
6.6.2 The role of the ward councillor 204
6.6.3 The “battle of rights” and the affordable housing gap market 205
7. REFERENCES 209
8. ANNEXES AND APPENDIX 221

TABLE OF FIGURES

FIGURE 1 Map of S section location (Cape Town, Khayelitsha, South Africa) ... 10
FIGURE 2 Scenes from S section informal settlement: (Khayelitsha, Site B) [JB, 2018] ... 13
FIGURE 3 Research questions and aims ... 17
FIGURE 4 Articulation between research questions and publications ... 19
FIGURE 5 General structure of the thesis ... 20
FIGURE 6 Apartheid city model (Davies, 1981) ... 29
FIGURE 7 Cape Town under the Group Areas Act, with District Six localisation, adapted from M.Houssay-Holzschuch (2018) ... 29
FIGURE 8 Khayelitsha Township Suburbs according to National Census 2011 [City Maps, City of Cape Town] ... 32
FIGURE 9 Khayelitsha Sub-divisions [DAG archives] ... 32
FIGURE 10 Informal Settlements categorisation according to the Housing Development Agency (RSA) ... 36
FIGURE 11 Map of Informal Settlements in Cape Town, zoom on the central area (cf. Appendix 1 for the whole map at Municipality level) ... 37
FIGURE 12 Extract of data from S section household survey conducted in 2018 (DAG & S Section) ... 39
FIGURE 13 Map of S section within Khayelitsha township ... 41
FIGURE 14 S section layout [Participatory Mapping and enumeration, DAG & Section, April 2018] ... 42
FIGURE 15 Extract of data from S section household survey conducted in 2018 (DAG & S Section) ... 43
FIGURE 16 Thandazo market stalls – some great fish and chips! ... 45
FIGURE 17 Thandazo Market Stalls ... 45
FIGURE 18 Waste management point at Kusasa rd crn Bida Crescent, Makukhanye Art Room (on the left-hand side) and Thendazo Market Stalls (on the right-hand side) ... 46
FIGURE 19 Drawings on the walls of the Library and Offices of Makukhanye Art Room [JB, 2018] ... 46
FIGURE 20 Mapping workshop at Makukhanye Offices – DAG members Sihle Mtuna (standing at the center of the picture) Sizwe Mxobo (black t-shirt) [JB, 2018] ... 47
FIGURE 21 Electrical spiderwebs [Altamore S, 2019] ... 48
FIGURE 22 CoCT taps and toilets in the SC sub-section [Altamore S, 2019] ... 48
FIGURE 23 SC structures with improvised water tap connection [JB] ... 49
FIGURE 24 Tortuous paths created by the shacks layout on sandy soil [JB] ... 49
FIGURE 25 SAA shack that is both residential and working place (taylor) [JB] ... 50
FIGURE 26 Fire outbreak in S section [DAG, December 2018] ... 50
FIGURE 27 Example of gardening in SC [JB] ... 51
FIGURE 28 S section boundaries comparison between "official" data and post participatory mapping and enumeration boundaries ... 52
FIGURE 29 S section profiling map (partly unverified data of 2018) ... 53
FIGURE 30 Synthesis of main methods and their contribution to each research question ... 78

FIGURE 31 Case study's main actors [JB, sketch Jan 2018] 83
FIGURE 32 One of the 13 field notebooks during fieldwork, Andiswa (on the left), me and some delicious umfino [JB,2018] 94
FIGURE 33 The notebooks 94
FIGURE 34 First notes for elaborating the survey draft - Extract from digital fieldwork Journal (page 23, 19 Feb 2018)........ 95
FIGURE 35 DAG workshop on participation in the CoCT budget proccess [May 2018, jb] 96
FIGURE 36 University of Cape Town upper campus, one of the countless racism-related women's restroom tag [Feb 2018, JB] 111
FIGURE 37 An aesthetic of the drought : signs of the crisis in public restrooms (We still do not know what to do if it is red though...) [Feb 2018, JB] 118
FIGURE 38 A water-themed public mural in Salt River neighbourhood (Cape Town). The bottle label says "Salt River 2018 Grand Cru" [March 2018, JB] 120
FIGURE 39 In the meantime in the KwaTshaTshu (Eastern Cape) heavy rainfalls were blocking the access to the nearest city Ngcobo [April 2018, JB] 121
FIGURE 40 Synthesis of main methods and their contribution to each research question........ 122
FIGURE 41 The flights routes [2019, JB] 124
FIGURE 42 ART2 Figure 1 - "S section" informal settlement location, Cape Town metropolitan area........ 137
FIGURE 43 Conceptual Framework. Empowerment as Topological resonances is the capacity to analyse power leverage which comes from learning new languages and from identifying actors and casual agents (Figure 1 in paper 3) 160
FIGURE 44 Location map of main informal settlements and relevant places mentioned in the empirical section (Figure 2 in paper 3)........ 161
FIGURE 45 S section mappers (volunteers) gathered around the settlement' A0 aerial image at Makukhanye Art Room (Figure 3 in paper 3 [JB March 2018])........ 162
FIGURE 46 S section mappers (volunteers) startin ghte settlement's rough mapping on the ground (Figure 4 in paper 3) [JB, Macrh 2018] 163
FIGURE 47 Materiality of experience sharing in a previous project at PJS informal settlement (Figure 5 in paper 3) [JB, March 2018]........ 168
FIGURE 48 The first map legend elaborated spontaneously by S section volunteers enumerating the neighbourhood (Figure 6 in paper 3) [JB, March 2018] 169
FIGURE 49 "What is hte role of the ward councillor?" Posters resulting from a brainstorming and discussion led at Andile Msizi Hall in Khayelitsha (Figure 7 in paper 3) [JB, March 2018] 171
FIGURE 50 The last slice of a nourishing lunch break offered by NGO members (Figure 8 in paper 3) [JB April 2018] 172
FIGURE 51 Summary of main results in terms of empowerment as topological resonances. The bulletpoints number correspond to the sub-sections of the paper. 174

FIGURE 52 Summary of main types of empowerment as topological resonances observed through the case study (Figure 9 in paper 3) 178
FIGURE 53 research question and sub-questions 179
FIGURE 54 : Publications structure and position within the thesis manuscript 180
FIGURE 55 Visual synthesis of research questions and main findings 181
FIGURE 56 Synthesis of papers' contribution to each research sub-question 181
FIGURE 57 Synthesis of empowerment framework elaborated throughout the thesis (cf paper #1 empowerment according to the literature and paper #3 empowerment as topological resonances) 184
FIGURE 58 Main types of "translation" and "connectedness" observed thorugh the S section case study in the 3rd publication (Barella, forthcoming) 186
FIGURE 59 DAG Exposition on informal housing and rental market at Lookout Hill (Khayelitsha) [JB 2018] 206
FIGURE 60 Backyard shack in BNG housing near Fort Beaufort (Eastern Cape) [JB, 2018] 207
FIGURE 61 APPENDIX 1 Cape Town, Informal settlements Map 221
FIGURE 62 APPENDIX 2 S section settlement zoning scheme 222
FIGURE 63 APPENDIX 3 Volunteer Confirmation Letter 223

LIST OF TABLES

Table 1 Overview of the papers 22
Table 2 Papers' content and structure overview 23
Table 3 Synthesis of papers' contribution to each research sub-question 25
Table 4 Type of dwelling in Cape Town 29
Table 5 Khayelitsha, population groups (Census 2011) 34
Table 6 Khayelitsha, language groups (Census 2011) 34
Table 7 Type of Dwelling in Khayelitsha (Census 2011) 35
Table 8 Summary of the research fieldworks 80
Table 9 Summary of the main interviews conducted during the fieldworks 98
Table 10 Examples of data created and collected 100
Table 11 Overview of data sources on Informal Settlements in Cape Town area (non exhaustive list, based on 2017-2020 fieldwork) 103
Table 12 Overview of estimates about Informal Settlements according to previous sources identified in Table 11 104
Table 13 ART2 Table 1 - A summary of main GIS implementation models within NGO and community-based organizations 133
Table 14 ART2 Table 2 - Data acquired and produced by the NGO throughout the GIS-based participatory mapping and enumeration process 141
Table 15 Dimensions of translations adapted from Wiegand (2006) [Table 1 in paper 3] 157

1. THESIS INTRODUCTION

1.1 Introduction

1.1.1 Nuances of empowerment – an introductory vignette

April 2018, Makukhanye Art Room, S section informal settlement, Khayelitsha, South Africa.
[vignette reconstructed from fieldnotes]

During a community meeting at Makukhanye Art Room space, in the informal neighbourhood called "S section" in Khayelitsha (South Africa), the first version of a colourful map of S section settlement summarizing the results of the participatory mapping conducted by the residents was about to be presented. This was the first stage of a longer project for housing and livelihood improvement, initiated by S section residents and supported by the NGO Development Action Group. The map was work in progress, yet it was the preliminary result of weeks of work by a group of S section residents volunteering for the project and NGO members. The meeting attendees were community volunteers taking part in the mapping exercise, community members, community leaders and three NGO members – me included as international volunteer and conducting research on these practices.

A A0 printed version of the map was laid out on the floor, as a central piece in the middle of a public arena. A PDF version of the same map was projected on the wall of the Art Room.

Sizwe, the main NGO facilitator, welcomed the participants and thanked everyone for attending this meeting, where the first results of the mapping exercise were about to be shared. He introduced the S section volunteers and the NGO members who closely worked on the technical components of the map – I was announced as the "GIS expert" in the room. He explained the data collection process, and went on by commenting the first draft of the S section settlement profiling map. Then he stepped back and asked everyone to take a moment to give a closer look at the maps before starting the discussion. Most people stood up and leaned over the A0 printed map. S section residents who had taken part in the mapping exercise were dispensing additional information to their fellow residents about the map, how to read it and how they had produced it. Arms and hands were pointing at that piece of paper and the room was filled with loud and entangled isiXhosa voices. Most heads were nodding.

The NGO facilitators invited the attendees to clear the stage and go back to their seat. The time had come to share the first impressions about the work done, identifying map features needing verification, and discuss the way forward. "Alright, do we have any first comments?"

One community leader stood up.

[Silence. But a heavy one. One of those about to be filled by the weight of disappointed expectations.]

The community leader made his disappointment heard loud and clear with regard to the map, that he considered too static and not up to his expectations. The problem was not the map in itself but rather its format and material. The leader shared with the audience that he was expecting a more interactive representation of the neighbourhood where anybody could click on an object and her/his name would be

displayed in an information bubble. According to him, the versions of the maps provided were not digital or powerful enough. This message was addressed to the three NGO members in the room, nevertheless he clearly stared at me throughout his whole speech. The main NGO facilitator reacted promptly. He reminded the leader that the map was a temporary "working map". He also argued that the work we were conducting was a collaborative community achievement and not a mere technical exercise conducted by a white international GIS savvy scholar with the intention to give him a personal visibility.

Although with a bit of discomfort in the air, the meeting went on as planned. The main features of the map needing verification were identified (e.g. settlements sub-sections, shacks numbering, socio-economic activities, etc.), so that those could be fixed before proceeding with the deployment of the a more detailed app-based household survey of the settlement. The participants seemed to leave the meeting with a clear view of the project's stages and next steps forward, but also with the uncomfortable feeling of dissonant needs and ambitions.

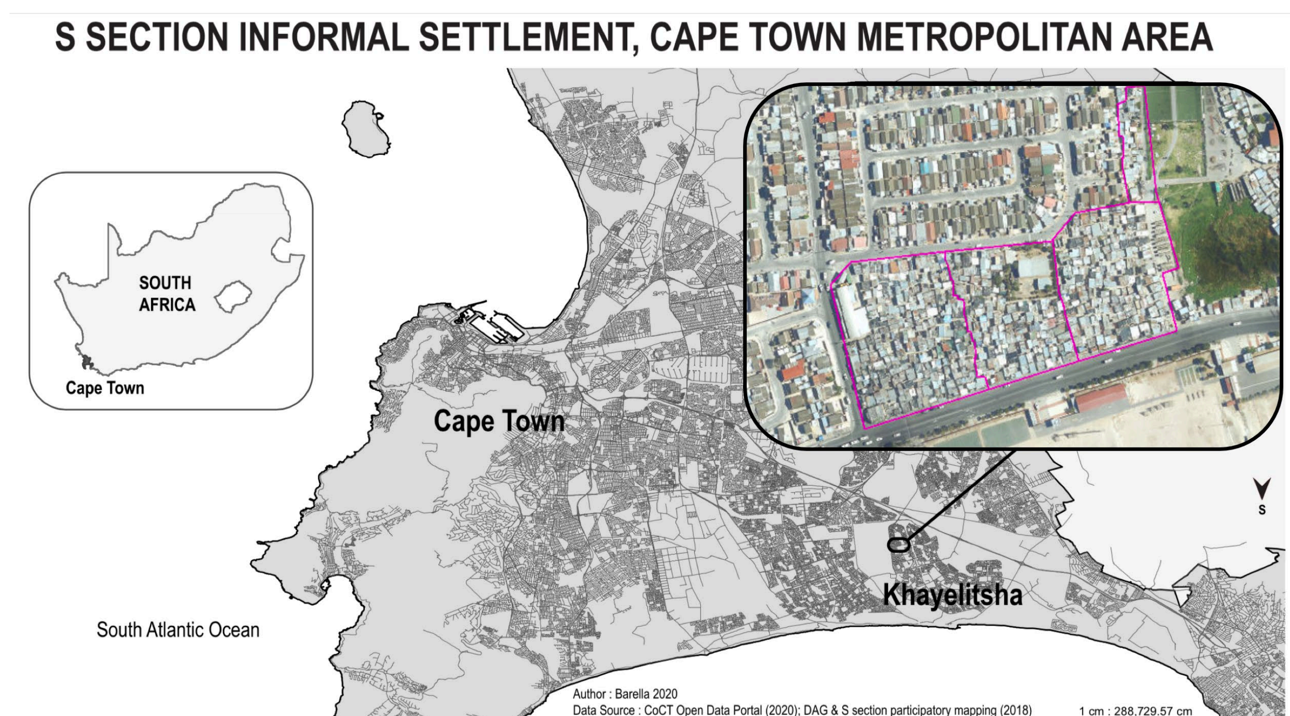


FIGURE 1 Map of S section location (Cape Town, Khayelitsha, South Africa)

This introductory vignette evokes some of the key elements and complexities of participatory mapping processes as means of empowerment: a group of actors with different roles and interests, different understandings of what "empowerment" means and different uses and visions of the map.

The community leader expected his own empowerment as a transfer of political legitimacy through a much more sophisticated mapping output. In his opinion, a fancy digital and interactive map would have staged and legitimized his authority better. In contrast, the response of the NGO member speaks to empowerment as a cooperative process were collective interest is predominant. At the same time, he positioned the NGO at

the centre of this "collective" mapping and enumeration process for housing claims. These competing understandings of participatory mapping and empowerment are at the core of this dissertation.
This vignette also points to the importance of materiality and technology (i.e. the printed map *vs* full GIS technology) in shaping people's reactions and the course of the discussion in participatory mapping interventions. The A0 printed map was source of disappointment for the community leader, but at the same time it was the big paper format that allowed the participants to gather around the map and exchange insights and knowledge. Less audible in the scene, but equally important, was the spontaneous sharing dynamic happening between S section residents who were explaining to each other the nature of the map, starting to make collective sense of that representation of their neighbourhood and its uses. The technology and the dynamics enabling this additional layer of empowerment are at the core of this research.
Finally, the vignette highlights the importance of my positionality in influencing expectations and the participatory process. My role and presence was used in a strategic way by at least two actors in the scene, despite me being rather passive during the scene. Firstly, I was identified by the leader as the (deceitful) provider of empowerment through technology, secondly, I was redefined by the NGO member as an almost disposable element in the project in the name of collective empowerment. The scene thus captures some of the quandaries of action research conducted by a European scholar in a South African informal settlement.

As a whole, while most research is centred on the outputs of participatory mapping, this scene features the *process* of participatory mapping, the paradoxes and unacknowledged aspects of empowerment on which my dissertation focuses. More specifically, this thesis is based on the S section participatory mapping and household survey process conducted in 2018 in Khayelitsha (Cape Town metropolitan area).

1.1.2 Research design overview

1.1.2.1 Contextualisation

Far too many households around the world live in urban settlements with housing barely fit for human beings. As a result of both apartheid's socio-spatial legacy and contemporary patterns of urban inequality, a large portion of South Africa's urban population live in conditions of precarious housing and perpetual marginalisation. This marginalisation is characterised, in particular, by a lack of access to basic services, a high vulnerability to natural risks, evictions, forced relocations and inadequate social housing programs. This vulnerability is, above all, linked to a lack of political recognition of the legitimacy of residents' "right to the city", coupled with a lack of strategic knowledge and data concerning their living conditions (Parnell and Pieterse, 2014; Roy, 2011; Huchzermeyer, 2006). Almost systematically, initiatives aimed at improving the living conditions and surfacing political recognition for marginalised inhabitants rubs up against a dearth of information on these places, their resident populations and their dynamics.

Parallel to these contextualising events in post-apartheid South Africa, is the contemporaneous development of 'datafication' strategies (Van Dijck, 2014). Such strategies involve the participatory production of geographic information: cartographic tools and Geographic Information Systems (GIS) serving as a privileged means by which territorial and development claims are made (Appadurai, 2000; Elwood, 2008b). Amongst development tools, PME projects have become key approaches that supposedly foster marginalised community empowerment and facilitate the involvement of communities in urban governance through the production and deployment of social and spatial data about themselves (Radil and Anderson 2019; Appadurai, 2012; Ghose, 2011; Elwood 2009).

In Cape Town, such PME initiatives are a widespread tool. The implementation of these tools aims to both support housing and social claims made by communities and enable mechanisms for the empowerment of informal community resident, resonant with the terms of Habitat III priorities (UN) and the 'right to the city' agenda. As a legacy of the anti-apartheid struggle, local NGOs and CSOs are part-and-parcel of the South African social development space, deploying methods such as PME as a means to 'fill the void' left by the State's malaise in informal settlements improvements implementation.

With urgent development pressures from the frontlines of urban poverty, NGOs, politicians and communities demand immediate and tangible outcomes. In particular, outcomes that are easy to measure and can be realized within a pragmatic time scale. Thus, we are witnessing a significant dissemination and standardisation of 'datafied' methods on an international scale, leaving little room to observe the consequences and dynamics that lie beyond their implementation and the achievement of a perceived end goal. Cape Town's vibrant milieu of development and activist grassroots organisations and communities are no exception to these urgent 'datafied' practices (Daniels et al., in Cirolia et al. 2016). In the face of such urgent deployment and dissemination of PME, the question yet to be answered is what becomes of community empowerment when the goals of these projects are not met or when projects reach an untimely dead-end? Despite PME being a widespread development tool, this question is often overlooked and became the central thrust of this thesis (Barella, 2020a).

1.1.2.2 A critical and participatory research design

This thesis is based on an action-research project that was carried out in collaboration with a local Capetonian NGO – Development Action Group (DAG). This research documents the story of the PME project in Khayelitsha's S Section, and how this collaboration has enabled – or not – forms of empowerment for the participants and residents. The project began in late 2017-early 2018 when the community of the S section settlement and DAG started discussing development strategies for housing provision and livelihood improvements. As a first step, the NGO suggested a PME process to define a settlement profile. After joining DAG as an international volunteer, my role in this project was to assist in establishing and conducting the first phases of the participatory mapping and enumeration. I oversaw the GIS related operations and was

involved in training workshops and facilitation activities organised alongside the community.

The process was divided into two participatory phases: first, the mapping of the settlement and, second, the household enumeration. The final goal was to deliver an information package that, in following municipality standards, documents the needs and living conditions of the community. The information captured would be made available to the NGO to produce socioeconomic profiles of a community's households. These profiles help to establish who in a community is eligible for specific social grants and housing program assistance.

Despite its intended aims, what started in early 2018 as a project for housing claim-making and livelihoods improvement, ended up in a deadlock at the end of that same year. Among the causes of a disruption in the relationship between DAG and the S section community were differences with regard to the purpose of mapping and enumeration, as well as quarrels within the community around the imagining and planning of the settlement's future development.

Instead of considering the project as a failure, this disruption has become an opportunity to explore an under-explored aspect of PME literature concerning empowerment. Rather than analysing this state of affairs only as a failure or a dysfunction, we propose here to analyse the process of participatory mapping as an operating, active and acting device. Regardless of the project stalemate, what did the process do and was left to the actors at play?

FIGURE 2 Scenes from S section informal settlement: (Khayelitsha, Site B) [JB, 2018]

This thesis describes the setup phase of the PME project for S section informal dwellers. Further, it analyses the implementation of PME "from within", exploring what is left in terms of empowerment when such a project reaches a dead-end.
This thesis journey begun by following a rather broad question, addressing the impacts of participatory mapping and enumeration (PME) practices on informal dwellers: **to what extent is participatory mapping empowering for informal settlements dwellers in Cape Town?**

This broad question is then split into three sub-questions that inform specific focus areas (cf. sub-chapter 2. Research questions):

(1) how are PME strategies for informal settlements housing claims mobilised in Cape Town?
(2) what kinds of empowerment is enabled through these practices?
(3) what is the impact of these practices and their outputs on urban policies and claim making?

In order to answer to these questions, the theoretical apparatus of this thesis intersects a variety of research fields. The main theoretical framework is given by the first publication (Barella 2020a), introducing the theoretical foci of participatory mapping and enumeration (PME) practices for empowerment: critical mapping and GIS (with subfields of Public Participatory GIS [PPGIS]), development studies, and science and technology studies (STS). These three theoretical fields are considered using a critical postcolonial approach, stemming from postcolonial urban studies. Subsequently, the second publication mobilises a sub-field of PPGIS addressing GIS implementation models within community-based organisations. This sub-field offers insight as to how GIS technology has shaped the participatory mapping and enumeration process, as well as the organisational strategic rationale for its implementation. Last, the third paper (re)introduces elements from postcolonial urban studies and urban data politics to frame the concept of "empowerment", discussed in relation to the S section case study.

The conceptual framework pivots around one main *dispositif* : "empowerment" as applied to PME practices. The definition and discussion of 'empowerment' graduates across the three publications. In the first publication, traditional approaches to empowerment within PPGIS literature are discussed and criticised.
The first paper addresses the concept of 'empowerment' as a buzzword; stemming from neoliberal rooted notions of development. This paper argues the need to re-politicise empowerment in order to more broadly re-politicise the study of PME practices towards social justice.
The second publication discusses the role of PME facilitators and how technology adoption within community-based organisations can shape the PME process and its empowerment goals. The paper explores the relationship between form and uses of GIS-based technology and the impacts this technological configuration can have on the overall PME process.
The third publication suggests a fine-tuning of 'empowerment' as a concept by focussing on its relational and situational aspects. Although a suggestion for a conceptual refinement was not initially envisioned, the limitations of the literature and the research process necessitated a customised lens through which "empowerment" was comprehended in the S section case study. In the third paper, 'empowerment' is redefined as "the enabling of topological resonances" which is dependent on two main dynamics of "translation" and "connectedness" – stemming from empirical observation. Chronologically, the first paper sets the groundwork for the partial reframing of 'empowerment' through postcolonial urban studies in the third paper.

This research implemented a variety of action-research aligned methods: participant observation (four intensive fieldwork periods), semi-structured interviews and data and documentation analysis. Alongside ten months of participatory action fieldwork, I conducted a total of fifty-three interviews with staff members of Cape Town-based NGOs employing PME methods and geotechnologies, as well as with activists, academics, and government officials from the City of Cape Town municipal government and the Western Cape province; particularly those overseeing GIS and informal settlement program services. The methodological chapter presents in greater detail the approach, as well as positionality politics related to the thesis research. This chapter links the theoretical framework and methods, and details how this link has shaped the data collection and the interpretation of the results. The second publication also offers explanation into specific aspects of the methodology – namely, the implementation of GIS technologies within the PME process led by NGOs.

The main findings of this thesis are discussed in the concluding chapter and are organised according to the three research sub-questions introduced earlier. Overall, the main contribution of the thesis is to surface the power leverages at play during PME practices.
The research shows that in Cape Town, PME strategies are mobilised by NGOs and community-based organisations to fill the gap left by local government around urban development claims and improvements for informal settlements. The S section settlement case study in Khayelitsha shows that PME is also mobilised for: (1) 'activating' the waiting phase for housing delivery and settlements improvements by enabling 'empowerment'; (2) positioning implementing NGO agents against a broader context of competing community-oriented organisations.

With regard to empowerment dynamics, this thesis reveals that through PME: (1) actionable data is collected and sustains communities' claims, (2) the 'collateral learning' of citizens participating in these practices is enhanced beyond the initial scope of PME. Different types of empowerment are therefore activated through different sets of circumstances that assemble people, materials and resources into different configurations. In the S section case study, the PME process enabled an interstitial and unexpected kind of empowerment that is triggered by dynamics of 'translation' and 'connectedness'. Translation refers to the capacity to make knowledge (data or information) actionable within a specific context, through a specific channel or towards specific actors. Whereas connectedness represents concrete opportunities – a space, a time, a setting – that becomes available to residents of limited means, allowing them to expand spaces of political, economic and cultural operation. These two tactics are seen to act either as opportunities to reinforce an already existing social and financial safety-net, or as new triggers to attempt to change their everyday life in the "here and now".

With regard to the practice of urban policies, the research suggests that, overall, PME practices tend to maintain a status quo in how social and urban local development policies are elaborated and conducted in Cape Town. PME is mainly facilitated by local NGOs who use these methods to position themselves in

relation to local government and to secure their role as an intermediary between State and community. Alongside contributing to a bureaucratisation of urban development, these mapping and surveying techniques are used as a statement of power through which NGO can assert their authority. In the S section case study, PME practices indeed enabled social and housing improvements claims for the community; however, it did not substantially change the way policies are elaborated or implemented. The same goes for claim making dynamics where findings show that to achieve public visibility, data production is positioned at the core of advocacy. Yet, when considering PME as an empowering process (second sub-question), the thesis shows that through these methods - the 'modalities of claiming' - available to citizens are manifold and go beyond the main scope of PME practices.

Other contributions of the thesis regard the interfaces created by the research across multiple literatures, such as the interfacing of (P)PGIS with the postcolonial urban studies, or by the unveiling of contextual specificities of the PME approaches amongst Capetonian NGOs. These contributions, as well as the findings mentioned above, are developed in greater detail in the concluding chapter of the thesis, alongside the limitations of this research and some insights for future investigations on the topic.

1.1.2.3 Outline of the introductory chapter

The section to follow unravels the main research question and sub-questions in greater detail. Moreover, it develops the aim of each sub-question and offers discussion as to how each sub-question contributes to the overall research.

Paper-based thesis – or thesis-by-article – are at high risk of resembling a messy patchwork quilt. Therefore, the third section of this introductory chapter guides the reader through the thesis structure. It maps out the outline of the manuscript, shows the coherence of each chapter and publications within the thesis apparatus, and highlights how the papers contribute to each research sub-question. This section is designed to clearly display the position and relevance of every publication and chapter in the composition of the overall research (theoretical framework and rationale, methods, findings).

Last, a short chapter gives a general contextualisation of Cape Town and presents the informal settlement called "S section" in greater detail.

1.2 Research Questions

It is understood that data gathering and data public and private management are imperative to interpret cities and to act towards more just and inclusive urban environments. However, the ability to transform these collections of information into actionable data that supports the livelihoods of urban poor and promotes inclusive policies is often overlooked (Parnell and Pieterse, 2014).

This thesis develops around a broad research question that is split into three sub-questions. Each sub-questions provide a specific contribution to the main query. The main question, the three sub-questions and their main aims are outlined in the Figure 3.

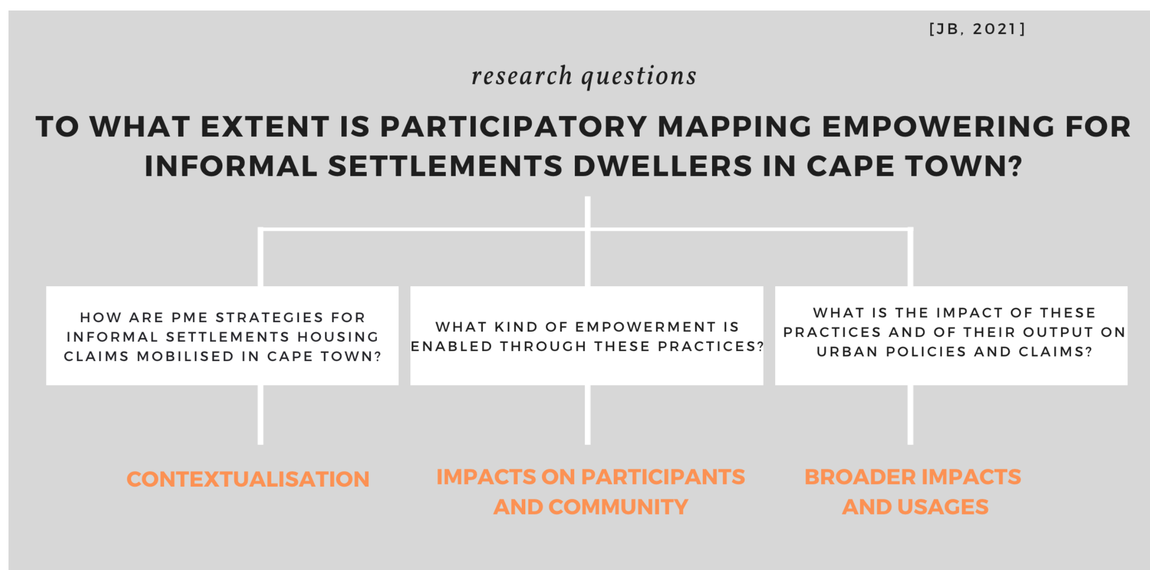


FIGURE 3 Research questions and aims

The research starts with a very broad question tackling the impacts of participatory mapping and enumeration (PME) practices on informal dwellers in terms of empowerment:

> ***To what extent is participatory mapping empowering for informal settlements dwellers in Cape Town?***

The aim of the thesis is to analyse three dimensions of this question, with regard to a specific case study in Cape Town (South Africa). The first dimension explores elements of the Capetonian context informing the way in which PME is implemented in informal settlements for housing and livelihood improvements claims. The second dimension investigates the impacts of these practices in terms of empowerment for informal dwellers – namely, PME participants and the community that is supposed to benefit from the PME project. The third dimension tackles broader impacts and usages of these practices as for the modalities of claiming for housing and for livelihoods improvements, and related urban policies.

1.2.1 SQ1 – How are PME strategies for informal settlements housing claims mobilised in Cape Town?

The first sub-question aims to document the peculiarities of PME experiences in the Cape Town metropolitan area. It sets the context for understanding the dynamics raised in the second and third sub-questions. This sub-question implies to identify the constellation of actors deploying PME, the technologies used to support these practices, and the broader strategies within which these methods perform. Mainly explorative, this first step allows to position the main case study within a broader geometry of pre-existing power relations and actors' workings.

As shown by the Figure 3, the publications informing the answer to this question are mainly the second and the third one. The former contributes to understand the positioning of actors towards PME and towards themselves in a competing environment. The latter contributes to give contextual insights from the point of view of the participants and of the community benefitting from these practices. Overall the contextualisation is a transversal element of the three publication.

1.2.2 SQ2 – What kind of empowerment is enabled through these practices?

The second sub-question addresses the types of empowerment that are observed through PME as means for claiming. In particular, this question focusses on the participants and the community that are supposed to benefit from the PME practice.

Obviously, the concept of empowerment is key here for grasping the impacts of these practices. The definition and discussion of "empowerment" is treated and completed in the different papers – if taken in chronological order. The first paper tackles the story of the concept empowerment as a buzzword of development in its neoliberal fashion. The second publication provides discussion around the role of PME facilitators and the way the technology adoption within community-centred organisations can shape the PME process and its empowerment goals. Whereas, the third publication suggests a fine-tuning of the concept by focussing on the process of PME as a space providing opportunities for empowerment and highlighting the relational aspects. Although, a suggestion for a conceptual refinement was not envisioned at the beginning of the research project, the limitations of the literature and the research process led to customise the lenses through which "empowerment" was apprehended in the S section case study.

1.2.3 SQ3 – What is the impact of these practices and of their output on urban policies and claims?

The third sub-question tackles the broader impacts of PME on procedural tactics. It focusses on how and whether PME practices observed in this research actually provides a leverage for change in urban policies and in the dynamic of claiming. A better understanding of the politics of community participation allows to explore ways for scaling-up effectively inclusive policy of planning. This questions relates to the effectiveness of PME practices and of their output. It differentiates between the two – PME as the output and PME as the process

– in order to address the main limitations of the literature and to show the disjuncture between the two approaches.

The answer to this question is provided by the second and third publications, which are the more empirical ones. These papers have a strong focus on the Capetonian context and on its peculiar dynamics since they highlight the way in which PME actors position towards one another, towards community and towards the government. In return, these dynamics informs the way in which PME are implemented as well as the way in which PME enables empowerment (2nd sub-question).

1.2.4 Articulation between research questions and publications

Hereafter, Figure 4 gives a taste of the articulation between the research questions and the publications constituting the thesis. The list of the articles (Art I, Art II, Art III) is organised in order of importance of their contribution to the corresponding sub-question.

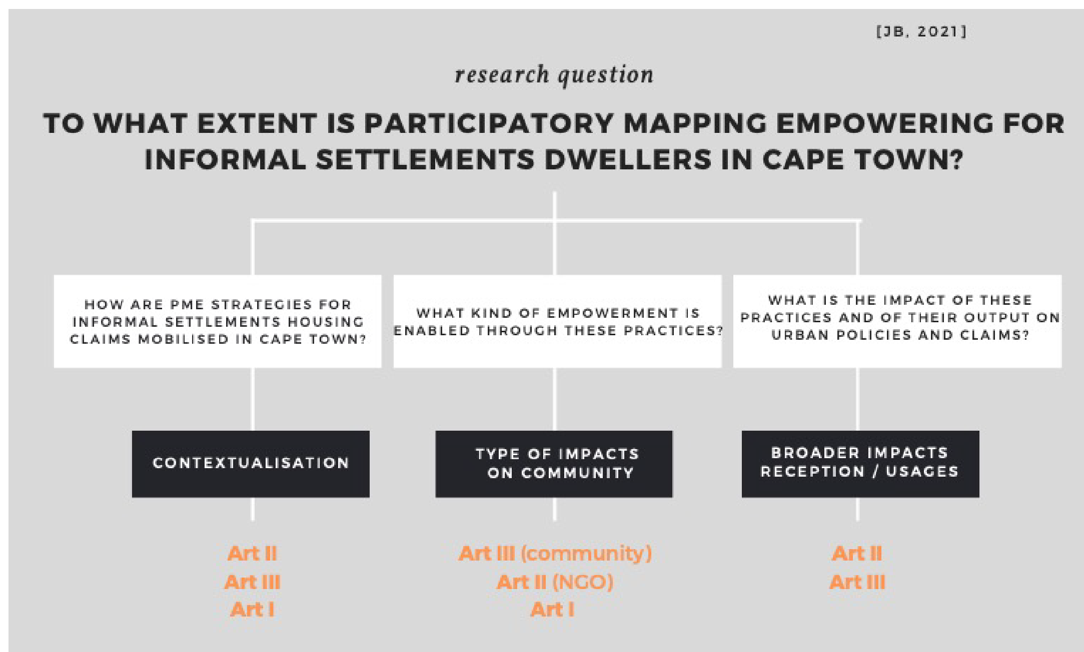


FIGURE 4 Articulation between research questions and publications

The features of the publications and greater detail about their relevance for tackling the three questions are presented in the following section which addresses the way in the manuscript is engineered (3. Publications & Thesis structure).

1.3. How To Read This Paper-Based Thesis: Outline And Publications

This doctoral research is a paper-based thesis. Following the current directive of the Faculté des Lettres et Sciences Humaines of the University of Neuchâtel, the thesis is composed of: a comprehensive introductory chapter discussing the main research goals and the relevance of the publications; three main peer-reviewed papers, two of which already accepted for publication; a methodological chapter detailing methodology and methods; a comprehensive conclusive chapter summarizing the main results, the contributions of the thesis and opening up paths for further researches.

1.3.1 Manuscript outline

The manuscript is composed by three main chapters – introductory, methodology and conclusion – and three peer reviewed publications. The figure hereafter presents the general structure of the manuscript and of its components (Figure 5).

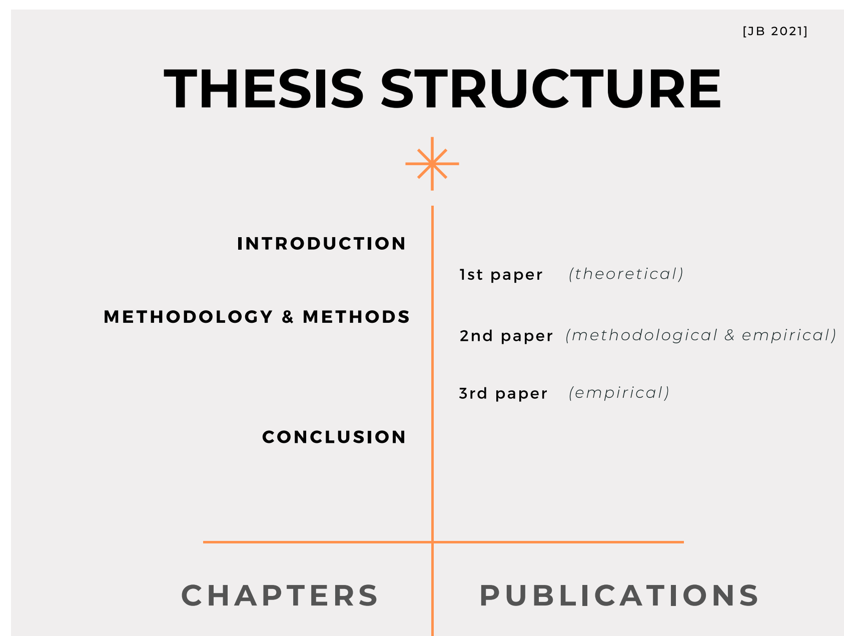


FIGURE 5 General structure of the thesis

The ***introductory chapter*** gives a summary of main research goals and discusses the relevance of the publications for addressing the research questions. Also, this chapter explains the individual contribution of each publication to the theoretical framework, to the methodological reflections, and to the overall results.

The main ***theoretical and conceptual framework*** is given by the first publication, and introduces the main fields studying participatory mapping and enumeration (PME) practices: critical mapping and GIS (with subfields of PPGIS), development studies, science and technology studies (STS). All three of them are considered in light of the postcolonial approach stemming from postcolonial urban studies that is embedded

in the research. The conceptual framework revolves around the main concept of "empowerment" applied to PME practices. In the first publication, empowerment is largely discussed and criticised. Conceptually, the first paper sets the ground for the partial reframing of "empowerment" through postcolonial urban studies in the third paper. In the third paper "empowerment" is redefined as "topological resonances" that are enabled by two main dynamics called "translation" and "connectedness".

The ***methodological chapter*** presents methods, tools and methodological issues related to the thesis research. It explains the link between the theoretical framework and methods, and how these have shaped the data collection and the results. This is a Participatory Action-Research and the main methods deployed are: participant observation (4 fieldworks), semi-structured interviews (53 interviews), data and documentation analysis. The second paper contributes to tackle specific aspects of the methodology – namely, the implementation of GIS technologies within the PME process led by a NGO.

The second and third paper provide the core of the ***results and empirical material*** discussed in this research. The former tackles material referring to the NGO and internal organising of the PME process that has ultimately impacted the empowerment potential of the project. Whereas the latter focusses on the subtler impacts of the PME process in terms of empowerment for the informal dwellers taking part into the PME activities.

The ***conclusive chapter*** considers the research questions in light of the theoretical, methodological and empirical engagements made in this research. The chapter provides a summary of the main results in relation the questions, it discusses the impacts and limitations of the research, and it opens up paths for further research in the field of participatory mapping and GIS in Cape Town.

Table 1 and 2, in the following section, summarize the contribution of each paper and their articulation with the main thesis elements mentioned above.

1.3.2 Peer-reviewed publications and articulation with the general outline

The following table presents the three publications by giving (1) general information about the paper, (2) a glimpse of the content and relative contribution of each paper to the main research outline and scope. The three publications give the backbone of a classic thesis structure, going from theoretical considerations to more empirical ones. The papers and their content are elaborated in a sequential way: the first paper being mainly theoretical, the second being mainly descriptive and methodological, the third focussing on empirical material. Each publication provides a different piece of literature and conceptual discussion contributing to the overall theoretical framework and empirical analysis.

PAPER #	I	II	III
Title	**Ramener la justice sociale au centre de la carte: propositions pour un renouvellement critique de la cartographie participative axée sur l'empowerment**	**Strategic and Acupunctural GIS Implementation within Community-Oriented Organizations: Evidence-Based Insights from a South African Participatory Action Research for Informal Settlement Upgrading**	**Empowerment as topological resonances: analysis of a participatory mapping and enumeration project as strategy for active waiting for housing in Khayelitsha (South Africa)**
Author	Barella Jennifer	Barella Jennifer	Barella Jennifer
Journal	Geographica Helvetica	Cartographica: The International Journal for Geographic Information and Geovisualization	Open Sage
State	Published (2020)	Published (2020)	*under review (2022)*
Language	French	English	English
Abstract (EN)	This paper discusses the need for a deeper critical interrogation of participatory mapping (PM) method as a tool for social justice. This stance is informed by the author's involvement in a NGO and community-led PM project in an informal settlement in Khayelitsha (Cape Town, South Africa). The paper argues that academic PM literature is ill-equipped to truly examine its potential for social justice. Firstly, this is due to the PM empowerment framework having shifted from an emancipatory aim to a governing tool. Secondly, this shift does not allow for the consideration of the power relations inherent to PM to be engaged with. This paper concludes by engaging the three epistemological and postcolonial roots of PM in order to provide a starting point for (re)centering PM on social justice.	This article brings evidence-based insights to support the importance of considering contextual elements when analyzing modalities of GIS implementation within NGOs and community-based organizations. I discuss challenges and unforeseen insights of GIS implementation within an advocacy NGO that supports community claims in an informal settlement of Cape Town's metropolitan area. Through the lens of empirical data, limitations of the GIS implementation models framework are highlighted. GIS implementation will appear to be "acupunctural" and highly strategic and will unveil the use of GIS-based solutions as relational leverage. Finally, I discuss directions for further scientific research on GIS implementation within NGOs and community-based organizations.	Informal settlement livelihoods in South Africa are characterised by a structural waiting for housing improvements. Participatory mapping and enumeration (PME) are a key tool for Capetonians NGOs to tackle urban injustice and improve livelihoods. Unfortunately, PME evaluation and empowerment dynamics are often associated and reduced to the PME final output (data, cartographic artefact, etc.). Based on an action-research PME project implemented by a Capetonian local NGO and by S section informal settlement's community (Khayelitsha), this paper studies PME as an empowering strategy for activating the waiting phase for housing. Drawing on postcolonial approach, this paper frames empowerment as "topological resonances" enabled during PME by the dual dynamic of "translation" and "connectedness". Translation and connectedness are applied to the S section case study and allow to grasp interstitial yet critical empowerment dynamics going beyond PME output solely.

Table 1 Overview of the papers

PAPER #	I	II	III
Theoretical Framework	• Postcolonial approach applied to: o Critical mapping and GIS o Development studies o Science and Technology Studies • PME practices and PGIS for empowerment [*state of the literature*]	• PPGIS implementation within community-based organisations [state of the literature] o Models of GIS implementation	• PPGIS merged with insights from Urban Data Politics • Postcolonial urban studies
Conceptual	• Definition of empowerment within the above theoretical framework • Critique of empowerment	• Discussion and redefinition of model of GIS implementation	• Reframing of empowerment as "the enabling of topological resonances"
Methods	• Case study development	• Case study development • Participatory Action-Research methods • GIS implementation within NGO (detailed)	• Participatory Action-Research methods • Main fieldwork organisation
Empirical	• Preliminary observations on the PME practices through critical and postcolonial lenses	• Documentation of the GIS-based PME organisation from the point of view of the NGO • Impacts of the above methodological elements on the PME process	• Analysis of types of empowerment as "topological resonances": o Translation dynamic o Connectedness dynamic

Table 2 Papers' content and structure overview

As shown previously, each publication plays a specific role within the thesis, and contributes in an individual way to the main parts of the research.

1.3.2.1 Research rationale and theoretical framework

The first paper is a position paper. It provides the general theoretical framework of the research and establish the rationale for doing this research and for doing it in a particular way. The paper introduces and discusses the main literature that this thesis engages with in order to analyse participatory mapping and enumeration (PME) form the empowerment perspective. The main theoretical fields presented are: Critical mapping and GIS (including PPGIS), Development studies, Science and Technology studies (STS). The peculiarity of this publication is to adopt the postcolonial approach when discussing the three fields by merging them with the postcolonial urban studies. This is done purposefully in order to re-center the theories and study of PME on social and spatial justice. In order to operate such shift, the paper explores and criticise the "empowerment" concept such as it is implemented in the broad literature tackling PME as means for empowerment. The paper identifies a gap within the literature. The failure in addressing empowerment beyond the PME output solely explains the rationale for conducting a research that focusses on PME as a process and for trying to look at empowerment dynamics through other lenses (cf. second and third publications).

Although subparts of the theoretical framework are spread across the three papers, the first publication states the main theoretical traits that inform the other publications, and the overall research. The general theoretical framework and literature discussion of these thesis is to be found in this first publication.

1.3.2.2 Methodological aspects and case study presentation

The second paper is oriented towards methodological aspects with regard to the PME case study. Theoretically, the paper is positioned in the field of Public Participatory GIS and Critical mapping and GIS. It introduces and updates the models of GIS implementation within community-based organisations and evaluates the case study against these models. The main contribution of this paper is to unravel the PME case study from the point of view of the NGO and of its strategic adoption of GIS technologies. A thorough documentation of the PME project, from a rather technical point of view, and of the impacts of these techniques on the PME process elaboration is analysed. This paper provides a fundamental step for unveiling power relations and strategies at play with regard to GIS and PME deployment in a broader context of urban politics.

1.3.2.3 Analysis of main results in terms of empowerment

The third paper is the more empirical one, still it does leave room for a conceptual proposition. The inadequacy of the empowerment vision (stated in the first paper) is here addressed by the renewing of the main concept through the lenses of postcolonial urban studies. The new empowerment conceptualisation is then tested against the S section case study. Compared to the second paper (mentioned above), the third publication focusses directly on the PME impacts experienced by the community of S section. The main results in terms of PME impacts are therefore analysed through the lenses of the new conceptualisation of empowerment as “topological resonances”, and by the underlying dynamics of “translation” and “connectedness”. Also, this paper is enriched by visual materials such as a set of pictures documenting the main phase of fieldwork.

1.3.3 Papers’ contributions to research questions

Each paper provides specific elements that contribute to answer to the main research question and sub-questions in a different fashion.
Alongside the Figure 4, the Table 3 presented hereafter summarizes the main contribution of each publication to the research sub-questions. This visualisation captures the relation between the pieces of the puzzle (the peer-reviewed papers) and the global picture given by the overall research. Elements of the answers to the research questions are developed transversally across the three publications. The details of the results are

presented in each publications discussion separately, and are then gathered and analysed in the conclusive chapter of the thesis which provides a straightforward answer to the research questions.

		Sub Question 1	Sub Question 2	Sub Question 3
Type of paper		**How are PME strategies for informal settlements housing claims mobilised in Cape Town?**	**What kind of empowerment is enabled through these practices?**	**What is the impact of these practices and of their output on urban policies and claims?**
1	Theoretical reflection; Critique of main concept	• gives a broad view of uses of participatory mapping and GIS for empowerment/advocacy • summarises a broad state of the literature of PME practices and their origins	• positions the reflexion of the rest of the thesis by stating a critique towards classic empowerment frameworks	• presents some unexpected results of the PME process
2	Methodological; Tech-centred (GIS); NGO-centred	• highlights the role of GIS for NGOs and community-based organisations working for informal settlements upgrading • PME as NGO's political strategies	• discusses NGO-centred capacity enhancement in terms of innovation • highlights specific limits and advantages in implementing GIS for community-based empowerment actions	• considers the impact on NGO and GIS-centred PME as strategies for positioning the NGO within a broader game
3	Empirical; Theoretical (reframing of main concept)	• clarifies contextual uses of PME in Cape Town • discusses "datafication" as a form of PME strategy in Cape Town	• reframes empowerment through PME as "topological resonances" • discusses "translation" and "connectedness" as dimensions of topological resonances	• offers an impact assessment based on the new framework • discusses collective / individual / organisational dimensions

Table 3 Synthesis of papers' contribution to each research sub-question

1.4. Context of the thesis – general introduction

This chapter introduces the general context of the research, the Cape Town's metropolitan area, in order to situate the main research territory where the action-research was conducted: S section informal settlement. More detailed and specific research-relevant contextual elements are presented and discussed in the three publications composing this thesis.

1.4.1 The ambiguous Mother and the scattered children

Greater Cape Town is a starkly polarized city. Affluent suburbs and prosperous economic centres offering rich opportunities of all kinds contrast with overcrowded, impoverished dormitory settlements on the periphery. This partly reflects the topography and environment: stunning mountain and coastal settings juxtaposed with the wind-swept, flood-prone, sand plains of the Cape Flats. Wide income inequalities sort people across this space according to their ability to buy into different quality neighbourhoods and lifestyles through the housing market. Underlying this for many years was a system of racial ideology and planning that emphasised separate human, economic and spatial development. It inscribed deep divisions into the geography of the city through population controls, forced removal and separate, unequal governing institutions. (Turok, 2001 : 2349-2350)

In a way Cape Town isn't even a city, it's an archipelago. It's a series of islands, where instead of water flowing between each piece of land there are highways, train tracks, fields, mountains and cemeteries. Some of these islands are amongst the most sought after tourist destinations in the world, others have the highest murder rate in the country and some have services and facilities barely fit for human beings.
(Phumeza Mlungwana e *Dustin Kramer in Fragments of Activism, Blackman Rossouw Publishers, 2019)*

The city of Cape Town is nicknamed the "Mother City" of the South African nation. It was the first port of entry for Dutch and British colonization. It then became a political centre for the Apartheid government, before asserting itself today as the legislative capital and the showcase of the African country one of the most integrated into the global system. However, many children born in this rainbowy multicultural crossroads still fight for equality and decent living conditions. Is there a favourite child of this ambiguous Mother? Yes, there is.

In 1948 the descendants of the Dutch (Afrikaners), with the complicity of the worldwide Western colonization and racialization, institutionalized the Apartheid regime in order to assert their identity and economic dominance through violent and authoritarian racial exclusivity. Apartheid is a socio-spatial-legal policy and planning driven system based on formalizing racial discrimination. The regime officially ended in 1994 with the transition to a Democratic government and the powerful nomination of Rholihlahla Nelson Mandela as the President of the Republic of South Africa. Today, the racial categorization and segregation are rejected and denounced, yet are still structurally socially and spatially reproduced.

According to the 2011 national Census, the official statistics surveyed 3.7 million inhabitants of the metropolitan area distributed across racial groups as follows: Coloured 42%; Black African 39%; White 16%; Indian or Asian 1%. Whereas the more recent data extrapolated by the Community Survey[1] in 2016 updates the total population at 4 million inhabitants of which Black Africans 43%, Coloured 40%, White 16%, Indian or Asian 1%. These racial demographic designations are based on the declaration of the citizen listed and no longer on an administrative decision as it was the case under apartheid.
The urbanization of Cape Town and its metropolitan area has indeed obeyed some socio-spatial representations that, in a certain way, persist until today in the urban policy just as in people's minds and practices.

During apartheid, the regime enforced the control on 'non-white' mobility and created 'illegal' migrations: Black Africans were not considered as South African citizens and were not free to work or to move around the national territory without holding a passport. At the same time, Coloured people saw their civic rights restricted and passed on to a separate specific Department. The internal passport system, the forced removals imposed on 'non-white' residents have led to building an urban system where the majority of the inhabitants are not admitted as citizens or even as city dwellers. Heavy legislation and bulldozer-based planning practices, such as the Group Areas Act (GAA), were formalized. When applied to existing cities, the GAA criteria allowed the forcible removal of 'non-white' population groups from urban spaces designated as "whites only" (*net blankes*), as in a radical consolidation of power by dispossession.

In Cape Town, District Six is a salient dramatic example of the material and symbolic violence perpetrated by the apartheid regime on places and people. The forced relocations and destruction of District Six neighbourhood caused the displacement of more than 60'000 people away from their homes, work opportunities and urban amenities, to the Cape Flats area. Even nowadays, the vacant plots, now encompassed by the city centre, exude the memory of that gangrenous urban trauma. The current controversial "Temporary Relocation Area" (TRA) urban policy tool resonates and re-enacts the ghost of that suffering (Ranselm, 2015). Some of the spatial-material-legal imbrications by which apartheid existed persist and, even thirty years after the end of the regime, they act back upon individual-collective lives and policy spheres.

[1] "The Community Survey 2016(CS) is a large-scale survey that happens in between Censuses 2011 and 2021. The main objective is to provide population and household statistics at municipal level to government and the private sector, to support planning and decision-making. Unlike a census, not every household will be visited; only those that are sampled." (STATSSA, http://www.statssa.gov.za/?page_id=6283)

Group Areas Act - District Six

[The destruction of District Six under the Group Areas Act, Cape Town – David Goldblatt]

The obsession with racial control led to unprecedented state-led urbanization efforts with the very aim of preventing the settlement of 'non-white' labour in towns and inhibit interaction between groups. Inspired by Europeans' model of planning such as the sectoral city, under the Group Areas Act a segregated sectoral planning design was put at the service of the Apartheid enterprise, resulting in a highly fragmented and hierarchized urban and social substrate (Davies, 1981). As show by the Figure 6 and 7, the city was organised around residential and activities sectors and divided by big infrastructures such as highways, railways or the topography acting as buffer zones and physical barriers. In Cape Town, "*physical layout and demographics provide this national model with extra twists (…) first, the mountainous Peninsula, including Table Mountain and Devil's Peak, and its abrupt slopes isolate the old city center from the peripheries where the majority of Capetonians live. Together with other natural elements, such as wetlands (vleis), they rupture the urban fabric further and often double up as buffer zones."* (Houssay-Holzschuch et al.,2018:13). To restrict land ownership in urban areas, and to confine Black African residency to designated areas were the main planning tools.

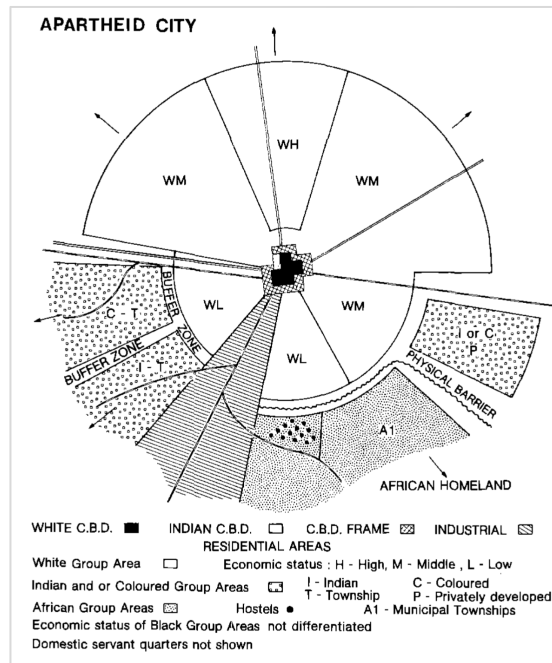


FIGURE 6 Apartheid city model (Davies, 1981)

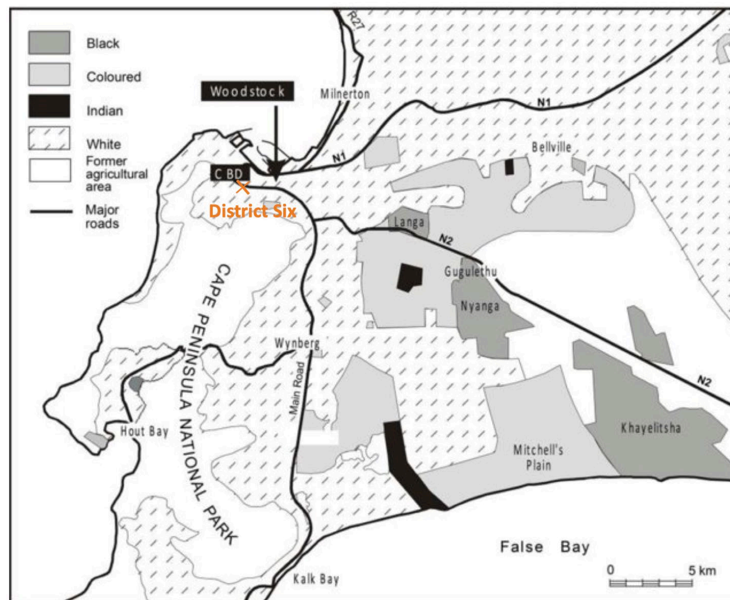


FIGURE 7 Cape Town under the Group Areas Act, with District Six localisation, adapted from M.Houssay-Holzschuch (2018)

Cape Town Type of Dwelling	Black African		Coloured		Asian		White		Other		Total	
	Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Formal Dwelling	250 762	56.4%	327 383	91.3%	13 852	97.1%	230 575	99.0%	14 961	82.8%	837 533	78.4%
Informal dwelling / shack in backyard	54 500	12.3%	18 082	5.0%	150	1.1%	337	0.1%	1 889	10.5%	74 958	7.0%
Informal dwelling / shack NOT in backyard	134 914	30.3%	7 531	2.1%	141	1.0%	387	0.2%	850	4.7%	143 823	13.5%
Other	4 607	1.0%	5 634	1.6%	123	0.9%	1 528	0.7%	369	2.0%	12 261	1.1%
Total	444 783	100.0%	358 630	100.0%	14 266	100.0%	232 827	100.0%	18 069	100.0%	1 068 575	100.0%

Table 4 Type of dwelling in Cape Town

Townships – and then informal settlements – seem to be one of the major contradictions that characterize Apartheid urbanization forms and the current legacy of segregated spatial dynamics. The term "township" has no formal definition but is commonly understood to refer to the underdeveloped, usually (but not exclusively) urban, residential areas that during Apartheid were reserved for 'non-whites' who lived near or worked in areas that were designated 'white only' (under the Black Communities Development Act (Section 33) and Proclamation R293 of 1962, Proclamation R154 of 1983 and GN R1886 of 1990 in Trust Areas, National Home lands and Independent States). These configurations were engineered as separated areas generally located on the periphery of cities – as settlements in between the rural Bantustans and the city – and were established to be transitionary. Many of those low-income settlements were far away from amenities and opportunities, and did not present the characteristics of a fully functional neighbourhood since the South African Apartheid government did not provide essential basic infrastructure and services such as electricity, water and sanitation, schools, hospitals, etc. Because municipalities were designed as peripheral "dormitory" where economic, industrial and commercial activities were prohibited, black residents were forced to travel great distances to central areas every day for work. Today still, the great spatial distance between job opportunities and residents is a peculiarity of the South African city, and of Cape Town in particular, which translates into high costs for transportation and a lot of time spent commuting – whereas in other global cities the poor and makeshift accommodations are located somewhere near the city amenities. "*The designation of Khayelitsha was a prime example. One of the penalties of economic imbalance and segregation has been the need to sustain a high degree of physical mobility. This imposed costs on individuals, businesses and the environment through travelling time, congestion and pollution.*" (Turok, 2001:2351).

Elements of a fragmented city

According to neo-marxist body of literature Cape Town may be just another global city devoured by its own contradictions as part of contemporary forms of urban fragmentation: wanting to gain access to globalized neo-liberal competition is a fundamentally incompatible objective with that of reducing inequalities (McDonald, 2008). Even though the current urban fragmentation is not due to the apartheid sectorial planning legacy solely, the past planning strategies and the transition to a democratic state through a highly neoliberal economy has certainly not resulted in a reconciled city.

According to Mabin (1995:196), "*The narrative of contemporary change in Johannesburg and other Southern African cities is partly about the problems of finding a means to handle, politically, waking up in a postmodern era while equipped only with the politics and planning of a modernist past.*" Mabin identifies a set of dynamics and policy choices, obviously fraught with ambivalences, that reinforced the historical urban segregation:

- the "freeway shift" and suburbanisation, or the design of a city car-based and structured around the existing heavy infrastructures. This alongside the abandonment of the city-centre and with that the cohesive value of publics spaces as spaces for confrontation and perhaps reconciliation (Bénit-Gbaffou, 2007)
- neoliberal economy and managerial choices made by the government such as the diffusion of commercial rationality and utilitarianism, privatizations – calling into question the principles of equalization and cross-subsidies – and the resulting social specialization of territories. For instance, the massive housing policy was superseded by neoliberal investment such as in offices and luxury residences. The Cape Town Waterfront is an example of a private space of consumption that is supposed to acquire a more public dimension. This alongside the prominent role left to private property markets in dictating the housing and development market. The government largely limited itself in terms of strategy for negotiating for pro-poor policies while
- a "diversity shift" induced by the global class polarization which exacerbates the class/race divide – i.e represented by the common image opposing gated communities to homelessness or informal dwelling. The current narrative shift from race to social class may only represent a cosmetic change in social relations in South Africa (Bekker et Leildé, 2002).

In other words, the collapse of Apartheid would ultimately result in the transition from a segregated city linked to the Fordist economy to a fragmented city under the influence of new managerial forms favouring privatization (i.e. of services, places or even security forms which formerly were "public").

Alongside structural elements, everyday practices of distrusts largely influence the divide as well. In some instances, a geography of fear persists, where previous socio-spatial divides endure through exclusionary mind-sets that weighs against the creation of a non-racial and non-fragmented city. That is to say, that some of the responsibility for spatial exclusion may perhaps rest upon private citizens rather than on structural and state control only (Beall et al, 2002). Nevertheless, the gloomy cartographic picture of a fragmented city should not prevent from seeing the social, political and urban dynamics that reunite and try to reconcile instead of perpetrating the divide. Close to the township residents and other urban actors, the participatory action-research approach adopted in this work responds to the concern to develop a nuanced analysis of the making of the city as a whole.

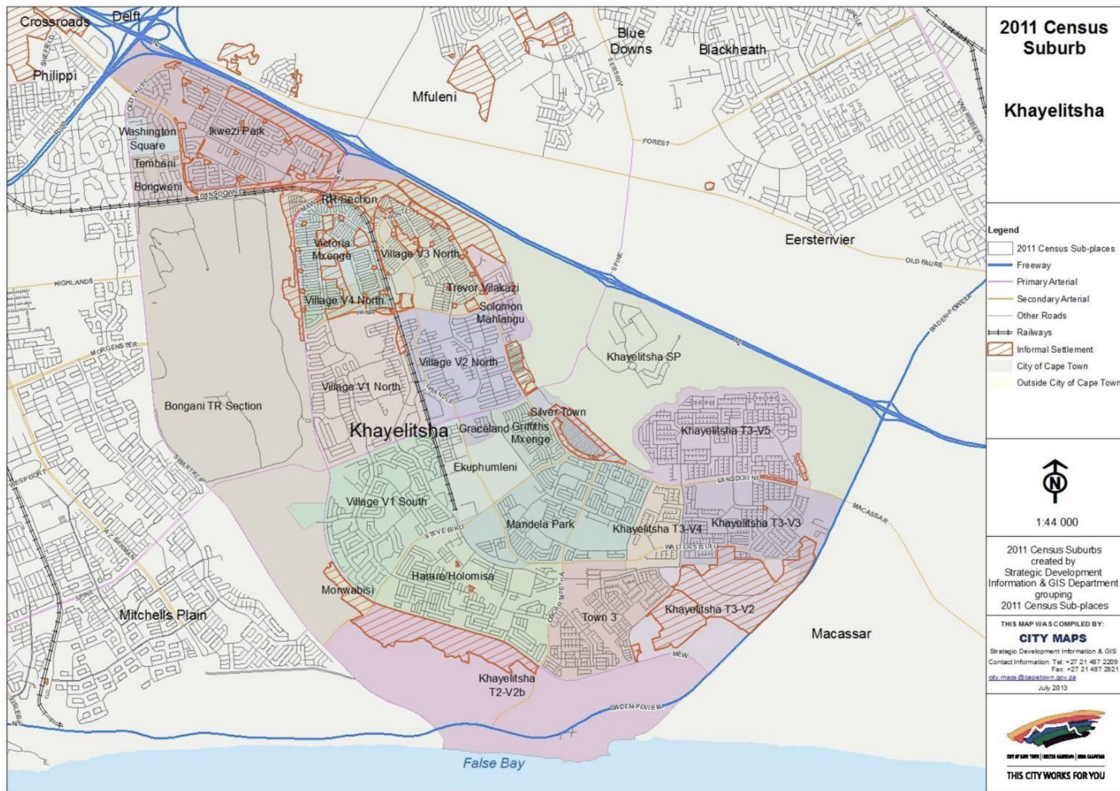


FIGURE 8 Khayelitsha Township Suburbs according to National Census 2011 [City Maps, City of Cape Town]

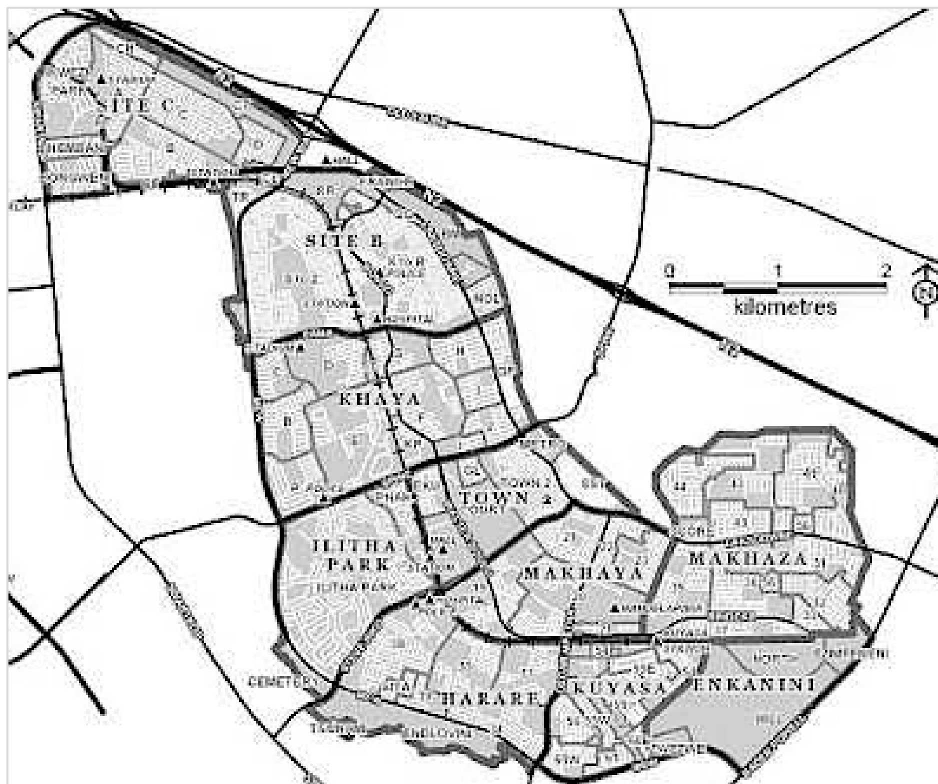


FIGURE 9 Khayelitsha Sub-divisions [DAG archives]

1.4.2 Khayelitsha

Khayelitsha (*New Home* in isiXhosa) has become the biggest township in the Cape Town metropolitan area. It is located approximatively 30km away from the city centre, and emerges between the False Bay and Table Bay in the Cape Flats (Figure 7, 8, 9). It was settled around 1980 during the resumption of the public housing construction policy for Black Africans, slightly earlier than the abolition of the *influx control* (1986), and in response to consequent heavy migrations from the Easter Cape and the general overcrowding of townships. It was established during a time of great pressure from the opponents towards the Apartheid government, which resulted in new urban policies that inscribed urbanization of Black Africans as irreversible. The segregationist pattern was not broken, since the housing offered to Black Africans did not substantially mark an evolution either in town planning or in the place granted to them in political life.

Alongside other political changes, what ultimately contributed to create turmoil and to waver the new segregation policy is the establishment in 1982 of independent municipal authorities in the townships called *Black Local Authorities* (BLA). BLA were supposed to organize and ensure the self-financing of townships, through a system of election of councillors that would have been in charge of the township budget – which was supposedly raised by their fellow residents through levies. In the meantime, Coloured people were already granted superficial electoral rights with the creation of a political system guaranteeing them partial representation. The unexpected effect of this brand new 'township power' was to allow residents to self-organize in parallel committees and to take over their spaces by violent protest and concerted rebellion against the state apparatus. Since the Apartheid state could not exercise administrative control over those areas anymore, the military forces were sent on to regain control by force. As soon as the state lost control of some Black Africans areas, liberated zones were declared. The breakdown of Apartheid regime was hastened.

"Documents and pamphlets from the United Democratic Front and the Mass Democratic Movement at the time are replete with references to 'discipline', to 'commitment', to 'dedication', to 'comradely' behavior, and so on. In other words, rendering the apartheid state ungovernable hinged, not simply on collapsing its capacity to govern, but on creating counter structures populated by new democratic subjects; i.e. disciplined, committed and dedicated comrades." (Chipkin, 2007 : 156) Chipkin highlights an important peculiarity that shaped today's Black South African way of practicing citizenship and the local political functioning : the fact that township residents were initiated to participatory democracy even before having the right to vote. That is to say, the creation of the disjuncture between citizenship as a value and right-based form of mutual solidarity, equality and accountability, versus the construction of a unique national subject that is supposed to emerge from the 1994 reconciliation. The former being a bottom-up co-construction of the citizens, the latter being an administrative labelling of citizenship.

Even today, strong post-apartheid grassroots movements such as Social Justice Coalition and Abahlali baseMjondolo have a strong presence in Khayelitsha, and have found home at the social justice and multi-purpose community centre of Isivivana.

These organisations just as other NGOs and CSOs have a long and solid experience of advocacy rooted into the anti-apartheid fights that still sustains their current drive and legitimacy in the eyes of civil society. When the government actions are not trusted, the interface between communities and municipalities is taken by NGOs/CSOs (Parnell & Pieterse, 2014)[2].

Compared to Langa (1930) or Gugulethu (1960), two more "senior" townships, Khayelitsha is more recent and thus it is located farther away from the city centre. According to the most recent official Census of 2011[3], Khayelitsha counts 391,749 residents. Nevertheless, this numbers are known for under-representing the reality on the ground. The main population group is Black African, with a majority of amaXhosa people. The 54,5% of residents live in an informal dwelling – whether this is a shack in a backyard or in an informal settlement (Table 7).

	People	Percentage
Black African	386359	98.62%
Coloured	2315	0.59%
White	327	0.07%
Indian or Asian	272	0.07%
Other	2477	0.63%

Table 5 Khayelitsha, population groups (Census 2011)

	People	Percentage
isiXhosa	354164	90.54%
English	12608	3.22%
Sesotho	5326	1.36%
Other	5138	1.31%
Afrikaans	4138	1.06%
Sign language	3357	0.86%
isiZulu	2418	0.62%
Sepedi	1145	0.29%
isiNdebele	1046	0.27%
Setswana	904	0.23%
Xitsonga	481	0.12%
Tshivenda	278	0.07%
SiSwati	155	0.04%
N/A	591	

Table 6 Khayelitsha, language groups (Census 2011)

[2] The 2nd publication of this thesis dives into the landscape of the main advocacy NGOs, with regard to their peculiar use of GIS-based practices for informal settlements upgrading and housing claiming.

[3] Census of 2021 was postponed to 2022 due to the Covid-19 pandemic circumstances.

Khayelitsha Type of Dwelling	Black African		Coloured		Asian		White		Other		Total	
	Num	%	Num	%	Num	%	Num	%	Num	%	Num	%
Formal Dwelling	52 186	44.5%	339	69.6%	34	54.8%	62	60.2%	369	46.1%	52 990	44.6%
Informal dwelling / shack in backyard	9 463	8.1%	47	9.7%	6	9.7%	4	3.9%	211	26.3%	9 731	8.2%
Informal dwelling / shack NOT in backyard	54 679	46.6%	95	19.5%	22	35.5%	36	35.0%	198	24.7%	55 030	46.3%
Other	1 028	0.9%	6	1.2%	0	0.0%	1	1.0%	23	2.9%	1 058	0.9%
Total	117 356	100.0%	487	100.0%	62	100.0%	103	100.0%	801	100.0%	118 809	100.0%

Table 7 Type of Dwelling in Khayelitsha (Census 2011)

1.4.3 Informal settlements

Alongside the creation of these formal districts, informal unplanned residential settlements were established by inhabitants looking for opportunities since the early years of apartheid. These makeshift accommodations were poorly equipped, barely furbished, built with whichever recycled material available and they were dependent on the formal side of the township for the access to (the scarce) amenities. Their rapid growth was observable in particular during the last decade of the regime (Crankshaw and Hart, 1990). Since in Cape Town the building of housing accommodations stopped for decades (Fast, 1955), informal "squatters" were in reality long-term inhabitants who had chosen informal dwellings due to lack of financial resources and/or need for independence – obviously, a choice made amongst a very limited set of options available. To resort to informal dwelling in townships or in other areas was the only viable option because less expensive and perhaps because of a partly established social net of relatives. In Cape Town in particular informal dwelling was characterised by a high risk of eviction: "*the official prohibition of squatting was enforced even more ruthlessly in Cape Town, for example, and this prohibition lasted and well into the 1980s. Building of accommodation for Africans was interrupted for many years, enormously increasing the housing backlog: people had no access to legal accommodation since vacant housing was non-existent; they could not resort to squatting without being evicted*" (Guillaume and Houssay-Holzschuch, 2002:5). Due to the high unemployment rate made people turn to non-formally registered market valuable activities in order to make a living while waiting for other opportunities and livelihood improvements.

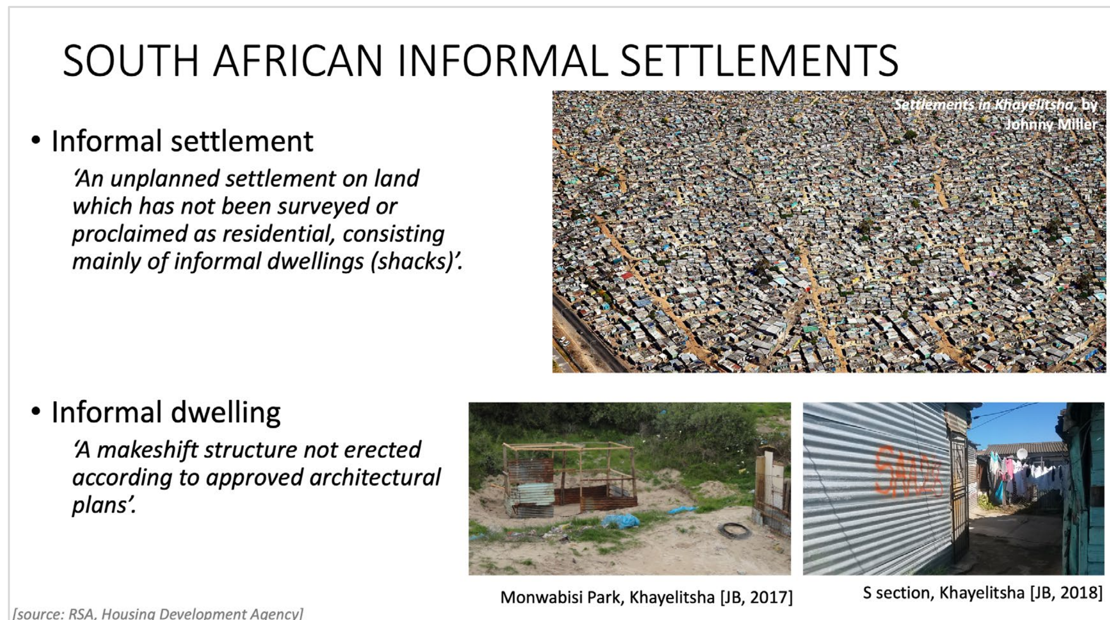


FIGURE 10 Informal Settlements categorisation according to the Housing Development Agency (RSA)

Figure 10 presents the official definition of informal settlement and informal dwelling according to the Housing Development Agency of South Africa (cf. also Research Methodology Chapter, 2.6 Data sources about Cape Town informal settlements). The pictures at the bottom show two scenes in Khayelitsha: a brand new shack in the making on the perimeter of the Monwabisi Park informal settlements; and a narrow alley in the S section settlement with freshly done laundry waiting to dry.

It is important to highlight that these pockets of informal livelihoods cover highly heterogeneous realities in terms of urban localisation, live trajectories and makeshift solutions. Yet they are characterized by similar poverty-related pattern such as: limited access to water and sanitation, limited access to secure and adequate food, high vulnerability from natural risk (i.e. flooding during heavy summer rains, fire outbreaks), scarce environmental and housing quality exposing people to health risks, higher exposure to criminality, etc. Also, since there are installed on unlawfully occupied land, the inhabitants are more unlikely to get access to security of tenure. As stated by Guillaume and Houssay-Holzschuch "*a clear distinction needs to be made between informal tenure and informal housing. Informal tenure includes non-western, traditional occupancy of the land, as well as squatting (i.e. occupation of a piece of land without its owner's consent). Informal housing can be found on squatted land but also in backyard shacks in townships or in site-and-service schemes. Harsh living conditions linked with informal housing vulnerability to wind, rain and fire, problematic access to water, electricity and sewer, etc.) are not only the squatters' lot*" (Guillaume and Houssay-Holzschuch, 2002:6).

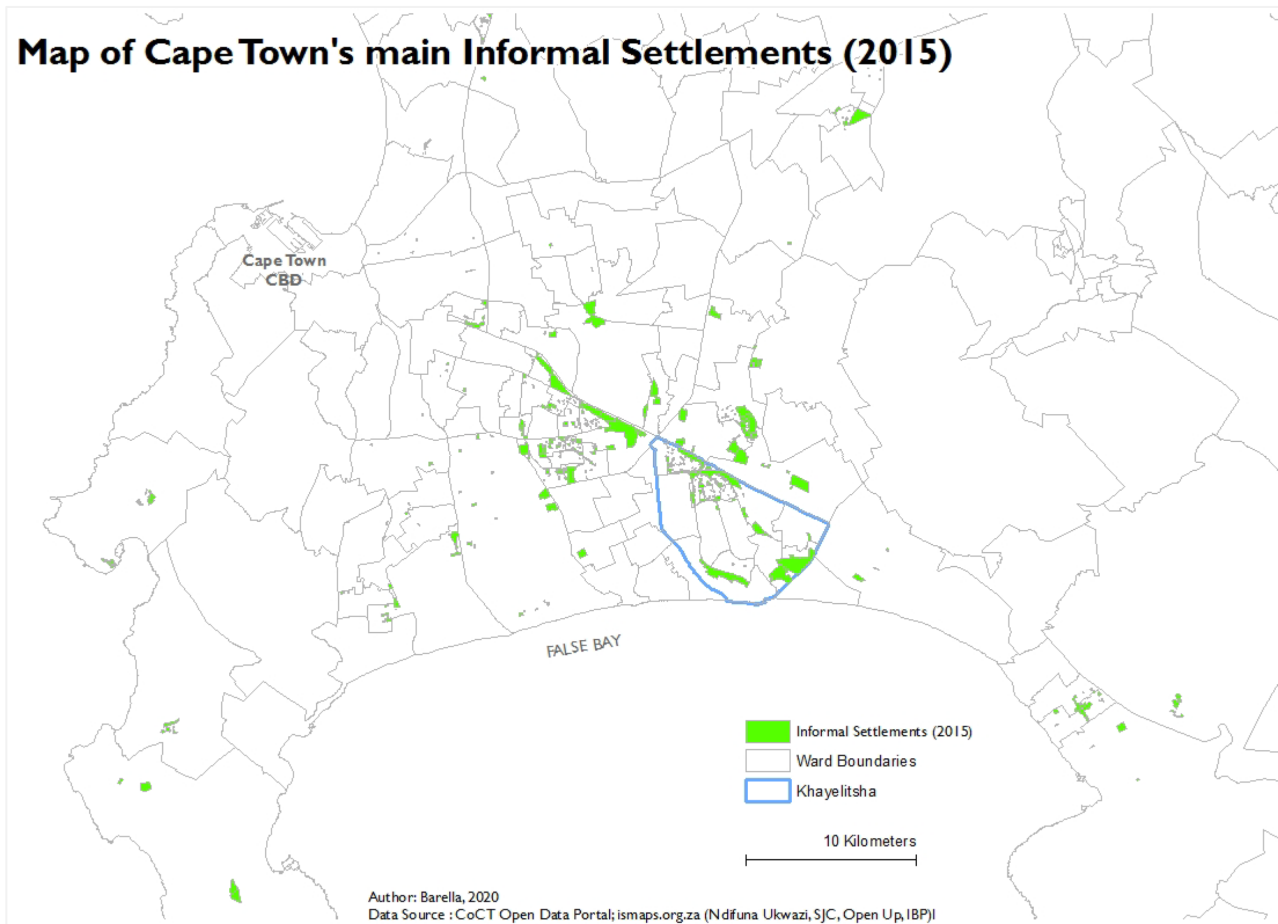


FIGURE 11 Map of Informal Settlements in Cape Town, zoom on the central area (cf. Appendix 1 for the whole map at Municipality level)

The recent growth of informal settlements is multifaceted and the literature identifies a variety of reasons for explaining this important form of the city and the specific role of informal dwellers as city makers. A common explanation is related to rural-urban migration. After the end of the regime, people previously locked into Bantustans flocked towards the urban economic opportunities and also tried to meet their family members who had previously left. In the Cape Town area, this refers in particular to amaXhosa people coming from the Eastern Cape region.

Although formal segregation ended with the new democracy, the townships and other low-income housing areas such as informal settlements have continued to see an exponential growth. Townships are vibrant multifaceted neighbourhoods, yet still trapped in a dominant-dependency relation with the main city, which concentrates the employment opportunities (Krygsman et al. 2016). As for the informal settlements in the Capetonian area, data from 2011 Census assess that almost 20% of the households are informal dwellings (shacks) – that is to say about 1.5 times the national rate (13%). Moreover, as seen previously on Table 4 and 7, the vast majority of Khayelitsha residents are informal dwellers. It is to note that these official numbers are likely to be an underestimation both at the metropolitan and national level.

Government reports suggest that, between 2002 and 2016, informal settlements in South Africa have increased from 300 to 2225 (Sijekula Mbanga).

In a government report from the Disaster Mitigation for Sustainable Livelihoods Programme elaborated by the province of the Western Cape and the City of Cape Town "more than 220 informal settlements" were identified in 2007, but not displayed and clearly localised in the document (WC and CoCT, 2008:17). According to 2015 data form the City of Cape Town, there are about 204 informal settlements in the metropolitan area – or 437 individual pockets as stated by the activist organisations Ndifuna Ukwazi and Social Justice Coalition on their *Struggle for dignity in Cape Town's informal settlements* interactive map [4]. In Khayelitsha 78 informal settlements have been identified, according to data extrapolated from the map (cf. Figure 11, for the map of the whole Municipality see Appendix 1).

Very limited and inconsistent formal information on settlements location and profiling seems to exist or to be accessible. Especially for newly established settlements, spatial and socio-demographic information is incomplete – due to their rapid changes in size and density. Verifying these numbers is a tricky task. During my PhD action-research I have come across many contradictory information about the number and location of informal settlements. Official data on informal settlements seems to be cautiously kept veiled – just as the famous housing waiting list that no one has ever put the hands on... – or it is mobilised only for risk management purposes (cf. Personal communication on page 271 of the 2nd publication of the thesis).

Eventually, this mismatch is symptomatic of a broader issue that this thesis explores through a participatory mapping and enumeration project for the S Section informal settlements in Site B Khayelitsha.

1.4.4 S section informal settlement – quick profile[5]

DISCLAIMER

The participatory mapping and enumeration project that this thesis speaks about has taken place with the community of the S section informal settlement, Site B, Khayelitsha. This is a profiling of the neighbourhood that aims to present the main characteristics of the site. It is based on the draft of the preliminary S section report elaborated with the intern working at DAG (2018) and on the dataset collected and available at that time (only partly verified). It has subsequently been completed by the author with maps and pictures and data collected through the S section household survey. In order to protect the sensitivity of some information, some data has been approximated.

Other details and information about the settlement may be found in the three publications composing this thesis. Data owners of the Participatory Mapping and Household Survey conducted in 2018 are Development Action Group (DAG) and S section community.

1.4.4.1 Prelude

While conducting the participatory mapping and enumeration (PME) exercise in the "S section" informal settlement in Khayelitsha (South Africa), the most recurrent answer to the open-ended question "Please,

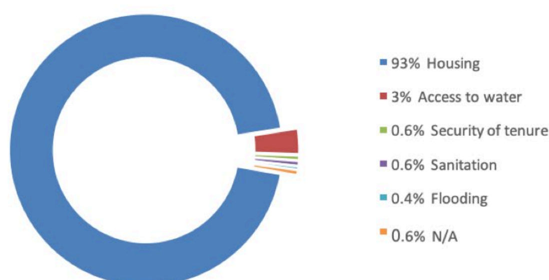
[4] The map is available at this link http://ismaps.org.za/desktop.html

[5] This profiling is based on the draft of the S section report elaborated with Sihle Mtuna at DAG (2018). It has subsequently been completed by the author with maps and pictures and data collected through the S section household survey.

give a brief history of the settlement" was related to aspects of "waiting" – waiting for housing delivery, for housing upgrading, for service delivery and development. Likewise, 93% of the interviewees answered that the most urgent priority they wanted to see addressed at the household level was "housing" (Figure 12). This is a well-known story for Capetonians and South African citizens living in informal settlements (Oldfield and Greyling, 2015).

A story of waiting, as well as a story of "measuring" this waiting through datification – just as this same research eventually helped to do.

Which is the most urgent priority you want to see addressed at the household level?



[Source: DAG , S section household survey, 2018]

FIGURE 12 Extract of data from S section household survey conducted in 2018 (DAG & S Section)

1.4.4.2 Demographic and peculiarities

"S section" informal settlement is an informal settlement established around 1985-1990s by illegal occupation of the site (DAG & S section, household survey, 2018). At times the settlement is referred to as Victoria Mxenge S block. Unlike other informal neighbourhoods who changed their names, the apartheid's inspired zoning toponymy was kept.

S section is situated along the N2 highway in Khayelitsha, on Pama road. It is part of the Informal Settlements' cluster of Victoria Mxenge 7410 in Site B Khayelitsha (cf. Figure 13 and 28 for Sites sub-divisions, and Appendix 1 – List of Cape Town's Informal settlements in 2015). The Victoria Mxenge settlement is located in a residential area surrounded by formal residential neighbourhoods. The settlement falls under Ward 91. The settlement is very dense and the informal dwellings are made from different recycled materials – mainly zinc and wood. The site is adjacent to Pama Road in the South, Bida Cres in the North and Tandazo drive on the Western side of the settlement, and it is approximately at 700 meters walking distance from Nonqubela train station.

As of May 2018, S section was composed of about 480 households, predominantly Black Africans and from Xhosa origins and isiXhosa speakers. The residents of S section are very young as the average age of the population was about 26 years old. Most of the elderly people are amongst the first founders of the settlement. According to data from the participatory enumeration, 78.6% of the households were living with an average monthly income below R3500 – which highlights once again a situation of extreme poverty.

Overall, the settlement is highly appreciated by its inhabitants because of its location close to the Nonqubela train station, taxi lines, and the proximity to a variety of amenities related to the formal part of the area – such as the Thandazo market stalls, the Ndabazabantu Supermarket, a crèche, a recreation ground, the Khayelitsha stadium and the elementary schools (Figure 13 and 28).
The peculiarity of S section is the presence of the Makukhanye Art Room, the first shack theatre in South Africa, which also operates as multi-purpose facility in the area. At the time of the research, the theatre was run by the Theatre4Change Arts Project led by the "artivist" Mandisi Sindo, today Siphosethu Dyonasi has the lead. Many community meetings and workshops for the participatory mapping and enumeration project were held in the spaces of this fabulous structure[6]. Around December 2018, the settlement was partly burnt down due to a fire outbreak (Figure 26). Supposedly, the incident was related to open flames uses. Fires outbreaks in informal settlements are often ravaging. In this particular instance, luckily, only a few homes were destroyed and (re)build in record time. In the meantime, people were sheltered *in situ* at Makukhanye (personal communication, 2018).

S section residents experience a variety of issues with regard to the quality of their livelihoods and to general safety and security within the site – some of the main issues are explored in relation the thematic descriptions of the site.

[6] For a detailed account of the storyline and of the role of this structure for the settlement refer to the thesis of Dr. Sara Altamore "Living apart: pratiche di urbanizzazione in territori contesi. Il caso di Cape Town." IUAV Venezia, 2020. More recently, during the covid-19 pandemic and the strict lockdown, Makukhanye provided a space for cooking meals for the community – confirming its role as a community centre of reference.

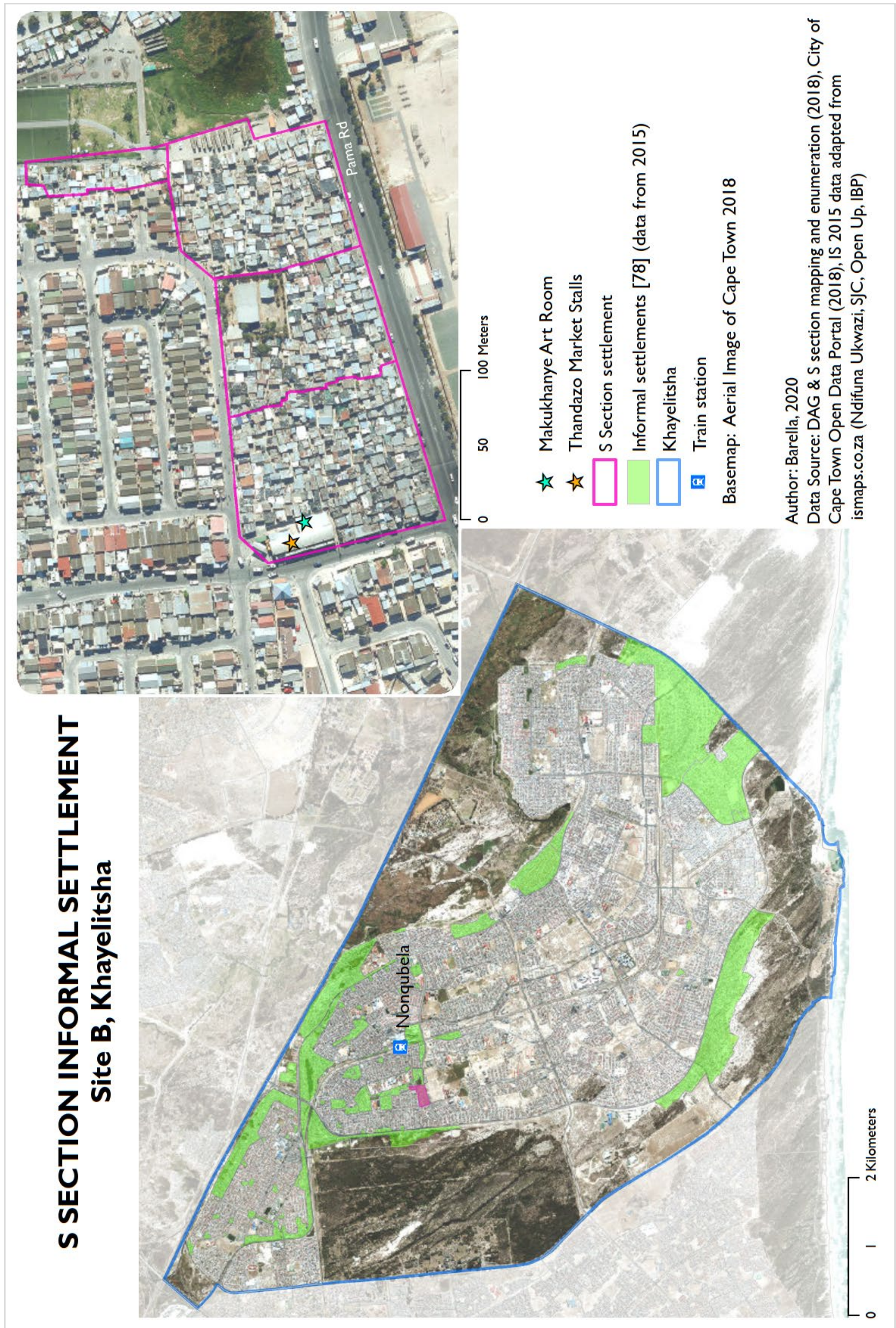


FIGURE 13 Map of S section within Khayelitsha township

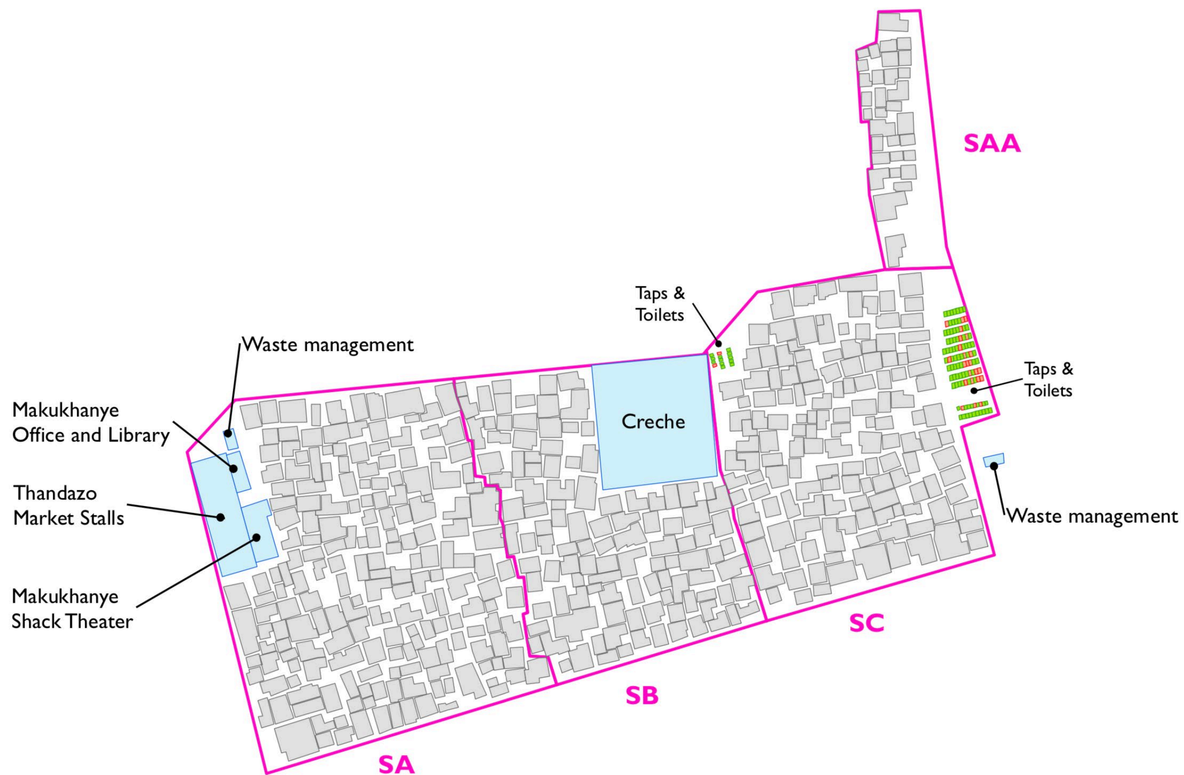


FIGURE 14 S section layout [Participatory Mapping and enumeration, DAG & Section, April 2018]

1.4.4.3 Land ownership and zoning

The site has different land use zoning like most other informal settlement. S section settlement is located on five different parcels of government land, mostly declared Community 1, Utility or Open Space in terms of zoning description (see ANNEXE 2). Internally S section settlement is divided into four subunits SA, SB, SC and SAA that were used as a reference for conducting and verifying the mapping and enumeration. As per the Cape Flats district plan the soil type of the area is regarded as greyish, sandy and excessively drained. There is little vegetation found in the settlement and the plant life is mainly grass. There is very poor drainage and ponding most likely happens during the winter season. As a matter of fact, flooding risk is amongst the top priorities that residents wish to see addressed at the settlement level (Household survey, DAG, 2018). The structures were developed under conditions of informal land tenure and most of the residents prove their tenure through the community register (or community book, or community file – as shown in Figure 15). The 78,6% of households declared being registered on the housing waiting list – of which most were living on a monthly income below R3500.

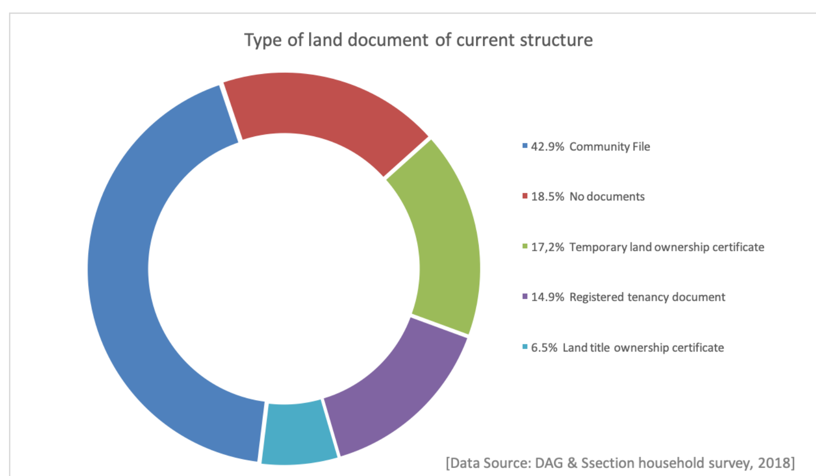


FIGURE 15 Extract of data from S section household survey conducted in 2018 (DAG & S Section)

1.4.4.4 Water and sanitation

The base standard set by the City of Cape Town for the arrangement of toilets framework and service is of a ratio of five households per toilet. S section has 114 flush toilets within the settlement, which aligns with the minimum suitable ratio. However out of all of 114 toilets, 89 of them only were functioning and 25 of them were unsuitable for use and/or broken. The quality and location of sanitation is ultimately linked to safety concerns in the settlement. Except for the toilet available at the Makukhanye Art Room and formal market stalls on the perimeter of the settlement, the other toilets are clustered in SC sub-section in the upper-eastern area of the settlement. Therefore, most residents have to walk up to about 300m across the settlement in order to use those facilities as well as to access public water taps. One of the big issues with regard to the 'walk to the toilets' comes during the night. The site is reported to be a high haphazard area for crime at night – in particular with regard to young people and women. Also, as testified by some residents, it is quite a challenge for old people to see and walk at night to get to these toilets. As in many other settlements, some of the residents use buckets during the night and empty the buckets in the morning because they do not consider the site safe for going out when it is dark. Amongst the reasons for this insecurity residents have mentioned fear of killings, gunshots, gang violence and drug-related violence. Insecurity at night may also be related to the lack of proper public lighting on site. Except for high-mast lights, which are known for creating shady zones of dark in these dense environments more than for illuminating the path, no proper lighting system is in place on S section site[7].

The government also installed taps for the community in the zone adjacent the toilets. Although the distance is just as problematic as for the toilets, access to water is less of a challenge for S Section since there are quite a number of people that have "private taps" in their structures[8].

[7] A very insightful work from Stephanie Briers ETHZ has been conducted in the PJS settlement, Site B, Khayelitsha, with regard to public lighting https://istp.ethz.ch/research/uri/projects/performing-light.html (consulted, Jan 2022). For more info refer to her PhD thesis « Lighting for freedom » (not published yet).

[8] see Barella, 2020a for an anectode with regard to the mapping of water taps.

1.4.4.5 Waste management and Electrification

In S section there are two solid waste containers that were provided for waste disposal. Their location was considered ideal since they are installed at two opposite points of the settlements, both easily accessible. As per the City of Cape Town requirements for solid waste containers, it is required that there is one container for every 400 households. Given the total households of S section community, the minimum requirements are met and exceeded. Nevertheless, pollution is still one of the major challenges on site. Especially during the summer heat, the bad smells are considered excruciating by those living close to the sites. Also residents express their concerns with children falling sick after playing in proximity of the dumpster spots which are in the open air and easily accessible (Figure 18).

According to the results of the household survey of 2018, the majority of the houses in the area have their own pre-paid electricity box. Just a few residents had to have an arrangement with their neighbours in order to share a pre-paid electricity. Many of the people in the settlements still use open flames (mainly paraffin or gas) as source of energy for cooking. This is known to represent a serious danger for the health of the households' members and eventually of the whole settlement. At the household level, non-electric fuels are the main source of indoor air pollution and are directly linked to severe respiratory illness – amongst confounding factors, notable are the inherent toxicity of fuels' fumes and the fact that informal dwelling are poorly ventilated[9]. At the neighbourhood level, these open flames solutions contribute towards keeping the risk of fires still active in the area.

1.4.4.6 Local organisations

Information related to local organisations, leader committee and people's relation to local political actors in the area were collected through the household survey. Nevertheless, this information is not reported in this quick profile, since data was not verified or further utilised by the NGO (as far as I know). On the one hand, this is a missing element of this research's analysis. On the other hand, the lack of said information is perhaps also symptomatic of the way the organisational aspects were tackled within the PME project.

[9] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6406283/

FIGURE 16 Thandazo market stalls – some great fish and chips!

FIGURE 17 Thandazo Market Stalls

FIGURE 18 Waste management point at Kusasa rd crn Bida Crescent, Makukhanye Art Room (on the left-hand side) and Thendazo Market Stalls (on the right-hand side)

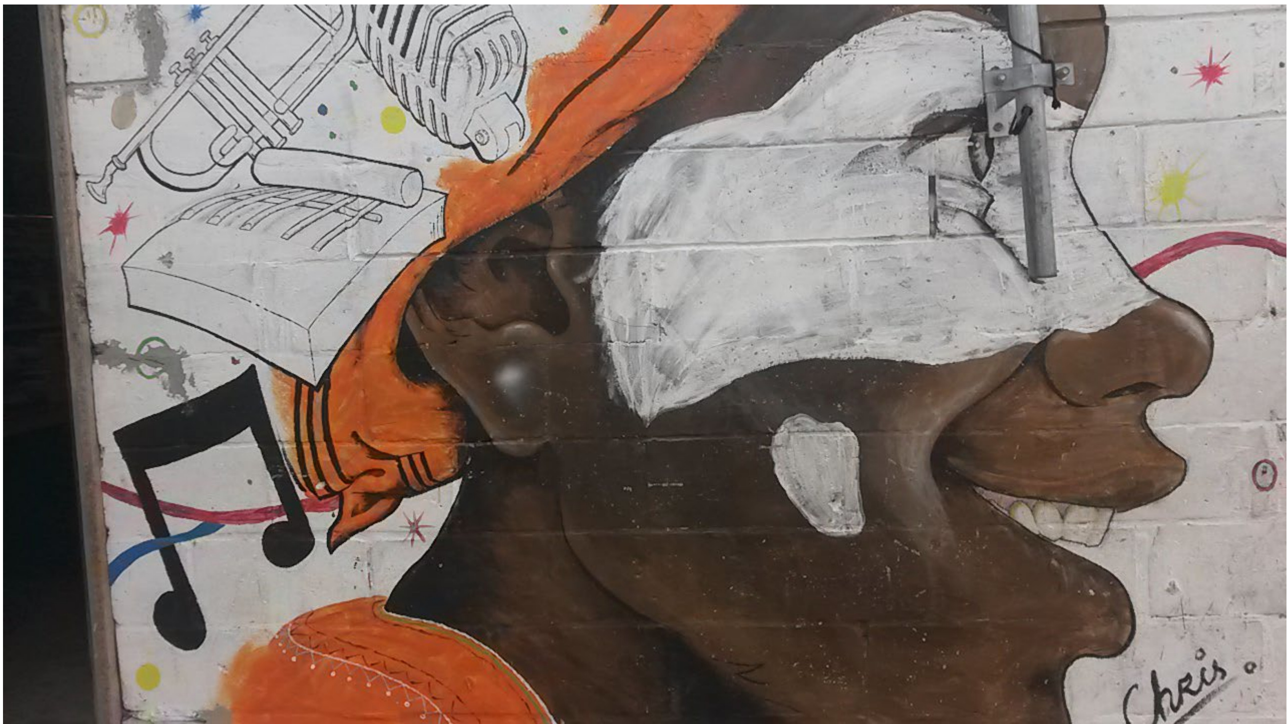


FIGURE 19 Drawings on the walls of the Library and Offices of Makukhanye Art Room [JB, 2018]

FIGURE 20 Mapping workshop at Makukhanye Offices – DAG members Sihle Mtuna (standing at the center of the picture) Sizwe Mxobo (black t-shirt) [JB, 2018]

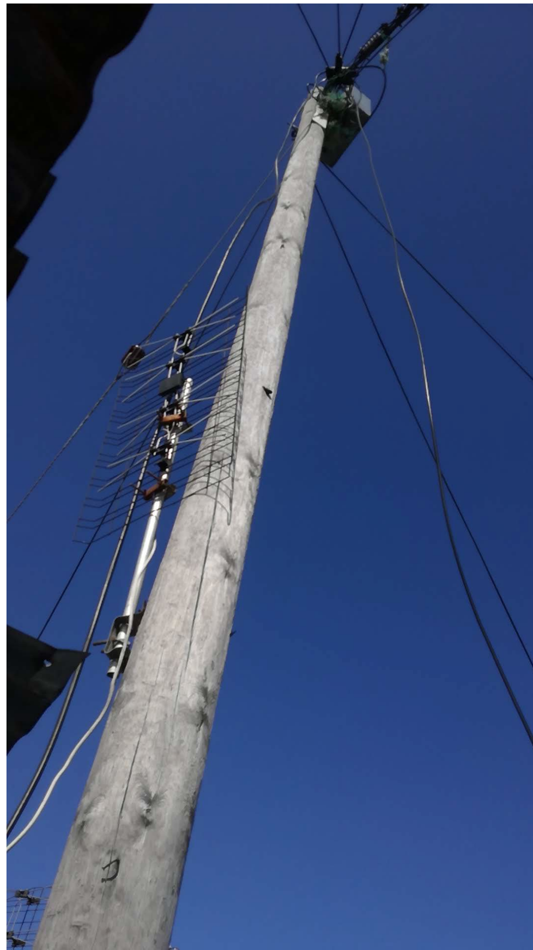


FIGURE 21 Electrical spiderwebs [Altamore S, 2019]

FIGURE 22 CoCT taps and toilets in the SC sub-section [Altamore S, 2019]

FIGURE 23 SC structures with improvised water tap connection [JB]

FIGURE 24 Tortuous paths created by the shacks layout on sandy soil [JB]

FIGURE 25 SAA shack that is both residential and working place (taylor) [JB]

FIGURE 26 Fire outbreak in S section [DAG, December 2018]

FIGURE 27 Example of gardening in SC [JB]

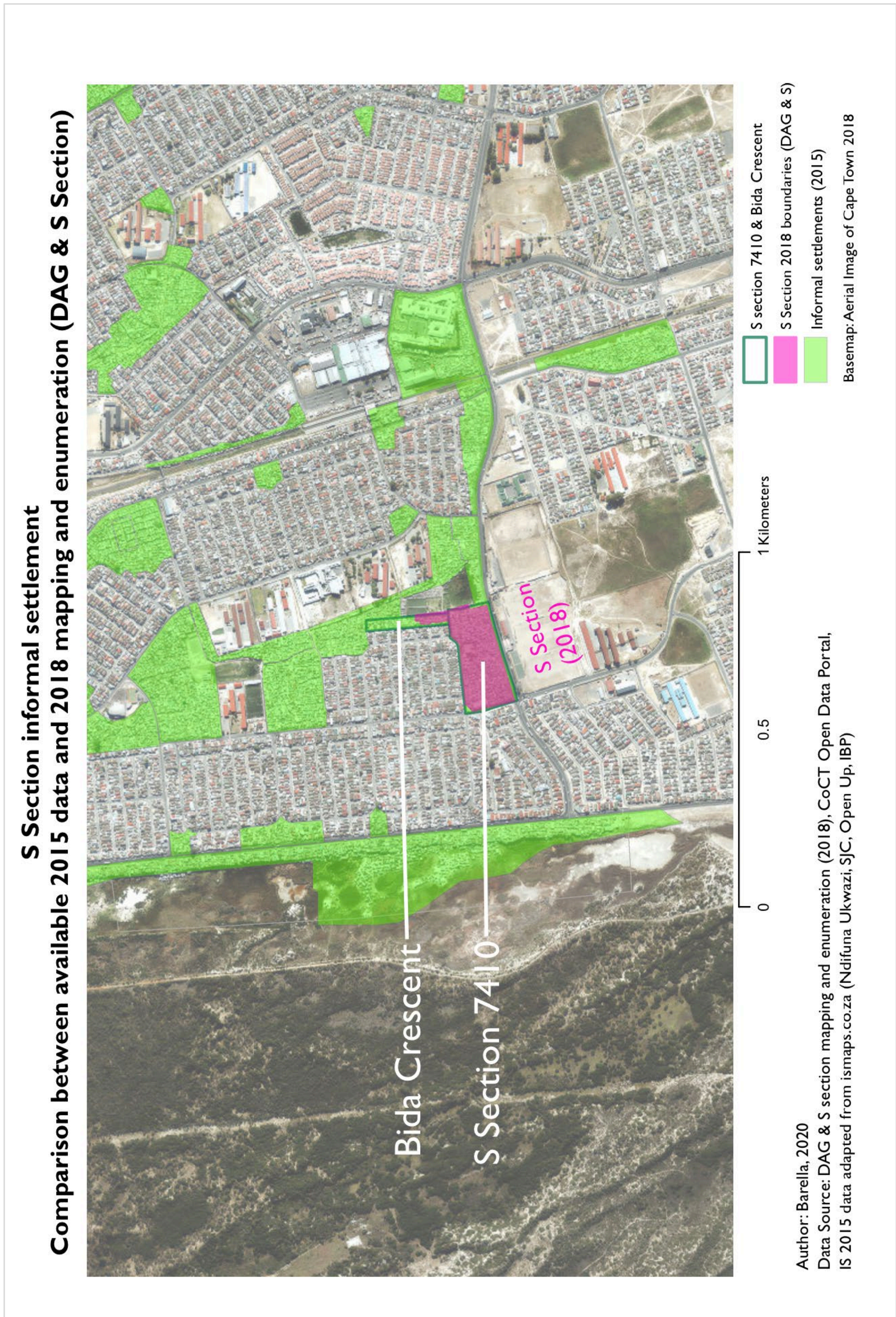
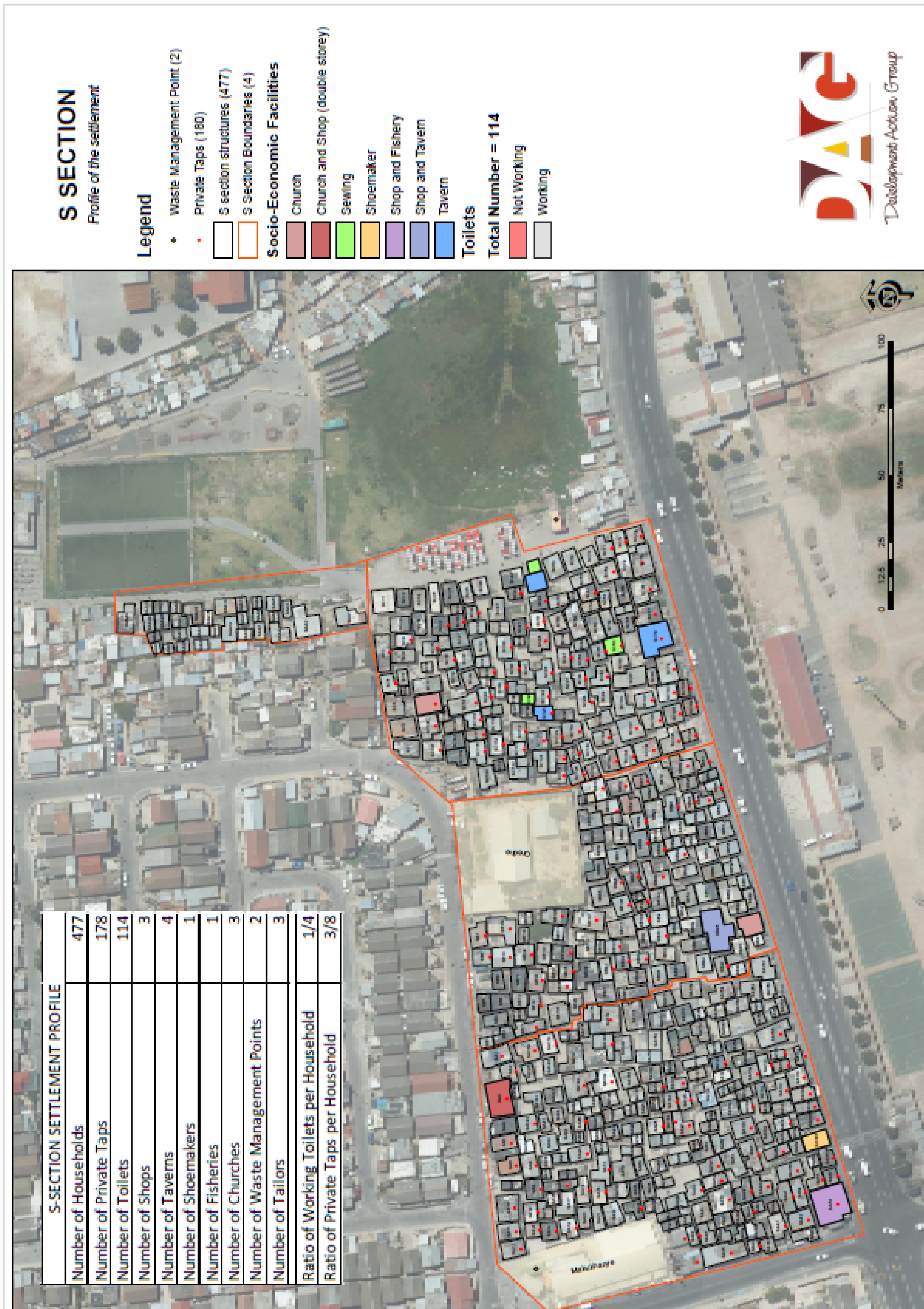


FIGURE 28 S section boundaries comparison between "official" data and post participatory mapping and enumeration boundaries



S-SECTION SETTLEMENT PROFILE	
Number of Households	477
Number of Private Taps	178
Number of Toilets	114
Number of Shops	3
Number of Taverns	4
Number of Shoemakers	1
Number of Fisheries	1
Number of Churches	3
Number of Waste Management Points	2
Number of Tailors	3
Ratio of Working Toilets per Household	1/4
Ratio of Private Taps per Household	3/8

FIGURE 29 S section profiling map (partly unverified data of 2018)

2. ARTICLE 1

Ramener la justice sociale au centre de la carte : propositions pour un renouvellement critique de la cartographie participative axée sur l'empowerment

Barella Jennifer

2020

Geographica Helvetica

75, 271–284

https://doi.org/10.5194/gh-75-271-2020 (open access)

ABSTRACT

This paper discusses the need for a deeper critical interrogation of participatory mapping (PM) method as a tool for social justice. This stance is informed by the author's involvement in a NGO and community-led PM project in an informal settlement in Khayelitsha (Cape Town, South Africa). The paper argues that academic PM literature is ill-equipped to truly examine its potential for social justice. Firstly, this is due to the PM empowerment framework having shifted from an emancipatory aim to a governing tool. Secondly, this shift does not allow for the consideration of the power relations inherent to PM to be engaged with. This paper concludes by engaging the three epistemological and postcolonial roots of PM in order to provide a starting point for (re)centering PM on social justice.

Ramener la justice sociale au centre de la carte : propositions pour un renouvellement critique de la cartographie participative axée sur l'*empowerment*

Barella Jennifer

2.1 Introduction

La question de l'empowerment lié à l'utilisation d'informations géographiques produites de façon participative est de plus en plus importante dans tous les pays qui mobilisent ces technologies en tant que levier de développement urbain et outil pour la justice sociale.

Dans les villes du Sud global une grande partie de la population urbaine vit dans des conditions d'habitat précaire et de marginalisation. Celles-ci sont notamment caractérisées par un manque d'accès aux principaux services, une forte vulnérabilité face aux risques naturels, aux expulsions, aux délocalisations forcées et aux insuffisances des programmes de logement social. Ceci est lié avant tout à un manque de reconnaissance politique de la légitimité du « droit à la ville » de ces populations, mais également à un manque de connaissances stratégiques et de données concernant leurs conditions de vie (Parnell and Pieterse, 2014; Roy, 2011). Les initiatives qui visent à l'amélioration des conditions de vie de ces habitant.es précaires et à leur reconnaissance politique se heurtent en effet, presque systématiquement, au manque d'informations sur ces lieux, ces populations et leurs dynamiques. De ce fait, la production participative de l'information géographique à l'aide d'outils cartographiques et de Systèmes d'Informations Géographiques (SIG) constitue un moyen privilégié pour exprimer des revendications territoriales et de développement (Appadurai, 2000; Elwood, 2008).

On assiste aujourd'hui à une diffusion importante et à une standardisation de ces méthodes à l'échelle internationale. Mais, que reste-t-il en terme d'empowerment, en particulier lorsque les objectifs de ces projets ne sont pas atteints ou lorsque les projets tombent dans une impasse ?

Pour répondre à cette question, l'article partira d'une expérience de cartographie participative menée en 2018 dans la ville du Cap, en Afrique du Sud. La première section présentera la mise en œuvre de ce projet en insistant sur les raisons qui ont conduit à son apparent échec. En effet, le plan d'aménagement conçu sur la base de cette cartographie ne verra vraisemblablement pas le jour. Cependant, d'autres dynamiques sur le plan à la fois social et politique sont apparues au cours de cette expérience. L'échec du projet est donc peut-être plus lié à un mauvais ajustement de la grille d'analyse qu'à une inefficacité de l'opération de cartographie en elle-même. La suite de l'article explore alors de manière critique les outils conceptuels autour de la notion d'empowerment que la méthode « cartographie participative » permet de mettre en évidence, à la fois de manière théorique et opérationnelle. Afin de réconcilier la cartographie participative avec une approche plus critique des jeux de pouvoir qui la sous-tendent, la seconde section de l'article reviendra sur l'histoire de

cette pratique – du Participatory Rural Appraisal dans le Sud global à l'aménagement participatif dans le Nord global – et montrera que l'analyse du potentiel émancipatoire de ces pratiques a été progressivement abandonnée en faveur de leur emploi comme outil de gestion et de « gouvernance néolibérale » (Bacqué et Biewener, 2013). Pour finir, l'article retracera les enjeux émancipatoires des méthodes participatives de cartographie qui peuvent être retrouvées dans trois sources épistémologiques – la critique de la raison cartographique, la critique de l'Etat développementaliste et les approches STS postcoloniales – et convergent vers la recherche de justice sociale par le biais de la critique postcoloniale.

2.2 L'échec d'un projet de cartographie participative à Khayelitsha (Afrique du Sud), problèmes de méthode ou biais d'analyse ?

Dans le cadre de la recherche-action à laquelle j'ai participé en 2018, j'ai travaillé pendant cinq mois pour Development Action Group (DAG), une organisation non gouvernementale (ONG) basée dans la ville du Cap en Afrique du Sud. Depuis 1986, et donc bien avant la fin de l'apartheid, l'ONG soutient les collectivités locales dans leurs revendications de droits politiques et spatiaux, notamment au moyen de programmes de formation en leadership, d'aide au logement social et de développement des quartiers informels. Un de ses slogans met la dimension émancipatoire au centre « Empowering people to create change since 1986 ».

Mon rôle au sein de DAG était d'aider à la mise en place d'un projet pilote de cartographie et de recensement participatifs dans le quartier informel nommé « S section » dans le township de Khayelitsha. Plus, précisément, j'étais en charge de digitaliser la collecte des données spatiales et sociodémographiques au moyen d'applications SIG de collecte de géo-données, ainsi que d'animer les ateliers de formation pour les cartographes volontaires de S section et de les accompagner dans les étapes cartographiques et de recensement. Cette participation active m'a permis de faire simultanément de l'observation participante et de mener des entretiens semi-directifs avec divers acteurs locaux – avec les membres d'ONGs travaillant dans le même secteur que DAG, avec des habitant.es de S section ainsi qu'avec des fonctionnaires du gouvernement de la municipalité du Cap et de la province du Western Cape.

La communauté de S section est composée d'environ 700 habitant.es. Depuis plusieurs décennies, elle est installée sur une surface qui s'étale sur trois parcelles cadastrales différentes. A l'époque du projet, elles appartenaient toutes à la municipalité du Cap, mais n'étaient pas toutes légalement constructibles. Le quartier, hérité de la ségrégation urbaine issue de l'apartheid, est entouré par des habitations formelles et dépend politiquement et fonctionnellement de l'aire métropolitaine du Cap. Comme de nombreuses autres poches de pauvreté urbaine, il est caractérisé par des structures d'habitat et d'installations sanitaires précaires et insuffisantes pour garantir des conditions de vie saines et dignes pour les résident.es – au sens des objectifs d'Habitat III (UNHabitat, 2017) – ainsi que par une forte pauvreté, de nombreux problèmes de sécurité et un taux de chômage élevé.

Comme de nombreux projets de cartographie participative, le travail s'est déroulé en deux étapes principales, qui visaient à récolter des données spatiales d'une part et socio-économiques d'autre part. La première étape consistait à cartographier les maisons informelles (shacks) et les infrastructures sur le terrain, par une comparaison d'images aériennes avec l'existant, en se rendant sur place. Une cartographie manuelle était réalisée à partir de relevés de terrain, puis les informations étaient numérisées à l'aide de SIG. La deuxième étape était celle d'un recensement des résident.es au moyen d'un questionnaire sociodémographique élaboré ad hoc par l'ONG en collaboration avec les résident.es. Ce dernier était rendu disponible au moyen d'une application pour tablettes et smartphones, et également réalisé sur la base de SIG.

Ce protocole de recherche a permis la production d'une représentation cartographique du quartier, le recensement des aménités et services publics, ainsi que la création d'un registre des habitant.es et de leurs conditions financières et d'emploi. Ce profiling était nécessaire afin d'établir une image de base de S section, de repérer qui était potentiellement bénéficiaire de subventions gouvernementales pour le logement[10] et de documenter les secteurs lacunaires en matière d'investissements publics. S'appuyant sur cet état des lieux cartographique, l'objectif premier du projet était de soutenir les revendications d'accès au logement social et à la propriété foncière des résident.es de S section face à la municipalité du Cap. Le but du projet était donc d'aboutir à un empowerment de la communauté par le biais de l'acquisition de droits fonciers et de meilleures conditions de logement – un empowerment distributif au sens de la littérature sur la cartographie participative (Elwood, 2002). Pour ce faire, le processus participatif a débouché sur l'élaboration d'un plan de développement intégré du quartier permettant à la fois de reloger chaque résident.e in situ, d'aménager de l'espace public et de respecter les quotas d'accès aux typologies de logement gouvernemental. Sur la base du plan, il était envisagé de tenir la municipalité responsable de ses politiques d'aménagement et de rendre prioritaire l'intervention urbaine à S section. Cependant, les négociations se sont rapidement trouvées dans une impasse à cause de l'impossibilité de trouver un accord entre les acteurs – le leadership de S section, l'ONG et la municipalité du Cap. Aggravé par l'incapacité de la communauté locale elle-même à s'entendre en interne, ce blocage a finalement amené l'ONG à abandonner le projet – comme l'explique rétrospectivement un collaborateur de l'ONG « one of the reasons why we've actually decided not to pursue the S section thing anymore is because there was no tangible outcome that could happen from this [mapping and enumeration project] » (Entretien personnel, juin 2019). On peut donc se demander ce qu'il reste de

[10] En Afrique du Sud, depuis l'entrée en vigueur du cadre de politiques socio-économiques du Reconstruction and Development Programme (RDP) postapartheid, les foyers disposant d'un faible revenu ont le droit d'accéder à une propriété ou à des logements fournis par le gouvernement. Le type de logement auquel les foyers auront accès dépend de leur niveau de revenu. Cependant, dans la pratique, le droit au logement des citoyen.nes sud-africain.es les plus démuni.es se traduit souvent par une longue attente, exacerbant les difficultés de leurs conditions de vie (Oldfield and Greyling, 2015). Les foyers tendent donc à trouver des solutions alternatives pour gagner en visibilité et accélérer les interventions sur leur cadre de vie. Comme pour S section, s'organiser au niveau social en demandant l'appui d'ONG locales est une stratégie couramment employée dans la région du Cap.

l'objectif du projet – « Empowering people to create change », un des slogans de l'ONG – malgré l'échec de la mise en application pratique de ce plan.

La réponse n'est pas évidente. Dans la littérature scientifique existante, les projets de cartographie participative qui ont échoué sont rarement relatés, et leur apport aux collectivités locales en termes d'empowerment reste peu abordé. Les études qui traitent du potentiel d'empowerment de la cartographie participative ne proposent ni n'appliquent une conceptualisation claire de cette notion. Comme le remarque Elwood (2002), ces études n'interrogent pas réellement la diversité des raisons et des conditions dans lesquelles un tel projet aboutit effectivement à des formes d'empowerment des participant.es, et, surtout, elles associent presque systématiquement l'empowerment à l'aboutissement des objectifs des projets. Si l'on reprend cette approche, l'expérience conduite à S section n'aurait pas produit l'empowerment souhaité en raison de l'absence de mise en application des préconisations du plan de développement, et donc en raison de l'absence de réponse concrète aux revendications d'accès au logement. Par ailleurs, aucune réflexion autour de l'idée d'un disempowerment ou d'une instrumentalisation de ces projets n'a été proposée.

En revanche, de tels projets participatifs sont de plus en plus fréquents et exigent des efforts importants – du point de vue individuel, collectif et organisationnel. Ils impliquent un engagement sur le long terme, des investissements parfois onéreux, de nombreuses ressources humaines et techniques, la mise en place de collaborations, l'apprentissage de compétences variées, etc. Inévitablement, les impacts de ces projets sont bien plus importants et immédiats que leur seule visée finale. L'empowerment est incarné dans des acteurs et se manifeste de manières variées. Par exemple, dans le cas de S section, le projet cartographique a notamment été utilisé par les habitant.es comme espace de formation, de recherche d'emploi, comme plateforme pour gravir les échelons du leadership local, comme espace pour profiter de la technologie à des fins personnelles ou pour obtenir une rétribution, etc. Cet espace a été également utilisé par le leadership du quartier et par certains fonctionnaires des sub-councils pour faire de la propagande politique, pour acquérir des informations sur des tiers, etc. Parallèlement, pour l'ONG ce projet était une opportunité pour tester sa capacité d'innovation, pour former son personnel à l'utilisation des SIG, mais aussi pour créer des coalitions entre ONGs et collectivités informelles, et pour dévoiler les agendas politiques intéressés des politiciens locaux, etc.

Or, sans un recentrement autour de la question de la justice sociale par le biais d'une conceptualisation de l'empowerment (en tant que redistribution de ressources et remise en question des rapports de domination), ces aboutissements et détournements gravitant autour de la cartographie participative ne peuvent pas être restitués ni analysés. Passer à côté de ces observations équivaut à passer sous silence les conditions dans lesquelles les luttes pour une justice sociale et spatiale se négocient par, pour et avec les populations les plus démunies ou marginalisées. Ces limites rencontrées lors d'une expérience de terrain, justifient l'urgence d'interroger davantage le cadrage théorique de ces méthodes.

2.3 La cartographie participative et l'empowerment, histoires d'une dépolitisation

Cette section présente la cartographie participative et la notion d'empowerment, puis aborde la manière dont l'empowerment est traité dans la cartographie participative pour la justice sociale.

2.3.1 La cartographie participative, une discipline d'étude et un outil de développement à l'intersection de théories, pratiques et contextes

La cartographie participative est l'union de la pratique cartographique et des méthodes participatives. Il s'agit d'un outil méthodologique et épistémologique qui vise une transformation sociale par le biais de la production et de l'utilisation collective et partagée d'information spatiale – dans ses formes variées. La cartographie participative revendique une méthodologie inclusive et décentralisée de la production de l'information géographique[11] (Chambers, 2006). Sous cette appellation générale sont regroupées toute une série de pratiques collectives, allant de l'élaboration de croquis cartographiques, à la récolte de données spatiales pour le profiling des communautés[12] (Appadurai, 2012; Cochrane et al., 2014; Day et al., 2007), à la création de plateformes web ou d'applications avec des interfaces cartographiques (Hagen, 2017), à l'analyse d'images satellitaires (Dennis et al., 2005; Nora and Niina, 2009), etc. – comme le montre aussi le cas de S section à Khayelitsha. Ces méthodes sont opérationnalisées par de nombreux acteurs – chercheurs et chercheuses universitaires, acteurs étatiques, agents internationaux du développement et de plus en plus d'acteurs non-étatiques comme les ONG – et dans des domaines variés – comme le développement, l'aménagement du territoire, la gestion des risques environnementaux et la gouvernance urbaine.

Afin de comprendre les inégalités socio-spatiales et de trouver une manière d'y répondre, la géographie a largement questionné l'imbrication entre espace et pouvoir – par exemple à travers des travaux de Alain Reynaud (1981) et David Harvey (1973). Puisque justice sociale et spatiale sont intimement liées (Lefebvre, 1974; Soja, 2009), la cartographie participative est un bon outil pour renouveler les méthodes de recherche car elle se positionne à l'interface entre pratique et théorie. Avant de devenir un objet et une méthode de recherche, la cartographie participative a vu le jour dans le domaine du développement rural et de la gestion des ressources naturelles dans les pays du Sud global (Chambers, 2007). Les prototypes de ces méthodes sont formalisés par Robert Chambers dans les années 1980 dans le cadre du Participatory Rural Appraisal

[11] Comme le montre Hirt au sujet des cartographies autochtones, les pratiques d'élaboration collective et participative des savoirs géographiques en tant que telles ne sont de loin pas un phénomène récent (Hirt, 2008). Certaines formes particulières uniquement ont été documentées et formalisées en tant que méthodologies et pratiques de la discipline cartographique dans les quatre dernières décennies seulement. C'est de ces dernières pratiques que traite cette publication.

[12] Par community profiling on entend une méthode pour établir une image « de base » de la communauté concernée en recueillant un set de données spécifiques sur une série de facteurs variés (Banque Mondiale).

(PRA). Le PRA regroupe une série de méthodes qui permettent aux participant.es d'agir sur leurs conditions de vie par la production et la valorisation de leurs connaissances sur le territoire afin de répondre à des problématiques qu'elles ont elles-mêmes identifiées. La production et l'utilisation de l'information spatiale, le plus souvent sous forme cartographique, sont un outil central de ces méthodes. Dans les premières expérimentations, cette approche cartographique était utilisée par les expert.es en tant que manière de « débroussailler le terrain d'étude » et de collecter des « informations référentielles sur le territoire » à l'aide des populations qui y habitent (Burini, 2012). Elle a rapidement évolué vers une méthode d'action participative qui permet aux populations les plus démunies ou marginalisées de prendre le processus en main, de revendiquer la connaissance produite et de guider les priorités des projets de développement dans un but d'auto-détermination (Burini, 2012 ; Chambers, 2006). Les sources principales de la cartographie participative en tant que discipline d'étude peuvent être identifiées dans la cartographie critique, les études du développement et, plus récemment les Science and Technology Studies (STS) appliqués à la cartographie et aux SIG (cf. Sect. 4).

La transformation du rapport de pouvoir entre expert.es et populations locales (Burini, 2012) et l'entrée dans l'époque du numérique (Castells, 1999), sont parmi les principes qui ont contribué au succès de ces pratiques. La reconnaissance de l'expertise des individus et des collectifs sur leur propre territoire, introduite par le PRA, – par opposition à la valorisation de l'expertise du chercheur cartographe uniquement – encourage les méthodologies participatives et l'engagement des chercheuses et chercheurs dans l'action sociale. Les recompositions politiques majeures engagées dans les décennies précédentes, comme les luttes pour l'indépendance des pays colonisés et les transitions démocratiques, poussent davantage à questionner l'inclusion des citoyen.n.es dans les débats publics et les manières dont leurs revendications peuvent remonter vers la sphère publique du gouvernement. C'est dans ces contextes que Peluso (1995) désigne par le terme « contre-cartographie » (counter-mapping) toute production et utilisation de la cartographie où l'information géographique ne représente pas les intérêts des élites mais exprime les revendications des populations marginalisées en vue d'obtenir des changements sociaux.

L'importante diffusion de la cartographie participative à partir des années 1990 s'explique par deux facteurs convergents concernant les innovations technologiques. Premièrement, les nouvelles technologies de l'information géographique (les SIG, le GPS et les logiciels d'acquisition d'images satellitaires) ont diversifié les formes du savoir géographique et renforcé la propagation de ces pratiques. Par exemple, le champ des SIG participatifs émerge dans la seconde moitié des années 1990 et s'insère entre autres dans la filiation de la cartographie participative (Dunn, 2007; Harris and Weiner, 1998). Le rôle des SIG d'abord et du Geoweb ensuite, qui numérise et permet la diffusion en ligne de données géographiques, ont tout particulièrement façonné les analyses et les applications de ces méthodes (Crampton, 2011). Notamment, depuis les années 2000 les initiatives collaboratives menées par les contributeurs de OpenStreetMap, pour combler les lacunes

en matière d'information géographique dans les pays du Sud global, sont également analysées au prisme de la cartographie participative (Pánek, 2011.).
Deuxièmement, la démocratisation des techniques de l'information et de la communication (TIC) – l'accès aux équipements informatiques et à Internet – est présentée par les organisations internationales en tant qu'opportunité pour impulser un développement (Dakouré, 2014) et pour implémenter davantage d'initiatives de cartographie participative. En effet, la production d'information géographique pour représenter les savoirs et les conditions de vie des populations les plus démunies ou marginalisées est devenue l'une des techniques participatives les plus répandues parmi celles élaborées par les agences internationales de développement, puis par les ONG locales, en faveur d'une réduction de la pauvreté dans les pays du Sud global (Burini, 2012).

La cartographie participative a donc connu un essor considérable dans des contextes géographiques divers et au service de projets sociétaux différents. De même, la littérature rassemblée sous la dénomination de « cartographie participative » étudie en réalité différents modes de production des informations spatiales (Chambers, 2006). Les recherches sont largement façonnées par les travaux sur les SIG et notamment par la société du centre de recherche nord-américain NCGIA (National Centre for Geographical Information and Analysis). C'est donc dans le Nord global que ces méthodes ont principalement été théorisées – par opposition à leur contexte d'émergence et à leur immense multiplication dans les pays du Sud global (Mukherjee, 2015; Radil and Anderson, 2019).

Cette disjonction géographique illustre bien le clivage épistémologique mis en exergue par Jennifer Robinson (2006) qui distingue études urbaines dans le Nord global et études du développement dans le Sud global. La littérature existante sur la cartographie participative se divise en effet en deux catégories : les théories et études de cas portant sur des initiatives de développement dans le Sud global d'une part, et celles issues des études urbaines et de l'aménagement dans le Nord global d'autre part (Brown and Kyttä, 2014; Radil and Anderson, 2019). Dans les cas issus du Nord global, la cartographie participative se greffe aux débats autour de la participation dans le cadre de l'aménagement urbain et, plus récemment, dans le champ d'étude des savoirs citoyens (citizen science) (Thompson, 2016). Ces travaux se focalisent davantage sur des expériences institutionnalisées, qui se déploient sous le contrôle de l'autorité politique qui les promeut (Radil and Anderson, 2019). Dans les cas issus du Sud global, en revanche, les premières études datent des approches PRA et étaient focalisées sur la gestion des risques et l'évaluation des vulnérabilités dans des contextes ruraux (Mukherjee, 2015). Enfin, dans les pays du Sud global plusieurs initiatives de cartographie participative sont promues par des organisations non gouvernementales (ONG) ou des groupes d'activistes qui travaillent pour les collectivités locales.[13]

[13] Cette rupture entre contextes géographiques s'applique moins à la littérature sur les cartographies en contexte autochtone. D'une part, par peuples autochtones la littérature se réfère à une catégorie politique et juridique élaborée au sein des Nations Unies et qui s'écarte de la distinction entre Nord et Sud globaux (Hirt, 2008; Lerch, 2014). D'autre part, cette littérature demeure plus ancrée,

2.3.2 La notion d'empowerment, de la perspective émancipatoire à l'outil néolibéral

La notion d'empowerment devient centrale dans les années 1990 et 2000 et marque de manière importante les études et pratiques de cartographie participative. En revanche, cette notion sera graduellement dépolitisée par son instrumentalisation au sein de politiques de développement et de réduction de la pauvreté.

D'après Bacqué et Biewener (2013), la notion d'empowerment trouve ses racines dans les luttes du mouvement des droits civiques aux Etats-Unis. Elle se diffuse dans les années 1970 par le biais de la société civile et des mouvements militants féministes, antiracistes et postcoloniaux aux Etats-Unis et en Asie du Sud en particulier – notamment par les travaux de Barbara Bryant Solomon (1987) et Lorraine Gutiérrez (1990). Elle est ensuite adoptée par les universitaires pour identifier de nouvelles approches en rupture « avec des modalités d'intervention considérées comme paternalistes, hiérarchiques et inégalitaires » (Bacqué and Biewener, 2013 : 8). Cette rupture s'accompagne d'un renouveau des méthodes de recherche, qui se veulent participatives afin de permettre un engagement explicite entre recherche et action sociale (Schurr and Segebart, 2012). Dans ce même tournant, la cartographie participative s'affirme en tant que processus participatif de recueil de données et de recherche-action.

L'empowerment est à la fois une approche qui a une visée de justice sociale, et un cadre théorique qui étudie les modalités pour y parvenir. Par empowerment on désigne à la fois un état et un processus d'accroissement des capacités d'un individu ou d'un collectif à s'autodéterminer et agir sur sa vie (Sen, 1999). Le terme indique une approche du développement et du changement social, et s'applique au niveau individuel, collectif et politique (Abbott, 2003; Alkire, 2001; Friedmann, 1992; Zimmerman, 2000). Le niveau individuel, ou psychologique, est le plus largement étudié, notamment grâce aux contributions de la psychologie communautaire (Zimmerman, 2000). Il fait référence aux compétences intra-personnelles, comportementales et cognitives d'un individu – comme la perception de soi, les compétences, la capacité de comprendre les intentions d'autrui et la volonté d'exercer un contrôle sur sa vie – et se focalise sur la construction d'une « conscience critique » et d'une capacité d'action autonome et programmatique (Gutiérrez, 1990). Le niveau collectif, ou organisationnel, représente la dimension interpersonnelle de l'action et désigne la capacité de « s'organiser avec » et « d'agir sur » – ce qui s'appose à la fois aux individus (création d'un collectif) et aux groupes sociaux partageant des objectifs (coalition). Enfin, le niveau politique, ou social, relève de la transformation de la société dans son ensemble par le biais de l'action collective (Bacqué and Biewener, 2013). Ces niveaux sont distingués dans un but analytique, mais opèrent de manière interdépendante.

non sans controverses, dans les débats sur la décolonisation et sur les interdépendances territoriales néocoloniales (Hirt and Lerch, 2013).

La notion d'empowerment postule que les problèmes sociaux et politiques découlent d'une répartition inégale des ressources et de relations de domination à et entre ces niveaux. Pour remédier à ce problème, une démarche d'empowerment passe donc par la redistribution des ressources – qu'elles soient matérielles, symboliques ou de pouvoir – et par l'acquisition de compétences, à travers la participation à des activités et actions collectives (Bénit-Gbaffou, 2015; Zimmerman, 2000). L'empowerment ne désigne pas uniquement une transformation individuelle ou collective, mais implique la remise en question des subjectivités et des relations de pouvoir qui sont la cause du différentiel de capacité à s'autodéterminer de certains individus et groupes sociaux (Bacqué and Biewener, 2013). En effet, la notion d'empowerment puise dans la conception poststructuraliste et relationnelle de « pouvoir », tel qu'il est défini à partir des œuvres de Stephen Lukes (1974) et de Michel Foucault (1975). D'une part, le pouvoir est pensé et se manifeste dans la dialectique entre des formes institutionnalisées (structure) et des formes internalisées (capacité d'agir). D'autre part, les capacités d'agir des collectivités et des individus, dépendent de leur subjectivité, qui est modelée et située dans des rapports de pouvoir. Les processus d'empowerment passent donc par la valorisation de la subjectivité du groupe, ou de l'individu, dit « marginalisé » en tant qu'affirmation et exercice de son pouvoir (Bacqué and Biewener, 2013). Dans cette acception, empowerment sous-entend la conception d'un pouvoir génératif – au sens qu'il promeut un changement, qu'il peut être acquis et échangé – par opposition à un pouvoir de domination ou d'autorité. Il représente l'échelon analytique manquant entre l'individu et le groupe social, car il se manifeste dans la relation entre acteurs et dans l'acte de s'organiser – puisque cet acte implique des échanges et des transferts (d'opinion, de compétences, d'argent, de responsabilités, d'autorité, etc.).

Cette visée transformative et émancipatrice requiert une pleine conscience des matrices d'oppression sociale – comme par exemple le genre, la race et la classe – de ce fait, la notion d'empowerment est inhérente aux débats sur la justice sociale. Ces deux termes sont parfois utilisés de manière interchangeable, cependant la justice sociale est à la fois une visée et une dimension centrale de l'empowerment. Dans un but de justice sociale, l'empowerment est un outil conceptuel et analytique qui permet d'appréhender la complexité des rapports de pouvoir et d'aborder structurellement les inégalités sociales.

Dans les années 1990, à travers les organisations internationales, telles que l'Organisation des Nations Unies et la Banque Mondiale, l'empowerment s'impose dans le vocabulaire courant des politiques publiques internationales et nationales de développement – comme le programme Black Economic Empowerment dans l'Afrique du Sud postapartheid, ou encore le programme Empowerment Zones aux Etats-Unis. Cette internationalisation de l'empowerment repose sur deux facteurs principaux. Premièrement, sur la standardisation du lexique politico-administratif des grandes institutions quant aux stratégies de réduction de la pauvreté (Cornwall and Brock, 2005). Deuxièmement, sur une réorganisation des pouvoirs locaux et nationaux par une « modernisation » administrative qui « condui[t] à repenser le rôle des administrés et [met] en avant la responsabilité des individus et l'enjeu de la participation » (Bacqué et al., 2005 in Bacqué et Biewener, 2013 : 14) vis-à-vis de la lutte contre les inégalités. Ceci est clairement visible dans la réorganisation

politique postapartheid en Afrique du Sud, où la participation représente le pilier de l'exercice de la démocratie dans la législation du gouvernement local (Republic of South Africa, 1998).

Dans cette dernière vague, la notion d'empowerment est mentionnée en tant qu'outil de « bonne gouvernance » et est substituée par de nouveaux termes comme, par exemple, participation, citoyenneté et, justement, gouvernance (Bacqué and Biewener, 2013). Dans cette utilisation, la notion se rapproche de la logique gestionnaire néolibérale qui réduit l'empowerment à une mesure participant d'un projet de management de la population. D'après Cornwall et Brock (2005) dans les politiques de développement, ceci revient d'une part à responsabiliser les plus démunis de leur situation et, d'autre part, à considérer les individus comme des citoyens génériques abstraits. Or, cette vision masque les rapports sociaux de pouvoir sous-jacents à la subjectivité et à la rationalité des acteurs, qui sont nécessaires pour comprendre les spécificités des revendications des populations marginalisées. La dualité conceptuelle de cette notion, qui permet de répondre aux inégalités à la fois par la redistribution des ressources et la remise en question radicale de rapports de pouvoir et de domination, se voit réduite à la première visée distributive uniquement.

Ce tournant vide la notion d'empowerment de sa posture émancipatoire, car il l'écarte des courants féministe et postcolonial et de leur ancrage dans la justice sociale qui était au cœur de l'acception originelle de ce concept. Rapidement, cette acception distributive de la justice sociale se diffuse parmi les militants et les ONG qui emploient ce terme dans une visée émancipatoire, certes, mais également en tant que passe-partout pour obtenir les fonds des bailleurs internationaux (Hirt and Lerch, 2013) – contribuant ainsi à dépolitiser le concept. Le mot « empowerment » était récurrent dans les slogans et logos de l'ONG sud-africaine avec laquelle le projet cartographique à S section a été réalisé. Le terme apparaissait de manière très visible sur différents supports de communication : les bannières du site web, les en-têtes du papier à lettre, et même dans les images de profil des groupes Whatsapp – un support couramment utilisé pour coordonner les communications diverses concernant les activités de formation de l'ONG au bénéfice des collectivités. En revanche, son sens et ses implications n'ont jamais été discutés, ni lors d'activités avec les communautés, ni lors de rendez-vous visant à définir la stratégie d'action de l'ONG en interne.

D'un projet radical pour la transformation sociale à un buzzword néolibéral vidé de sens politique (Bacqué et Biewener, 2013 ; Cornwall et Brock, 2005), l'utilisation de la notion d'empowerment a largement mué dans le temps. Ce mouvement sémantique et cette dépolitisation a considérablement impacté les outils méthodologiques et épistémologiques qui empruntent ce terme. C'est notamment le cas de la cartographie participative, une discipline à la croisée entre recherche et activisme social.

2.3.3 Empowerment et cartographie participative pour la justice sociale

Si l'empowerment est un outil conceptuel au service de la justice sociale, la cartographie participative apparait davantage comme un outil méthodologique pour l'atteindre.

La cartographie participative s'est saisie de la notion d'empowerment dans les années 1990 et 2000 de plusieurs façons. La notion est tout d'abord mobilisée dans les débats sur les avantages et limites de ces approches pour les participant.es (Craig et al., 2002; Harris and Weiner, 1998). Mais elle a été aussi mobilisée pour rendre compte de multiples questions plus spécifiques, comme la question des revendications des droits à la terre dans le cas de la cartographie autochtone (Hirt, 2008), celle de la reconnaissance des problématiques des groupes socialement marginalisés (par exemple Freund et al., 2016 et Townley et al., 2016) ou encore celle des luttes pour la reconnaissance et l'aménagement d'habitats précaires (Abbott, 2003) – comme dans le cas de S section à Khayelitsha.

Dans ses recherches d'inspiration féministe, Sarah Elwood rassemble les travaux sur la cartographie et les SIG participatifs qui traitent de la question d'empowerment et propose une catégorisation multidimensionnelle de ce concept en se basant sur les manières dont il a été utilisé dans la littérature. La mobilisation de la notion est courante dans les années 1990–2000, notamment dans la recherche sur le développement communautaire (community development), le militantisme citoyen et l'organisation collective dans le cadre de politiques d'aménagement urbain dans le Nord global (Elwood, 2002). Elwood dégage trois critères analytiques permettant d'évaluer qualitativement le degré d'empowerment de ces méthodes : la transformation distributive (distributive change), la transformation procédurale (procedural change), et le développement de capacités (capacity building).

Premièrement, la « transformation distributive » indique une vision de l'empowerment focalisée sur les résultats du processus qui sont mesurés en relation à une transformation matérielle. Il s'agit notamment des projets de cartographie participative qui ont pour but premier l'amélioration de l'accès à des biens et services et au déblocage d'opportunités de participation à la prise de décision pour des populations marginalisées. C'est le cas des objectifs primaires du projet de S section, qui mobilisait les méthodes participatives de cartographie dans le but de recueillir les informations stratégiques nécessaires à l'élaboration d'un plan d'aménagement du quartier informel. L'implémentation de ce plan de développement in situ, était la visée primaire du processus, à travers de laquelle évaluer la réussite du projet.

Deuxièmement, la « transformation procédurale » définit l'empowerment en tant que changement substantiel dans la reconnaissance de quel savoir spatial est considéré légitime dans la prise de décision. Il s'agit par exemple d'études qui portent sur l'utilisation de cartes ou de données spatiales produites par une population afin d'obtenir un contrôle sur les décisions qui concernent le territoire qu'elle habite (Young, 2012). Le savoir

ordinaire dans ce sens n'est plus seulement rendu visible, mais devient une ressource légitime pour la gestion d'un territoire. De nombreux travaux sur les savoirs spatiaux autochtones (Indigenous Spatial Knowledge) dans le cadre de revendications territoriales correspondent à cette vision émancipatrice de l'information géographique (Hirt, 2008). Or, dans le cas de S section, cette dimension n'était pas valorisée par le rendu final du projet. Conformément à l'objectif final, et afin d'accélérer les interventions sanitaires et l'attribution des logements sociaux pour S section, le projet cartographique a mobilisé une information géographique conforme au langage des aménageurs. De ce fait, la sélection du type de savoir à représenter a été largement influencée par l'ONG. Plus que le savoir ordinaire et les récits des expériences de vie et des problèmes quotidiens des habitant.es, c'est le savoir géographique dans sa forme managériale qui a été privilégié.

La troisième dimension de l'empowerment est le « développement de capacités » qui se définit en tant qu'extension de la capacité des citoyen.n.es et des collectivités à agir pour leur auto-détermination (Elwood, 2002). Il s'agit de la dimension la plus explorée car elle repose sur la vaste littérature sur les différentiels de capacité d'action (agency achievement) des individus et des collectivités (Alkire, 2001 : 31). Cette conceptualisation s'éloigne de l'idée selon laquelle la redistribution du pouvoir serait liée à une concession plus ou moins temporaire émanant d'une autorité – comme il est sous-entendu dans la « transformation distributive ». Au contraire, elle permet d'appréhender les individus et les collectivités en tant qu'acteurs stratégiques. Cette dimension est très importante au vu de la grande diffusion de ces pratiques car elle pose la question de savoir ce qui reste aux individus et groupes au-delà de la production d'informations géographiques. Par contre, si elle est considérée indépendamment des autres dimensions, elle participe à la responsabilisation des plus démunis vis-à-vis de leur situation et omet ainsi la toile de rapports de pouvoir et de domination coloniale dans laquelle ces acteurs stratégiques opèrent (Cornwall and Brock, 2005). Dans le cas de S section, des ateliers de formation pour les habitant.es étaient intégrés au processus de cartographie et portaient sur des compétences diverses (utiliser et produire une carte, demander de l'aide sociale, comprendre les niveaux de gouvernement sud-africain et leur fonctionnement, participer à la discussion sur le budget municipal, etc.). Or, bien que nombreux, ces moments étaient traités par l'ONG comme de simples effets secondaires du projet – il est donc difficile de saisir leurs apports réels en termes d'empowerment.

Elwood (2002) montre que les études traitent de ces trois dimensions émancipatoires à l'instar d'aboutissements finaux des projets. Elle suggère de considérer ces dimensions de manière conjointe et dans leurs interrelations afin de construire un cadre analytique pour la cartographie et les SIG participatifs. Cependant, même à travers ce cadrage il est ardu d'analyser comment et dans quelles conditions ces projets peuvent être véritablement empowering et pour qui, car les dimensions individuelles (ou psychologiques), organisationnelles et sociales, et notamment les subjectivités des acteurs et leurs rapports de pouvoir, se trouvent mélangés, voire leurs imbrications dans les différentes dimensions ne sont pas traitées.

Or, c'est bien au sein des rapports de pouvoir entre acteurs, notamment dans les contextes coloniaux ou de ségrégation, que se définissent les objectifs des projets et donc le type d'émancipation souhaitée, mais également les modalités choisies pour les atteindre (le type d'outil cartographique, les informations qui seront représentées, etc.).

2.4 Retour sur les prémisses de la cartographie participative : la critique postcoloniale

Tout comme pour l'émergence de la notion d'empowerment, les sources épistémologiques de la cartographie participative entretiennent un lien fort avec la critique postcoloniale qui n'est que rarement explicité. Ce lien est retracé ici par le biais des trois origines intellectuelles principales de la cartographie participative qui convergent vers une pratique relativement unifiée – la critique de la « raison cartographique »[14], la critique des études du développement et les approches de construction sociale des technologies – et s'appuie sur des exemples issus du projet sud-africain.

La définition du terme « postcolonial » est largement débattue[15]. Cette entreprise politique et intellectuelle trouve ses origines dans les études littéraires (Bhabha, 1984; Said, 1978). En suivant les définitions de Roy (2016), Hirt (2008) et Anderson (2002), le postcolonial est considéré ici en tant que cadre dans lequel appréhender les phénomènes contemporains sous un angle critique, propositionnel et explicitement inséré dans un débat de justice sociale – au sens de remise en question des rapports de domination. Du point de vue épistémologique, il questionne le problème de l'eurocentrisme concernant tant les savoirs coloniaux que leur héritage (Roy, 2016). Les préoccupations postcoloniales de justice sont intrinsèquement spatiales. Puisque le projet colonial est considéré comme un acte de violence géographique, l'insurrection et les revendications des colonisé.es passent également par une recherche et une restitution de l'espace dont ils/elles ont été dépossédé.es, à la fois matériellement et symboliquement (Jacobs, 1996; Said, 1978). Dans la littérature sur la cartographie participative, ceci revient à identifier et à dénoncer la complicité de la discipline cartographique dans la réalisation de tout projet colonial et par extension de tout projet de domination. Dès leur émergence, les projets de cartographie participative se distinguent par la volonté de penser de manière renouvelée les modalités de production de la connaissance spatiale et en particulier de réfléchir aux conditions dans lesquelles l'inclusion et l'émancipation des populations marginalisées sont possibles.

---

[14] Ce terme est emprunté à Farinelli, F. : La crisi della ragione cartografica, Einaudi, 2009. La « raison cartographique » fait référence à l'influence historique de la cartographie et de ses corollaires dans la lecture du monde propre à la culture occidentale – et qui aurait été imposée aux peuples du monde par la colonisation.

[15] Nous ne souhaitons pas ici simplifier la complexité de cette entreprise intellectuelle, mais nous nous restreindrons à expliciter ce que nous entendons par « postcolonial » dans notre argument.

2.4.1 La critique de la raison cartographique – (in)visibilité cartographique

La critique de la raison cartographique se base sur la reconnaissance de la cartographie en tant que représentation mimétique (Bhabha, 1984) et en tant que construction d'une configuration historique particulière des relations de pouvoir : la représentation géographique n'est que le dessin d'un dessein. La cartographie participative est une réponse aux critiques de la complicité de la cartographie dans les emprises coloniales et impérialistes (Hirt, 2008; Huggan, 1989). Lacarte du colonisateur était un dispositif de hiérarchisation et de normalisation des territoires et des sujets. Elle était l'outil graphique qui inscrivait la rhétorique coloniale sur un espace considéré comme vide et dont on considère qu'il n'a été approprié par personne. Les approches critiques de la cartographie considèrent la carte en tant que « texte culturel », donc en tant qu'élément linguistique, bien que graphique, au service d'une rhétorique de domination (Harley, 1989; Jacobs, 1996). C'est en acceptant l'interprétation textuelle des cartes qu'il est possible de déconstruire la prétention à la neutralité des conventions cartographiques et de montrer qu'elles sont déterminées par des rapports de pouvoir (Harley, 1989; Jacobs, 1996; Pickles, 2006). De ce fait, il devient possible de délibérément s'approprier la question cartographique et de l'utiliser au bénéfice d'un autre type de programme politique. C'est au cœur de cette réflexion épistémologique que la carte acquiert un pouvoir émancipateur qui permet de subvertir les dynamiques d'exclusion et de domination (Peluso, 1995). Comme elle a servi à la création d'un récit, elle permet aussi de l'inverser et d'en raconter un nouveau. Les projets de cartographie participative dans un but de justice sociale postulent que la visibilité cartographique est au centre de la démarche émancipatoire – être sur la carte, c'est exister et réclamer ses droits sur le « vide cartographique ». En revanche, comme le remarquent Choplin et Lozivit (2019) dans leur expérience de cartographie participative dans un quartier précaire de Cotonou (Bénin), les enjeux de la visibilité cartographique sont ambivalents. D'une part, visibilité signifie officialiser les revendications des habitant.es de ces quartiers, d'autre part, elle signifie officialiser l'illégalité de certaines conditions que l'on peut rencontrer.

Ce statut ambigu des entreprises des cartographies participatives appliquées à des organisations territoriales informelles en milieu urbain est bien illustré par l'exemple d'étude du projet à S section, notamment autour de la question de la cartographie des réseaux d'eau. Le projet incluait en effet un recensement des points d'eau dans le quartier. Or, à l'exception d'environ cinq points d'eau officiels installés par la municipalité et partagés par les 700 habitant.es, l'intégralité des connections au réseau d'eau des habitations informelles étaient illégales. Afin de représenter leurs conditions de vie avec précision, les cartographes volontaires de S section ont minutieusement recensé tous les rattachements au réseau et les ont indiqués dans la légende en tant que « private taps » (robinets privés). Mais il a été choisi d'exclure cette information de la carte finale car, au lieu de soutenir les revendications de S section pour une amélioration de leurs conditions de vie, elle aurait localisé et quantifié les détournements illégaux du réseau d'eau officiel. Si, d'une part, la représentation soignée des points d'accès à l'eau permettait de montrer la réalité et la débrouillardise des résident.es, elle aurait, d'autre part, officialisé l'illégalité de leur situation. Puisque dans tout contexte territorial la limite entre

informel et illégal est très subtile (Willis, 2020), la visibilité cartographique est une arme à double tranchant. De ce fait, la question de ce que l'on représente, au nom de qui et dans quel but, sont des considérations à discuter au préalable de chaque projet de cartographie participative. Par contre, ce que l'on ne voit pas, c'est qu'il faut être prêts à remettre en question ces décisions en cours de route, comme dans l'exemple des robinets, le consensus entre acteurs et le but des cartes sont temporaires.

Notons enfin que les types d'(in)visibilité qui émergent de ces études en milieu urbain – en l'occurrence, en Afrique du Sud et au Bénin (Choplin and Lozivit, 2019) – peuvent être très différents des enjeux présents dans d'autres contextes. Par exemple, d'après l'expérience de Berthier-Foglar en Amérique du Nord (2008), en contexte amérindien c'est la localisation cartographique de sites considérés comme sacrés qui n'est pas toujours souhaitable pour des raisons de protection des sites. De même, la (in)visibilité cartographique, de par le pouvoir performatif de la carte, joue un rôle important dans l'attribution d'identités spatiales – cartographier c'est aussi prendre le risque d'essentialiser des identités et des récits qui dans la réalité sont en perpétuelle mutation (Desbiens et al., 2020 ; Turnbull, 2000).

2.4.2 La critique de l'État développementaliste – instrumentalisation par les acteurs

La nécessité d'une cartographie alternative trouve aussi son origine dans la reconnaissance du rôle de la cartographie dans l'exercice du pouvoir autoritaire et le maintien de l'appareillage étatique, l'État moderne étant un des principaux acteurs à la fois du projet colonial et des politiques du développement. Dans Seeing like a State, James Scott (1998) montre comment les cartes étatiques participent à la création d'une version générique de la réalité du territoire qui n'est qu'une des représentations possibles parmi une pluralité, car elle cache les réalités locales du terrain en faveur d'une vision lissée et unifiée. Scott montre comment ces techniques du savoir géographique – notamment le cadastre et le plan d'aménagement urbain – sont mobilisées pour maintenir le contrôle sur les populations tout en les privant de la possibilité de s'auto-définir et de faire valoir leurs savoirs et leurs droits sur le territoire. Ces critiques conduisent à la naissance de méthodes d'intervention, comme la cartographie participative, qui permettent une émancipation des populations locales à travers leur capacité de parler pour elles-mêmes (Spivak, 1988). C'est au moyen de cette critique que la cartographie, un outil privilégié du « seeing like a state » (Scott, 1998), commence à être considérée en tant que « weapon of the weak » (Scott, 1985). La critique développementaliste pose la question des acteurs et de leurs programmes. Or, nous avons vu que, très souvent ces pratiques sont implémentées par des acteurs non-étatiques du développement, qui sont les nouveaux médiateurs dans le processus de collecte et d'utilisation de l'information géographique. La critique de Scott doit donc être étendue à ces acteurs, car la mobilisation non-étatique de ces pratiques n'indique pas forcément une réappropriation du savoir spatial de la part de la population. Au contraire, ces pratiques peuvent être instrumentalisées, plus ou moins volontairement, car imbriquées dans une toile d'agendas politiques.

Dans le projet de S section, la mise en œuvre du processus de cartographie participative avait pour fonction, d'une part de répondre aux revendications de S section, et d'autre part, de tester la capacité de l'ONG à internaliser totalement le processus cartographique et de recensement par le biais de nouvelles technologies de l'information géographique – afin d'éviter de recourir à des experts externes. Ce deuxième intérêt a impacté le déroulement du projet, qui, par exemple, était itératif, ne suivait pas un protocole précis et a posé des soucis quant à la consolidation des données. Ainsi, l'importance d'étapes clé du processus liées aux rouages de la technologie, comme les phases de test des applications, de vérification des flux de données ou de vérification des données saisies lors du recensement, a été largement sous-estimée. Premièrement, en raison d'un manque d'expertise technologique au sein de l'ONG. Deuxièmement, en raison d'une incompatibilité entre les mécanismes de la technologie et le fonctionnement de l'ONG (Barella, 2020). L'opérationnalisation des systèmes d'informations géographiques requiert l'élaboration d'une stratégie stable sur le long terme, alors que le travail de l'ONG se fait par projets de courte durée et doit répondre aux humeurs politiques et à la disponibilité des collectivités. Il faudrait donc pouvoir questionner dans quelle mesure cette instrumentalisation a impacté, ou pas, l'empowerment des participant.es, tant des habitant.es de S section que de l'ONG en tant qu'acteur organisationnel, au sens de Zimmerman (2000).

Parmi les raisons du blocage du projet, figure un désaccord entre le leadership de S section et le ward councillor[16] : « there was influence from the ward councillor in this process that he wanted to use it as some type of political tool » (Collaborateurs ONG, entretien personnel, juin 2019). Bien que n'étant pas invité, ce dernier participait assidûment aux rencontres de quartier et était particulièrement attentif aux étapes intermédiaires du projet. Il souhaitait s'assurer que son nom apparaisse sur les cartes produites dans la collaboration entre la communauté et l'ONG, afin d'affirmer son autorité sur le quartier. Au premier abord ceci peut paraître anecdotique, mais en réalité cela révèle une partie des rapports politiques et de pouvoir dans le cadre desquels la communauté et l'ONG ont dû constamment négocier leurs objectifs cartographiques pour S section. Soudain, le projet cartographique n'était plus négocié uniquement entre l'ONG et la communauté, mais également avec un représentant politique et une administration municipale complexe (Buire, 2011).

Afin de garantir une visée de justice sociale à ces projets, il est nécessaire de considérer les programmes des acteurs qui y participent et, de ce fait, d'évaluer le potentiel de ces projets de manière plus large – puisqu'il implique un transfert/exercice de pouvoir, l'empowerment nécessite de prendre en compte toute une série d'acteurs, autres que les seuls cartographes, susceptibles de modifier le cours de l'action.

[16] Le ward councillor ou conseiller du gouvernement local est une figure particulière du gouvernement local sud-africain qui est censée faire le lien entre les leaders des communautés locales (community leadership) de son aire administrative (ward) et le conseil de municipalité. Il ou elle représente le canal officiel pour faire remonter les revendications des collectivités vers la municipalité. Cependant, ce rôle est souvent instrumentalisé à des fins personnelles, ce qui rajoute un échelon de complexité dans le processus de revendication des droits des collectivités locales (Cirolia et al., 2017; Bénit-Gbaffou et al., 2015).

2.4.3 Les approches STS postcoloniales – le pouvoir du numérique

Les approches Science and Technology Studies (STS) postcoloniales étudient comment les technologies et les savoirs fonctionnent et se déploient dans des contextes divers. La critique postcoloniale et les préoccupations en matière de justice sociale se manifestent dans le champ des STS dans les années 2000 avec l'émergence des Postcolonial STS, et en réponse à l'optimisme démesuré du « déterminisme technologique » (Odendaal, 2010; Turnbull, 2000). Ce champ d'études explore non seulement comment les différentes formes de domination marquées par une dimension (néo)coloniale opèrent dans l'interaction entre technologies et sciences, mais aussi comment cette interaction impacte les revendications de la part des populations qui ont le plus subi, ou subissent encore, des formes de domination. Dans une perspective de comparaison interculturelle, Turnbull (2000) contribue au champ des STS postcoloniales en actualisant la notion de tiers-espace (third space) de Bhabha (1984) et l'idée d' « hybride » qui en dérive : tout système de « technoscience » est un assemblage (ou agencement, au sens deleuzo-guattarien) qui est façonné, à un moment donné et dans des circonstances particulières, par les contributions d'acteurs différents (Turnbull, 2000). De par la relation synergique entre science et technologies qui la caractérise, la cartographie est une technoscience à décoloniser par excellence. Les technologies et les savoirs cartographiques en particulier nécessitent donc de nouveaux outils analytiques qui permettent de laisser la place à de nouveaux récits et de dévoiler la complexité de la négociation qui s'opère lors de la création d'une carte ou d'autres formes de savoir spatial.

Les STS postcoloniales promeuvent donc l'analyse de phénomènes et d'acteurs autrement délaissés (Anderson, 2002) en permettant de comprendre la dialectique relationnelle qui façonne la forme des technologies actuelles de production du savoir géographique. Une des préoccupations principales de cette littérature est de préciser comment la forme même de la technologie influence le type de savoir retenu, son utilisation et son appropriation.

La description du projet de S section a montré que la cartographie participative regroupe un ensemble varié de pratiques et d'outils, ainsi que de formes de représentation de l'information recueillie. Au niveau de la représentation de l'information, le brouillon de la carte imprimée en format A0 que les cartographes volontaires de S section ont présenté lors d'un atelier de discussion du projet n'a pas fait l'unanimité au sein du leadership. Ceci non pas en raison de son contenu – une cartographie minutieuse des maisons existantes qu'il s'agissait de vérifier collectivement – mais en raison de sa matérialité – le format papier. En effet, la reproche concernait la simplicité du support et le fait qu'on ne puisse pas, avec un simple clic, accéder à une bulle d'informations plus détaillée et zoomer dans l'image. Intuitivement, aux yeux du leadership de S section, la médiation par la technologie et l'interactivité de l'information constituait un élément important inhérent au pouvoir performatif de la carte. On peut donc se poser la question de savoir si une carte numérique

permettrait un empowerment différent selon les contextes, en considérant que la vision et les attentes qu'ont les acteurs vis-à-vis de la technologie utilisée influence la réussite du projet.

C'est à l'aune des questionnements des STS postcoloniales que cet exemple s'inscrit dans une logique post- et décoloniale. Pour l'ONG, l'atelier de discussion pouvait se dérouler autour d'une carte « frugale » – pour reprendre le terme d'« innovation frugale » utilisé par Choplin et Lozivit (2019) – et donc sans la mobilisation de technologies numériques particulières. En revanche, l'ONG s'est confrontée à un leadership qui avait des idées précises quant au rôle du numérique en tant que levier politique. Cette vision spécifiquement et stratégiquement technophile était liée à deux constats en particulier : la connaissance d'expériences internationales et locales mobilisant des technologies numériques en tant que vecteur de revendication, et le rôle prépondérant du numérique dans les politiques du gouvernement local du Cap. Au sujet du deuxième point, effectivement, l'administration municipale du Cap promeut une politique axée sur les données et sur le numérique en tant que levier pour la participation citoyenne dans la fabrique urbaine (Ricker and Cinnamon, 2020). Cette politique définit le référentiel quant à la forme que peuvent (ou doivent) prendre les revendications des habitants des quartiers informels afin de contester, voire de s'aligner sur, la rationalité de l'acteur gouvernemental censé pourvoir à leurs besoins. De par les discussions qu'il a soulevées, le brouillon de carte de S section apparaît donc en tant qu'assemblage de bouts de récits et de rationalités d'acteurs différents qui se confrontent et qui contribuent à façonner la forme et le contenu du produit cartographique final, ainsi que son utilisation dans une visée d'émancipation.

De même, le choix des géo-technologies pour recenser les données sociodémographiques de la part de l'ONG peut être analysé en tant qu'enjeu de pouvoir qui n'apparaîtrait pas sans un cadre d'analyse postcolonial. Bien qu'il existe des alternatives en open source, les outils technologiques choisis par l'ONG sont produits par Esri (Environmental Systems Research Institute), le géant étasunien des logiciels SIG. Ceci implique l'acquisition de licences pour les logiciels et la dépendance vis-à-vis de l'entreprise nord-américaine quant au stockage des données en ligne. Tout comme pour les formes du savoir géographique, l'adoption de certaines technologies au détriment d'autres dépend avant tout du pouvoir exercé par les acteurs de l'économie politique de ces logiciels – et il en va de même pour les composantes matérielles nécessaires au déploiement de ces outils (Choplin and Lozivit, 2019). Malgré la grande diffusion de ces technologies dans les pays du Sud global (Dakouré, 2014), c'est depuis le Nord global qu'elles sont développées et diffusées. Sans une approche critique on passerait à côté de ces rapports de dépendance néocoloniaux, qui renforcent et s'ajoutent aux rapports de pouvoir issus du clivage entre théorisation de la cartographie participative dans le Nord global et application importante dans le Sud global (cf. Sect. 3.1).

2.5 Conclusion – vers une cartographie participative postcoloniale ?

Cette publication avait pour but de montrer que la littérature sur la cartographie participative doit rétablir son lien avec les préoccupations de justice sociale. En se basant sur une analyse de la littérature et de réflexions issues d'une recherche-action en Afrique du Sud, il s'agissait de montrer l'importance de reposer de façon renouvelée et critique la question du potentiel d'empowerment de ces méthodes.

L'impossibilité de comprendre les impacts du projet mené à S section au-delà de son aboutissement final est tributaire du glissement de la notion d'empowerment en tant qu'outil conceptuel de la justice sociale à un outil de gouvernance néolibérale. Premièrement, cette contribution montre que ce glissement s'est opéré au moment de la multiplication de ces méthodes par les agents du développement – organisations internationales et organisation non gouvernementales – qui coïncide avec un dénouement du sens politique de la notion d'empowerment. Ce problème est souligné également dans la restitution de la littérature sur la cartographie participative et l'empowerment qui s'articule autour de trois dimensions – appelées distributive, procédurale et développement de capacités – et qui sont appréhendées en tant qu'objectifs finaux des projets. La littérature sur la cartographie participative se focalise davantage sur les modalités de mesure de la transformation sociale que sur les mécanismes qui permettent de la provoquer. De ce fait, elle n'est pas équipée pour appréhender les échecs, les effets inattendus et les détournements hors consensus de ces pratiques participatives. Dans ce contexte, l'analyse du potentiel de justice sociale est réduite à une question de redistribution de ressources en délaissant totalement les rapports de pouvoir qui influencent cette redistribution.

Ensuite, la publication reconnecte la cartographie participative avec ses sources épistémologiques postcoloniales afin de montrer l'importance de considérer les rapports de pouvoir dans l'étude des pratiques cartographiques participatives. Elle identifie trois sources principales de la cartographie participative : la critique de la raison cartographique, la critique de l'État développementaliste et les approches STS postcoloniales. Cette historicisation de l'émergence de la discipline montre qu'elle s'est développée en réponse au besoin de repenser l'impact des méthodes cartographiques dans un but d'émancipation et de remise en question de rapports de domination à plusieurs niveaux. À l'aide de brefs extraits issus de l'expérience sud-africaine, cette section dégage trois thématiques clés de la pratique de la cartographie participative qui ne peuvent pas être considérées en dehors de rapports de pouvoir : la tension entre visibilité et invisibilité cartographique, l'instrumentalisation de ces pratiques par différents acteurs, et l'influence du numérique et de son économie politique sous-jacente.

Cette contribution est une tentative de fournir un nouveau point de départ pour une cartographie participative qui puisse retrouver et revendiquer sa place centrale dans les débats et les pratiques adressant les inégalités spatiales, sociales et politiques. Une cartographie participative postcoloniale serait une

cartographie participative qui se donne les moyens théoriques, conceptuels et méthodologiques pour opérer et appréhender ses impacts au sein même des rapports sociaux de pouvoir, en dehors du consensus et au-delà des clivages géographiques réitérés par la littérature. Comme nous le rappelle Achille Mbembe (2006 : 121), la critique postcoloniale est « une pensée qui, à plusieurs égards, croit encore au postulat selon lequel il n'y a de savoir que celui qui vise à transformer le monde ». Ramener la critique postcoloniale au centre de la théorie cartographique n'est pas une étiquette à rajouter ou une fin en soi. C'est une manière de prendre au sérieux l'importance de théoriser en partant de l'intégration de points de vue multiples, de repenser de manière critique les impacts des méthodes de recherche sur les savoir spatiaux et leurs usages, et avant tout, de remettre la justice sociale au centre de la carte.

Disponibilité des données

L'ensemble des données utilisées dans le cadre de ce travail (entretiens, observations, cartes et données produites lors du recensement participatif du quartier informel, etc.) n'est pas rendu public en raison du caractère sensible et confidentiel du matériel récolté.

Intérêts concurrents

L'auteur déclare qu'elle n'a aucun conflit d'intérêt.

Remerciements

Je tiens à remercier l'ONG Development Action Group et les résident.es de S section settlement à Khayelitsha que j'ai eu l'opportunité de soutenir pendant ce travail de recherche participative.

---

3. RESEARCH METHODOLOGY AND KNOWLEDGE PRODUCTION

3.1 Introduction

This chapter presents methods, tools and methodological issues related to the thesis research. It explains the link between the theoretical framework and methods, and how these have shaped the data collection and the results.

The focus of this thesis, how I encountered the case study, the knowledge I have accessed, collected, analysed and reported on, have to be considered in light of the relationship between places, people, practices, etc. These relationships are key in understanding the knowledge discussed in this thesis – and to discuss the limits of such knowledge. For instance, my position as activist-academic, white, female, Swiss, Italian-speaking, among other attributes, travelling to South Africa, and my interest in a particular form of mapping and its applications within social projects are critical ingredients in the knowledge reported in this thesis.

Firstly, this chapter presents and reflects on methods used in this research by drawing attention to data collection as a messy and iterative process that simultaneously combines many techniques. However, for the sake of clarity, methods are presented separate from each other, and independently from reflections on research ethics and positionality.

Secondly, a discussion of my positionality will follow, in which I will clarify aspects related to the researcher position and negotiation within the fieldwork, as well as more structural and contextual events. Both elements impacted the research process and therefore need to be debated thoroughly.

3.2 Data Collection

This chapter is not only about data collection techniques per se, but about the overall process leading to the production of this thesis. Grounded in the ethnographic approach, this thesis has employed three main research methods that emerged from the perspective that I have chosen and are best suited to analyse each of the three components of the research question, *viz*: participant observation (largely inspired by the Participatory Action research framework), semi-structured interviews, and document analysis. Hereafter, Figure 30 condenses the main methods, the fieldwork dates, and the methods' contribution to the research sub-questions. The methods, in orange, are ordered according to the importance of their contribution for answering to the sub-questions.

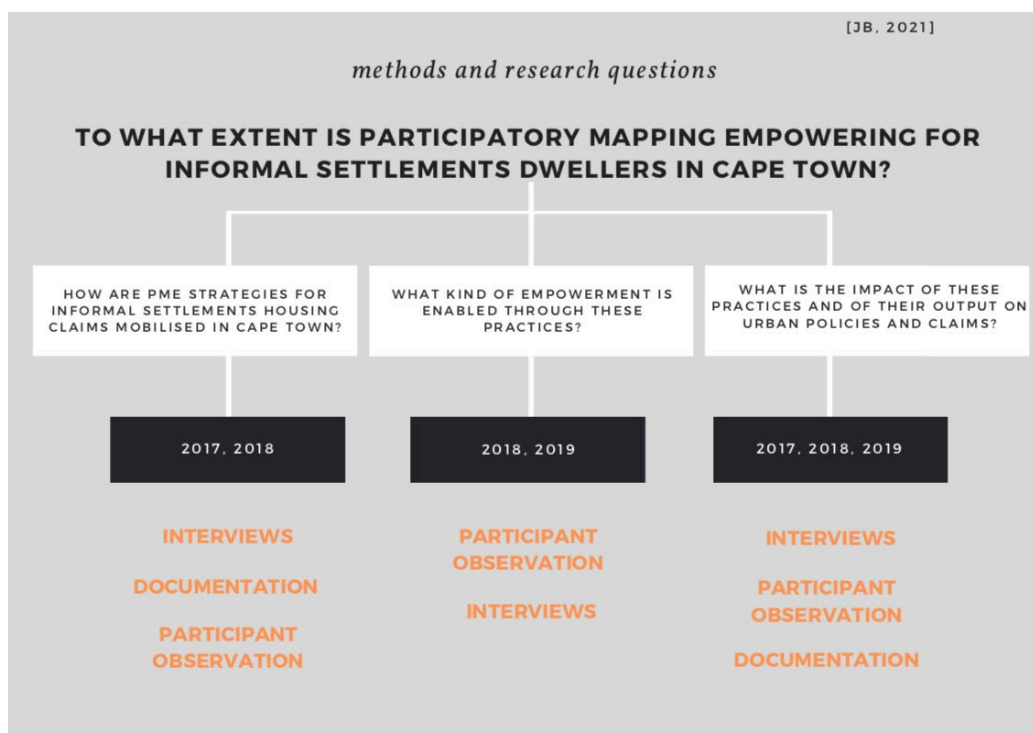


FIGURE 30 Synthesis of main methods and their contribution to each research question.

This section briefly introduces the case study and the fieldworks organisation. It then presents methods for data collection and data analysis. I will try and discuss how the research topic emerged and was negociated, and my approach to relating the theoretical framework and the empirical work. This discussion is fundamental for understanding the delimitation of the case study and focus of research.

3.2.1 Preliminary research and fieldwork organisation

The preparatory work consisted in a set of different exploratory tasks: literature review, preliminary interviews and a short fieldwork in Cape Town and Johannesburg.

When I started the PhD research in 2015, I was unfamiliar with the empirical field of informal settlements in South Africa. A conceptual literature review on the topic allowed to identify gaps in the literature and to highlight its scientific relevance. In practice, the PhD proposal I submitted to my host institution in 2016 was written unilaterally by myself and previous to any in depth field visit. At the early stage of my research project, the disjuncture between theory and empirical unit troubled me as it felt dramatically incongruous with regard to the participatory methodology I wished to implement. Ultimately, this did not threaten my intentions as the PhD proposal left room for adaptability. Nevertheless, the approval of the proposal itself – thus the renewal of my contract at the host institution – depended on selecting examiners who were ready to accept a 'loose project' which did not pre-empt the unfolding of the research. This is to note that a PhD project based on participatory methodology and direct action might collide with conventional institutional norms which require a greater level of anticipation and a clearer program (Kloker, 2015; Graeber, 2009).

In my thesis proposal, the research focus was formed in order to fit to what I felt was important in relation to literatures and techniques that I was aiming to combine for my own "professional and skill set growth" and interests: participatory GIS and urban studies within a context of developmental urgency and advocacy. At the time, I was unfamiliar with informal settlements in South Africa. These considerations are essential to acknowledge, since the personal and social background of the researcher shapes the research orientations (Willis, 2007). The research focus was framed in a very broad way, allowing room for dialogue between the theory and the empirical unit – so that the research focus could emerge from relevant elements observed during fieldwork. Therefore, this thesis is not a fully inductive (generating theory) or deductive (testing theoretical hypothesis) piece fo work, rather it ias adaptable as it intertwines both logics (Layder, 1998)

The crucial part of the preparatory work consisted in verifying the feasibility of the research, building a work/research collaboration in which my skills could be socially useful and identifying a case study. Establishing contacts with researchers and NGO practitioners in Cape Town and Johannesburg was the first step for testing the relevance of the research question, as well as for adjusting it in accordance with elements emerging from the ground.

Preliminary loosely structured interviews were conducted via Skype and/or during the first phase of fieldwork with both academic scholars and NGO practitioners. These interviews allowed to identify the main participatory mapping actors and places and to surface topics and issues that were of particular significance according to the interviewees.

This work is based on a participatory methodology, and required the setting up of a collaboration with a local organisation, which would not have been possible without the exploratory fieldwork.

The one-month exploratory trip to South Africa was undertaken in early 2017 in two different cities: Cape Town and Johannesburg. These locations were chosen as an entry point for my exploration on the basis of the existing literature and in relation to their role within the South African context. Moreover, many NGOs working on and with participatory mapping and enumeration in informal settlements are based in Cape Town and Johannesburg.

Overall, the identification of a suitable case study revolved around (1) building up a robust collaboration with a local NGO and (2) finding a participatory mapping and enumeration project in which I could get involved. At the beginning of my PhD journey, I was fully receptive to the idea of working on a case study taking place in a South African city "off the map" (Robinson, 2002). Eventually, due to opportunities, local contacts and political relevance of the projects I came in contact with, I decided to choose Cape Town as a case-study. On the one hand, the vibrancy of local NGO's landscape made it somewhat easier and quicker to establish reliable contacts with local organisations for a researcher unfamiliar with informal settlements in Cape Town. On the other hand, the choice was also related to personal limitations and constraints which occurred at the

time I had to take the decision a limited timeframe, a limited knowledge of the South African context outside main urban centres, and other considerations.

My research ended up focussing on a project in Khayelitsha, in the metropolitan area of Cape Town. This area already benefits from a strong international presence within (postcolonial) urban studies literature, compared to other South African cities. Nonetheless despite the depth of urban studies literature on the city, Capetonian experiences with participatory mapping and enumeration are not widely documented or analysed. This allowed for more room for original findings that this thesis could possibily contribute towards.

3.2.1.1 Fieldwork organisation

#	Where	When	Duration	Methods	Type	Objectives achieved	Notes
1	Cape Town, Johannesburg	Jan-Feb 2017	1 month	Interviews; Document Analysis; Observation	Exploratory fieldwork	to gather contacts and evalute the potential for a collaboration with an NGO	
2	Cape Town	Jul-Aug 2017	1,5 months	Interviews; Document Analysis; Participant Observation	Exploratory / 1st phase main fieldwork	to set up of a collaboration with an NGO	
3	Cape Town	Jan-Jun 2018	5,5 months	Participant Observation; Interviews; Document Analysis	Main fieldwork	PME project at DAG (rough mapping and household enumeration of S section settlement)	*fieldwork extented by one month*
4	Cape Town	June 2019	1 month	Interviews; Participant Observation; Document Analysis	Verification fieldwork	follow-up of the PME project in S section (partial)	*fieldwork postponed (from Feb to June) and shortened (from 2,5 months to 1 month)*

Table 8 Summary of the research fieldworks

The research is based on four phases of fieldwork conducted in the metropolitan area of Cape Town. The teaching assistant role at the University of Neuchâtel has largely influenced the fieldwork organisation, namely in terms of its duration, because throughout the semester a regular presence at the Swiss institution was required. The fieldwork trips were only possible thanks to the funds I applied to and obtained from the *Fonds des donations* and the *Bureau Egalité* of the University of Neuchâtel.

The table above summarizes the phases of fieldwork I undertook from early 2017 up till June 2019. I visited my study area four times, for a total of about nine months. The “Methods” column presents the main methods mobilised during the corrisponding fieldwork in order of importance. The column “Objectives” states the main objective of the fieldwork.

Compared to the dates specified on the original letter outlining the nature of my voluntary service at DAG (cf. APPENDIX 3), the 3rd and main fieldwork was extended by one month. This stretched the duration of my stay in Cape Town the closest as possible to the expiry date of my South African visa application –

allowing me to make the most of my time there. Whereas the 4th fieldwork had ot be rescheduled and shortened, therefore impacting some research goals. This and other difficulties regarding the fieldwork organisation are tackled at the end of this chapter and in the final chapter of the manuscript (cf. *Limits of the thesis*).

3.2.2 Constructing a research on participatory mapping and enumeration project in an informal settlement in Khayelitsha

Eager to explore ethnographic and participatory methods, my methodology was highly influenced by literature on Participatory-Action Research (PAR) (cf. as is it shown in subchapter 2.3). Although said methodology was central for shaping the methods, I did not carry out a pure ethnographic or PAR research. I am not trained in either of these methodologies, I could not benefit from years of established interconnectedness with local actors and political dynamics in order to elaborate a sharp PAR project, and I was not in the position to commit to several years of fieldwork in order to produce a full ethnographic piece of work. Therefore, the research design was built around the deployment of a set of PAR-inspired and ethnographic methods applied to a case study.

The case study is the setting up and implementation of a participatory mapping and enumeration process in an informal settlement in Khayelitsha by a Cape-Town based NGO and the settlement's community, with the collaboration of a Swiss scholar (the researcher). As Yin develops it, the case study is "*an empirical inquiry that investigates a contemporary phenomenon, within its real-life context especially when the boundaries between phenomenon and the context are not clearly evident*" (Yin, 2009:23). It consists in identifying within the fieldwork a bounded system of meaning (Collignon, 2010). Epistemologically, a case study is defined by a set of boundaries and working parts that make it operate as a context-dependent object. This thesis focuses on the implementation of a process (participatory mapping and enumeration), hence the case is not a static image of a situation, rather it developed throughout the course of the research.

3.2.2.1 Access to fieldwork and case study identification

The case study was not picked out of a list of PME that I identified during preliminary fieldworks. Rather, it was meant to emerge from a collaboration that I could possibly create with a local NGO. When first trying to establish a partnership with an NGO, I did not look for a specific project nor I actively suggested to start one. I began by initiating contacts and meetings with NGOs working in the field of urban development and advocacy rights. The strategy I adopted was to simply introduce my position, skills and research interests (Swiss scholar GIS-savvy with funding for research on participatory mapping), and to give a glimpse of what I could offer as skills or research insights to their organisation based on my knowledge of their work. The main aim was : to connect with an organisation, to identify resonances in our mutual interests, to enrol in their actions as a volunteer, and then to start defining the focus of the case study from there.

Eventually, the NGO I worked with is a Cape Town based non-profit organisation called Development Action Group (DAG). They have over 30 years' experience in working with communities and community-based organisations to unlock opportunity to access basic services, land, tenure rights and affordable housing. There is a very important spatial and planning component in their work. At the time of the collaboration the organisation was in transition from a financially difficult moment to a rebuild and restructuring of their main scope and methods.

The first contact with DAG dates back to July-August 2017, during a meeting with a Programme Director, a Lead Researcher and a Project Support Officer. The meeting was held at DAG headquarters in the neighbourhood of Observatory and lasted a bit more than one hour. Due to Programme Director's tight schedule, the meeting was hosted by the Lead Researcher and Project Support Officer solely. As usual, I introduced myself as a Swiss scholar with a PhD funding for research on participatory mapping, and willing to volunteer for the NGO and to put my GIS skills at their service. The discussion quickly developed around the main NGO competency areas and ongoing projects related to informal settlements and mapping. Eventually, the potential opportunity to embark on a mapping process in Khayelitsha that was yet to be defined was put on the table. The lines of said project were still extremely blurred (who? where exactly? how? when?), but the interest for the (free) skills I could offer seemed to have struck a chord. In fact, towards the end of the meeting, the Project Support Officer asked for suggestions with regard to GIS manipulations on Google Earth desktop – I assisted. Following the meeting, the two hosts acted as spokesperson towards their NGO supervisors. I was asked to address an email to the Executive Director of the NGO in order to define the nature of our collaboration and for compiling the letter I would have needed for getting the immigration visa.

Throughout the exploratory fieldwork in 2017, I brought with me a research question drafted according to the literature gathered on the context and subject, but yet formulated in an outrageously open way: *what is the impact of participatory mapping?*

The main concept mobilised was "empowerment" as it stemmed from the PPGIS literature (see. first publication of the thesis). The main research question tackled empowerment assessment as means for investigating impacts of participatory mapping practices. The concept was considered to be broad and flexible enough to accommodate different directions that the research could have possibly taken. I used this broad research question to present my research interest when investigating whether a collaboration with an NGO was possible. Early in my networking with NGO, I made clear that in my interpretation of the term "empowerment" no duality or hierarchy such as "empowered/empowerer" was intended, since the concept itself does not inherently imply a directionality of power (Elwood, 2008). Likewise, I clarified my urge not to romanticise this emancipatory dynamic, but rather to try and observe how and in which circumstances actors (residents in particular) can bring about some change in their lives and environments. Said element was particularly important for actors working with participatory mapping since their interrogations about participatory processes were gripped by the creation of settings that could possibly enable forms of empowerment rather than on how to empower someone unilaterally. This rather broad framing through the

"empowerment lenses" gave room for discussion and for reshaping the research question accordingly to a potential case study.

3.2.2.2 The collaboration with S section informal settlement

In January 2018, when I officially enrolled in DAG, there was still no detailed mapping project. The opportunity to study and contribute to the mapping and enumeration of S section neighbourhood came up in the first weeks at DAG, amongst other settlements requiring advocacy support. S section is an informal settlement established towards the end of the apartheid regime in Site B in Khayelitsha. Among other features, the settlement manifests inadequate and unsafe living conditions, lack of proper sanitation and the inexistence of land or housing tenure. In late 2017, community leaders contacted the NGO and asked for assistance for claiming their rights in terms of access to housing and living conditions improvements on-site. As a starting point, as no information about the site and population was apparently available, DAG suggested to conduct a participatory mapping and enumeration. In order to organise the action, it was necessary to identify: *how many people are there? What are their living conditions? How is the settlement organised? What are the main issues within the settlement? how many people do qualify for and for which type of social grant and housing programme? Etc.* And this was considered key to then define the type of urban development suitable for residents and for the area. The goal was, at the end of the process, to be able to deliver a set of information packaged according to municipality standards and documenting the needs and living conditions of the community, as well as a development layout proposition that the community could take to the City of Cape Town (CoCT). The main actors identified at the beginning of the case study and their broad relation to the mapping exercise are represented in the Figure 31 - the orange boundaries identify the main focus of the research.

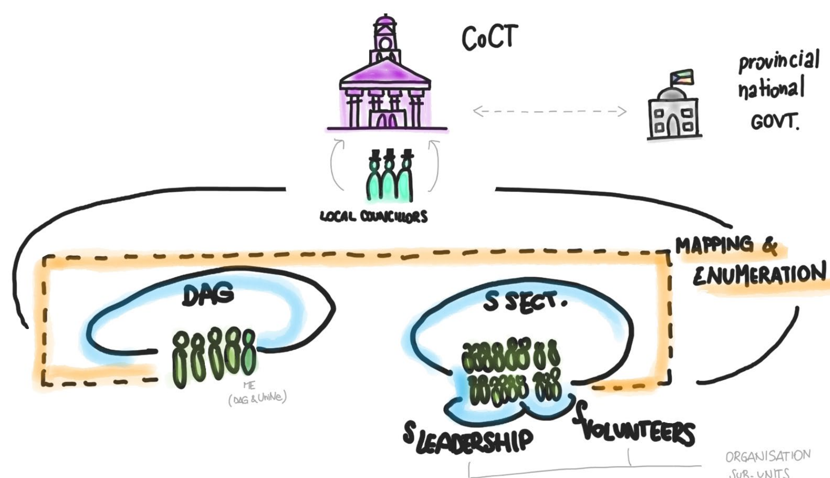


FIGURE 31 Case study's main actors [JB, sketch Jan 2018]

When discussing my role within the NGO, I was interviewed by the executive director and programme director with regard to tools for conducting enumeration and potentially digitize the mapping process. It is

from that discussion that I was officially assigned to the Informal settlements team and ended up working on the S section project with a Project Support Officer, and an urban planner intern (who joined the team a month later) under the sparse supervision of a programme director. A clearer design of the "object of study" began at that very moment, with the internal question of how to design a mapping process and household survey for the S section residents. When discussing about the frame of research with NGO members at DAG during an internal meeting and personal interviews, the "empowerment assessment" framing sounded familiar and appropriable enough. Also, the use of that particular term resonated with a previous DAG slogan putting the emancipatory dimension at the centre of their action "*Empowering people to create change since 1986* " (Barella 2020a). The general question tackling an "assessment" was well received, since it potentially allowed to measure the impacts of such practices – and NGOs are often keen on exploring ways for measuring their impact.

Internally to the NGO, the S section project was a pilot experiment. Firstly, it was the first time that DAG tried to implement a participatory mapping and enumeration with solely its internal capacities – usually, part of the tasks was outsourced to stakeholders. Besides, DAG wanted to embed geo-technologies for data collection into the process, but they had no previous experience with technologies for spatial data gathering. From January 2018 to June 2018 (3rd and main phase of the fieldwork), my role in this experience, was to support the 'digitalisation' of the mapping and enumeration tasks within the NGO, as well as to assist the development of the overall data collection process with the community (including trainings, workshops, data capturing and verification, etc.). The boundaries of my case study are defined by the implementation of the project, with a specific focus on the first steps of the implementation phase, which I actively contributed to during the 3rd phase of the fieldwork. For this reason, the research question was opened up to enumeration processes alongside the mapping activities, and pointed in the direction of geo-technology implementation.

3.2.2.3 A co-constructed research object?

Overall, the main research question morphed very little during the fieldwork. The main edits to the research object and approach came from discussions with the Project Support Officer and the Lead Researcher who suggested to integrate element of the "how to implement a GIS PME from scratch within a NGO" and the "how do we use PME and GIS, as an organisation, in order to make sense of our purpose amongst other competing NGOs" (Personal conversations, 2017 and 2018). The first suggestion was indirectly tackled since the PME adopted by DAG was an "acupunctural experience" as stated in the 2nd paper of this thesis. The second suggestion became a central element of the thesis since it resonated with other fieldwork observations as well as with some S section volunteers who manifested their frustration when seeing NGOs coming and going from their neighbourhood. These discussions were integrated in the research design by giving a much bigger space to the governmentality of NGOs and the way these actors strategically use these techniques. This is particularly visible in the 2nd paper, where the research highlights the role of PME for the

NGO. As for the question of creating expectations towards the neighbourhood's residents, it was not tackled frontally due to the failed 4th fieldwork (cf. concluding chapter and limits of the research).

In general, discussions related to how to produce a context- and "project-relevant" question articulating theoretical, methodological and empirical objects, happened to be scarcer than envisioned. Many reasons for this can be raised. On the organisational side, the main focus of the NGO at the time was not on the S section PME process per se but their broader internal restructuring and need for funding. Internally, as I pointed out during my exit interview with my NGO supervisor, people and projects were working on silos on their competency area, little discussions cutting across projects took place except for personal informal conversations with NGO members during coffee breaks or lunch. Also, DAG turnover happened as such a high rate that none of the people I worked with on the informal settlement programme is still holding the position at the NGO today – this made the continuity of the follow up and keeping in touch quite difficult since people rapidly moved on.

On my side, as the "main" researcher in this story, during the PME implementation I partly lost track of the research duty as I was trying to keep up with the hectic pace of the practical mapping and enumeration work. I ended up focussing more on the direct action and the practical aspects of implementing the PME process rather than on the research itself – this could also partly explain the discrepancies found in this academic rendition of the work.

In this research, the co-construction of the object of study was rather situational than programmatical. Discussion about the research focus and tools were lead with the NGO mainly. The NGO was interested in getting feedback on their practices and impacts but were more focussed on the outcome of the process rather than on the research results. The research scope related to the project was presented to S section volunteers and leadership committee, but was not directly re-discussed with them from the beginning. The main time for integrating the "community's" input and insights on the research framing and on the first results was supposed to happened during the S section focussed fieldwork. The 4th fieldwork was not carried out as planned and the major restructuring biased this last phase of the research.

Nevertheless, during PME workshops with S section mappers, their reasons for taking part into the process and their way of explaining the relevance of such a project instilled the need to readapt the empowerment framework. This is visible in the 3rd publication and the urgency to try and embrace an even more situational understanding of "empowerment" framing it as a topological resonance. The theoretical framework presented in the last publication of this thesis is grounded in the inherent research dissatisfaction of noting discrepancies between the research ambition and the actual implementation of the research.

Although this research started with great inspiration from PAR methodology, the actual co-construction of the object remained weaker than envisioned – not allowing this PhD to fully endorse the PAR flag.

3.2.2.4 Considerations on a sensitive case study

This case study has to be considered as sensitive. According to Bouillon, Fresia and Tallio (2005), a sensitive case study analyses "illegal and/or informal practices of highly stigmatised populations, often living in violent

settings entrenched into structural inequalities". Informal settlements are an ever-changing and highly heterogeneous environments, often scarred by conflicts, and quite delicate and difficult to research. This applies to S section community, which is an impoverished community settled in a vacant parcel of land and not openly considered as 'legal' by the CoCT. Inadequate infrastructure and living conditions of residents make them vulnerable to health and safety related issues, as well as to a potential eviction. Insecurity of tenure has also a significant impact on individuals' capacity to improve their social and economic status – for instance, as in getting a job or obtaining a loan. Besides, marginalized populations' conditions in South Africa have to be read through the lens of ever-present spatial and social consequences of apartheid.

In addition to these elements, the case study was sensitive as for the moment when it was conducted: during the worst drought that Cape Town has ever experienced. Ethical questions, regarding the realisation of a fieldwork in time of crisis and peculiarities of this occurrence, are thoroughly reported and discussed further on in this chapter, in the section 4.2.

The researcher has to be acutely aware of power relations and structural inequalities at play, both when conducting the research and when communicating the results. As Jenkins puts it, data collection from a sensitive field is a "meticulous selective process" (1984). By mapping the unmapped and counting the uncounted, this research confronts itself with questions of cartographic visibility/invisibility of a (potentially) vulnerable population. Therefore, in practice, a significant amount of data is not reported in this thesis – such as many results from the enumeration – even though it has largely informed my insight on the topic. Also, community members' names are anonymised for the sake of confidentiality – except for specific instances when I asked for permission to mention their first names.

The role of research and of the researcher raises issues as well. Barry and Ruther (2005) also states that within South African informal settlements suspicion and internal tensions often raise towards researchers conducting work in these areas. This might partly be linked to the expectations that research contributes to create in these settings, in particular when focussing on livelihoods improvements and developmental matters. Also, academics are deemed to contribute to represent the "poor" as a singular fixed subjectivity, therefore confining the "poor" to their very subjugation (Welsh, 2008: 73). Therefore, the way poor livelihoods are constructed when talking about informal settlements impacts the representation of both the "poor" and of informal settlements. The methodology adopted for this work is therefore explorative and combines different kinds of methods in order to adapt to empirical observations.

The sensitivity of the case study guided the choice of the methodology (that is to say a wide range of data collection techniques) and shaped the relationships with participants whilst conducting the fieldwork. These elements are discussed later in this chapter when explaining the methodology and reflecting upon my positionality.

3.2.2.5 Limits and advantages of a case study

Using a case study has some specific advantages directly related to the approach chosen. Case study methodologies aim to produce context-dependent knowledge and evidence-based knowledge that is crucial to inform policy and public debate. This thesis aims to have a direct social impact through its enactment, hence, producing evidence- and context-based information was a priority. Also, case studies are mobilised within critical and interpretative research (Willis, 2007). While aiming at providing an in-depth account of a case, this approach accommodates a range of data collection methods and combines data stemming form a variety of techniques (Yin, 2009). The methodology employed for conducting the research, that is presented and discussed in the following section, aligns with these requirements.

However, following these same reasons, case study approach entails questions of replicability and generalisation (Fassin, 2013). Replicability and generalization raise the issue of whether the research deductions and results apply only to the context and people who actually participate in the study.

"Among qualitative researchers, there is a considerable division of thinking as to whether replication or the possibility of reproducing results has any import whatsoever in terms of judging the value of qualitative studies. Some people, such as Jerome Kirk and Marc Millar (1986), argue that reliability in the sense of repeatability of observations still has an important epistemic role to play in qualitative inquiry. They contend that for a study to be judged good or valid, the observations made in that study must be stable over time, and that different methods, such as interviews and observations, should yield similar results.

Others, most particularly Egon Guba and Yvonna Lincoln (1994), have noted that because of the philosophic assumptions underlying qualitative inquiry (e.g., reality is constructed), the concept of reliability should give way to the analog idea of dependability. They contend that replication is not possible for qualitative inquiry; all that can or should be expected from a researcher is a careful account of how she or he obtained and analysed the data." (Bryman et al, 2004: 957)

This case study follows the latter vision, that is to say, replicability does not have an epistemic status. In the sense that, for this topic of research and the context of application, replicability or reliability are not the main criteria for judging the quality of the study. Nevertheless, constructs and propositions emerging from the research allow for generalization – but not "universalization" – at different levels. On the one hand, they contribute to broader discussions on informal settlements planning in the Cape Town's metropolitan area. On the other, they contribute to larger reflections and cross-context comparison of participatory mapping and enumeration projects.

Finally, with regard to the sensitivity of the case study, in order to minimise risks of 'knowledge hijacking' for repressive purposes against the community involved, the results of the research need to be contextualised within wider contexts.

The next section discusses methods applied in this research and allows to better grasp both the "impossibility of replication" and the need for generalisation.

3.2.3 Participatory Action research inspired methods

"*PAR seems to combine the goals of feminist and postcolonial concerns: to change power relations in the research process and to stimulate transformative action*" (Schurr and Segebart, 2012:149)

This section addresses the reasons for adopting Participatory Action Research (PAR) as the main methodological inspiration for conducting this study, and details the way in which this approach has been implemented. Due to a set of practical constraints and lack of experience of the researcher, this research did not turn our as a proper PAR piece of work. The starting research ambition had to be considerably adjusted. In this thesis PAR is not the main methodology per se, but rather an orientation to inquiry and learning, nor is it fundamentally distinct from other empirical research procedures. Every "action-oriented" research is, by necessity, a participatory and co-productive process at one stage or another, in one form or another (Kindon & Pain, 2007). To know the world and to try and (prospectively) change it for the better seems to be the political agenda for methods oriented towards action. However, this ethical imperative to act has to be accompanied by a persistent critique, and needs to be developed throughout the work. With this in mind, a specific section of this chapter aims to tackle in a critical way a specific selection of the main issues and pitfalls experienced during the realisation of the fieldwork (just as metioned in the previous sub-section tackling the limitations of the co-construction of the research object).

Reason and Bradbury (2006 : 1) define participatory action research (PAR) as "*a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview… [and bringing] together action and reflection, theory and practice, in participation with others in the pursuit of practical issues of concern to people, and more generally the flourishing of individual persons and communities.*"

Participatory Action Research is an approach involving researchers and participants coming together to tackle a problematic situation that is both relevant on the ground and at a theoretical level. It aims to blur the artificial boundaries between the researcher and the "researched", between theory and practice. The crucial

point in this approach is that the research agenda is co-produced by the researcher and the participants. This means that the research agenda has to stem from a collective framing of what the "problematic situation" is and how to come to grips with it. The same goes for discussions around analysis and results of the research, ideally all parties involved should have a say into the discussion and ways in which the results are communicated. As for the methods employed, multiple qualitative tools are at play and are combined according to the setting, the actors, the situation and goals.
As Oldfield (forthcoming) would define it, the political imperative of such methodologies is to provoke theory through collaborative learning and action. This epistemological imperative implies a collaborative knowledge production, and combines a set of techniques. PAR is particularly relevant for the posture, the context and topic of this study.

3.2.3.1 Why to consider Participatory Action Research?

"*…to think ourselves not apart from the world, but rather deeply and irrevocably caught up in all its contradictory entanglements*" (Pieterse, 2014 : 23)

Geographers have a "longstanding concern with the societal impacts of academic research and teaching" (Kindon & Elwood, 2009:20). The reasons for adopting PAR are multiple and are here summarised in two main explanations: the critical posture of the work and the topic of research. In both of these, PAR operates as a research methodology and as an intervention for urban and social change. Also, it takes into account questions related to the sensitivity of the case study.

The research posture

In her essay "Can the Subaltern Speak?" (1988) Gayatari Spivak highlighted the social and cultural embedding (or situatedness, Rose, 1997), of knowledge produced by Western researchers and critiqued the use of universalising categories. In 2019, questions related to fieldwork conducted in the "Global South" by Western researchers are still multiple and still urgent (Roy, 2016; Schurr and Segebart, 2012).
This thesis is positioned within the contemporary urban postcolonial studies field and therefore adopts the principles of postcolonial critique. The postcolonial critique requires the constant questioning of theories, practices and ways in which knowledge is produced by condemning inherent power relations (Roy, 2016). It requires to perpetually turn assumptions into questions in order not to stabilise categories of thinking and hierarchies of knowledge production. Thus, to position oneself into this field of critical questioning and theorizing, it appears fundamental to adopt an inclusive but yet reflexive methodological setting. PAR answers to this imperative. On the one hand, PAR embraces the postcolonial imperative of avoiding stabilisation by creating alternatives (Schurr and Segebart, 2012), and, on the other, it offers a set of tools which allows one to try and navigate spaces of tensions and power relations that constitute the "field". This approach inhabits a space of re-definition, as it demands "immersion into profoundly fraught and contested spaces of power

and control" (Parnell and Pieterse, 2014: 23). PAR comes with a need for rigorous reflexivity and disillusion, for instance, as for participation being an unequivocal solution to the ethical dilemmas surrounding research (Pain and Francis, 2003) or as for collaborative research being a straightforward empowering practice. Awareness, transparency and critical self-reflection towards modalities of co-production are key in PAR approaches to avoid the risk of "re-colonisation" when standing within development disciplines (Schurr and Segebart, 2012).

Likewise, the critical posture is related to the context of study itself and to the role of the researcher in this particular context.[17] As Oldfield points out (forthcoming), South African universities are in a crucial moment of re-definition of their position within society – and this equally applies to other contexts. Student movements, such as #Rhodesmustfall and #Feesmustfall, do not only consider the issue of equal access to education but incorporate a multitude of other aspects regarding systemic socio-spatial injustice.

Racial privilege is still a major determinant of social power in SA. As a white international researcher landing in SA to conduct a research on social justice, one has to be aware of the ways in which position and identity impact power relations inherent to the research process (Bond in Amini, 2017) – *what are the structural inequalities at play? To what extent do I reinforce or help disrupt them? How to work towards the latter?* The "how" question is crucial; hence the choice of the methodology is central in this work. The PAR tools allow the researcher to inhabit those relational spaces of tension, sense- and identity making as well as to consider them in the construction of inequalities.

Finally, such as shown in the three publications of the thesis, participation is a main component for democratic dispensation in South Africa's post-apartheid local government legislation (White Paper on Local Government 1998) and it is also inherent to the cartographic and surveying methods studied in this work. The methods employed during PAR respond to these traits.

Relevance for the topic and context of research

Conceptually and empirically, the PAR approach is also critical for observing and understanding modalities of empowerment in participatory mapping and enumeration.

From a broad conceptual point of view, this thesis focuses on a nuanced understanding of *empowerment* and how it is enabled by the participatory mapping process rather than by its output solely (cf 1st and 3rd publication). Likewise, the potential of PAR to affect change is intrinsically related to governing effects of participation – expected or unexpected, positive or negative. Therefore, the most suitable orientation of inquiry that could allow for the provoking of the insurgence of the 'object of study' itself is this participatory, socially and politically engaged approach.

As a geographer, I consider PAR as an inherently spatial practice as it seeks to identify resources that can be "successfully redeployed, normalised and dissociated over time-space" (Kesby and al in Kindon and Pain,

[17] This argument is developed in the first paper of the thesis.

2007: 25). The effectiveness of the PAR process is not predicated solely its chronological development but is also determined by the spatial development and reconfigurations of spaces and places that occur when PAR is used or where it is deployed. The where of PAR matters equally as much as the when.

This is particularly important in the light of the set of tools studied in this thesis. Participatory mapping and enumeration were born as participatory research methods themselves (Chambers, ?); they revolve around the idea of opening up spaces for participation and learning, and relate directly to the production of spatial knowledge when tackling spatial and social issues. In this sense participatory approaches of cartography and PAR share a political goal, that is "to create collaboratively knowledge that reflects the knowledge and communication of all those participating and consequently, as a function of participatory process, to see and communicate the world in a new way" (Sanderson et al. in Kindon and Pain, 2007:123).

Finally, I choose this approach as it is "*able to be flexible and accommodate chaos, uncertainty and messiness; able to tolerate paradoxes and puzzles and sense their beauty and humor*". (Kindon and Pain, 2007:14) To stay with the messiness of a perpetual re-definition of the work was key in this research, since the mapping and enumeration process did not develop in a linear and smooth way – rather it was subjected to numerous last minute changes of direction which impacted both the project and the research.

3.2.3.2 Data collection techniques

This section discusses the main techniques that were mobilised. The unfolding of the research itself is detailed in the empirical chapter where the case study is thoroughly documented.

There are multiple tools availabe focussing on dialogue, transparency and collective action by emphasising spaces of inclusion and learning. Every case study-based research is different and combines these tools in a variety of ways (Pain and Kesby, 2007).

When considering my study, it is important to emphasise that degrees of participation and co-production have varied significantly depending on the tools, and the stages of the research process. In theory, degrees of participation are "negotiated with co-researchers and participants" (Kindon and Pain, 2007:16). In practice, they were also circumstantial (as it can be seen in the subsection 2.2 of this chapter), in the sense that they were highly dependent on the situation, resources and type of activity suggested. In this work, all methods employed revolved around group work and discussion, except for interviews with government officials. In this methods' presentation, collective activities led with the NGO and the community, such as workshops, training activities and feedbacks, are assimilated to participant observation. This is justified by the fact that those events were not set up accordingly to a specific research method per se. Indeed, they were all spaces for collaborative action and observation, though they were often performed without methodical anticipation.

Also, it is important to acknowledge that research and working methods I took part in whilst working at the NGO cannot be isolated from each other. "*While PAR appears to be an attractive way to respond to (…) claims*

of decolonising and breaking down hierarchies of knowledge production, it is difficult to translate into research practice" (Schuur and Segebart, 2012:149). PAR approaches facilitate the redefinition of power dynamics of mapping and spatial knowledge production, but it also faces serious challenges related to the nature of collaborative work itself (Elwood et al., 2007). For this reason, PAR processes cannot be standardised, as standardisation leads to the predetermination of the course of the research and action and therefore entrenches power dynamics and limits coproduction within the participatory space.

Definitely, this work does not go without contradictions or "conflict of interests" – including those of the researcher. To pretend these could be expunged from the research process or mediated among different ones would mean to silence power relations and the agendas at play. PAR embraces these spaces of contradiction voluntarily – it is embedded in the power settings it is studying – and thus requires transparency and a persistent critique of how to take power relations into account. These aspects are thoroughly discussed in the 2nd and 3rd publication as well as in the final chapter of the thesis.

Participant Observation and "instant ethnography"

Participant observation is rooted in ethnographic research. It is a rich source of qualitative and context related data as it aims to capture the research object within its social situation and setting. Participant observation consists in an intensive and usually extended involvement of the researcher with the group of individuals or the situation s/he is studying.

"The researcher becomes part of the process being observed and immersed in the setting, hearing, seeing, and experiencing the reality of the social situation with the participants" (McDonald, 2012). The researcher seeks to obtain a broad view of what it is occurring, what it is communicated or what it is implicit in the setting observed. It is not a mere observation but a proper engagement in the situation that is required. Participant observation is an embodied activity, it involves the researcher mentally, physically, emotionally (Crang & Cook, 2007). This engagement is likely to shape the setting itself and the participants' behaviour. Consequently, self-observation, positionality and being accountable with regard to the knowledge produced and the way it is utilised are critical features of participant observation (Rose, 1997).

This research focusses on dynamics of empowerment within participatory mapping and enumeration. Such as it is conceptualised in this work, empowerment can occur on different temporal and spatial scales – it can "build up" during the process or can be triggered at a specific stage or by a specific internal or external event. Understanding mapping in a participatory frame means to be receptive to any learning moment, incongruity or voluntary disruption of the participatory space: "old understandings can be undermined in an instant and new meaning made just as quickly" (Farrel et al, 2008:217). Traditionally within ethnography, the longer a researcher visits the field the better would the quality of the research be. This might be real depending on the topic of inquiry and the context. Nevertheless, this assumption downplays the value of the unexpected, which manifests itself in the immediacy of the action (Ferrel et al, 2008). Phenomenologically, some specific

moments are pivotal, in the sense that they become key for decoding the turns that the action will take form that moment onwards. These events are "instant" and unpredictable. The capacity to witness these events, and to make sense of the transformations that they carry in tow, is higher when conducting a mid-long-term fieldwork.

For instance, a pivotal moment was witnessed when community volunteers made sense of their neighbourhood map for the first time (this event is explored in greater detail in the 3rd publication). The collective understanding of how to interpret the cartographic representation of S section was acclaimed with great deal of enthusiasm. This was the exact moment when people started to foresee the value of the work they were about to lead and therefore created momentum and motivation for the overall process. Another pivotal moment was witnessed when a community leader tried to hijack a workshop discussion to promote his personal political goals. This event, also reported in the positionality section and empirical chapter, unveiled a personal political agenda which, until that moment, was hidden behind a rehearsed and consensual position. For capturing those pivotal moments, I draw on the idea of "instant ethnography" from cultural criminology (Ferrel et al, 2008) and transpose it to participant observation of participatory mapping. Instant ethnography helps in grasping the construction of a momentary new meaning and learning that occur in collective mapping processes. The duration of the participant observation alone does not define the quality of the research, rather the capacity – or the opportunity? – to witness those pivotal events which shifts the course of the action and rearrange actors' relationship. For this reason, in this research the intensity of the involvement in the field, and being part of pivotal moments, perhaps matters more that the extended duration.

Participant observation was systematically applied during the 3rd phase of fieldwork whilst working with/for the NGO Development Action Group, as well as during every site visit with other NGOs during the 1st, 2nd and 4th phases of fieldwork (cf. Table 8). The main participant observation was conducted in early 2018 from January to June (5 months) during which I worked with/for a Cape-Town based NGO on a participatory mapping and enumeration project in the informal settlement of S section (Khayelitsha).

FIGURE 32 One of the 13 field notebooks during fieldwork, Andiswa (on the left), me and some delicious umfino [JB,2018]

Participant observation entails a systematic recording of events, behaviours, reflections through the use of accurate and comprehensive field notes. In total I have compiled 13 notebooks and a Word document of about 80 pages long (Figure 32 and Figure 33). The materiality of the "note taking" was multiple and dependent on the situation, therefore, my field notes are in both digital and paper form. When conducting site visits, training and workshops in S section or elsewhere, I did not carry my personal laptop around for safety and comfort issues. Hence, notes were taken mainly by hand on a set of notebooks – such as the one pictured above. While working at the NGO I wrote a daily journal which was both a fieldwork and work journal. Information was compiled on tasks I had to deal with on a daily basis, and on personal observations. More personal and thick (self-)reflections were disclosed on the digital version of the journal.

FIGURE 33 The notebooks

23

ADI #enumeration WB : from scratch. After lunch discutere con Adi per setting up a form

TIMELINES _ for mid-March workshop and then start the enumeration at some point

Creare il draft per il form che verrà digitalizzato in Survey123 etc. // aggiungere delle sezioni e preparare una spiegazione di che tipo di info provvedono e di che cosa se ne può dedurra (what does that info tell us ?) in stile questionario di ricerca // Mock Test of the survey next week Friday.

NUMBERING : la questione del numerare le shacks… alcune shacks sono di referenza di ESKOM che ha portato l'elettricità – sono un punto di riferimento per la numerazione – per il resto Adi propone WB1, 2, 3, etc.

I.E. pensare a modi di verificare le informazioni come per esempio the age with the last digit of the SA ID passport

SECTION : **SOCIO-ECONOMIC AMENITIES** : hospitals, schools, communities facilities 8spaza shops, shabeens)

SECTION : **HOUSEHOLD AFFORDABILITY :** monthly income (suggest a series of ranges) and define an annual income of the household // IMPORTANTE because the development will be mixed action – some reblocking and some other housing solution ! important to know the annual income of people

- I criteri per accedere ai sussidi per gli alloggi sono (i) essere sotto i 40 anni (ii) guadagnare meno di 3500ZAR etc (verificare i criteri per definire le domande)

SECTION : **TRANSPORT** (see how people live the neighbourhood and to what other places they are connected) : do you (work) commute ? to where ? what mode of transportation ? how much do you pay daily ? whta does transportation cost represent in terms of your income ?

SECTION : **RELATIONSHIP** : how often do you attend community meetings ? where ? how often do you meet the councilor ? What other meetings do you attend ?

SECTION : **SAFETY** : regarder s'il y a des categories prédéfinies + categories qui stem from the ground (cose specifiche di S)

SECTION : name **TOP 5 PRIORITIES** for the informal settlements : organizzare una serie di criteri in ordine di short – mid – long term ? tra i quali devono sceglierne 5 max.

FIGURE 34 First notes for elaborating the survey draft - Extract from digital fieldwork Journal (page 23, 19 Feb 2018)

In theory, data recording should be meticulous and consistent. In practice, the reality of the field does not always allow to take notes or to make time for it. I was involved in the activities just as any other participant; therefore, I prioritised the "real-life" action over the immediate note taking. The same goes for interstitial observations. Many notes were taken on post-its, on a random piece of paper or audio recorded on a voice note. Observations were then carefully transcribed as soon as possible within the end of the day either on the digital journal or on the notebooks – sometimes on a collective taxi ride from Khayelitsha to Observatory, or in a Café or in my room in Observatory.

Fieldnotes were compiled in four different languages, listed here in order of frequency: English (main "field" language), Italian (my mother tongue), French (the language in which I obtained my university degrees and

that I use on a daily basis when in Switzerland) and isiXhosa (S section residents' first language). The language adopted depended on the situation, the type of information and the time available for transcribing. As my thinking develops in Italian, French and English, in order to follow my train of thoughts and report my own observation and feelings as accurately as possible, those languages are often combined. As for isiXhosa, following lessons with a Xhosa friend, I was able to introduce myself in isiXhosa and to passively understand topics of conversation and to capture expressions and intentions. This was also key to reinforce trust relationship with both NGO colleagues and community volunteers, and perhaps to "unsettle" some barriers of belongings when entering a predominantly Xhosa space. IsiXhosa fieldnotes, however limited, consist in fragments of conversations or specific comments during "instant ethnographic moments" – such as those reported in the above paragraph.

FIGURE 35 DAG workshop on participation in the CoCT budget proccess [May 2018, jb]

3.2.4 Interviews

In this research interviews are complementary to participant observation. They allow to capture and define ways in which actors position themselves in the participatory mapping and enumeration landscape in Cape Town. They allow to collect narratives on the implementation and results of such projects, on how actors are in contact with each others, on the perceived difficulties and advantages of such projects, etc. When interviewing government officials, a particular focus on policies and ways in which mapping and GIS structure the action within municipal and provincial level of government was addressed.

Semi-structured or loosely structured interviews were appropriate as they gave the flexibility to adapt questions accordingly to the interviewee (government officials, NGOs members, community members, etc.), and accordingly to the kind of information required. To be as open-ended as possible allows to unveil information about attitudes and personal agendas hiding beyond rehearsed or official positions – this is particularly important for the context and topic of research. Likewise, loosely structured interview made it easier to build confidence with the interviewees. This approach allows to maintain the fluidity of the conversation, which is crucial when addressing political and potentially controversial topics.

Although loosely structured, the interviews were guided by the research questions, acknowledging: *"the focus of inquiry; what they want to learn from the person they are speaking with; how much time they have available and the kind of access they have; and how much they already know about their research topic."* (Edwards and Holland, 2013)

As this research does not focus on discourse analysis, only specific interviews were audio-recorded and transcribed – by the researcher. As for all other interviews, in addition to notes taken during the development of the conversation, detailed notes and considerations were written down straight after the interview. Interviews were often held late in the morning which allowed me to take the time over the lunchbreak for reporting the interview on my fieldwork journal and then go back to the work at the NGO.

Interviews were held in English even though English was not the first language for many interviewees.

Questions related to the way my position shaped the access to interviews and internal information with government officials is discussed in the sub-chapter 3.

The Table below, shows the list of interviews conducted during the frieldworks. Interviews conducted "informally", for instace during conferences or workshops, are not reported in said table. In total, 53 interviews were conducted with a variety of actors. I met and interviewd some interviewees more than once depending on the fieldwork and the topic of inquiry.

The interviewees can be cathegorised in three different groups [% on total number of interviews]: NGOs/CSOs [68%], government officials [15%], scholars and researchers [15%], other stakeholders [2%].

FIELDWORK		NAME		ORGANISATION	ROLE
Jan - Feb 2017	Johannesburg	Molopi	Edward	SERI - SA	Research and advocacy officer
		Dlamini	Nomcebo	Planact	Research and advocacy officer
		Bennett	Jhono	1to1	Researcher and 1to1 co-founder
		Mosselson	Aidan	GRCO, University of Witswatersrand	Researcher
		Merlo	Stefania	GRCO, University of Witswatersrand	Researcher
		Samson	Melanie	GRCO, University of Witswatersrand	Researcher
		Matsela	Motebang	CORC (SDI alliance)	Project Manager
		Mann	Chantal	BJALA	urbanist
	Cape Town	Berens	Chris	VPUU	GIS expert
		Musungu	Kevin	Ardhi Geomatics Incorporated	Managing Director
		Mancitshana	Blessing	CORC (SDI alliance)	GIS expert
		Schlatter	Carmen	CORC (SDI alliance)	architect, urbanist
		Ngcuka	Thembelihle	CORC (SDI alliance)	architect, urbanist
		Looringh-van Beeck	Rebecca	urban Think Thank	Researcher
		-	Patrick	Imizamo Yethu leadership committee	resident and activist
Jul - Aug 2017		Brown-Luthango	Mercy	ACC, University of Cape Town	Researcher
		Ewing	Kathryn	VPUU / SUN	Director, Planner, Urban designer
		Damasceno	Tiago	VPUU	Architect
		Strauss	Margot	University of Stellenbosch	Researcher
		-	Michelle	Urban ThinkThank	Researcher
		Anderse	Kelly	The Cape Craft and Design Institute	Project Manager
		Russel	Shaun	Ndifuna Ukwasi	Researcher and activist
		Cuff	Shawn	PEP (people's environmental planning)	Director
		Schermbrucker	Noah	PEP (people's environmental planning)	Programme coordinator
		Silber	Gavin	Tshisimani	Senior Fellow
		Gebu	Philani	Tshisimani / SJC (social justice coalition)	Office Administrator, Programmes Support
		Majoos	Dylan	SJC	Project support officer
		McGregor- Rourke	Helen	DAG	Programme Director
		Mxobo	Sizwe	DAG	Project support officer
		Matiashe	Willard	DAG	Lead Researcher
Jan - Jun 2018		Aditya	Kumar	DAG	Executive Director
		McGregor- Rourke	Helen	DAG	Programme Director
		Mxobo	Sizwe	DAG	Project support officer
		Matiashe	Willard	DAG	Lead Researcher
		Mgwatyu	Zama	DAG	Programme Manager
		Siswana	Akhona	DAG	Project coordinator
		West	Crystal	DAG	Programme Manager
		Fester	Ryan	DAG	Project officer
		Sadien	Naeemah	DAG	Project officer
		Briers	Stephanie	ETHZ	Researcher
		Groenewald	Susan	City of Cape Town, Informal Settlement Planning	Head of ISP, GIS specialist
		Williams	Jeffrey	City of Cape Town	Principal GIS Analyst at City Maps office
		Smit	Julian	University of Cape Town	Associate professor
		Blaauw	Denzel	Human Development Agency, Western Cape Government	
		Khoza	Bosco	Human Development Agency, Western Cape Government	
		Ntshanga	Saneliswe	Human Development Agency, Western Cape Government	
		Mndzebele	Siphilele	Human Development Agency, Western Cape Government	
		Berens	Chris	VPUU	GIS expert
		Mancitshana	Blessing	CORC (SDI alliance)	GIS expert
		Kirsten	Kenneth	Department of Human Settlements, Western Cape Government	GIS manager
Jun 2019		Majoos	Dylan	DAG	Project officer
		Aditya	Kumar	DAG	Executive Director
		Berens	Chris	VPUU	GIS expert

Table 9 Summary of the main interviews conducted during the fieldworks

3.2.5 Documentation, reports, GIS data and maps collection

Through a detailed analysis of reports (governmental and by NGOs), grey literature and some legislative texts, the topic of research can be better grasped in its historical context and therefore understood in relation

to the current political moment. This method is employed as a contextualisation tool and for capturing official discourses and to give preliminary answers to questions such as: *What is the current role of participatory mapping and enumeration in informal settlements in South Africa and more precisely in Cape Town's metropolitan area? Who are the main actors? What are their roles and connections? What is the official information that communities have access to? Etc. etc.*

For this research material it is important to operate a distinction between collected and created data. Collected data represents already existing documents in their various forms (written or drawn, paper-based or digital, etc) that the researcher has gathered through the course of the research. Created data represents here every type of material that was produced by myself as part of my work at the NGO or as a support for the research. This distinction is particularly important in light of the approach chosen – participatory action research – which implies a high level of implication in co-defining the shape and content of the knowledge produced.

The documentation gathered consists in a variety of reports, shapefiles, Excel and CSV tables, aerial images, project proposals, minutes of meetings, journalism accounts, leaflets, WhatsApp groups content, community radio features, etc.

Due to the variety and amount of material, it was not possible to record every single piece of information gathered during the fieldworks. The table below summarizes a selection of type of documentation that informed this thesis.

DATA (selection of examples)		
Collected	***Documents***	
	UCT, African Centre for Cities International Urban Conference" (1-3 Feb2018)	
	UCT, Workshop "Cities, Geo-technologies and data-driven urbanism" (11 June 2018)	
	DAG exhibition and public debate Lookout Hill on “Creative shacks” (6 March 2018)	
	Activities and training workshopa, DAG Activist Citizen Programme (2018)	
	SJC, NU, Tshisimani activism workshop on housing rights in 2017 at the Isivivana Centre (Khayelitsha)	
	Maps and GIS	
	National Geo-spatial Information , Mowbray (visited 3 times)	
	CoCT, City Maps	
	-	Through interviews at CityMaps (i.e. aerial image and informal settlements database based on the CoCT/WC/DAG projet of participatory mapping conducted in 2014-2015)
	-	Online: Open Data Portal
	-	Online: City of Cape Town map Viewer
	DAG archives	
	Open Street Map RSA	
	Open Up website	
Created	***Documents***	
	DAG minutes of meetings (DAG in S section, DAG & VPUU meetings)	
	NGO internal reports (Survey123 app for data collection “manual”, etc)	
	Maps and GIS	
	S section “physical” working maps	
	S section shapefile	
	Household survey questionnaire	
	Enumeration data : Data from S section household survey (2 relational tables)	
	S section database	
	PJS, WB settlements' shapefiles	

Table 10 Examples of data created and collected

3.2.6 Data sources about Informal Settlements in Cape Town

The impossibility to find data on S section settlement was amongst the main reasons for carrying out the mapping and enumeration process composing the case study of this research.

Available accurate data about individual informal settlements in Cape Town is a rare commodity. The data sources about informal settlements are multiple, yet up-to-date data about the number of settlements, and households, and their localisation, is difficult to find.

“*According to South Africa’s 2011 Census, 20,5% of Cape Town’s households live in informal dwellings – with 7% in informal backyard structures and 13,5% in informal settlements. We expect this amount to rise steadily as more and more people move to the city looking for work.*” (CoCT, website[18])

[18] https://www.capetown.gov.za/Family%20and%20home/Residential-property-and-houses/Informal-housing/About-informal-housing (consulted Aug 9th 2020)

The quotation from the City of Cape Town website shows the most common way of presenting data on informal settlements: relative data giving a general quantification of households living in informal dwellings, with a distinction between backyarders and settlements, often relating to national Census. Another common data presentation is the narrative of the relative increase of informal dwellings between two periods of time: "*in 2001, one in seven households in the Western Cape lived in informal settlements or backyard shacks; by 2011, this had increased to one in six.*" (Western Cape Informal Settlement Strategic Framework, 2016). In such forms, data is certainly illustrative of the big picture of a phenomena, but it cannot be made operational and it does not inform local action for the dwellers.
This section lists main sources of data on informal settlements that were (partly) available during the realisation of fieldwork with DAG.

3.2.6.1 Main sources

Hereafter I synthetized the data sources on informal settlements that were identified when conducting fieldwork (2017-2019). The Table 11 identifies the main sources, whereas Table 12 shows data estimates about informal settlements (number of settlements, number of households, etc.) according to the same sources. For the case study of S section informal settlement, data was produced *ad hoc* because no other up-to-date information about the settlement was available to the NGO. Although rigorous, this list of sources is not comprehensive. Nevertheless, it sheds light on the information that were considered during fieldwork and that shaped the analysis.

The main data authors stemming from this overview are: governmental offices (at national, provincial, municipal levels), public utility company, open data portals, NGOs working in informal settlements. Most actors seem to cross-source data from each other, therefore referring to data produced at a national level mainly.

	Overview of data sources on Informal Settlements (IS) in Cape Town *This list is not exhaustive. It represents data sources considered during fieldwork and that have informed the PhD analysis (2017-2020)*								
	Data Source	**Actor**	**Form of data**	**Thematics**	**Is data mapped or GIS-based?**	**Scale / extent of data production**	**Data origin**		**Condition of Access**
1	Community Survey (CS) and Census data – by StatsSA	National govt	Database Reports	Demographic	n/a no	National Municipal (CS)	Produced	Producing Census (every 10 years) data and Community Surveys (in between Censuses)	Partly public, partly accessible only to government officials
2	Reports by National Department of human settlements (NDHS) and Lapsis (Land and Property spatial information system)	National govt	Reports LAPSIS database	Demographic	no yes	National	Sourced	Sourced from various data custodians: Stats SA, Deeds Office, Survey General, National Department of Human Settlements, and the HDA also uploads its own information	Public Government officials
3	Reports by Housing Development Agency (HDA part of NDH)	National govt	Reports	Demographic	no	National	Sourced	Sourcing various data custodians (satellite images, census, etc.) from : SANSA, StatsSA, GetTerraImage, Informal Settlement Network, Surveyor general (SG), Municipalities	Public
4	Data by ESKOM	National public utility	Database	Demographic	yes	National	Produced	Produces a SPOT building count (Eskom Dwelling Layer)	On request, accessible to government officials
5	Reports by Western Cape Department of Human Settlements	Provincial govt	Reports	Demographic	no	Provincial	Produced and sourced	Produced in collaboration with NGOs (notably, CORC, DAG, VPUU) and sourced from national government	Public
6	Reports by City of Cape Town	Municipal govt	Reports Database	Demographic	no yes	Municipal Settlement	Produced and sourced	Producing data internally for risk assessment and emergency response; Sourcing data from: StatsSA and national agencies	Public (such as bi-annual report State of Cape Town)
7	Data portals by City of Cape Town	Municipal govt	Public database Internal database	Demographic and Infrastructure	n/a yes	Municipal Settlement	Produced and sourced	Sourced from various data custodians at national and provincial level, and produced internally mainly for risk assessment and emergency response in IS	Public On request
8	WaziMap data visualisation platform (Openup)	Open data advocacy organisation	Data portal	Demographic	no	National	Sourced	Sourcing from govt data, mainly from Community Surveys	Public
9	Community Atlas data visualisation platform (VPUU, OpenUp)	Partnership between NGO and open data advocacy organisation	Data portal	Demographic	yes	National	Sourced	Sourcing from govt data, mainly from Community Surveys	Public
10	ISMaps "Struggle for dignity in Cape Town's informal settlements" (Ndifuna Ukwazi, Social Justice Coalition, IBP, OpenUp)	Partnership	Data portal Datasets	Demographic and Service Delivery	yes	Municipal Settlement "Pockets"	Sourced (updates partly produced?)	Sourcing from: municipal data, water and sanitation directorate	Public
11	openAFRICA "Informal settlements" of Cape Town	Repository of open data on the African continent (maintained by Code for Africa)	Shapefile	Demographic and Infrastructure	yes	Municipal	Sourced	Sourcing from: City of Cape Town (actual source within CoCT unknown)	Public
12	**Main Capetonian NGOs** Development Action Group (DAG) Violence Prevention Through Urban Upgrading (VPUU) Community Organisation Resource Centre (CORC)	Non-govt organisations	Reports Database	Demographic and infrastructure	depends on the data	Settlements (at municipal and/or provincial scale) Individual Settlements	Produced and sourced	Sourcing from various govt data	Not accessible, except for data presented on published reports
13	**Main Capetonian CSOs and advocacy organisations** Social Justice Coalition Ndifuna Ukwazi	Civil Society organisations	Social Audits and reports	Demographic and infrastructure	depends on the data	Individual Settlements	Produced and sourced	Sourcing from various govt data	Not accessible, except for data presented on published reports

Table 11 Overview of data sources on Informal Settlements in Cape Town area (non exhaustive list, based on 2017-2020 fieldwork)

Overview of data estimates about Informal Settlements (IS) in Cape Town

This list is not exhaustive. It represents data sources considered during fieldwork and that have informed the PhD analysis (2017-2020)

	Data Source	Actor	Date of data	Est. # of Informal Settlements (IS) in CT	Est. # households in IS	Est. Extent/scale available
1	Community Survey (CS) and Census data – by StatsSA	National govt	Census: 2011 (2022)	n/a	191668 households in informal dwelling (not in backyard)	Western Cape Province
			CS: 2016	n/a	17.6% (222 960) households (shacks and in backyard) *[this estimate does not match with my calculation from communtiy survey data 2016 cf. WaziMap source]*	
2	Reports by National Department of human settlements (NDHS) and Lapsis (Land and Property spatial information system)	National govt	2009-2011	201 informal settlement polygons (provincial level)	20,5 % (218780) households (City of Cape Town)	Western Cape province and City of Cape Town
				189 informal settlements (provincial level) of which 139 in Cape Town		
3	Reports by Housing Development Agency (HDA part of NDH)	National govt	2012	189 informal settlements in the Western Cape	167 250 (IS or shack not in a backyard)	Western Cape Province
4	Data by ESKOM	National public utility	2008 (quoted by HDA reports)	234 informal settlements (province), The dataset does not characterise the areas, nor does it match areas to known settlements.	n/a	Western Cape Province
5	Reports by Western Cape Department of Human Settlements	Provincial govt	2014	31 informal settlements (sample)	19258 households (sample)	Sample of settlements in City of Cape Town (Philippi , Horticultural Area, Khayelitsha)
6	Reports by City of Cape Town	Municipal govt	-	n/a	n/a	-
7	Data portals by City of Cape Town	Municipal govt	-	n/a	n/a	-
8	WaziMap data visualisation platform (Openup)	Open data advocacy organisation	2016	n/a	17.6% (222 631 - calculated) households *[this data does not match with data mentioned in official reports by StatsSA]*	City of Cape Town
9	Community Atlas data visualisation platform (VPUU, OpenUp)	Partnership between NGO and open data advocacy organisation	2016	n/a	18% as "Shack" informal dwelling (227690 calculated)	City of Cape Town
10	ISMaps "Struggle for dignity in Cape Town's informal settlements" (Ndifuna Ukwazi, Social Justice Coalition, IBP, OpenUp)	Partnership	2015	437 individual "pockets", but they identified 204 recognised informal settlements in Cape Town	146000 households	City of Cape Town
11	openAFRICA "Informal settlements" of Cape Town	Repository of open data on the African continent (maintained by Code for Africa)	2011 (?)	310 entities categorised as "informal" (definition not clear)	184387 households	City of Cape Town
12	**Main Capetonian NGOs**	Non-govt organisations	-	no overall estimate	no overall estimate	Sample of IS or individual Informal settlement unit
	Development Action Group (DAG)			-	-	
	Violence Prevention Through Urban Upgrading (VPUU)			-	-	
	Community Organisation Resource Centre (CORC)			-	-	
13	**Main Capetonian CSOs and advocacy organisations**	Civil Society organisations	-	no overall estimate	no overall estimate	Sample of IS or individual Informal settlement unit
	Social Justice Coalition			-	-	
	Ndifuna Ukwazi			-	-	

Table 12 Overview of estimates about Informal Settlements according to previous sources identified in Table 11

Overall, available data about informal settlements is fragmented, unreliable, not up-to-date, and utterly useless for localising and analysing individual informal settlements. Across sources, data is not aligned in terms of definition of "informal settlement" or demarcation of the areas. As shown in the table here above, most actors refer back to information gathered during national Census. Although reliable, the Census' information is too general to become actionable at a municipal level and outside rhetorical considerations.
Some disjunctures preventing an ergonomic use of data have been identified.

3.2.6.2 Definitions

The estimation of the actual number of informal settlements and households seems to be a complex task. First of all, the lack of alignment regarding the proper definition of "informal settlement" within the levels of government prevents from consolidating the datasets. Most definitions used by actors emphasise the dwelling type (shack in or not in backyards), and/or the nature of land tenure and formal demarcations.

List of definitions of "informal settlement" according to sources

Source	Definition
Statistics South Africa (Census 2011, concepts and definitions report)	"An unplanned settlement on land which has not been surveyed or proclaimed as residential, consisting mainly of informal dwellings (shacks)." Definition of an informal dwelling :"A makeshift structure not approved by a local authority and not intended as a permanent dwelling"
National Department of Human Settlements (National Housing Code report 2009)	The National Housing Code's Informal Settlement Upgrading Programme (2009) identifies informal settlements on the basis of the following characteristics: • Illegality and informality; • Inappropriate locations; • Restricted public and private sector investment; • Poverty and vulnerability; and • Social stress
City of Cape Town Metropolitan Municipality	Definition in accordance with Statistics South Africa
NGOs	Ad hoc definition depending on project and/or type of partnership (cf. NGOs subsection)
Online platforms for data visualisation (WaziMap; CommunityAtlas)	Definition in accordance with original data sources
Online Map "Struggle for dignity in Cape Town's informal settlements"	Definition stretched to any informal "pockets" observed by cross-comparing other existing sources (cf. ISmap disclosure). They use the term "pocket level", although meaning not specified.

Informal settlements are an ever-changing environment, they evolve rapidly and their demarcations are not formalised. Compared to regulated suburbs, inscribed in the cadastral system (Surveyor-General), informal

settlements boundaries are fluid. It is not always clear when, how, and with who these boundaries have been negotiated. For these reasons, public data coming from Census is not gathered for settlements as such but rather focus on the household unit.
For surveys and Census, two potential indicators can be used to identify households living in informal settlements. The first one is based on the enumeration area (Informal Settlement EA) and other one is based on the type of dwelling (only "shacks not in a backyard" are considered as units). In most of the cases, there is no match between the EA and the settlement such as defined /delimited by the municipality and/or the "communities" living in those areas (Meeting with three NGOs GIS-specialists, March 20th 2018). Also, EA is based on sampling, therefore informal settlements' data inferred from EA does not include all the settlements. National surveys data is therefore not appropriate for understanding an individual settlement.

Besides, even when data is available, the absolute value of data about informal settlements (such as number of IS, number of households enumerated) is difficult to extrapolate from official statistics. In order to obtain such data, one has to reconstruct indicators from estimated statistics based on EA sampling. Once again, the data might as well be illustrative of the big picture, but it is not detailed and accurate enough for planning or advocacy purposes. The only source identified that publicly shares a straightforward number of settlements (or "pockets", as they are called in their disclaimer) and their accurate location is the online map "Struggle for Dignity In Cape Town's Informal Settlements"[19] (Appendix I). Although not updated, this source is often referred to by researchers using this data for contextualising their work.

Actors working in informal settlements, such as NGOs, tend to produce their own data. This allows them to create up-to-date information, at the moment they need it, on what they need to work with, and without having to go and negotiate with City officials for supposedly existing data. In a setting were positioning towards the Municipality is key for legitimating an NGO's action (Barella, 2020b; Blake, forthcoming), a negotiation with city officials would imply to expose part of their intentions and making their action visible. Nevertheless, as shown in the 2nd paper of this thesis, even after this "ad hoc" information collection, NGOs informal settlements' data sits on internal servers and is not likely to be accessible to other actors.

3.2.6.3 NGOs

Even amongst non-governmental actors, the most active on the ground, there is no "community of practice" with regard to informal settlements data production and sharing. The three main Capetonian NGOs leading the realm of data production in informal settlements are: Development Action Group (DAG), Violence Prevention Through Urban Upgrading (VPUU), Community Organisation Resource Centre (CORC, from the South African SDI Alliance). During a meeting (March 20th 2018, VPUU offices, Cape Town) bringing together the main GIS officers of the three NGOs (I was part of the DAG team), two complications impacting

[19] https://ismaps.org.za/disclosure.html

data consolidation were highlighted. First, the heterogeneous terminology employed by NGO methodologies. Second, the unreliable spatial extent of datasets and projects across City, Province and NGOs. The first point refers to the use of a variety of terms used to identify similar processes of data collection such as: enumeration / household survey / profiling, or to specific terms coined by one or the other organisation (cf. "baseline", VPUU's enumeration based on sampling). At the time of the meeting, DAG did not have an internally established methodology, whereas VPUU had an established manual guiding PME practices (VPUU manual), and CORC was aligned with Slum Dwellers International methodology. The second point highlights the deployment of PME projects on a variety of geographical scales: informal settlement / neighbourhood / precinct / household. Once again, this variety resonates with the difficulty encountered with delimitating these urban settlements. These terminological and geographical inconsistencies are then reflected in the production of fragmented sets of data across NGOs and communities – which cannot, or are difficult to, be consolidated.

In addition to these two points, the NGOs' competing interests preclude a full transparency with one another. When it comes to actionable data about informal settlements, secrecy and confidentiality enter the game. I personally experienced how feelings of mutual distrust shaped NGO relationships when I was instructed to be cautious when talking to other Capetonian NGOs about the ongoing mapping and enumeration in the S section settlement.

3.2.6.4 Difficulties in constructing this overview

Considering how difficult it is to understand who owns what, who has produced what, how and where, re-constructing this overview was a challenging task. Data sources themselves are scattered, reinterpreted and/or not available outside some organisation. Also, official data is not publicly available in its original form but has to be extrapolated from reports and other data sets relating to informal settlements' infrastructures. Overall the data politics and data visibility across scales of government seems to be uneven.

During fieldwork, it was a common conviction amongst NGO members that the City of Cape Town had to have (more or less) accurate data about informal settlements location and household's units. Data on informal settlements is partly available on official documents such as the State of Cape Town (compiled every two years) – yet it reports only broad numbers.

Whereas, when it comes to data on fire outburst and floods in informal settlements available through public reports (W), the City of Cape Town keep tracks of these events meticulously. This confirms the existence of a constant monitoring of informal settlements in terms of risks and vulnerabilities. In this sense, the municipality shows to own a lot of GIS-based data but to use it mainly for risk assessment and emergency response rather than for housing development purposes. Basic enumeration data on informal settlements under municipal mandate seems to be kept hidden.

This observation aligns with information gathered during interviews with public officials. Although datasets at city-scale must sit on someone's server, the access to such information seems to be buried under piles of request forms forcing respondents to be explicit about their intentions. As another sign of mistrust towards

the municipality, the NGO felt that such procedure would put their action under scrutiny way more than needed and would consequently slow down the actions on the ground.
Beyond the data displayed on the isMaps project, little informal settlement data was available to the NGO. The only exception was the shapefile they co-produced in 2014 during the elaboration of the NUSP Participatory-based planning for Informal Settlements Upgrading (source number 5). In practice, for getting access to this data, the NGO had to schedule a meeting at the "City Maps" office at Wale street cnr Loop. The dataset was quickly disclosed without further inquiries because DAG was co-author of such information. However, the data collected during the partnership covered a sample of 31 informal settlements in Philippi area and Khayelitsha only.

On the one hand, it is an organisational duty to protect people against unintentional, unlawful disclosure or use of data about their household's situation. On the other hand, the boundary between data confidentiality and data secrecy seems to be blurred and to be defined more by an organisational politics dictated by organisational needs (i.e. not to be called out by other actors) rather than by informal dwellers' interests.
A question remains: who actually benefits from the status quo with regard to this lack of coordination for improving livelihoods of informal settlements?

3.2.6.5 Missing sources

Although reflecting the type of information available during the project with DAG, this overview is partial. Some major informal settlements actors are missing in this review and further clarifications on their role is due. For instance, organisations such as local branches of SANCO (South African National Civic Organisation) or political parties (mainly ANC) are ever-present in informal settlements realm and politics. It would be worth clarifying their role within data production on informal settlements. Moreover, informal dwellers themselves – often organised as "communities" or other group of interests – might as well own and use data for their daily activities and the neighbourhood management. For instance, community registers about land tenure, title deeds and other demographic info are not considered in this overview and did not stem from fieldwork observations. There does not seem to exist any city-wide registry of said registers either.

3.3 Data Analysis Methods

Three different types of data have been collected and created during the work: 1) Fieldnotes 2) Discursive material 3) Visual material 4) basic GIS analysis.
Data analysis is a cross-cutting process, and data cannot be categorized in solely one typology or another. For instance, GIS data could be analysed as visual, discursive and quantitative material, depending on the

analysis the scholar aim to produce. However, for the sake of clarity, data analysis is presented separately according to a typology of data collected.

3.3.1 Fieldnotes

While conducting participant action-observation the researcher is embedded into the enactments of the setting being reported. Ethnographic fieldnotes analysis draws from Geertz's thick description as in this perspective *"analysis, then, is sorting out the structures of signification…and determining their social ground and import."* (Geertz, 1973: 9) This approach allows to make sense of the knowledge in the local context of its production as well as to achieve external validity (Holloway, 1997). By thoroughly describing a phenomenon the researcher can evaluate the extent to which the results are transposable to other settings and people. Within postcolonial urban studies, the transferability of theories and practices drawn from a specific context is an essential conversation. *What can this Capetonian experience tell to the wider context of participatory mapping and enumeration methods?*

In practice, the "thick fieldnotes" were firstly filtered according to the type of note (NGO work related, observations, personal thoughts, anecdotes). Secondly, notes were organised thematically and following the research subquestions.

As mentioned in the section 2.3.2 on Participant observation, fieldnotes were compiled in different languages, namely: English, Italian, French, and, marginally, isiXhosa. This language mashup has no impact on the quality of my analysis as the person who wrote the notes is the same persons analysing them. However, it might have consequences on the way fieldnotes are reported in this thesis document, because, for the sake of consistency, I translated or paraphrased them into English.

3.3.2 Discursive material

This investigation draws from qualitative content analysis (Schreier, 2014) and critical discourse analysis (van Dijk, 1993) and applies both to written and spoken material. Critical discourse analysis is *"a type of discourse analysis research that primarily studies the way social power abuse, dominance, and inequality are enacted, reproduced, and resisted by text and talk in social and political contexts*" (idem). This approach to discourse analysis matches the methodological posture of this work, as it considers discourse as inherently produced in social interaction.

Material collected from interviews consists in personal notes taken during and after the interviews, transcribed interviews, as well as the transcription of a community workshop translated from isiXhosa to English. The aim is to uncover discourses that elucidate the meaning and uses of participatory mapping and enumeration in how actors (municipal actor, NGOs and communities) come together around informal settlements actions in the field.

Discursive material was organised thematically and coded according to the keywords related to the research subquestions.

3.3.3 Visual material

The interpretation of visual materials draws from Gillian Rose visual methodology (2007). The analysis draws on both content and compositional analysis depending on the type of material. The type of material is of two kinds: maps and GIS objects and pictures.

In this work maps and GIS are the object of analysis, an investigative tool and a tool for action.

First, visual material is subordinated in some way to the researcher's interpretation. In this thesis some of the maps produced are used as descriptive tools to provide context. Equally, pictures were taken during participant observation in order to document the stages of the mapping and enumeration process.

As visual material, maps are a polysemic form of spatial knowledge representation. When considered as an investigative tool, they are seen as excessive to the researcher's interpretative work. In this sense, maps are assimilated to a visual discursive material which has a proper performativity. For instance, questions of visibility or omission can be explored as for understanding the map as a political and discursive artefact (cf. 1st publication).

Finally, part of this material was created as a tool for action. I refer to maps and GIS created within the partnership with NGO and community, and whose purpose was to advocate for housing and infrastructural improvements. This material is to be analysed not only as visual material but also as an "acting material". For instance, some working maps served as a base for discussion with S section community around land tenure issues, some other helped the NGO reflecting upon strategies for communication, some other were mobilised for engaging the discussion with the CoCT, and so forth. In this research these "acting" maps were "followed" in order to capture ways in which they shaped and framed discussion around advocacy.

3.3.4 Basic GIS analysis

Some primary data to process with GIS software were gathered, namely: shapefiles, aerial images and CSV and Excel tables. This included data collected with/for the NGO through the enumeration in S section, open access data provided by the CoCT and other data distributed publicly by various organisations. Data visualisation bring to the surface connections that could not be seen if they were not transcribed graphically. This data and its uses are commented directly in the thesis.

Additionally, some basic GIS analysis were conducted. For instance, proximity analysis (such as buffer zones) was implemented for determining how many shacks were not located within 200m from a public water tap, which is the legal distance within which water access has to be granted to residents by the municipality. Otherwise, some topological analysis and GIS visualisation in general were used for understanding the interplay between administrative boundaries, zoning, etc. on S section site.

3.4 Positionality And Ethnographic Fieldwork In Time Of Crisis

This section explores and brings to surface some key elements of the setting in which methods presented in the previous section were deployed.

A key duty of the researcher is to actively resist reinforcing or replicating structural inequalities within the research relationship. For this reason, critical ethnography and PAR approaches "asks us to be both situated and reflexive, to be explicit about the perspective from which knowledge is created, to see inquiry as a process of coming to know" (Reason and Bradbury, 2006 :7). This because, epistemologically, in participatory research the 'theorizer' inhabits the same space as that of the 'theorized'. Also, the research would not be the same if the researcher was someone else, in terms of data collection but also in terms of ways in which this knowledge is translated into theory (Rose, 1997). Hence, this section of the methodology chapter aims to discuss the position from which the researcher has conducted the research. The information I accessed, I collected, analysed and reported, has to be considered in light of these considerations.

The first part of this section clarifies some questions related to the researcher position and negotiation within the fieldwork. The second part develops circumstances and events that shaped the research process and therefore need to be debated thoroughly.

3.4.1 Negotiating positions and access to the fieldwork

This subchapter is organised in three sections addressing three different elements, which are to be considered as acting simultaneously during the field. In particular, considerations around ways in which my whiteness shaped the research and relationship have to be considered as a cross-cutting component. These three elements contributed to ethical issues I found myself caught in (i.e. conflict of loyalty towards the NGO and my interviewees and/or the public institution they represented).

3.4.1.1 Whiteness and privilege

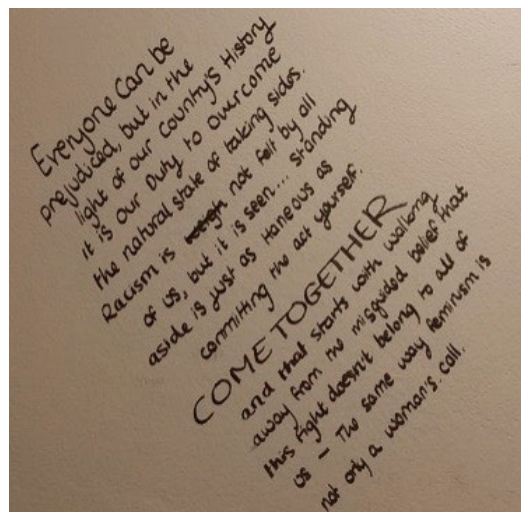


FIGURE 36 University of Cape Town upper campus, one of the countless racism-related women's restroom tag [Feb 2018, JB]

The racial component of my identity seemed to affect the process much more than, for instance, my gender. My skin phenotype and heritage meant different possibilities in field observations and surely shaped interpersonal relationship. Whiteness is not only a skin colour but a marker of a broader symbolic privileged status built throughout colonisation, among other historical events. In a context where the consequences of settler colonialism and of an institutionalised and spatialized racial segregation are still structural, racial dynamics plaid a role in many situations. This does not want to suggest that racial component is relevant solely in South Africa in relation to the country's history, but rather to highlight that in that particular context "race" is a manifest focus in public debates. As opposed to Switzerland, my main host country, where race and racism manifest through denial rather than through an overt public discussion (see, for instance, Boulila, 2018).

Race was quite often brought up as a topic for upfront discussions, as the following extract from the very end of an interview in Johannesburg conveys: "*Like, how do you deal with your white privilege in your work? Because, I am black, you know, but I still ask myself many questions when working with communities because I did not grow up in informal settlements myself, like, [in] Joe Slovo… how can I relate to that? Like, you know, it's like nobody is ever at the right place nje… you know what I mean right?* " [Johannesburg, Planact, February 2017]

The questioning of identity, belongings and entitlement of working in such or such context with such or such community was ever present in every action and situation. Very often, identity matters were first stated as a racial subject. Nevertheless, the discussion was then frequently redirected on intersectionality and on more detailed account of people's life itinerary and belonging – like the second part of the extract shows by taking social class into account. In the above quote, it is interesting to notice that, according to the interviewee (a young black lady coming from upper middle-class), the "whiteness" is not a unit per se but it adds up to other considerations around identity and origins. Probably, it is impossible to verify and clearly identify the actual extent of this influence in every single situation – to what extent was it mainly the racial component or the international or gender or something else? As Rose states "no identity is secure in and of itself; it may only be made temporarily more certain (and even this is not guaranteed) by being enacted" (Rose, 1997:316). Anyhow, I am white. For this reason, it is crucial to be explicitly aware that whiteness has had effects on practicalities of the research and the information collected, as well as on the choice of adopting a partly ethnographic methodology.

For instance, in practice, my whiteness influenced the way two interviews with government officials from Afrikaans heritage began. It seemed that at first sight people considered me from Afrikaans origins and cheerfully suggested to lead the interview in "our mother tongue" (implicitly referring to Afrikaans). Yet, none of the information interviewees had about me could possibly suggest that I was from Afrikaans origins like them: nor my name (from Italian origin) or my institutional affiliation (Switzerland) or my accent. I firmly believe that this "misunderstanding" was based on their interpretation of my phenotypic traits. This resulted in a bigger trust and openness towards me. Firstly, because they thought we could relate. Then, secondly, because when I explained my actual origins the conversation suddenly became very personal and based on

our life itinerary. Since trust and mutual connection are critical for conducting interviews, establishing this kind of bond from the very beginning of the interview was a key to interview's success.

Then again, whiteness impacted the access to some collective activities I was supposed to be part of. In some occasions during delivery protest or land occupation along the N2 towards Khayelitsha or in the surroundings of S section, I was prevented from attending any activity organised with the community. This for safety reasons regarding myself and the colleague responsible for the mapping and enumeration project. – a young black Xhosa Capetonian. He considered that my presence in the car while driving through tense areas would have amplified existing risks of becoming a target. Which he often vented as "I don't want to have stones thrown at my car just because they see you there" (Fieldnotes, March 2018). In those cases, my colleague was leading the activity in S section on his own. In practice this means that fieldnotes reporting those activities had to be reconstructed based on his personal narrative and especially on his availability for giving me a detailed account of the event.

These two instances are just examples selected among others and do not go without ambiguities. However, they were selected to highlight two situations that happened during distinct data collection moments – interviews and participant observation – in two different spaces – a governmental building in Cape Town city centre and the itinerary between Observatory and Khayelitsha. Also, both examples give a different interpretation of whiteness. In the first case, I personally interpreted the setting of the situation as whiteness related, whereas, in the second case, whiteness is mentioned as relevant by an 'outsider'. Likewise, in the first case, whiteness opened doors to a substantial data collection and provided access to other interviews, whereas, in the second, it hindered the access to the field and complicated the data collection.

3.4.1.2 Blurred roles and (one example of) conflict of loyalty

With regard to understanding modalities of implementation and impacts of participatory mapping and enumeration in informal settlements, interviews with government officials are a crucial element. In early 2018 the opportunity to interview CoCT officials almost fell apart. This subsection discusses the influence of "roles" for accessing interviews.

Since early 2018, for undertaking research in the City of Cape Town an application for permission from the Organisational Policy and Planning Department of the City was requested. Apparently, according to what I observed and captured through interviews, sensitive data and information on urban development projects and informal settlements leaked from previous contacts between researcher, activists and the CoCT. Those data were used to hold the municipality accountable and eventually led to the opening of a Court case against the CoCT. Presumably, the new procedure aimed to control the access to public, and potentially sensitive, information and to regulate the way it is delivered.

I never encountered any of that during my previous fieldworks in 2017, hence I was not aware of those new requirements until March 2018 while trying to schedule a meeting with some CoCT officials working on GIS and informal settlements. At that time, this felt like a dramatic deadlock as for conducting interviews with government officials.

When volunteering for the NGO, I was both an NGO staff member and an international researcher – a potential double threat in terms of information leakage. As a matter of fact, as a researcher I would have had to fulfil the requirements and the very long procedure, whereas as an NGO staff member I would have had to be extremely specific about my role, the information I needed and the intended use – and it would have been looked at with more suspicion, as it happened to a NGO colleague later on. This certainly shows the power relation at play between NGOs and CoCT. I was stuck at the interface of those two roles, and the opportunity to meet CoCT officials seemed an impossible task to accomplish in the time I had left. The situation took a welcomed yet unexpected turn.

Paradoxically, thanks to this "double bind" I bypassed the CoCT bureaucratic procedure and I did not have to undergo a meticulous scrutiny. In fact, it seemed that I was perceived neither as an international researcher nor as a proper NGO staff member. Although, my meeting request was transparent with regard to my research intentions and involvement at the NGO, it was seen as "not for research related per se – in the sense of the engagement leading to a new knowledge product" (extract from a personal e-mail communication with CoCT Research branch of the Organisational Policy & Planning Department, April 2018). The combination of both roles gave me somewhat access to a first meeting which then informally set the path for two other internal CoCT meetings – also in relation to the impact of whiteness and foreignness discussed in the previous section. This "bypassing" influenced my behaviour with regard to data collection. From 2018 onwards, I did not record any interview with CoCT officials in order to keep the conversation on a more informal level and to avoid the risk to be pointed back at the (lack of) municipal ethical clearance. The analysis of the content and rhetoric of those conversations has been reconstructed from my personal notes and not from detailed and "quotable" interview transcriptions.

Compared to NGO colleagues, my foreignness and blurred roles clearly were an advantage for interfacing with these actors. Although this PhD benefitted from that privileged access, this dynamic also raised ethical questions with regard to transparency and loyalty towards the NGO.

A specific conflict of loyalty manifested when reflecting on what to do with some pieces of information : what should I share or not with the NGO? and/or with CoCT officials about the NGO's doings? what can I report in the PhD manuscript? I did not actively request any data, I did not receive any "official datasets" from CoCT officials or make use of sensitive information in an ambiguous way in this research. Nevertheless, I decided to orally report back the broad topic of discussion with CoCT officials and some material observed

during interviews to the NGO members I was collaborating with[20]. For instance, during an interview with a public official, I was exposed to various data gathering devices that were about to be set up for surveying in various informal settlements. As a way to showcase their expertise and highly technological means, I was shown how the devices were setup and with what kind of survey. But I was denied to take pictures of said room, and more generally of their offices. Although the NGO was well aware of CoCT interest for data collection, the actual hardware supporting CoCT practice and their willingness to scale-up such surveying exercise was unknown from the NGO members. This information had no direct impact on the scale of the S section mapping activity. Nevetheless, it seemed to fuel the sense of suspicion towards CoCT officials and their trustworthiness during meeting, as well as the City actual level of infiltration within and knowledge about informal settlements. Mistrust towards the State, at all levels of government, is not a novelty in South Africa (Oldfield and Greyling, 2015). Although in a very marginal way, as a tiny brick intervening in the construction of a much bigger mansion, my act of sharing might have participated (at that particular moment) in confirming the skepticism towards City officials susceptible to interface with these NGO members.

DAG was my gateopener for experiencing the implementation of a participatory mapping, and for research purposes. I was compelled to guarantee my loyalty to the NGO since I felt a direct obligation towards the organisation who was enabling my professional experience and fieldwork. With regard to questions asked by CoCT officials on DAG's current activities (a recurrent opening question), my plural-identity supported by a bit of "naivety" happened to be an avoidance tactic. I wore the hat of "the foreigner" (I do not have a deep insight yet.; By the way I am sorry for my English, it is a bit rusty, and I just landed in SA.) and of the "rookie researcher" (I am here for research, I still have not selected a case study; I do not know DAG well enough yet.). If needed I could then divert the discussion as quickly as possible with a personal question about them or about something technical I observed in the office (Do you know DAG well? Have you ever worked alongside NGOs? How long have you been working here for?; Is that a data collection device?). By downplaying my level of understanding or diverting the discussion towards them or technical elements, no specific information about the NGO doings was disclosed.

These elements speak to situational communication skills as an ability to be fully aware of the different hats that researchers use in order to fulfil their mission, but also as elements that inadvertently influence a data collection setting. Social settings like interviews and participant observation are full of complexities, and the researcher is embedded in the dynamics of presentation of self (in)voluntarily impacting upon other's people perceptions (Goffman, 1959).

3.4.1.3 The expert

Personal skills and past working experiences of the researcher have a large influence on the turn that participatory direct action and interviews can take. The ability to resonate with interviewees background is

[20] Most of the interviews with public officials were partly informal, therefore they were not even recorded. No interviews' transcriptions were shared with any actor.

key in defining what kind of information will be shared and how. The same goes for building trust with co-participants within participatory activities. Depending on the interviewee or co-participant, some skills can also create expectations or tensions. Broadly speaking, the 'expertise' or being perceived as an expert has strong consequences on interpersonal relationship in the field. Hereafter, I develop two examples readapted from my fieldnotes.

As a consequence of my technical GIS training and my first-hand experience with geo-data collection within a public department in Geneva (Switzerland), I can speak the technological GIS language as well as understand the workings of GIS infrastructure within a public administration. The GIS skills, and especially the work I conducted in Geneva, resonated with GIS officials' everyday work in terms of technology set up and issues. This allowed for a bigger trust from their side as I could easily relate to some aspects of their working routine. People were more likely to show me live on their screen the work they were conducting and the internal GIS capacity. On the base of my previous work experience with GIS, I was asked for suggestions on specific technical issues they were facing "Aw perhaps you can help me out with this". In practice, during some meetings, I was seen more as a GIS passionate fellow than as someone who needed to be fed with information. Even though in an ephemeral way, this trust-building through expertise gave me a privileged insight on internal information and materials I was probably not supposed to see. None of the sensitive information is explicitly displayed in this work. However, it was used for making sense of the way in which GIS operates in the informal settlement domain and, broadly, in understanding CoCT informal settlement programmes priorities and contradictions.

On the other hand, whilst working with communities, to be "the expert" can create expectations. This is a sensitive component when working with communities, and especially with marginalized communities. Expectations are directly linked to people's hope for an urgent improvement of their life conditions. Hence, "the experts" responsibilities are just as high as the stakes at play.

For instance, in April 2018 during a community report back meeting at Makukhanye Art Room space, we presented the first version of a map summarizing the main results of the enumeration. The map was both printed in A0 format paper – and laid out on the floor – and a PDF version was projected on the wall. The attendees were community leaders, community volunteers taking part to the mapping exercise, other community members and three NGO members – of which I was the only white and international. The one community leader made his disappointment very clear with regard to the digital map, that he considered too static and not up to his expectations. The community leader shared with the audience that he was expecting a more interactive representation of the settlement where anybody could click on an object and his name would be displayed in an information bubble. According to him, the digital version of the map was not digital or powerful enough. This message was addressed to all NGO members in the room – we were three people – nevertheless he clearly stared at me throughout his whole speech as if to suggest that I was the main recipient of his critique and that I was responsible for it. One of the NGO colleague got a sense of that

diversion and reacted promptly. Firstly, he reminded to the leader that the map was a temporary "working map" version. Secondly, he argued that the work we were conducting was a collaborative community achievement and not a mere technical exercise conducted by a white international GIS expert with the intention to give him a personal visibility. To underplay my expertise was key for recentering the purpose of the participatory mapping exercise around community needs.

As we will explore further in the empirical chapter, this is a significant anecdote as it unveils ways in which the power of the map is conveyed through digitalisation, it raises questions about the perception of project and map ownership, and speaks about risk of political hijacking of participatory spaces. Anyhow, this example is narrated here to show the interplay between expertise, whiteness and expectations.

3.4.2 Fieldwork in time of (a new layer of) crisis

As discussed in section 2.2 of this chapter, working on a case study entails issues of replicability and generalization. Also, the knowledge produced is dependent on the moment in which it is collected. This section addresses a major event that shaped the main fieldwork of this research: the worst Capetonian drought in 100 years.

Conducting a research in time of crisis makes the research even more sensitive. On the one hand, crisis are moments of redefinition of political and social dynamics. New actors emerge and agendas are reorganised – in this thesis, actors related to informal settlements programmes. On the other hand, those are moments of high-risk vulnerability for people experiencing them hence require extra cautiousness. I reflect here on how these implications impacted, or not, the project in S section, and my understanding of Cape Town's public debate around informal settlements interventions and levels of government. This subchapter aims to raise a rather peculiar contextual element that, at first, seemed susceptible to impact the realisation of the mapping and enumeration process and therefore to shape the (s)object of study.

3.4.2.1 Cape Town water crisis 2018

Cape Town's metropolitan area experienced the height of the worst drought in the early months of 2018. This would have made of Cape Town the first major city in the world to run out of water. Early 2018 was the exact time of my five-month close collaboration with Development Action Group.

Water restrictions were already in place during summer 2017 (level 3B) and winter 2017 (level 4), while I conducted the two first field trips, but the situation aggravated quickly during spring 2017. "Day Zero" was announced for April 12th 2018 following a low rainfall winter, the still too high agricultural and residential water consumption, the government failure in managing the water system, and evergreen partisan fights diverting public responsibilities. "Day Zero", or level 7 water restriction, correspond to the day the municipal water supply would be shut off – except for key water access. About 200 water-collection points guarded by police and soldiers were planned by the CoCT, so that residents could fetch a daily ration of 25L of water

per person. Luckily, as a result of financial, social and moral pressures, water usage declined significantly. The looming projection was postponed several times and eventually, in late June, was postponed indefinitely. The fourth phase fieldwork, and main stage, of this research was conducted from January to June 2018, while the drought reached its climax (level 6B restriction, corresponding to a maximum use of 50L per person per day).

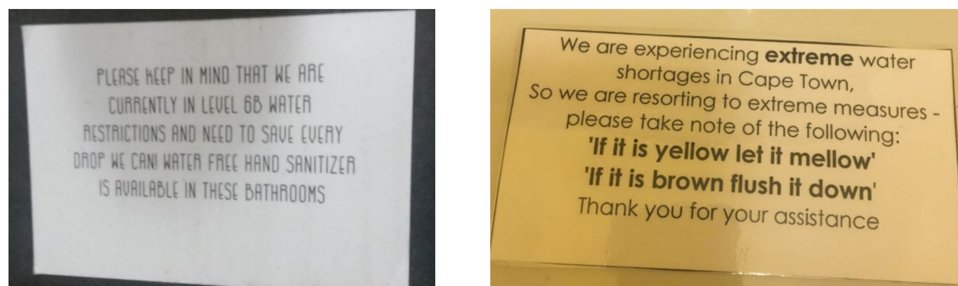


FIGURE 37 An aesthetic of the drought : signs of the crisis in public restrooms (We still do not know what to do if it is red though...) [Feb 2018, JB]

Self-centered interrogations emerged prior to carry on with an already sensitive fieldwork (see section 2.2): *to what extent will my presence in Cape Town add pressure on the drought? Am I going "to steal" water to residents? How can I conduct a research in such a situation knowing that I will leave eventually? Will my presence contribute in enhancing structural inequalities? Should I redirect my work on a different case study? But if so, what will this mean with regard to my commitment to the Cape-Town based NGO?...*

These were just questions that added up to the insecurities of travelling to South Africa for conducting a research as an international scholar who had never properly approached ethnographic research and was unfamiliar with informal settlements.

Following discussions with South African friends and consultations with NGO staff about this dilemma, it turned out that, according to them, the purpose of my stay in Cape Town somewhat downplayed the impact of my presence on water consumption. I was getting involved in local social action through volunteering for a local NGO. Therefore, in light of drought-related ethical questions, the methodology adopted became even more relevant. A direct-action approach allowed to have a direct impact on both the participatory mapping project in S section – as previously agreed with the NGO – but also to potentially get involved in water-related projects and discussions in other Capetonian neighbourhoods, individually or through the NGO activities. On a personal level, as a short-term Capetonian resident, I was extremely aware and attentive with regard to water usage and I developed a series of strategies to limit my daily water consumption as much as I could – which was way below 50L per day defined in the level 6 water restriction in effect at that time. Additionally, I attended neighbourhood meetings and other water action-oriented workshops around my living area. Those five months, and the bloody violence I witnessed around water provision in particular (stabbings at the water sources, physical frictions in the shops for the last bottle of water, informal settlements invaded by "water police" shutting down activities using public water – i.e. informal car washing, etc), have given a new twist to my relation with water scarcity.

Water apartheid and informal settlements concerns

The drought almost redirected the research question of this work. *How do mappers react in time of crisis? How are the resources of participatory mapping and enumeration redirected to face such a crisis? …*

Eventually, the drought did not influence the implementation of the participatory mapping and enumeration project per se, as the NGO did not drop it or modify it consequently. For this reason, I kept the same focus but observed how the public discourse was (re)framed around this occurrence. Still, the water crisis undoubtedly impacted the setting in which the project was conducted. In fact, emergency situations like this can bring people together but also create tensions and exacerbate inequalities.

The drought made infrastructural disparities even much more visible. For instance, as Robin explains, a lot of "'water facts' surfaced, revealing that while residents in impoverished informal settlements used only 4.7 per cent of the city's water, middle class Capetonians in the suburbs used over 70 per cent." (Robins, 2019:5). Public debates around informal settlements gained a new visibility. On the one hand, in terms of learning from informal dwellers. Accounts of informal settlements life conditions since post-apartheid became then more visible, as a set of strategies for coping with a small amount of water and lack of proper sanitation were revealed in the main media. Everyday water-related practices, routines and issues of informal dwellers were front-page. Informal settlements residents, mainly black and coloured, were called to help out the "Mother city" residents, mainly white.

On the other hand, this gave voice (again) to a pre-existing water emergency – a water apartheid – that never has been officially declared as such. In informal settlements thousands of people have been living in impoverished environments and emergency water conditions for decades (SERI, report). For thousands of South African dwellers – and millions worldwide – the crisis is not an upcoming scenario, rather it is an everyday-life struggle and reality. S section, the informal settlement this work focuses on, is part of those impoverished areas having insufficient water access and sanitation. When chatting with a S section resident about water saving strategies in Cape Town suburbs, she replied smirking "maybe they will finally understand what it is like…" (Fieldnotes, March 2018). Unlike other informal settlements in Khayelitsha, S section settlement did not seem to experience major police interventions for shutting down water-dependant informal activities (notably, carwashs).

During the drought two worlds apart were getting closer and exacerbating their distances at the same time. In early 2018, ways in which the drought could impact and undermine NGOs action in informal settlements were a crucial agenda item within NGO working in informal settlements. These concerns were framed mainly around governmental funding allocation. In a local community of practice, drought-themed questions emerged such as (extract from email communication from Isandla institute to other NGOs, 19th Feb):

- *What does the water provision issue mean for communities living in informal settlements?*
- *What alternative arrangements have been made?*
- *What will it mean and what will happen if money/budgets are re-directed from upgrading towards mitigating the water crisis?*
- *What resource efficiencies are organisations using to deal with the water crisis?*

Public funding allocation was raised as a critical point of discussion, in view of the fact that, in early 2018 the Municipal Budget for 2019 was available for public consultation. In South Africa, the Municipal System Act (2000) formalises in law requirements for 'participatory governance' which pledge a public voice in governing between elections (Anciano and Piper, 2019). This Act states that municipalities consult the public on the annual budget draft. As Anciano and Piper (2019) explains, "public consultation on the budget and IDP [Integrated Development Planning] processes are generally ineffectual in South Africa, with poor transparency and often low levels of participation".

The drought situation provided momentum for participation in this consultation and NGO passionately mobilised themselves around that. For instance, new synergies were created between the internal Budget Participation campaign at DAG and local community of practice on informal settlements discussing water issues. The aim being to make communities as well-equipped as possible for impacting the draft budget by giving consistent public input in identifying priorities for budget allocation. The idea was to try and ensure that water related project in the city centre, or infrastructural projects on water source alternatives, would not hijack governmental funding destined to informal settlements in the name of the drought-related policies. Obviously, the fight was not uninterested since the financial capacity of some NGO is also partly dependent on that public funding.

As stated before, the NGO project in S section and S section community's priorities – which are the main focus of this thesis – were not redefined in light of the drought. S section, and broadly informal settlements' emergency goes beyond water supply. Therefore, advocacy for improvements needed to be tackled holistically and not focussing on water issues only. In spite of that, budget consultation and water related civic workshops were plugged into already planned mapping and enumeration activities. In that sense, participatory spaces created as part of the mapping project were converted into broader discussions around public debates highly relevant at that time. This expresses the flexibility and the empowering potential of participatory mapping projects as platforms for broader civic learning and citizen mobilisation beyond the original mapping goal.

FIGURE 38 A water-themed public mural in Salt River neighbourhood (Cape Town). The bottle label says "Salt River 2018 Grand Cru" [March 2018, JB]

FIGURE 39 In the meantime in the KwaTshaTshu (Eastern Cape) heavy rainfalls were blocking the access to the nearest city Ngcobo [April 2018, JB]

3.5 Conclusion Of The Chapter

I am part of the material I have studied just as any other participant, map or voice. This process has shaped me just as I have shaped, both, the research process and the process I studied. There is no escape, nor I seek one, from that entanglement. This chapter aimed to shed a light on how this mutual shaping is articulated by developing: the research methodology and methods, and considerations around positionality and specific events witnessed.

The main methods used to collect data were:

- *Participant observation*, organised on a total of about 10 months of fieldwork (Table 8), 13 A5 field notebooks and a Word document journal of about 80 pages.
- *Semi-structured interviews*, 53 interviews were conducted with a variety of actors (Table 9)
- The collection of a range of *documents, maps, reports, GIS data*, as illustrations and complements of information to the material gathered through two first methods (examples in Table 10)

Their contribution of each method to the research sub-questions is summarized by the Figure 40.

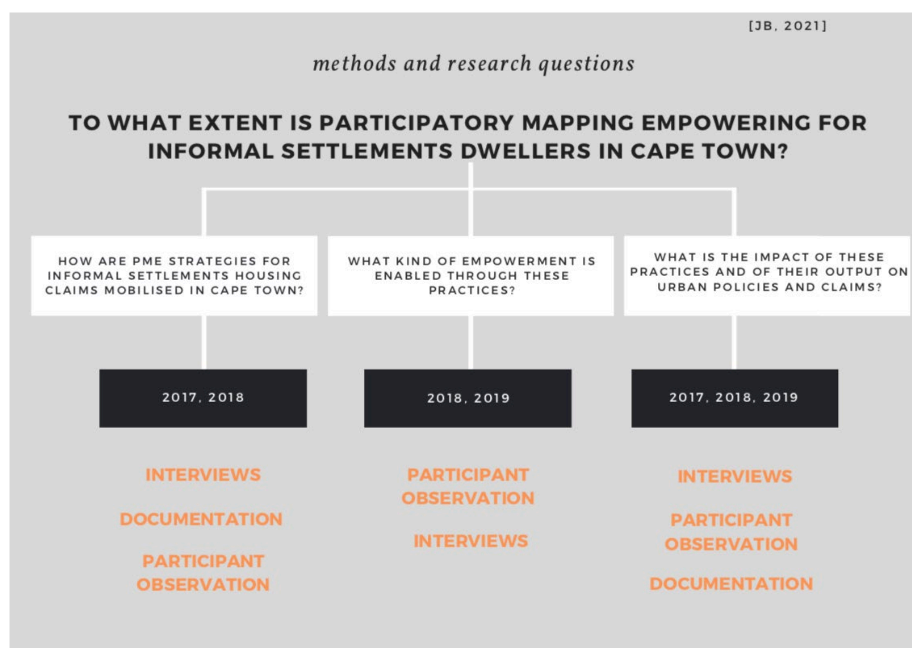


FIGURE 40 Synthesis of main methods and their contribution to each research question

Limitations of the fieldwork organisation that impacted the research focus

The fourth phase of fieldwork had to be rearranged and it only occurred from the second half of 2018 onwards (cf. Table 8 – Summary of the research fieldworks). This rearrangement occurred at short notice and impacted the duration of the fieldwork just as the fulfilment of its main objectives.

Firstly, these changes affected the accuracy and comprehensiveness of the data collected for answering my 2nd research sub-question tackling community empowerment. It was not possible to stage a proper focus group or set of interviews with the S section community volunteers in order to capture their situation and feelings one year after the mapping and enumeration project. My access to that space was strictly dependent on the NGO, and hence required to plan logistics ahead of time and discuss the modalities of realisation (date, place, transportations, people attending, etc.). Moreover, in early 2019 DAG was not collaborating with S section community anymore. The colleagues working on the project had left the NGO and the remaining team's energy was absorbed into another mapping and enumeration project as part of a collaboration with the Western Cape province.

Secondly, these changes impacted the data verification and the reporting back workshop that I had planned to finalize my fieldwork. I was unable to organise a one-day activity on participatory mapping and enumeration for informal settlements in the Cape Town metropolitan area. The aim of this workshop was to bring together scholars, NGOs based in the Western Cape province, and community members working with participatory mapping and enumeration. The interest for such a space of sharing clearly emerged during my 2nd and 3rd phases of fieldwork through observations such as a lack of collective discussion and coordination on a broader city/regional scale between main actors of participatory mapping and enumeration. The intention was to raise the discussion around issues of data sharing, spatial knowledge fragmentation, consequences of "pop-up" implementations of participatory mapping etc. which are problematized in the last

part of the conclusive chapter. Additionally, in terms of my research, the event was supposed to be an interface for reporting back and making (collective) sense of part the material collected throughout my work. In order to organise the workshop, a funding was allocated by my host institution. However, the event did not occur.

Nonetheless, consequences of this rearrangement need to be nuanced as they did not fully undermine the quality of the research or the capacity to provide an answer to my questions. Although I gathered less amount of material than excpected, the observations are still enough to discuss the impact of the project on community's empowerment (2nd sub-question). The main repercussion regards the capacity to collect the community's perspective on PME impacts, one year after implementation of the project. This resulted in a slight redirection of the analysis towards the NGO workings and empowerment happening in the interaction with the community, as opposed to a narrower focus on community empowerment itself.

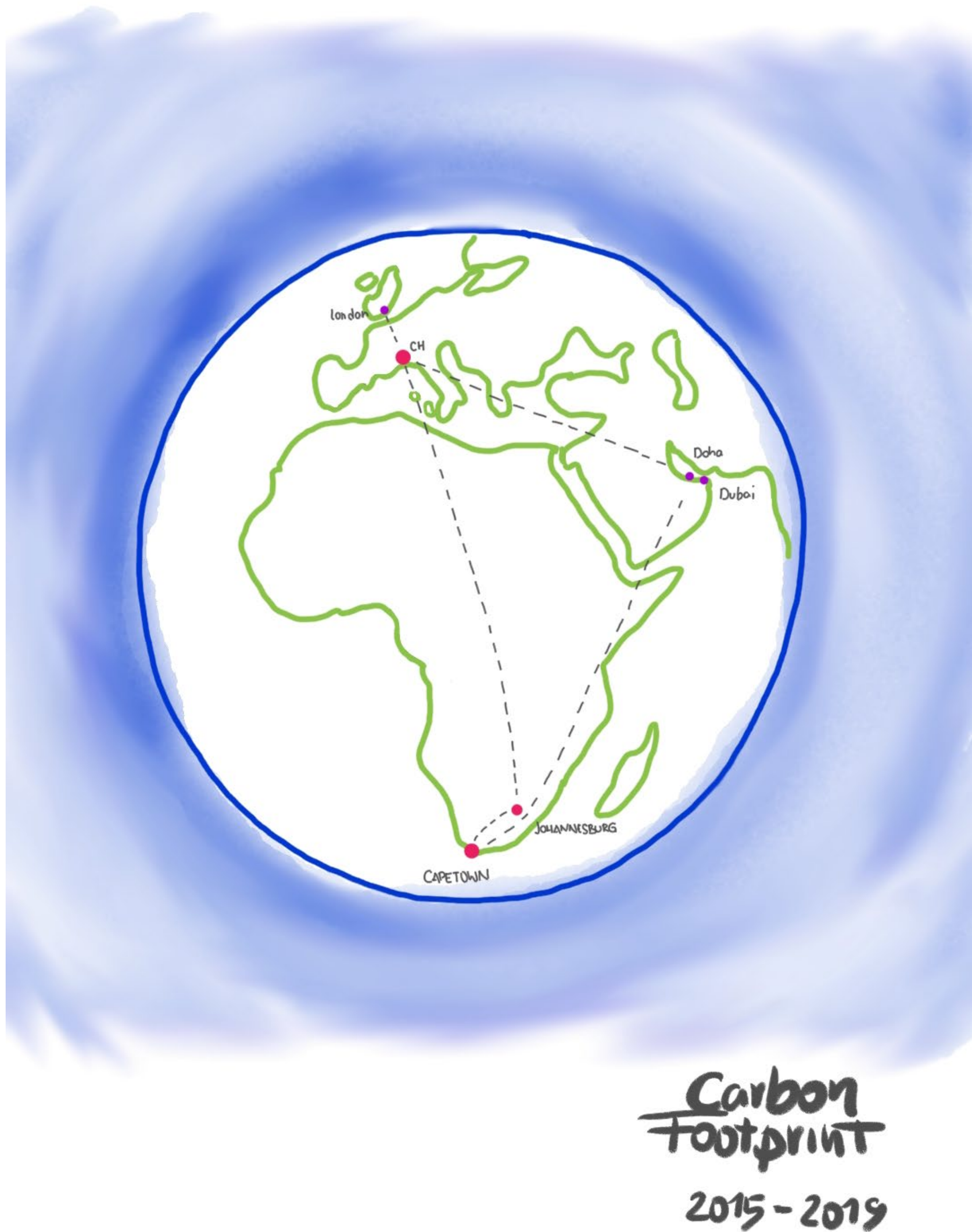


FIGURE 41 The flights routes [2019, JB]

Numbers and pollution : the estimation of the carbon footprint of the flights is of 11,2 t of CO_2, for a total of 67,800km covered (myclimate.org). The amount of flights necessary to conduct the PhD fieldworks represent more than 1/3 of the flights I have taken so far in my entire life (1989-2022). These numbers made me raise questions about the impact of my research choices and the overall impulse to hypermobility within academia.

4. ARTICLE 2

Strategic and Acupunctural GIS Implementation within Community-Oriented Organizations: Evidence-Based Insights from a South African Participatory Action Research for Informal Settlement Upgrading

Barella Jennifer

2020

Cartographica: The International Journal for Geographic Information and Geovisualization

Volume 55 Issue 4, pp. 266-280

https://doi.org/10.3138/cart-2020-0013 (or available on demand)

ABSTRACT

This article brings evidence-based insights to support the importance of considering contextual elements when analyzing modalities of GIS implementation within NGOs and community-based organizations. I discuss challenges and unforeseen insights of GIS implementation within an advocacy NGO that supports community claims in an informal settlement of Cape Town's metropolitan area. Through the lens of empirical data, limitations of the GIS implementation models framework are highlighted. GIS implementation will appear to be "acupunctural" and highly strategic and will unveil the use of GIS-based solutions as relational leverage. Finally, I discuss directions for further scientific research on GIS implementation within NGOs and community-based organizations.

RESUME

A l'aide d'une étude empirique participative en Afrique du Sud, l'auteure discute des modalités d'utilisation de SIG au sein des ONGs et des organisations communautaires, et étaye l'importance de confronter les modèles théoriques aux éléments contextuels. Elle analyse les défis et les enseignements inattendus liés à la mise en œuvre de SIG par une ONG appuyant les revendications en matière de droit au logement et à de meilleures conditions de vie des habitants d'un quartier informel dans la région métropolitaine de Cape Town. À travers cette étude de cas, les limitations des modèles théoriques d'implémentation de SIG sont mises en exergue. La mise en œuvre de SIG se révélera « acupuncturale » et hautement stratégique. Cette analyse nous éclairera sur l'utilisation de solutions basées sur les outils SIG à titre de levier relationnel. Enfin, des pistes de recherche futures sur l'adoption de SIG au sein des ONG et des organisations communautaires sont proposées.

KEYWORDS: public participation GIS, GIS, participatory mapping and enumeration, informal settlements, advocacy, NGOs, community-based organizations, Khayelitsha, Cape Town

Strategic and Acupunctural GIS Implementation within Community-Oriented Organizations: Evidence-Based Insights from a South African Participatory Action Research for Informal Settlement Upgrading

Barella Jennifer

4.1. Introduction

Participatory and data-driven development processes are the fastest-growing strategies for both development programmes and urban governments administration (Patel and Baptist 2012). At a global level, the diffusion of digitalization and the spatialization of information have transformed knowledge management (Baud and others 2014). Within this trend, participatory mapping and enumeration (PME) projects are axiomatic approaches that make it possible to foster marginalized community empowerment and to facilitate the involvement of such communities in urban governance through the production and deployment of social and spatial data about themselves. The production of social and spatial data is often mediated by the public–participatory implementation of GIS-based tools – referred as PPGIS – in various forms and by a variety of actors. Radil and Anderson (2019) categorize PPGIS's main implementations using a global South–North distinction suggesting that participation and GIS applications unfold differently depending on geographical and political contexts. As a mat-ter of fact, these applications are led by a variety of actors and are deeply influenced by political cultures, agendas, and technological capacities, as well as entrenched power relations. In the global North, government-led initiatives make these approaches flourish within highly formalized decision-making processes and citizen involvement in urban planning policy (Ghose 2011). In the global South, international development agencies contribute to mainstream these strategies for tackling Habitat III goals in terms of urban poverty reduction, living conditions improvements, and community empowerment (UNHabitat 2017). In postcolonial settings, such as South Africa, these strategies are widely employed to bridge the gap in data surrounding informal settlements; to gather knowledge on issues affecting residents; to advocate upgrading programmes; and to foster capacity building and collective organization (Appadurai 2012). Local nongovernmental and grassroots organizations play a prominent role in implementing PPGIS-led mapping and enumeration with communities living in informal settlements. Increasingly, they are drawn to GIS, as it assists in innovating data gathering methods, accessing public data, complexifying analysis and display of community knowledge, and eventually influencing public policy formation. Moreover, successful applications of GIS-based tools within nongovernmental organizations (NGOs) are gaining visibility thanks to international networks such as Slum Dwellers International (SDI) and to the growing range of GIS-based solutions for NGOs developed by the Environmental Sciences Research Institute (Esri), along with open source alternatives (Pánek 2014).

Compared with international development agencies and with public/private sector stakeholders, local community-oriented organizations are more fragile when it comes to GIS implementation. The issues are

technical as well as organizational and are often related to the resource-poor nature of these groups (Sieber 2000). This undermines the effectiveness and the sustainability of projects relying on GIS. PME outcomes not only are about goal-oriented data collection but also are supposed to boost the involvement and capacity enhancement of marginalized groups. GIS incorporation into existing practices should empower those whom NGOs are supposed to represent. In reality, NGOs operate at the intersection between development and urban governance, as well as between scales of government, local communities, and development agencies. Hence, GIS implementation within PME is a highly political process entrenched in contextual power relations and political agendas (Ghose 2011).

For communities living in informal settlements, the stakes are high. Evidence-based analysis on the widespread application of GIS tools in participatory mapping and enumeration is politically urgent as well as highly contextual (Radil and Anderson 2019). I contribute to the debate by presenting evidence-based insights on the implementation of GIS-based tools for conducting a participatory, community- and NGO-led enumeration in an informal settlement in Khayelitsha (South Africa). I discuss challenges and unforeseen outcomes of GIS implementation within a Capetonian advocacy NGO through the prism of PPGIS literature on GIS adoption within community-oriented organizations. After a literature review, the role of NGOs in South African informal settlement advocacy actions is discussed. Then I present the field example of a PME process in the metropolitan area of Cape Town. In the discussion confronting the literature and my fieldwork outcomes, I will propose directions for further scientific investigation.

4.2 Models of GIS Implementation According to PPGIS Literature

Organizational GIS implementation is positioned in a broader intellectual debate on public participatory approaches to GIS. A more specific literature addresses GIS implementation models used to analyze the South African case study. In this section, I discuss both in this order, before proposing a theoretical framework to be tested on my empirical data.

4.2.1 Public Participatory Gis And GIS Implementation

Discussions of participatory implementation of GIS-based tools and participatory approaches to mapping stem from critical cartography and critical GIS debates initiated by the National Center for Geographic Information and Analysis in the United States (Dunn 2007). PPGIS relates to the use of geotechnologies to support public involvement in policymaking (Sieber 2006) and to advocate goals of community and nongovernmental organizations through spatial knowledge production. Embedded in debates on social and political impacts of GIS, PPGIS is an approach "that emphasizes grassroots participation in spatial data development, analysis, and application; empowerment of traditionally marginalized social groups through self-directed use of spatial data and technologies; and adaptation of existing GIS software and data structures to

diversify the forms of spatial knowledge that may be included" (Elwood 2009, 63). The growing adoption of geographical information technologies by a range of nongovernmental users is an expanding matter of inquiry within PPGIS studies. Leitner and others (2002) identify two broad tendencies in the PPGIS research agenda: addressing strengths and difficulties of implementing GIS within marginalized groups-oriented actions (cf. Sieber 2000, Brandt 2002, Ghose 2011), and creating alternatives for conventional uses of GIS (as theorized by Elwood and Leszczynski 2018). Questions explored in this article – namely a GIS-tool implementation in an NGO-led mapping and enumeration project – belong to the former trend.

Implementation refers to "activities necessary to put the innovation into practice and incorporate it into existing and developing operations" (Onsrud and Pinto 1993, 21). First, this supposes that an organization is aware of a (GIS-based) innovation and strategically decides to adopt it (Onsrud and Pinto 1993). Second, technological implementation implies consideration for pre-existing practices, work protocols, resources, and current operations that it will modify; it encompasses a wide range of technical, organizational, and contextual challenges (Sieber 2000). Literature on GIS implementation in community- and NGO-led processes is largely influenced by literature on GIS adoption in governmental agencies, such as public departments and municipalities. Similarities between the two are highlighted in a set of technical and organizational elements, such as budget restrictions, technical and infrastructural issues, and uncoordinated internal efforts. Main structural elements for a successful implementation are related to the presence of a leading actor guiding the implementation, a long-term commitment to resources allocated to GIS, and end-user participation throughout the process (Convery and Yves-Dewey 2008). To an important extent, however, this framework is ill-equipped to help refine the analysis of small local NGOs.

NGOs face a specific set of obstacles related to the variety of organizations' internal resources and modes of operation, as well as to their specific roles in the context in which they operate (Elwood and Ghose 2004). First, compared with international development agencies and with public/private sector stakeholders, local community-oriented organizations tend to be more fragile when it comes to affording, deploying, and maintaining GIS provision internally (Ghose 2011). Software purchase, hardware, and data, as well as ensuring GIS skills and ongoing training for non-GIS-professional staff, can be a financial challenge for these very often resource-poor groups (Barbeito, Bowman, and Applied Research and Development Institute International 1998). Likewise, frequent staff turnovers and NGO reliance on skills outsourcing represent an impediment to continuity and work quality when it comes to dealing with technical knowledge such as GIS. Ironically, staff training could exacerbate turnover rate by causing a local and/or international "brain drain" as the highly technical GIS expertise enhances staff employability in higher-paying organizations (Lemay-Hébert and others 2020). This applies both to NGO staff and to community members who eventually develop these skills and take them elsewhere (Leitner and others 2002).

Second, NGOs' funding, and consequently their mode of operation, is often project-based (Lerch 2014). Typically, this translates into short-term outcome-oriented actions, geared towards optimizing financial opportunities and being accountable to donors – as opposed to sustainable engagement in long-term incremental action, strengthening the local political agenda for marginalized groups. This impacts the way GIS is adopted internally as well as the focus of the GIS-based intervention. In some cases, the instability resulting both from the inability to retain staff and resources and from the project-led focus of action affects an organization's openness to innovation (Sieber 2000).

Third, the NGO's scope and contextual setting play a critical role in defining the appropriateness of GIS implementation, along with its challenges and advantages. NGOs form a heterogeneous group of non-profit institutions, operating within civil society1 and undertaking a variety of development strategies in multiple areas of action (Mitlin 1998). In the international development sector, The World Bank commonly distinguishes between advocacy and operational NGOs – the latter being specialized in de- signing and engineering development programs and their implementation, the former being principle-based and po-litically oriented organization, often campaign-based and targeting human rights. Although both could work towards a shared development objective, an operational NGO is more likely to implement GIS as a basis for its overall operations, whereas an advocacy NGO is more likely to embed GIS within snapshot interventions and punctual actions. Therefore, the purpose and temporality of action in which GIS in incorporated vary considerably. The organization's scope is contextual, being inherent to the local political setting in which the NGO operates (Elwood and Ghose 2004). Internal capacities and characteristics influencing the adoption and uses of GIS are dependent on the "intra- and inter-organisational networks and relationships that influence how an organisation navigates the broader situation in which it is embedded" (Elwood and Ghose 2004, 20). Namely, advocacy NGOs often operate as intermediary groups between communities and between communities and the government. Their independence from the government allows them to undertake action aimed at increasing the accountability of the government and making policy production more inclusive of different marginalized groups (Mitlin 1998). Therefore, NGOs interested in adopting GIS for advocacy purposes may also face challenges in positioning their GIS use with regard to a highly formalized governmental practice of GIS. Openness to GIS innovation might be part of some NGOs' strategy to keep a seat at the decision-making table, more than a deliberate choice for renewing internal modes of operation.

Indeed, GIS implementation is a highly political process entrenched in contextual power relations and political agendas – especially if the actor implementing it is considered to be in a subordinate position in the local political hierarchy (Ghose 2011). Since political and organizational circumstances are constantly changing, GIS adoption and use within NGOs follow a variety of trajectories and negotiations that cannot be carved in stone. Nonetheless, GIS implementation models provide a multidimensional framework for gaining insights into the processes of GIS adoption.

4.2.2 Models Of GIS Implementation Within NGOs And Community-Based Organizations

Analytical models of GIS implementation for community-oriented organizations stem form PPGIS studies on participatory planning initiatives, mainly grounded in Northern American experiences (Sieber 2000; Brandt 2002; Leitner and others 2002; Elwood and Ghose 2004). In this literature, two main insights on "implementation" are presented: models of GIS availability (as in first steps of GIS implementation and GIS provision) and models of GIS deployment (as in factors for GIS incorporation into operations). Both directions address the flexibility and responsiveness of models for community organizations' needs, as well as the difficulties of providing and maintaining the provision of GIS.

To understand the main mechanisms of GIS implementation within NGOs and community-based organizations, I have summarized the existing PPGIS literature on the topic in Table 13. This table provides a view of the main GIS adoption strategies and of challenges and advantages. It adapts models from Leitner and others (2002); strengths and limitations of these models from Sieber (2000), Leitner and others (2002)), Lin and Ghose (2008), and Ghose (2011); and reasons for GIS adoption from Sieber (2000). Additionally, the table anticipates examples from the South African context that will be discussed further on in the article.
Leitner and others (2002) differentiate between six main types of GIS availability: community-based GIS (in-house); university/community partnership; GIS facilities in universities and public libraries; "map rooms"; Internet map servers; and neighbourhood GIS centres.

First, community-based or in-house GIS characterizes a full GIS analytic and representational internal capacity. Software – often desktop GIS – servers, data, and paid GIS staff are maintained within the organization. This is a rare model of implementation, as it requires that the mode operation adapt entirely to the technology. GIS becomes a core strategic function on which the organizational stability is reliant. Therefore, this model is ideal for operational NGOs that want GIS and consortium through GIS – hence NGOs that could become GIS providers for other community organizations (Sieber 2000). In the Cape Town area, this model is representative of NGOs working in informal settlements, such as the Slum Dwellers International (SDI) alliance, or of the local NGO Violence Prevention through Urban Upgrading (VPUU), whose methodology is highly data-cantered (Ricker, Cinnamon, and Diewechter 2020).

Second, university–community partnership refers to GIS provision through community organization and higher educational institution collaboration. Two main forms of partnership are identified: (1) service learning, where the faculty provides a GIS service to the community for a specific purpose, and (2) action research, collaborative and participatory research with or on GIS use for tackling community-based problems. GIS infrastructure is owned and managed by the university, which also provides staff/ student training. This is a valid starting point for organizations without previous GIS capabilities, although it does not allow the same

kind of long-term GIS involvement. One of this model's characteristics is the differentiation of the type of knowledge produced (organizational and academic). Since this model does not give full GIS control to the NGO, partnerships are often adopted by organizations that seek to learn GIS skills and/or that are interested in the GIS outcome more than GIS capacity (want map).

Third, GIS facilities in universities and public libraries provide access to computers, GIS software, and expertise. This model is dependent on the quality of and access to public facilities (presence, opening hours, etc.), which depend on the local context, as well as on access to publicly held information. An organization solely interested in basic GIS outcomes is likely to adopt this model as a once-off strategy (want map).

Fourth, the "map rooms" model refers, for instance, to governmental offices acting as data providers, such as City Maps in the Cape Town municipality or the South African National Geospatial information offices. This model can also manifest as online map rooms such as Web-based GIS and mapping sites from which citizens can access, print out, and sometimes even analyze geographical information. A common example is planning and surveyor's offices, through which organizations can access land registry and taxation information. In the Cape Town area, this is promoted by the Cape Town Open Data Portal, motivated by a desire to democratize data access and knowledge production, strengthen transparency, and advance cities socially and economically (Ricker, Cinnamon, and Diewechter 2020). The main focus of NGOs adopting this model is on acquiring geographical information rather than developing GIS capacity. Nevertheless, this model implies high negotiation skills with authorities when it comes to acquiring data considered sensitive by the government.

Fifth, and on a different sociotechnical level, Internet map servers refer to GIS provision through distributed online GIS platforms. This GIS interface is based on an array of pre-formatted platforms and solutions (OpenStreetMap, Google Map, ArcGIS online, etc.); therefore the interaction with GIS requires more or less active knowhow, depending on the purpose. This model can manifest within a university–community partnership, as a full Web-based in-house GIS, or as a one-off adoption. Nonetheless, it is specific, as these online platforms play an increasing role in PPGIS (Weiner and others 2002; Ghose 2011; Pánek 2014).

Finally, a more sophisticated and interconnected model is identified in neighbourhood GIS centres. This rare type results from collective merging of expertise, resources, and data to provide a bottom-up central facility that all affiliated organizations can use. In some ways, this is a shared in-house GIS facility, which could be neighbourhood-based as well as issue-based. Neighbourhood GIS centres could combine a set of attributes difficult to obtain in other models and praiseworthy for truly bottom-up spatial knowledge co-production (Ghose 2011). However, this is the most complicated model to implement in terms of funding and interrelation skills between organizations. Examples from Cape Town close to this model could be identified in the community registers of some VPUU Safe Nodes,2 where community members are trained to collect,

manage, and distribute household information and neighbourhood residents have physical access to GIS hardware and software.

These six models articulate different dimensions of GIS availability: the nature of interaction with GIS, interest in GIS capacity or outcome, the location of GIS, stakeholders involved in GIS use and setup, and legal, ethical, and copyright issues related to data ownership, privacy, and free access. These models provide a multidimensional framework for gaining insights into the processes of uses of GIS. Different levels of responsiveness are fashioned by GIS providers' financial constraints, agendas, and time schedules (Ghose 2011). Every GIS implementation is therefore unique to particular moments and contexts. Nevertheless, models stem exclusively from North American experiences with neighbourhood planning purposes. Since organizational context and inter-/intra-actors' relationships are identified as key issues for successful GIS implementation and responsiveness (Elwood and Ghose 2004; Lin and Ghose 2008); this article will enrich them through a South African case study.

Table 1. A summary of main GIS implementation models within NGO and community-based organizations

Model	Strengths	Limitations	Reasons	Examples (Cape Town)
In-house GIS (community-based GIS)	• Full control of GIS infrastructure and proactive uses • GIS customized to needs • Long-term investment and stability • High responsiveness as immediacy and adaptation of uses	• Costs (hardware, software, training) and allocation of resources • Confidentiality (copyrights and licensing) and data standards • Adaptability of previous mode of operation • Legal responsibility for databases (ownership, control, accuracy)	*GIS capabilities oriented* • Wants GIS • Wants consortium through GIS • Wants independence • (Wants map)	• NGOs from Slum Dwellers International (SDI) South African alliance • NGO Violence Prevention through Urban Upgrading (VPUU)
University/ organization partnership	• Cheaper than full in-house GIS capacity • Customized to needs (data collection, analysis, representations) • Integration of knowledge • Volunteerism • Enhances learning for both stakeholders • Reliance on university expertise and stability • Help in establishing GIS capacities within the organization	• Often university-initiated partnerships (dependent on research agendas, academic calendar, etc.) • Short- or mid-term commitment • Dependency • University can serve only a limited number of community organizations	*Mainly GIS capabilities oriented* • Wants GIS • Wants map	• Various yet specific forms of collaboration with academic institutions (University of Cape Town, University of the Western Cape, etc.)
Internet map servers	• Easy to access, low-level equipment required • Easy to acquire basic skills • Responsiveness	• Preconfigured and often display-oriented • Customization requires high GIS skills • Data server–client model • Data ownership often lies with data provider	*Mainly GIS outcomes oriented* • Wants map • Wants (Web) GIS	• Open Street Map • ArcGIS online
"Map rooms" (as data providers)	• Access to public datasets • Access to printable geographical information • Sometimes, active GIS use allowing simple spatial queries	• Consultation • Dependent on institutional priorities • Limited customization potential • Difficult to incorporate datasets from the organization • Paid service • No gain in GIS expertise	*GIS outcomes oriented* • Wants map	• City maps offices, City of Cape Town • Cape Town Open Data Portal • National Geospatial Information Offices • Wazimap portal
GIS facilities (in universities and public libraries)	• Easy and low-cost access to software, hardware, and selected data • Access to GIS advice from experts	• Limited dataset access • Desktop GIS solution (as opposed to GIS apps or online servers) • Need basics GIS skills to know what kind of data/ analysis/representation to ask for • Less responsive and limited complexity of analysis • Variability of GIS facilities	*GIS outcomes oriented* • Wants map	*Often within University/ Organisation partnership model* • GIS facilities in VPUU safe nodes
Neighbourhood GIS centres	• Network connectivity and strong joint political action (if successfully implemented) • Innovative and proactive use of GIS • Customized for collective action	• Shared ownership and responsibility for databases and infrastructure • Continuity of funding • Interdependence • Adaptability of various modes of operation	*Mainly GIS capabilities oriented* • Wants consortium • Wants GIS	• Community registers in some VPUU Safe Nodes

Sources: Models adapted from Leitner and others (2002), Reasons adapted from Sieber (2000), Strengths and limitations adapted from Sieber (2000), Leitner and others (2002), Lin and Ghose (2008), and Ghose (2011).

Table 13 ART2 Table 1 - A summary of main GIS implementation models within NGO and community-based organizations

4.3 South African Framework for Informal Settlements' Advocacy Actions

This section introduces contextual elements of NGO-led actions in informal settlements in South Africa, as well as the importance of spatial knowledge production through GIS for informal settlements programs in Cape Town – namely via PME projects. These elements inform the case study presented in the next section by stating place-based peculiarities influencing GIS adoption within NGO.

In South Africa, just as globally, informal settlements are a complex and pressing social and urban challenge involving several governmental and nongovernmental actors. Based on the national Housing Act, the Upgrading of Informal Settlements Programme (UISP) states that the responsibility for informal settlements falls under municipality jurisdiction – integrating municipality-wide strategic planning, as well as development actions for a specific settlement.3 Therefore, the main recipient of informal settlement planning and community advocacy actions is, in this case, the City of Cape Town (CoCT). Also, post-apartheid, the Reconstruction and Development Programme policy framework asserts that the state is supposed to deliver housing for marginalized groups. This is the world largest state-led housing campaign. On the one hand, although stipulated in the South African constitution (Republic of South Africa 1996), the citizen's right to state-delivered and adequate housing often translates into temporary and yet sometimes lifelong waiting. This waiting exacerbates the life conditions of already marginalized groups (Oldfield and Greyling 2015). On the other hand, "housing oppor tunities and improvements" are shaped by the dominant role of the government and by the private sector in charge of the delivery (Görgens 2016). These rationalities rely on heavy technical and bureaucratic procedures as well as on the capacity to navigate levels of government that informal settlements' communities – the "target population" – struggle to follow up with (Watson 2009). Therefore, locally, communities seeking responsive solutions to gain access to social housing or housing improvement on site call on NGOs' support organizing action and helping them advocate their rights. As a result, programs for informal settlement upgrading and programs for housing improvements are mainly implemented on a partnership-based approach (Cirolia and others 2016).

Knowledge production through participatory mapping and surveys are key methods for bridging the gap in data surrounding informal settlements and livelihoods and for collecting basic knowledge on the population and informal neighbourhoods (Abbott 2003; Weiner and Harris 2003; Watson 2009). Indeed, the CoCT has a wide GIS and data-driven strategy when it comes to informal settlement management (municipal and provincial government officials, personal communications, 2017, 2018). However, the GIS CoCT strategy focusses on risk assessment and disaster management only, rather than on fulfilling its development mandate in terms of housing development actions for informal settlements (municipal government officials and Capetonian NGOs staff, personal communications, 2017, 2018). This leaves a big gap in terms of socioeconomic and demographic information on marginalized groups. Likewise, as promoted by the Municipal Systems Act (Republic of South Africa 2000), "community participation deepens democracy by giving local

citizens a direct say in a range of decisions and processes which affect them, for example, municipal planning and budgeting." Therefore, as a key element of post-apartheid social/ spatial justice and democracy enforcement, municipal planning of informal settlements is supposed to be participatory. Nonetheless, it often ends up being consultative only and consequently insufficient to empower marginalized citizens and "to deliver sustainable human settlements" (Görgens 2016, 279). The gap in terms of data and in terms of availability of proper spaces of encounter and contestation between rationalities – levels of government and communities – is often bridged by local NGOs. NGOs collect the information necessary to determine who is eligible and for what kind of social housing,4 as well as basic information on settlements, making it possible to elaborate "re-blocking" plans or on-site integrated upgrading of the settlements. This data are used for planning purposes and also for elaborating land tenure registers and giving form to community's claims, whereas, through participatory mapping and surveying processes, NGOs facilitate citizens' mobilization, collective learning, and capacity enhancement (Appadurai 2012; Pánek 2014; Bénit-Gbaffou and others 2015). Within this landscape, spatial data and knowledge production through GIS-based solutions can support NGOs and community organizations in a variety of goals and organizational needs.
It is within these particular settings that GIS implementation will be analyzed in the following sections.

4.4 Methodology

To test GIS implementation models against a case study, I use material collected during a nine-month period of participatory action research in South Africa – in particular, a five-month collaboration with a Cape Town-based NGO for implementing GIS-based solutions within a participatory mapping and enumeration (PME) project in an informal settlement in Khayelitsha. My role in the process is clarified in the following section. Alongside the participatory action fieldwork, I conducted interviews with staff members of Cape Town-based NGOs employing PME methods and geotechnologies, as well as with activists, academics, and government officials from Cape Town municipality and the Western Cape province from overseeing GIS and map-based information and informal settlement program services. Therefore, my methodology involves multiple sources of data: participant observation, semistructured interviews with NGO staff, community members, and local government officials, and, additionally, the analysis of a variety of documents obtained during the fieldwork.

4.5 Case Study: GIS Implementation for Participatory Mapping and Enumeration within a Capetonian NGO

4.5.1 The ngo and "s section" community

The Development Action Group (DAG) is a Cape Town-based advocacy NGO employing around 20 staff. It has over 30 years' experience in supporting communities in unlocking access to basic services, tenure rights, and affordable housing, along with resisting evictions and shaping development policies. DAG operates in the

metropolitan area of Cape Town, including the township of Khayelitsha. Being non-profit, it is funded mainly by a variety of international donors. As of 2018 – at the time of the fieldwork – its internal structure was organized around three main missions: affordable housing and informal settlements programs, community leadership training, and supporting neighbourhoods' civic organizations. In each mission, the spatial and planning component is integral for strengthening community organizing and advocating for community-led development. Namely, participatory data collection methods, such as participatory mapping and enumeration, were mobilized in the informal settlement programs unit.
When the leadership committee of "S section" – an informal settlement in Khayelitsha – solicited support in advocating housing improvements and accessing services, the NGO suggested conducting a PME process as a first step in organizing the action by gathering data and knowledge about the settlement – and eventually leading to in situ housing upgrading. As stated by one of the directors, "Data are the first step that will feed strategies" (NGO internal meeting, fieldwork journal, March 2018).

S section (cf. Figure 42) is an informal settlement established towards the end of the apartheid regime in Khayelitsha. Among other features, the settlement manifests intolerable and unsafe living conditions, lack of proper sanitation, and the nonexistence of land or housing tenure. S section was chosen as a test case for GIS implementation for two main reasons. First, because of the urgency of the action with respect to housing and living conditions, it was confronted with a lack of information on the settlement. Second, the community leadership had come to an internal consensus with regard to asking DAG for support and was already on board: "S section is priority … they are already ready … because they already have an appetite for an action like this one" (NGO internal meeting, fieldwork journal, March 2018). This is common in advocacy NGOs, since their work is inherently people-focussed and adapts to commu-nities' dynamics. From early 2018, a team of four people worked on the S section project, three of them full time: the project manager and coordinator, an intern, and me – as an international volunteer.

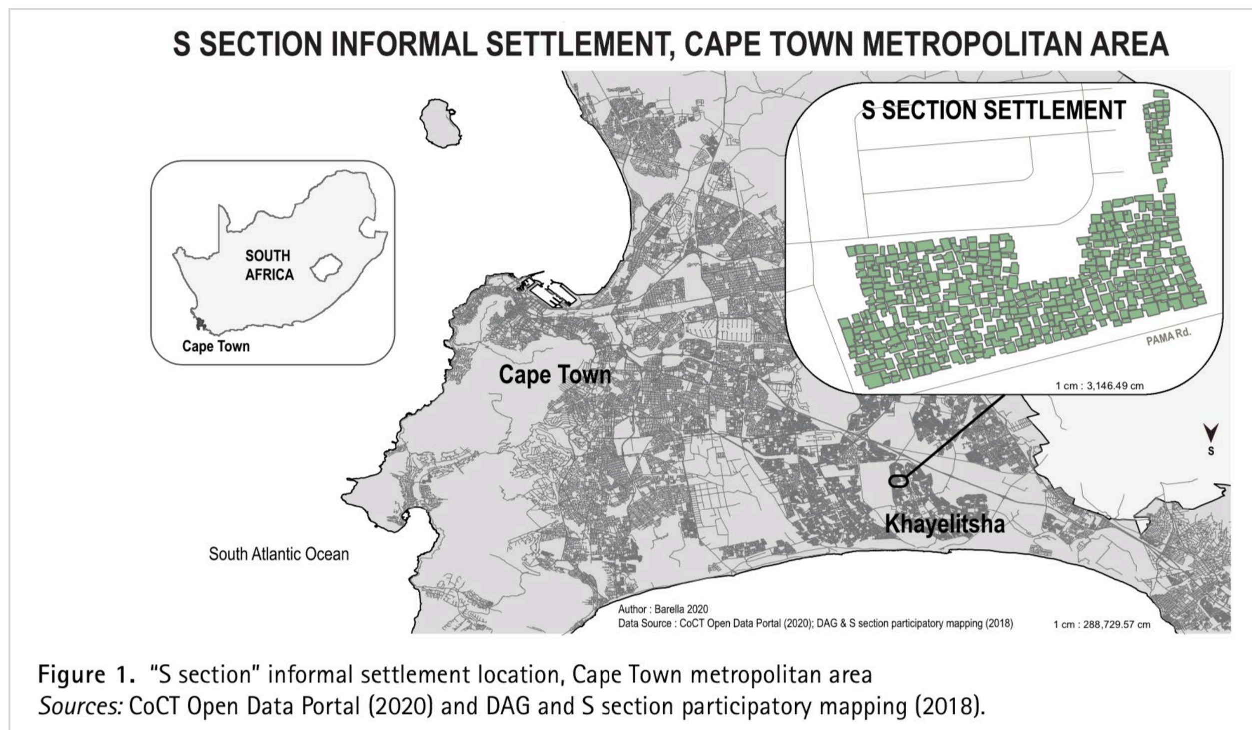


Figure 1. "S section" informal settlement location, Cape Town metropolitan area
Sources: CoCT Open Data Portal (2020) and DAG and S section participatory mapping (2018).

FIGURE 42 ART2 Figure 1 - "S section" informal settlement location, Cape Town metropolitan area

4.5.2 Reasons For GIS Adoption: A Twofold Pilot Project

For the NGO, innovation by GIS adoption was a test of improving the effectiveness of PME processes and the allocation of their limited resources. Previous to the GIS implementation, the NGO had long experience in facilitating and supervising PME processes for several neighbourhoods' communities. However, the technical component of these methods was often outsourced to external stakeholders. Hence, GIS implementation for the S section project was an experimental twofold strategy for the NGO. First, the NGO envisioned leading an in-house PME process entirely on their own for the first time. Second, they intended to do so by implementing new digital tools for data collection, which could enhance their mode of operation. The NGO was aware of the competitiveness of a variety of tools used by development actors internationally and locally (see Table 13) – in particular, through NGO staff members (executive director and project coordinators) who previously worked for organizations such as the Slum Dwellers International (SDI) South African alliance.

Through a GIS-based solution, the NGO tested technical and organizational innovation simultaneously. Technical innovation was mainly related to the enhancement of PME methods through a digital component. GIS tools were believed to provide a flexible and responsive mode of action for PME that could make it possible to save time during data capture and to link all socioeconomic data easily to a specific dwelling. The time saved could then be reinvested into training/learning activities with the community and to take further community claims. In this sense, technology was interpreted as an integrity enhancer of the overall NGO

methods of intervention for informal settlement upgrading. Also, producing data within the NGO and community partnership meant taking full ownership and control over data access and appropriateness for advocacy needs – compared with the sensitive and incomplete governmental data on informal settlements (cf. Data Accessibility). In this case, data security was not only a matter of data ownership, but also a matter of building a database coherent with specific NGO purposes and keeping an in-house backup of the information.

As for the upskilling of organizational capacities, three main objectives can be highlighted. First, the NGO aimed to internalize PME and sought independence from external stakeholders. This allowed greater competitiveness of the NGO with regard to donors, and in comparison, to other GIS-equipped local NGOs. Second, this snapshot trial aimed to put to test GIS pre-configurations and to assess whether GIS implementation could be extended incrementally to the assorted NGO projects and missions. In the worst-case scenario, GIS tools would be adopted as a one-time strategy without implying an overall organizational restructuring. Third, GIS capacities gained through this experience could expand and strengthen the networking skills of the Development Action Group with other NGOs and with governmental agencies. Following Table 13, the NGO's reasons for adopting GIS correspond to the "wants GIS," "wants map," and "wants independence" categories.

4.5.3 Overall View Of The Process

The GIS implementation was tested on a snapshot process first, focussing on GIS solutions for field data collection. The setting up of the GIS-based data collection evolved over a 5-month period – it started in February 2018 and the main phases of the PME data collection process ended in June. After a thorough consultation and setup phase, the process was divided into two main participatory phases, the mapping of the settlement and a household enumeration, within which GIS-based tools intervened in two different ways. For the former, a detailed mapping of informal homes was completed by four teams of community volunteers, trained by the NGO. The volunteers compared printed maps of the latest aerial images with the existing structures on the ground. The first "rough mapping" of the settlement was GIS-free, in order to equip participants with a broader sense of the whole method and focus on skills enhancement. Additionally, volunteers gathered basic information on the structures (uses, numbering, presence of informal water connections, etc.). The informal houses' layout and basic characteristics were then digitalized into a shapefile at the NGO offices by me and the intern. For the latter, a household survey questionnaire was set up by the NGO and the community and was then discussed during a public meeting gathering community leaders, local councillors, and NGO members. I subsequently translated the questionnaire into a digital survey via a form-based GIS tool for data collection. Teams of community volunteers would then take the digital questionnaire and go house to house to gather information from residents in order to establish a sociodemographic profile of the settlement.

The final goal was to deliver a set of information packaged following municipality standards and documenting the needs and living conditions of the community. The information captured would then be available to the NGO for elaborating a socioeconomic profile of the households, in order to establish who was eligible for which kind of social grant and housing program and foster advocacy actions towards the municipality. During the very last phase of the project, these GIS data were used to elaborate a development layout proposition sketched accordingly to the housing rights of every resident. This layout was taken to the CoCT in order to start a discussion about upgrading in situ and to influence the vision for community planning.5

4.5.4 Implementation Of Main GIS Components

4.5.4.1 Software and Hardware

To test the GIS adoption within the project and the NGO, a desktop GIS program and a tool for field data collection were chosen. Despite the fact that open source and free GIS alternatives were discussed,6 the NGO executive management decided to adopt a solution developed by the Environmental Systems Research Institute (Esri). Through the Nonprofit Organization Program from Esri, the NGO renewed a low-cost one year-term licence to ArcGIS that came with access to the ArcGIS online platform. The software was installed on one desktop computer at the NGO offices in Cape Town, to which I had almost exclusive access. The desktop GIS was mainly used to consult public data (see Data Accessibility for details) and to digitize the S section structures' layout – such as the map displayed in Figure 42. As the connection to the internal server was unstable, in order to preserve the work done on the GIS, files and geodatabases were saved locally on the computer – therefore precluding other NGO members having direct access to the overall work, which would otherwise have been possible through the internal servers. Also, this precluded the possibility of organizing community activities or demonstrations with the GIS software in the S section community centre in Khayelitsha.

For the household enumeration process, the data collection tool chosen was Survey 123 for ArcGIS. This form-centric GIS solution is freely available but requires an ArcGIS online identifier to upload the forms and make them available on computers or mobile devices for data collection. This tool was customized to facilitate data gathering and visualization using a digital device. After some budget negotiations, about five tablets were provided and set up to deploy the Survey123 questionnaire on the ground. All tablets were equipped with SIM cards and a bundle of data connection. Thus, the information gathered on the field could be synchronized immediately on the Survey123 cloud – this in order to prevent data loss, for instance, in the event of a device being stolen or in case of sync issues in bulk uploading the data at the end of a day of work.

4.5.4.2 Data Accessibility

Data involved in the process came from several sources and required different GIS skills. Table 14 summarizes data involved in the process that the NGO either produced or managed to obtain from external sources.

Previous collaborations with governmental agencies were key for obtaining some of the information on informal settlements in the area, since municipal information on informal settlements was considered sensitive. The NGO was entitled to get material based on previous collaborations with the government, whereas it had to invest valuable time and resources to negotiate any other new data request. My role as both NGO volunteer and international researcher was used to gain insights on data and access to them when negotiating with government agencies. This strategy was not very successful, as, since early 2018, for undertaking research in the City of Cape Town, an application from permission from the Organizational Policy and Planning Department of the municipality was requested. This was part of a broader procedure that aimed to monitor the access to public and potentially sensitive information by regulating the way it is delivered7. These factors impacted the type of data accessed as well as the time available for designing the PME process and defining GIS uses. On a different level, some data required specific GIS skills to be accessed or utilized. The handling of these data happened to revolve mainly around my role as "the GIS expert" within the process. Also, due to the variety of formats and technical skills required to navigate data, it becomes clear that without an intermediary – such as the NGO – the community of S section would not have been capable of providing such an effort to advocate for their housing rights and hold local and municipal authorities accountable.

Table 2. Data acquired and produced by the NGO throughout the GIS-based participatory mapping and enumeration process

Data	Format	Data owner or custodian	Access	Uses
External data				
Cape Town aerial image[a]	• Web Map Service (from ArcGIS-based rest services directory)	• CoCT open data portal	• Free • Required GIS skills (or to request it and go and fetch it in person)	• Rough mapping of the settlement • Guide for S section digitizing
Cape Town's Informal settlements layout[b]	• Maps on official reports • Shapefile	• CoCT city maps and Western Cape province (data custodian) • Previous National Upgrading Support Programme partnership	• Free, since the NGO was involved into the project • Required negotiation and to be fetched in person	• Compare shapefiles and data structure
S section settlements layout[c]	• Shapefile	• Open Street Map	• Free • Required GIS skills for extraction	• Settlement layout preview
Administrative boundaries of S section area[d]	• Shapefile	• Cadastral spatial data viewer from Chief Surveyor Genera • CoCT open data portal	• Free • Online download	• Create a general location map and plan of the site • Identify stakeholders
Other data on S section area and surroundings[e]	• Official maps and reports • Shapefile • Excel files	• CoCT open data portal • UISP Western Cape Province reports	• Free • Required negotiation and time to get access	• Create a general location map and plan of the site • Compare data structure
Data produced by the NGO				
S section settlement structures layout[f]	• Working maps (paper) • Shapefile	• DAG and S section	• NGO computer, GIS-equipped • NGO internal servers (backup)	• Settlement profiling • Verify structures numbering • Elaborate planning scenarios • Update community register
S section household survey outcomes[g]	• Excel (related) tables • Export available in various geoformats	• DAG and S section • Survey 123 online platform	• Survey 123 cloud (an ArcGIS online account is needed) • NGO internal servers (backup)	• Settlement profiling • Advocacy purposes • Elaborate planning scenarios (defining ratio and types of social housing) • Update community register

[a] Latest version available January 2017 (at the time).
[b] Dataset from 2014 NUSP project, which represents only selected informal settlements in the area (S section settlement was not included).
[c] Not fully exploitable, as not up to date or accurate.
[d] In particular, local authority boundaries and cadastral parcels.
[e] Limited availability. The CoCT had already conducted surveys in S section, but no data were made available to the NGO at the time.
[f] Up-to-date version (April 2018).
[g] Georeferenced data based on the survey number of each structure.

Table 14 ART2 Table 2 - Data acquired and produced by the NGO throughout the GIS-based participatory mapping and enumeration process

4.5.4.3 Capacities and Training

The literature identifies internal GIS capacities and training as central elements of GIS implementation, since they influence the continuity of a GIS-based action (Ghose 2011). As part of the agenda of the participatory

action research, my role in the collaboration with the NGO was based on providing GIS expertise and support for the NGO. Just as for GIS software and hardware, the organization had low GIS capacities and little margin of manoeuvre for redistributing them across the NGO missions. For instance, in the whole organization, only a couple of staff members had basic GIS skills, and none of them were involved in the informal settlements programs unit. Therefore, in practice, the GIS test implementation for PME with S Section community happened to revolve around this collaboration with the NGO. On one hand, I found myself responsible for guiding technical aspects of the GIS-based PME as it emerged from previous sections. On the other hand, I provided GIS training in particular for two staff members working on the PME: the project coordinator and an intern. A general workshop on GIS basic skills for all NGO members should have been organized but was cancelled due to tight work schedules and software and hardware limitations. This is important for considering the continuity of the GIS within PME and the "appropriateness of the GIS implementation" for the whole organization. Feedback meetings were conducted, and reports were written to document the work done and aiming to ensure replicability of the method (for instance, a ready-to-use summary for setting up the app for data collection and explaining structures of geodatabases and how to use them). Despite these efforts, many resources got lost and are sitting on NGO servers waiting for someone to use them. The information produced was usable for advocating for "S section" claims but ended up being too fragmented to introduce GIS-based methods any further.

Despite all good intentions to ensure continuity, a significant brain drain happened parallel to the end of my contract at the NGO in mid-June. The project coordinator left approximately in late June for a different job opportunity in which basic GIS skills were also required. At the same time, the intern ensured transmission of the project to the new project coordinator. Her internship contract ended at the end of the project in S section, after which she obtained a job in a different local NGO tackling similar issues with similar methods.

4.6 Discussion

This section discusses elements of the Capetonian case that are central for understanding the importance of contextual elements within GIS implementation models. By focussing on selected contextual elements of each GIS implementation pattern, the section addresses the use of GIS as a broader NGO tactic in itself rather than solely as a tool for data collection.

4.6.1 GIS Implementation "Models Mashup"

Through the prism of traditional models of GIS implementation within NGOs and community organizations, DAG's GIS adoption was multiple and improvised. Still, two leading patterns are identified (cf. Table 13). The empirical study stands at the intersection of two GIS implementation models: "in-house community GIS" and "university–organization partnership". The NGO aimed to explore the possibility of an in-house GIS by

enacting a cautious and incremental implementation test through a partnership-based approach. Nevertheless, secondary patterns intervened in the process as well, contributing to highlighting challenges and strategic uses of GIS adoption for advocacy NGO. Primary and secondary patterns are discussed hereafter.

4.6.1.1 Primary Models: In between "In-House GIS" and "University–Organization Partnership"

Following the "in-house GIS" model, key components of GIS, such as software and hardware, were located within the organization. Settlement maps and data on the community were produced and owned by the NGO and the community on their own terms and suitably to their needs. This is a key advocacy tool, since data tell a story backed with evidence of challenges that the community faces and allow it to demonstrate how well-organized and determined to pursue political action it is. The organization had control over GIS resources and could then benefit from greater responsiveness. The reactivity offered by an "in-house GIS" is key in informal settlement projects, since people move often and tenure situations may change rapidly, and thus data need to be updated and edited frequently. For instance, the updating of settlement maps and of the numbering of the structures was much easier to revise after the approval of local councillors and community. This reactivity is central for showing quick steps forward and displaying mid-course results of the profiling. Furthermore, by owning the main GIS components, the NGO could test and adapt the survey's questions live during meetings with community leaders and respondents – hence showing and creating a greater sense of collective ownership of the process and also showing that despite the technology being held by "the expert," the content and leadership of the overall operation stayed within community hands.

As for data capturing innovation, this model made it possible to optimize the NGO workflow and save a great deal of time. This time is precious for advocacy NGOs such as DAG, since it may be reinvested in enhancing civic learning for communities for which they are working, in order to help them gain independence of action. This participates in, first, preserving momentum throughout the PME process and, second, ensuring independence of the community leadership and continuity of the action regardless of the successful outcome of the PME.

Advantages of owning an in-house GIS were multiple. Still, it is important to note that in this case study, "in-house GIS" refers to the acquisition of GIS software with basic capabilities and mainly focussed on data capture and display (maps of the settlement, charts, etc.) rather than on a full GIS analytical component.

Conforming to the "university–organization partnership" model, GIS capacities were introduced into and enhanced in the organisation through action research conducted through my academic project. Volunteerism was the key for establishing GIS capacities within the organization and for conducting a first in-house GIS-based survey of an informal settlement. As seen in the previous section, my presence and specific GIS skills happened to be central for ensuring the digitalization of the PME process of S section community. Research and activist agendas were merged, since the NGO was exploring possibilities for method innovation through GIS adoption, and also, my research project tackled similar issues and was therefore adapted to the action.

This outsourcing was free from costs for DAG, since it was conducted on a voluntary/participatory basis. Nevertheless, it located the main responsibility of GIS use in the hands of a short-term staff member. In practice, this meant that an external actor was in charge of trying to adapt technical requirements and pre-configurations to a long-lasting NGO mode of operation.
In addition to the fast staff turnover, this set up an important barrier to proper technical and organizational consolidation of these GIS-based methods. Overall, in terms of data collection, the introduction of technology was not problematic, but the actual step forward towards a proper GIS analysis capacity was not compatible with the NGO's actions. The NGO's mode of operation was guided by organizational and relational goals rather than by technical requirements solely – the former requiring malleability and inventiveness, and the latter requiring long-term technical and organizational stability.

4.6.1.2 Secondary Models: "Internet Map Server" and "Map Rooms"

In focussing specifically on software and external data accessibility for conducting the PME, two other models of GIS implementation enter the equation: "Internet map server" and "map rooms." They are considered secondary because they rely on components purveyed by the previous two models. However, they are not subordinate in terms of insights they provide on GIS adoption.

First, the geodata collection tool (Survey123) for profiling S section settlement was adapted and deployed directly via the Survey123 online platform. This aligns with the "Internet map server" model of implementation, since it is based on a server–client structure. In theory, this model does not require a full in-house GIS to be deployed. In practice, access to the Survey123 online platform – where survey forms and data are synchronized and can be accessed – was dependent on an ArcGIS licence account. Although PPGIS literature indicates that through the emergence of a "Neogeography" (Turner 2006), online GIS-based tools for gathering data are accessible to citizens without any particular professional and technical training, in reality their setup and implementation require specific skills. The skills necessary to set up and deploy an "Internet map server" GIS were heavily reliant on my own expertise and capacity to transmit it to NGO staff.

Second, the "map rooms" model was followed in accessing external data. Already existing georeferenced data were collected by accessing the CoCT Open Data Portal or by meeting officials from governmental offices. Despite falling under the same GIS model, these procedures highlight two different ways of talking GIS with governmental spheres. First, data access was reliant on the "open data policy" that the city of Cape Town (CoCT) preaches as a form of civic participation enhancer (Ricker, Cinnamon, and Diewechter 2020). Despite this "openness," essential GIS capacities (provided through university–organization partnership) were central in acquiring and using official data. Likewise, information on informal settlements openly available online is scarce and does not meet communities' and NGOs' needs in terms of building an evidence-based narrative for supporting housing claims. Historically, in South Africa, data accessibility has been difficult (impossible) for marginalized communities – especially along racial lines (Weiner and others 1995). This

divide, which is not exclusively digital, persists (Harris and Weiner 2002). Despite the encouragement of participatory measures and PPGIS-type initiatives by post-apartheid policies and scholars, (some) data accessibility is inexpensive but still requires high skills to be attained. In this context, the actual value of "data openness" and GIS potential is therefore relative – and the role of NGO as mediators is therefore more important than ever.

Third, negotiation skills and ability to create personal networks were central for acquiring data on informal settlements and even for acquiring knowledge of the existence of such information. In this sense, networking skills were prior and yet furthered by the GIS implementation test. The GIS adoption process allowed the NGO to explore new channels of collaboration with government officials and to map out actors operating as gatekeepers for getting data about informal settlements. This effort at connecting the dots is the advocacy NGO's backbone. First, it is necessary for ensuring successful mediation of community claims. Second, it safeguards the existence of the NGO itself, since its ability to support marginalized groups depends directly on its ability to navigate and to remain relevant in the post-apartheid "urban planning game"– which, in the Capetonian case, happens to be more and more "data-tech-centred" (Ricker, Cinnamon, and Diewechter 2020).

4.6.2 An Acupunctural And Strategic Implementation Of GIS?

As suggested in the PPGIS literature, GIS implementation is an inherently political and contextual process. In South Africa, community dynamics and service delivery claims in informal settlements are highly political and volatile, as they change very quickly and can serve a variety of political agendas (Bénit-Gbaffou 2015). Therefore, for advocacy NGOs – which are people-centred – it is essential to follow communities' momentum in order to keep communities on board their projects and to guarantee long-lasting engagement that prevents other agendas from hijacking community voices (Mitlin 1998; Bénit-Gbaffou 2015). Thus, the dynamic nature of advocacy NGOs and community organizations seems to prohibit proper "routinization" of GIS; "instead organisations may exist in a perpetual state of implementation" (Sieber 2000). "Actors have limited capacity to engage across temporally and spatially wide-reaching … interaction processes and, instead, make a series of partial interventions within their span of control and relevance" (Hyysalo 2019, 13).
GIS introduction at DAG emerges as an arrangement of four different patterns, each assisting specific purposes. Primary models pose organizational, technical, and methodological challenges faced internally by the NGO. Secondary models pose challenges to the NGO–government relationship and more broadly to networking between actors. This models mashup indicates the limitations of the models and provides insights into how a GIS can be implemented in an acupunctural and strategic fashion.
GIS implementation was "acupunctural" in the sense that it aimed to release tension on specific elements of the PME process – such as saving time during data capture and producing measurable outcomes (community profiling, registers, maps, etc.).

Also, GIS was strategic, since these methods were chosen based on the rules of a broader governance game. GIS adoption was tactically used to display technical experience, expanding networks and thus gaining visibility and broadening connections in a tech-led sector.

Indeed, within advocacy NGOs and community organizations in Cape Town, such as DAG, the responsiveness and flexibility of the overall organization are more important than the upholding of stable GIS provision. Challenges stemming from these acupunctural and strategic GIS implementations have to be apprehended as an opportunity to explicit contextual power relations rather than technical or organizational issues solely.

4.7 Conclusion – GIS Display as a Relational Leverage

Conforming with the PPGIS literature, my fieldwork illustrated the main critical challenges to stable and long-term GIS adoption within a resource-poor NGOs and community-based organizations. Notable among these are GIS capacities and software provision.

In addition to the literature, new lessons emerged from my case study. First, there is a need to consider GIS implementation not only as a goal in itself but also as a snapshot strategy that opens doors to a broader governance game. GIS implementation manifests as a spectrum of GIS uses and intervenes in different ways – more or less improvised and ephemeral – that do not imply a full implementation. My fieldwork also illustrates the limits and the nongeneralizability of existing models: none of them apply completely to my observations.

In the South African case, negotiation and adaptability skills appears to be the most important for many resource-poor community-oriented organizations. All things considered, the pilot GIS implementation emerged as a way for the NGO to understand what kind of role it could play in the post-apartheid urban planning agenda for marginalized groups, among tech-driven NGO and navigating a political space in between levels of government (tech-savvy) and marginalized groups (less tech-savvy).

Further research is needed on GIS uses within NGOs, community-based organizations, and grassroots, since these actors (1) constitute a diversified body of agents and their workings are highly contextual and (2) are increasingly called to take the lead as intermediaries in more and more tech-led urbanism. This diversity needs to be documented further so that other organizations considering GIS as an innovative tool for supporting their actions can refer to evidence-based studies to guide and ponder their decisions and strategies. From the PPGIS point of view, this would make it possible to theorize across contexts more than is done today – perhaps by introducing comparative approaches such as theorizing within postcolonial urban studies (see Oldfield 2015; Robinson 2016; Simone and Pieterse 2017) into the PPGIS literature.

A second line of research could weave an explicit link between GIS implementation models and a geopolitics of GIS software. For instance, a thorough discussion of Esri's strategies for creating customer loyalty to their

products and their impacts on community organizations, especially but not exclusively in the global South, could be opened. Without diabolizing the company, it is important to acknowledge that Esri is a corporation making use of its own "empowerment rhetoric" and this should be examined critically.

Another line of inquiry could foster aspects of reflexivity of PPGIS implementations in order to expand the analysis of power relations at play within GIS implementations and related to the University–organization partnership model. This type of reflection could draw on recent digital feminist geography such as Elwood and Leszcinsky (2018).

Finally, and more broadly speaking, research making a direct link between ways of using GIS and the empowering potential of the projects in which it is used should be encouraged. This could also make it possible to advocate a broader empowerment framework that could tackle "empowerment" as a multidimensional object articulating technology-related as well as organizational and contextual issues (Barella 2020). For marginalized communities, whether living in informal settlements or not, stakes are high and highly political. As suggested by Radil and Anderson (2019), a repoliticization of PPGIS is urgent.

Notes

1. An all-embracing term, "civil society" is commonly used to refer to an aggregate body of nongovernmental and not-for-profit agencies (Mitlin 1998).
2. Violence Prevention through Urban Upgrading (n.d.).
3. NUSP, May 2016, Module 3, Introduction to Informal Settlement Upgrading, SA Upgrading Policies, Programmes and Instruments.
4. In South Africa the type of social housing is determined by the household income.
5. Due to political quarrels within the community, the last phase of the project ended in a temporary impasse yet to be dissolved.
6. Namely, the adoption of QGIS as the main GIS software, parallel to field data collection tools such as QField, Open Data Kit tool, or Kobo Toolbox.
7. According to fieldwork observations captured through interviews, sensitive data and information on urban development projects and informal settlements leaked from previous contacts between researchers, activists, and the City of Cape Town (CoCT). This data was used to hold the municipality accountable and eventually led to the opening of a court case against the CoCT.

Acknowledgements

I would like to thank Development Action Group and S section community (Enkosi kakhulu!) for their trust and for giving me the opportunity to be involved in their advocacy actions. Also, I would like to thank the reviewers for their helpful comments, and the Fonds des Donations of the University of Neuchâtel for supporting my doctoral fieldwork.

---

5. ARTICLE 3

Visibilising empowerment as topological resonances: analysis of a participatory mapping and enumeration project as strategy for active waiting for housing in Khayelitsha (South Africa)

Barella Jennifer

Draft Version - Submitted to the Journal : SAGE Open

2022 Please consult the up-to-date version of the paper - link here below.

ABSTRACT

Informal settlement livelihoods in South Africa are characterised by a structural waiting for housing improvements. Participatory mapping and enumeration (PME) are a key tool for Capetonians NGOs to tackle urban injustice and improve livelihoods. Unfortunately, PME evaluation and empowerment dynamics are often associated and reduced to the PME final output (data, cartographic artefact, etc.). Based on an action-research PME project implemented by a Capetonian local NGO and by *S section* informal settlement's community (Khayelitsha), this paper studies PME as an empowering strategy for activating the waiting phase for housing. Drawing on postcolonial approach, this paper frames empowerment as "topological resonances" enabled during PME by the dual dynamic of "translation" and "connectedness". Translation and connectedness are applied to the S section case study and allow to grasp interstitial yet critical empowerment dynamics going beyond PME output solely.

KEY WORDS: participatory mapping; PPGIS; empowerment; housing advocacy; South Africa

Published version 2024 - SAGE Open

Barella, J. (2024). Visibilizing Empowerment as Topological Resonances: Analysis of a Participatory Mapping and Enumeration Project as Strategy for Active Waiting for Housing in Khayelitsha (South Africa). Sage Open, 14(2). https://doi.org/10.1177/21582440241258414

Visibilising empowerment as topological resonances: analysis of a participatory mapping and enumeration project as strategy for active waiting for housing in Khayelitsha (South Africa)

Barella Jennifer

5.1 Introduction

Worldwide, participatory mapping and enumeration (PME) projects have become key approaches that foster marginalized community empowerment and facilitate the involvement of communities in urban governance through the production and deployment of socio-spatial data about themselves (Radil and Anderson 2019; Appadurai, 2012; Ghose, 2011; Elwood 2009). In Cape Town, PME initiatives are a widespread tool for supporting housing and social claims in terms of Habitat III priorities (UN) and of the "right to the city" agenda, while enabling forms of empowerment for informal dwellers.
Mainstream approaches to empowerment tend to focus on the performativity and impact of the final artefact of the process – i.e. a redevelopment plan, data from a household survey – therefore contributing to nourish the expectation of a future event which potential is secluded within a specific instrumental outcome (Author, 2020a, 2020b; Elwood, 2009). Smaller achievements and steps towards structural changes are only considered anecdotally. When talking about PME practices within contexts of precariousness and marginalisation, the potential of the 'here and now' for meeting communities' needs is often unappreciated when evaluating empowerment.

Although state-provided housing is a constitutional priority of the South African government since the end of apartheid, "for the majority of citizens, this right to access housing translates in practice to the experience of waiting" (Oldfield and Greyling, 2015: 1101). While conducting a PME exercise in the S section informal settlement in Khayelitsha, the most recurrent answer to the open-ended question "Please, give a brief history of the settlement" was related to aspects of "waiting" – for houses, for housing improvements, for service delivery and development. As a S section resident stated "*It's been long waiting for houses, we don't see any improvement" (DAG and S section survey, 2018).* Likewise, 93% of the interviewees answered that the most urgent priority they wanted to see addressed at the household level was "housing". This is a well-known story for South African citizens living in informal settlements. The waiting phase is crucial because it is within that space-time that specific ensembles of actors, materials, knowledge are organised, deployed and accounted for.

Capetonian NGO are very active within this waiting phase – this is one of the spaces NGOs navigate the best and in which they carve their own legitimacy towards the government. "*What are the victories we can get while we are waiting, according to the government priorities?*" (fieldnotes, DAG Human Settlements coordination

meeting 17th march 2018) this was the main concern stemming from a PME-related community meeting gathering community leaders, ward councillors and NGO's members. In Cape Town, within the network of NGOs working for informal settlements advocacy, PME is a tool that intervenes as a strategy of active waiting called "datafication" (Cinnamon, 2019). PME practices provide a space for activating the 'here and now' potential, as in a setting within which networking is done, processes of legitimation are stated, information is made actionable for claims. Despite being oriented towards a future expectation, the act of waiting has a lot of potential and opportunities to unleash in the present time. In a context of everyday struggle, identifying the triggers that enable change throughout the PME process is just as important as to produce a map or data for backing a specific claim or end goal. By fine-tuning empowerment's conceptualisation, this paper observes the mechanisms of those unacknowledged empowerment strategies that occurs during the waiting phase. This paper documents an alternative framing of 'empowerment' stemming from the Capetonian context and specifically from a PME project for housing claims in Khayelitsha.

This paper is based on a participatory action research conducted on a PME project led by "S section" community with the support of Development Action Group (DAG) and the researcher in 2018. During this collaboration a thorough mapping and a GIS-based household survey was conducted in order to gather data and knowledge about the S section settlement and to eventually elaborate a redevelopment plan leading to in situ housing upgrading (Author 2020b). Thanks to the mapping and household survey, a profiling of the settlement was elaborated and then brought forward by the NGO and Architectes Sans Frontières (ASF) for sketching a redevelopment proposition in accordance with the housing rights of every resident. The profiling and the redevelopment layout allowed to start a discussion with the City of Cape Town (CoCT) about in situ upgrading influencing the vision for community planning. Nevertheless, due to political quarrels within the community in response to the CoCT counterproposal, the last phase of the project ended in a temporary impasse yet to be resolved. Blurred endings like this one are common within PME practices and so is the importance of considering subtler aspects of empowerment and achievements of these methods. What do PME allow to achieve within the waiting phase in terms of empowerment other than working towards a potentially empowering outcome of the process?

First, the paper clarifies how PME practices for empowerment are central to the housing development practices of NGO in Cape Town. It positions PME as a strategy of datafication (Cinnamon, 2019) for active waiting, and it lays the foundation for contextualising the new definition of empowerment discussed afterwards.

Second, this paper challenges the mainstream vision of empowerment within PME that still considers empowerment as a definite instrumental goal. Rather, it theorises empowerment as a sum of transformations allowing to make power leverage visible and to make the most out of the long waiting for social housing and livelihoods improvements. Inspired by works of Simone and Pieterse (2017), empowerment is defined as the enabling of topological resonances and it is tailored to the empirical observations through the conceptual

sub-dimensions of "translation" and "connectedness" that are observed throughout the S section mapping and enumeration.

Third, the empirical part will put the new definition to test through the case study of S section informal settlement. This way of framing empowerment allows to explore the potential of the waiting phase and to see how power leverages are made visible and how people seize them to improve their present or future life circumstances. Therefore, this section goes beyond the instrumental vision of empowerment through PME practices by discussing forms of translation and connectedness observed on the ground.

5.2 Contextualising PME As A Strategy For Active Waiting

5.2.1 The role of NGOs

The exhausting waiting experienced by informal dwellers is often associated with the failure of the South African state as a developmental state (Bond, 2008; Parnell and Pieterse 2010). The South African constitution informs a right-based agenda making the state, and subordinate levels of government, function as main providers of development and (wealth) redistribution (RSA 1996: art. 26). For informal settlements like S section in Khayelitsha, the national state is responsible for housing delivery (RSA Constitution), whereas the municipality of CoCT is responsible for service delivery (RSA 2000). The state's malaise in addressing informal livelihoods improvements, results in a peculiar form of waiting from this is recognised as specific and structural in South Africa (Oldfield and Greyling, 2015). Alongside this governmental implementation void, there is the political lack of consideration for the low-cost housing shortage, the importance of informal rental market, and the weakness of affordable rental housing market.

In South Africa, informal settlement's upgrading and housing improvements programs are often initiated on a partnership-based approach at the instigation of local NGOs (Görgens, in Cirolia 2015). In Cape Town, the "grey area" space left by government is taken over by local NGOs. NGOs act in the realm of waiting, as intermediaries between spheres of government and communities, and between communities (ibid.). NGOs intervene mainly in the development pre-implementation phase and in the task of helping communities to organise their claims. For instance, in the process of gathering information about the community and the neighbourhood in which they live. They document livelihoods conditions in order to highlight community's needs and government's mismanagements. This process allows communities to be prioritized within the governmental plan of action: "*the city is likely to prioritize communities that are already organized and already have a plan*" (Internal coordination meeting DAG, 17 March 2018) – therefore, informal dwellers are pressured to come up with 'the best plan'.

5.2.2 Datafication for fostering claims

According to the critic of developmental state, one has to be seen by the state in order to benefit from it (Scott, 1998; Parnell & Pieterse 2010). Consequently, the strategies of reclaiming adopted by NGOs starts by enabling communities' visibility through data-gathering - and by quantifying their needs in accordance with governmental criteria. Globally, data-driven methods have gained international visibility thanks to international networks such as Slum Dwellers International (SDI) and humanitarians increasingly use data-based tools. Locally and internationally, these methods attract donors and funding (Sieber, 2000). In this perspective, the production of data and maps about residents is one of the prominent strategies implemented by NGO in Cape Town (Author 2020a, 2020b). As stated by an NGO member "*data is the first step that will feed strategies*" (Fieldnotes, 17 March 2018).

Locally, their multiplication is directly related to the growing obsession of local policymakers with data and map driven decision-making (Author 2020b). Since data is seen by the government as a key-condition to implement housing policies, NGOs tend to exploit this taste for data as political leverage.

Literature has called this process "datafication" (Kennedy, Poell and van Dijck 2015). Datafication refers to rendering into data aspects of the world not previously quantified (Kennedy, Poell and van Dijck, 2015 : 1) and to turn this information into exploitable knowledge. Building on his studies in the Capetonian context, Cinnamon refers to the appropriation of datafication by NGOs as "data activism" (Cinnanmon 2019: 626) just as suggested by Appadurai's enumeration processes studies (2012). Local NGOs are increasingly drawn to this data-mediated activism for several reasons. to attract international funding. Second, data sustain a rhetoric of contestation aiming to draw attention to service delivery iniquities and delays (cf. Capetonian organisations such as Ndifuna Ukwazi; Social Justice Coalition). Third, and most importantly, data is actionable and aligns with governmental criteria for accessing social grants/housing. (Capetonian organisation such as DAG, VPUU – see Author 2020b for the distinction between the organisations mentioned).

Intially, "data positions". Data-driven methods become an asset for NGO for positioning themselves in relation to the government and in relation to other organisations and to communities. Although every local NGO work towards social justice, these organisations often have limited means and are in (in)direct competition between each other (Author2020b). For instance, the metrics offered by data allow them to make themselves accountable towards donors and within the local development landscapes.

Then, "data empowers". These methods have been proved helpful in achieving instrumental goals and to tangibly improve lives (Appadurai, 2012; Elwood, 2009). Data is considered to be an inherently empowering tool as in a mediator of political action (Cinnamon 2020). Empowerment is deeply embedded into the vibrant activist culture in South Africa – namely finding its roots into the anti-apartheid fights. Datafication through PME is a form of technical assistance for housing claims and "*technical assistance is so vital in thesense of empowering the community to have a successful housing project*" (Ley 2009: 147).

5.2.3 PME datification within the waiting phase

Datafication is central to policymaking and governance, to quantify and to document are indeed crucial for advocating for informal settlements' development. Nevertheless, when it comes to critically examine data production and uses, the "what" is documented and the "how" this information is collected and transformed into active knowledge are just as fundamental as the data itself.

Two main datafication strategies deployed across Capetonians NGOs and grassroots organisations are PME processes and social audits (Cinnamon, 2019).
Social audit is a budget-assessment-oriented tool acting as a mechanism of accountability, and provides an external oversight on government performances. In South Africa, this is a very specific form of datafication stemming from "service delivery protest" type of culture (Bénit-Gbaffou 2015). It is mainly used by NGOs positioning themselves in a confrontational stance against policy-makers, while asking for transparency and policies efficiency – often associated with social media activism and rights campaigns.

Compared to social audits, PME is a looser and more gentle form of data activism, since it is implemented in order to align with governmental criteria for accessing social grants/housing, rather than as a form of militant public contestation. PME encompasses a broad diversity of techniques and approaches (Brown and Kyttä, 2014). It is a common form of collective socio-spatial data gathering, often implemented at community level and increasingly practiced through the adoption of GIS-based tools. These methods emphasise the involvement of participants, the documentation ownership, the 'collateral learning' occurring throughout the process. Also, PME evolve on a mid-to-long-term focused plan of action and asserts a strong empowerment aim, since they origin from the traditional development action promoted by NGOs and international development organisations (Ghose, 2011).
Furthermore, PME are considered as an empowering tool for community by NGO, especially during the waiting phase for housing delivery and improvements. It is seen as a way to speed up the housing-improvement process, to prioritise housing issues and to present alterative plans of action. The spatial dimension of PME also allows NGO to address the socio-spatial dimension of inequalities which is key when tackling spatial injustices.

5.3 Redefining Empowerment

Empowerment can be investigated through the lenses of the process of translation and connectedness, two characteristics that stemmed from the Participatory Action-Research (PAR) case study in Khayelitsha.

5.3.1 Empowerment and PME: main critics

Based on a thorough literature review, Elwood distinguishes between three different dimensions of empowerment within PPGIS and PME: procedural empowerment, distributive empowerment and empowerment as capacity building. Firstly, *Distributive empowerment* refers to the achievement of a "tangible or material change" (Elwood, 2002: 908), and refers to an instrumental outcome – i.e. such as data, or a map, etc. This is the favored element used to evaluate empowerment within NGOs projects since it is identified as the project's goal. The instrumental outcome is also the first dimension considered by the datafication process, which is mainly based on a computational understanding of urban planning decisions.

Although being crucial, this dimension suggests that data has an inherent power in itself and that empowerment is measurable through a set of tangible outcomes.

Secondly, *Procedural empowerment* refers to the achievement of a 'knowledge legitimacy shift' throughout the PGIS/PME initiative, notably the inclusion of citizen's contributions to the decision-making process. This dimension relates to the "expanded legitimacy for participants and their priorities and arguments" (Elwood, 2002: 908). It identifies empowerment as a normative dynamic of challenging power asymmetries and as a drive towards making voices heard and issues visible.

Thirdly, *capacity building* frames empowerment as the enhancement of citizens' capacity to increase control over their lives. This dimension relates to right-based approaches and campaigns and it is (in)directly inspired by Appadurai's definition of capabilities (Appadurai 2012).

These three dimensions articulate, in their own way, three different power leverages and ways in which power is negotiated among actors and institutions. All three are highly contingent and context-related. Even though they provide valuable guideline for assessing the main impacts of GIS related initiatives, they still tend to focus the 'empowerment process' as stemming from the end goal.

While most PME actions aim to empower local communities, they are not without ambiguity. Development approaches fostering community-based and grassroots participation through mapping, GIS and data gathering are increasingly considered a part of the neoliberal urban agenda (Author 2020a; Raid and Anderson, 2019). In this context, people are often seen as pawns playing a frontline role for meeting development agendas and goals determined from the outside, as opposed to partners who uses these spaces to direct their own development. Empowerment is often considered in an instrumental aim as the achievement of specific goals. When it comes to PME, this means to focus on the map or quantifiable output, rather than on carefully observing the social, technical and political processes at work which enables development in a specific context. Also, PME is established as a space within which people can develop the ability to meet their own needs while cutting their dependence on state services. This vision tends to disenfranchise the state responsibility towards social services and to release part of the state's obligations towards its citizens – since the citizens seem to capacitate themselves. Moreover, this vision does not allow to challenge and not even to make power dynamics and structures visible. Regardless of well-intended agendas, the process enabling

empowerment can also be corrupted or hijacked (Mitlin 1998; Bénit-Gbaffou 2015). Thus, it is key to refocus empowerment analysis around the process rather than solely focussing on the outcomes.

Conceptually, empowerment has essentially been framed in connection to the material end purpose of projects. Everything occurring *during* PME processes is overlooked by the literature. However, it is *during* this phase, inherent to the waiting for housing, that variegated forms of empowerment are produced. Within PME, the output as in quantitative data and maps alone do not shift power, nor it is always directly actionable as a tool for tackling (in)justice (Cinnamon 2020). On the contrary, the process through which this data is produced visibilise how power is negotiated, how power structures manifest themselves in a particular context, and therefore show what are the power leverages at one's disposal. This same process unlocks opportunities for makeshift strategies going beyond the main scope of the PME practice. The process creates, temporarily and spatially, interfaces between actors, languages, places, materials. This paper argues that it is within this space of encounter – regardless of it being conflictual or co-optative – that learning and exchanges happen. It is the place and time in which people acquire new resources and resources are reallocated amongst actors. It is within this space that the premises for "the shuffling of cards" and power shifts can happen, since power relations and the position of actors are performed and made visible.

5.3.2 Empowerment as topological resonance

The paper renews empowerment definition as a sum of circumstantial transformations allowing to make power leverage visible and to turn the long waiting for social housing and housing improvements into an opportunity.

Empowerment is here defined as a strategic redistribution of agency resulted from an improved capacity to navigate situations and identify power leverage that are within one's reach. In this interpretation, empowerment is the capacity to analyse power leverage which comes from learning new languages (maps, data, official documents, governmental documents, political procedures and claims, political responsibilities), and from meeting new actors, and to identify the causal agents (those with authoritative power according to Zimmerman 2000) such as NGOs, local councillors, government officials, communities struggling with similar issues (de Moor 2018). These capacities result from specific circumstances that can be created within PME practices. Through the pretext of producing performative quantifiable data and cartographic representations, PME process aims to make power leverage visible. Thus, capacitating people with navigating theses spaces and relations, for instance by learning new languages contextually.

This paper uses Simone and Pieterse's concept of "enabling topologicial resonances" (2017) to apprehend these dimensions of empowerment. A *topological resonance* is the event/capacity to put different places, materials, services, discourses and institutions in different contact to each other. A *resonance* represents a modality of people "feeling each other out", attending each other. According to Simone and Pieterse definition "*It is the affective process of people and things associating with each other, (…) of acting as components*

in the enactment of operations larger than themselves and their own particular functions and histories" (2017: 16). *Topological*, characterises the relative positioning of elements resonating, as well as highlighting the absence of hierarchy between those elements once they are connected with each other.

This paper proposes a theoretical framework that defines empowerment as a process and not as a finality, by revealing two complementary modalities for putting places, people, institutions, and materials. in different contact with each other: Translation and Connectedness.

5.3.2.1 Translation

Translation is the first modality of empowerment. It is defined as a capacity to make knowledge (data or information) actionable within a particular context, through a specific channel or towards certain actors. Translation is the process through which a contextually-bound expression is made intelligible into another context (Holi et al. 2017). It implies the capacity to listen and to understand other actors as well as to manipulate the information according to the situation and goals (Wiegand 2006). Language plays a role within power relations, and translation is the main tool for navigating social and political situations (Bertin, 1967). From a cognitive point of view, within the act of learning languages and spatial languages, translation implies the combination of three main features – hereafter adapted from Wiegand (2006: 114).

Comprehension	to convert from one language or mode of representation to another, to be able to interpret meaning, to be able to extrapolate meaning
Application	to be able to conceptualise and to think with abstraction
Analysis	to be able to breakdown the previous information into elementary key pieces, to see their interdependence and to be able to recombine those essential elements into a new object

Table 15 Dimensions of translations adapted from Wiegand (2006) [Table 1 in paper 3]

Within translation, information is actionable since this act of synchronisation is capable of generating an effect (Terranova 2004). In this sense, translation is a modality of empowerment since it is a form of social transformation.

Published Version 2024 (please consult this up-to-date version of the paper)

Translation within Capetonians informal settlements

Barella, J. (2024). Visibilizing Empowerment as Topological Resonances: Analysis of a Participatory Mapping and Enumeration Project as Strategy for Active Waiting for Housing in Khayelitsha (South Africa). Sage Open, 14(2). https://doi.org/10.1177/21582440241258414

Translation is crucial in Southern African informal settlements. As Weyer et al. point out "when employing unfamiliar technology, disparate literacy levels and language barriers create challenges for ensuring participants understand the risks of their involvement and recognize their rights." (2019) Illiteracy, whether referring to spatial illiteracy, or to the broader capacity to read and write, is also critical. It is unlikely for an illiterate person to be able to register for social housing or grants on his/her own, as the application requires to understand and fill in a written form in English.

Multilingualism in South Africa is a challenge (Webb 2009). Most people living in informal settlements speak native African languages (isiXhosa, amaXhosa people in my case study) and English – which is one of the

official languages – is not their native tongue. In the case of S section community, informal dwellers are from the rural side Eastern Cape, or grew up in the same informal area mainly with other isiXhosa speakers. Relationally, language plays a role within power relations and is key for establishing relation of trust and for legitimating one's expertise in a collective discussion. Moreover, language influences the way in which we take part into a discussion, from what we say to how we use our voice and body. The socio-spatial setting around us has therefore a direct impact on the way we express ourselves and understand one another.

Inherent to the act of claiming and the importance of language, is the untranslatability of certain words and concepts. This is a problem for understanding the reality of residents, and for residents to understand the nature of development projects and policies. Terminology and idioms have an impact on how one structures meaning and defines action. To be a citizen implies understanding how the government functions and its documentation. From the 'common everyday ways of speaking' to explaining one's living conditions using the government language (more formal, technocratic terminology) there is a gap that has to be addressed when claiming for rights or when trying to hold authorities accountable for their (lack of) actions. Likewise, from the epistemic point of view, to be a participant in a PME requires navigating a specific technological jargon that accompanies datafication processes similarly to data-driven policies. The efficacy and sustainability of PME practices themselves depends on translation.

Spatial Apartheid-induced injustice is intimately linked to how places are represented. As studied by Barthes (1984) and Bertin (1967), the format/mode of representation of information is a language in itself. Spatial language can influence spatial cognition (Wiegand 2006). Different languages perform differently when it comes to reading a map and for example to give directions. (Ibid.). Moreover, literature generally takes people's capacity to spatialize a social issue for granted, since authors (or reasearch) are often based in countries with higher literacy and/or education rates. Therefore, spatialisation as a skill has been so far overlooked (Radil, Anderson 2019). This paper argues that scholars should see mapping as a process enabling empowerment by enabling forms of translation.

5.3.2.2 Connectedness

Connectedness is the second modality of empowerment. It is defined here as the state of being in connection or being part of a network, *i.e.* interacting, establishing and developing connections of (mutual) benefit with people you meet in different places – regardless of these relations being makeshift or long-term. Connections are concrete opportunities designating a space, a time, a setting that allow to expand spaces of political, economic and cultural operation that becomes available to residents with limited means (Simone & Pieterse 2017). Connectedness is a function of people playing out different versions of themselves according to the situation and opportunity. Therefore, it involves enlarging the number of relations people have access to and through which they perform plural roles and skills. This definition resonates with the idea of "people as infrastructure" developed by Simone, since it positions "*residents, territories and resources in specific ensembles where the energies of individuals can be most efficiently deployed and accounted for*" (Simone, 2004: 407).

Connectedness within Capetonians informal settlements

Social connectedness is particularly important within Southern African informal settlements livelihoods – it consists in building quantity and quality, meaningful and supportive relationships between individuals and communities. Meaningful social connections improve emotional, social, political, and economic wellbeing (Hall and Lamont, 2013; Umberson and Montez, 2010). They can be a determining factor in whether an at-risk individual or community can break the cycle of poverty and vulnerability. Therefore, connectedness is central to the empowerment dynamic both at a collective and individual level.

Social connectedness is particularly important within Southern African informal settlements as it can be seen as a way to alleviate the social isolation and marginalisation inherited from the Apartheid-induced racial divide. Building quantity, quality, meaningful and supportive relationships between individuals and communities improve emotional, social, political and economic wellbeing (Hall and Lamont, 2013; Umberson and Montez, 2010) and can be a determining factor to break the cycle of poverty and vulnerability, both as a collective and individual level.

The waiting space-time associated with the housing delivery and improvements is a space for deploying and enhancing informal dwellers's connectedness. Connectedness implies mutual recognition, which is the key for establishing trust and navigating positions as informal dwellers – and making one's position clear is then necessary to be taken seriously by authorities. Connectedness alleviates social isolation and expands one's social network, which is both a contributing factor and a consequence of marginalisation or limitedness of means. Marginalisation can be experienced in a variety of ways by Southafrican citizens, where inequalities and economic precariousness are rooted into the Apartheid's-induced racial divide. Poverty is a structural issue originating from the heritage of segregation and increased by unregulated aspects of the neoliberal globalisation (Strauss, 2019). People often rely on makeshift strategies to cope with economic deprivation and precarious life conditions on a daily basis. Since structural inequalities are massive, the South African poor try to seize short-term opportunities as soon as they manifest. Makeshift strategies happen everywhere, but they are critical in contexts of strong inequalities and indigence, such as for informal dwellers in South Africa.

Through connectedness, empowerment potential lies in the act of differentiating types of connection within a peculiar space such as PME, and in the process of identifying actors responsible for specific actions related to the community's claim. In this setting, connections are a support that could work both as a way to enlarge, reinvigorate one' social-economical safety net, and to unlock opportunities and resources for triggering change.

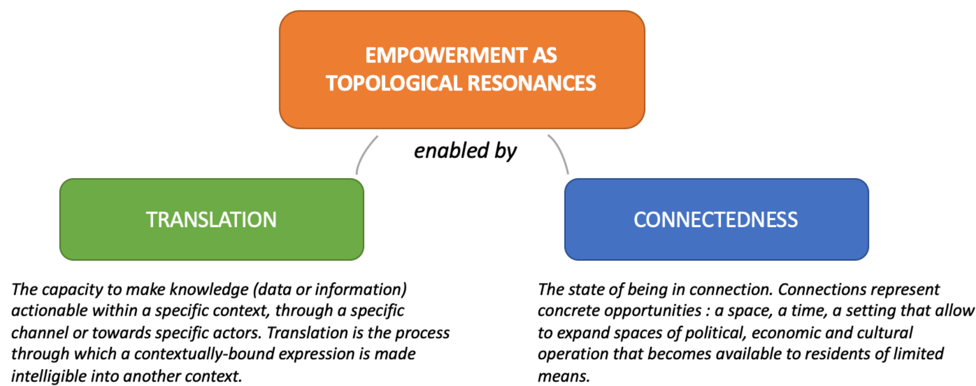


FIGURE 43 Conceptual Framework. Empowerment as Topological resonances is the capacity to analyse power leverage which comes from learning new languages and from identifying actors and casual agents (Figure 1 in paper 3)

5.4 RESULTS: Translation and Connectedness as two modalities of empowerment for S section community in Khayelitsha

This section brings evidence of empowerment as translation and connectedness emerging from the action-research conducted with DAG and S section informal settlement. Some stories stem from observations made during the PME activities; some others from a PME large meeting led at the Andile Msizi Hall in Khayelitsha and gathering different communities' leaders, S section community volunteers, NGO members as well as a few ward councillors. In-text quotes referenced as "DAG Human settlement meeting, 17th March 2018" are translated from isiXhosa to English by N. Moshani (Khawuta Xhosa services). The "s/he" form stems from the translation of isiXhosa non-gendered phrasing into gendered English morphology.

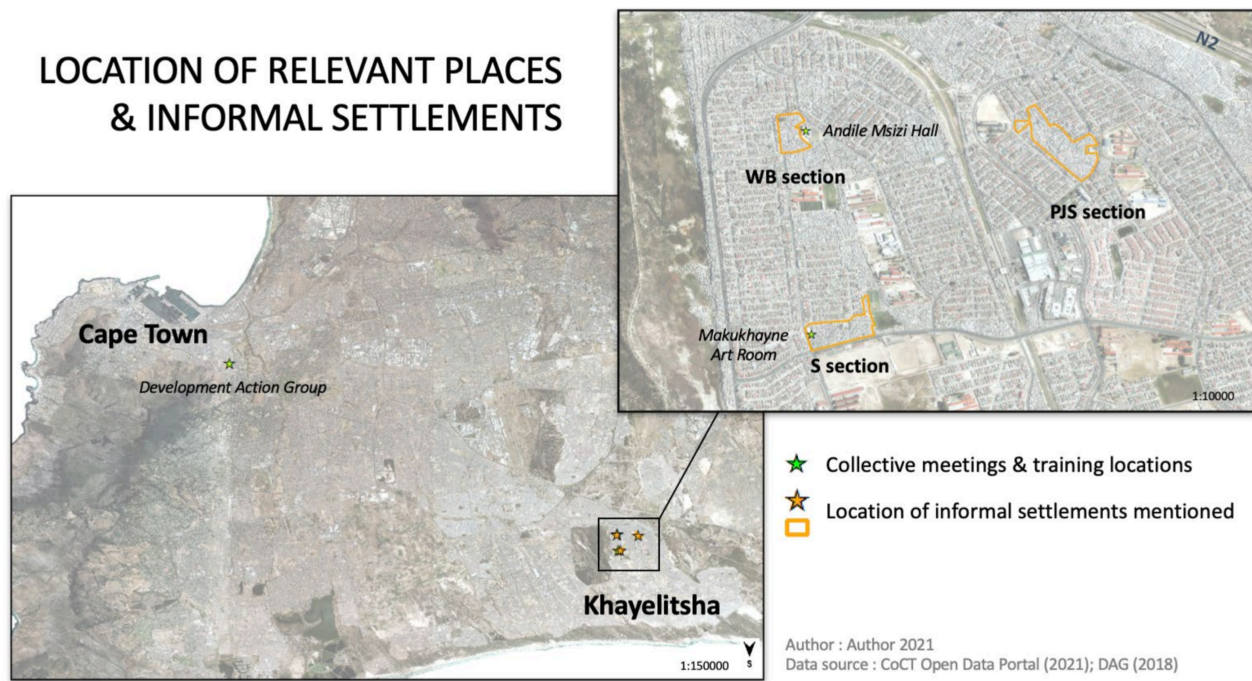


FIGURE 44 Location map of main informal settlements and relevant places mentioned in the empirical section (Figure 2 in paper 3)

5.4.1 Translation

5.4.1.1 Spatial Learning and Map Reading – the Hayibo! moment

During the first phase of the PME a 'rough layout mapping' and count of the settlement's structures is needed to sketch the neighbourhood. Many A0 aerial images prints of the area and examples of other settlements' mapped layout where taken to the S section volunteers at Makukhanye Art Room – where the activities were led – in order to start the mapping activity on the ground. Initially, many volunteers could not understand what they were looking at, nor consequently make sense of the task.

The facilitators – NGO members and myself – let the group gather around the A0 paper representing their settlement and gave them time to try and figure out the utility of that piece of paper. The print was turned upside down and jumped from hand to hand. All of a sudden, a participant ran outside, came back into the shack to grab the A0 print and took everybody else in the sunlight to show that that particular square on the bottom-left of the image was the roof of the Art Room, and that this other roof was his house. A collective and surprised "Hayibo?!" (isiXhosa interjection here intended as sign of revelation) brighten up the place. The volunteers spent the following 30 minutes searching for their own roof on the image, gluing their finger on it, and then walking the group to the location of the finger to show with a huge smile that that square was their home.

This is an example of translation, in its comprehension dimension, that happens due to the circumstances created by the PME setting at this specific introductory stage of the mapping activity. In this occurrence, empowerment was enabled by the resonances of:

- the collective presence: people being able to exchange their understanding of the object and then of the task;
- the materials: paper maps and prints. Just as observed by Qiu et al. (2020), paper maps are more conductive to acquisition of spatial learning than their virtual equivalents;
- the location of the activity itself: a community facility within the settlement. The chosen location implied that participants were familiar and comfortable with the site, and that it was much easier to compare the spatial images with the reality on the ground.

Although, literature tends to focus on technical issues when evaluating PME processes, the actual first "technical issue" that appeared was related to the uneven spatial orientation and map reading knowledge of participants. Therefore, spatial literacy, and the capacity to read maps, should not be taken for granted – anywhere in the world. Holding configurational spatial knowledge is a key skill for understanding the value of spatializing information and claiming for one's rights.

FIGURE 45 S section mappers (volunteers) gathered around the settlement' A0 aerial image at Makukhanye Art Room (Figure 3 in paper 3 [JB March 2018])

FIGURE 46 S section mappers (volunteers) startin ghte settlement's rough mapping on the ground (Figure 4 in paper 3) [JB, Macrh 2018]

5.4.1.2 Multilingualism and forms of language

The enumeration of S section settlement was conducted through a GIS- and form-based app for data collection, at the household level, with the intent to gather basic socio-demographic information of the settlement. The first draft of household questionnaire was elaborated by the NGO and was discussed and edited with community members during a community meeting. The choice of the language (English, isiXhosa or Afrikaans) in which the survey was formulated was debated within the NGO and with S section community. Eventually, English was chosen for the written questionnaire, but door-to-door interviews were then conducted in English and isiXhosa by the community volunteers.

English was best understood by all parties and it was considered the easiest option for communicating with the government and other potential stakeholders. The NGO considered the possibility to set up the app in two – or more – different languages. Although the technology allowed this duplication quite easily, it would have implied to invest more time for re-translating some of the answers as part of the post-processing of data. The original answers, with the interviewees words choice, were then preserved.

The example speaks to translation as the capacity to understand and to navigate between different languages. This is a form of empowerment since a lack of interpretative resources often results in a lack of access to the technology in use and/or to the specific jargon that accompanies policies and technologies. (Weyer et la, 2019: 4). By learning how to navigate policies official language, people were able to access information in its original and customary form (English) outside the PME. The process of navigating between several languages

allowed community volunteers to collectively learn and agree on a technical jargon. Within PME, the interviewers – community members conducting the door-to-door surveying – took the role of isiXhosa to English interpreters. Using this form of translation, community members were able to learn and use their knowledge to become a point of contact between community fellows, the NGO and the government.

From the NGO point of view, this experience reiterates that, in order to enable empowerment through PME processes, it is crucial to provide clearly understandable information in one or more languages and in a form that is accessible to local inhabitants. This multilingual communication keeps all channels of communication open between stakeholders, but also preserves the cohesiveness of PME action that is necessary for achieving empowerment goals.

5.4.1.3 Spatializing rights

According to the South African policy for free basic services and water supply, every household should have access to drinkable water and sanitation within 200m from the dwelling (DWAF 2001). This information about a legal measure was presented by the NGO facilitators during a workshop with community volunteers. The workshop aimed to discuss a draft of the settlement's profile map, and to present the importance of spatializing claims. In order to demonstrate the spatial meaning of such information, an NGO member roughly drawn on the settlement's map. All the houses left out of that sketchy buffer were then technically in an illegal situation in terms of basic service provision. The attitude of participants turned from taciturn listening to a state of surprise and commenting fingers pointing at the divide created by the imaginary 200m-long line. The effect of a spatial visualisation changed the perception of dwellers' circumstances and their ways of talking about it, at least for the time of the meeting. The waiting for livelihoods improvement characterised by makeshift strategies for accessing water was perceived as precarious and highly problematic. But with the emergence of the word "illegal", as label associated to some households, suddenly their living conditions became more than unbearable since the injustice was yet spatially visualised.

Information translated into *spatial* information had an effect, anticipated by the NGO facilitator in this case. This example shows how the transposition of an information onto a map turned a well-known reality into the realization of an injustice. It shows the performative power of maps in understanding the scope of a law and basic rights. Policy's language is otherwise hermetic or difficult to access for most citizens, which is aggravated by the high illiteracy rate measured in the area. Also, this speaks to the affective response that the spatialisation provoked. Once the imaginary 200m line was drawn, people were more actively engaging in the discussion and could make sense of the overall PME scope, since they were able to identify the potential effects of the mapping. This is key for a development activity like PME, where facilitators must ensure that participants take ownership of the process.

5.4.1.4 What is "land tenure"?

Test phases are important when implementing GIS-based tools for data gathering and conducting households' surveys. Especially, when elaborating co-created questionnaires, all the questions and their implication for the overall scope of the activity need to be understood by participants. For this reason, a long meeting for discussing and editing the questions' survey was organised. Participants could ask for clarifications, suggest additional question, edit the format, etc.

Nevertheless, when verifying the results of the first data-collection test on the ground, the answers to the questions "*Tenure type*" and "*Type of land document of the current structure*" were inconsistent. We soon realised that the interviewers – seemingly the interviewees either – could not make full sense of the word "land tenure" and its meaning. The language gap identified above (4.1.3) did not help in unifying the task. At first, when reporting back the results of the test phase to the volunteers' team, the realisation of this gap inspired hilarious comments due to the supposed inherent irony of such misunderstanding. Then, a short introduction to 'tenure rights' and its jargon was proactively given by an NGO member, so that everyone could be on the same page and all doubts could be cleared. This event informed the shape of the technology: in response to this observation, the question on the survey was edited and pre-set with four possible answers to guarantee the data standardisation and to avoid further potential misunderstandings on the matter.

To understand a word, a concept, a mode of functioning in urban planning and distribution of urban rights is necessary when claiming housing improvements. Land ownership and land representation are bound to the past colonial and Apartheid's regimes ensuring the possession of valuable land for the white minority (Weyer et al. 2019). Even though since 1997 White Paper on Land Reform there was an effort for addressing those injustices, the scene above suggests that the terminology of spatial planning tools perpetuates this gap (Strauss 2019; Weyer et al. 2019).

In this example, PME provided with reiterative spaces of (re)discussion of the activity and verification – both for technology implementation and for the clarity of the activity's purpose itself. Through the test phase a significant misunderstanding was raised, and precautions were taken to fix it. The merit of the PME-provided space was to make such misapprehension visible and "fixable" in a very short time. Moreover, when conducting the survey, the interviewers were asked to explain the term to the households in order to raise awareness about the way one's housing claim could be formulated. They became translators themselves. As for technology-related impact, the misconception urged to redefine the way 'land tenure' and 'property rights of the shack' were asked and configured in the GIS-based app.

5.4.1.5 Translation as positioning – becoming the expert

The capacity to become an informed citizen and gaining position to the discussion table is enabled by the acquisition of translation skills. Gaining vantage points when facing authorities is based on one's ability to navigate different jargon and displaying expertise on a subject.

During PME, a collective meeting gathering local politicians, the NGO, and the community, was organised and used as a platform to present the responsibilities of the different levels of government. The aim of the meeting was also to publicly discuss the updated Housing White Paper (HWP) criteria for accessing social housing and its scope. The HWP is the official document defining who is eligible for which type of housing program – the data-collection was supposed to verify the matching criteria for S section. Printed copies of the new HWP draft and regulations were distributed to community leaders, and were accompanied by the social housing application forms and by oral explanations on how to complete it.

> *"… in the Human Settlement, it is good to know what the policy says so that if you are cornered by a certain official, having a meeting with him/her, you can corner him/her saying there is that certain policy. This policy says... s/he will also be knowing that. S/he can also not deceive you because s/he knows that, "Here I am conversing with a person who is very clear in terms of policy and Human Settlement challenges and who is also putting solutions on the table".* (DAG Human settlement meeting, 17th March 2018).

> *"…so that if there are public hearings that are being done by the national government, when a person goes to participate in those public hearings, s/he must know what questions s/he will ask because s/he has gotten that discussion document" (ibid.)*

Relationally, language plays a role within power relations and is key for establishing relation of trust and for legitimating one's expertise in a collective discussion. To be informed, to be taken seriously, to elevate an ordinary knowledge to the level of informed expertise is key for influencing decision-making and being prioritized. This positioning as fully capacitated and informed citizen is essential in a context like CoCT, where the accountability of local government is under constant scrutiny (Sikhakane, 2011). By extension, the intervention quoted above, ensured that, to the eyes of the local councillors, all citizens present at the meeting were deemed to be thoroughly informed about their rights. Thus, translation contributes in reducing mistrust.

This example resonates with the "connectedness" dimension of empowerment, since the meeting set-up allowed to publicly connect authorities and community members through the supervision of NGO acting as mediator and creating the space-time for this encounter to happen, as well as limiting the potential political hijacking of the space by authoritative actors (see Author 2020a for an example based on the same case study).

5.4.2 Connectedness

Following the observations, connectedness revealed two main modes of topological resonances: connectedness acting as trigger and connectedness acting as safety net. The former being an active search for change, the latter being a way for preserving and securing one's current position and resources.

Building on empowerment literature (Friedman 1992), collective and individual dimensions are differentiated in order to structure the section, but the intention is to emphasize interconnections and relational aspects.

Connectedness – collective level

The link between these following experiences is the presence of NGOs as intermediaries for unblocking connections or supporting people's voices within a power relation setting. Connectedness values as the experience of belonging to social networks within which the exchange of experiences, resources and mutual recognition is attainable.

5.4.2.1 Connecting the dots

Connectedness enabled by compresence fosters social cohesion by constructing trust, a sense of shared commitment and reciprocity. Within this setting, data participates to mutual learning: identifying people's needs and fostering collective organisation for moving outside marginalisation. As a member of PJS settlement community explained to S section's community volunteers : "*the older people, we must also know them so that we can assist and link them to the correct offices,… to know the wheelchair bound people so that we can link them to the correct offices right away*" (fieldnotes, March 2018). Identifying vulnerable people and direct them to the correct offices is a form of connection that empowers, and, within PME these vulnerabilities are backed by data verified by an external stakeholder. Through PME, the needs are identified on the ground, and are directly addressed through the support of the NGO who can inform people on governmental procedures for obtaining the help they are eligible for. This connection is susceptible to trigger change as to financial resources and support for a specific population of the settlement. This new connection allows for a small step towards getting out of marginalization while waiting for housing improvements. Moreover, gathering people in a similar situation in a collective action was seen as key for fostering development : "*let's link people who are a priority because it is important for us to know them. Do the leaders know them so that we can align them, and there is a space in the community for them and development progresses?*" (DAG Human settlement meeting, 17th March 2018).

Beyond building social connection, this process also higlights residents' specific needs in terms of urban planning. For instance, it can lead to a redevelopment layout integrating wheelchair mobility or children's playground.

FIGURE 47 Materiality of experience sharing in a previous project at PJS informal settlement (Figure 5 in paper 3) [JB, March 2018]

On figure 47, people from PJS community were sharing their experience with S section community, while also explaining how to read the 3D settlement layout model PJS volunteers elaborated in a previous project. Not only was there a transfer in terms of knowledge, but also in terms of local contacts and strategies. The firsthand feedbacks came from different community leaders and councillors in direction to S section members, for S section members to be learned from. Therefore, connectedness also operates as an exchange of knowledge based on previous experiences using PME or other datafication tool, that is shared with S section through the mediation of the NGO.

PME also allows for a more horizontal way of connecting the dots, by bringing together people from different communities experiencing similar struggles. Mutual learning from peers is here labelled as connectedness but could also be considered as translation skill since other communities' members act as translators of the instruction given by the NGO. They provide firsthand advices for leading the PME exercise, as well as a broader vision of how the mapped information was used and what it allowed to achieve. The actors compresence enabled these informal exchanges and supported S section members with enlarging their network collectively, but also for individual purposes.

If taken further, this co-learning could lead to the building a city-wide network of communities and to scale-up the informal settlements' action since many stakeholders are brought together around a common goal.

5.4.2.2 Settlement safety and emergency response

In case of emergency, connections as "knowing your neighbours" are crucial to guarantee neighbourhood safety, for self-organising first emergency responses and evaluating damage extent. As explained by a NGO member to S section community leaders during a collective meeting:

> "*The enumeration thing is very important in terms of numerating people and know how things are everyday". "If there could be a fire, you can put a face on the paper as well as the map that supports all of that" (sic)* (DAG Human settlement meeting, 17th March 2018).

The mapping and enumeration activity permit to know people and activities in the area. Community volunteers in charge of the enumeration were going door-to-door to interview and listen to their neighbours' stories – this enabled a powerful mutual recognition. The household enumeration included taking pictures of each home and every resident who was there at the moment. Community volunteers had then a clear overall awareness of who is living where, in which conditions, and of the type of neighbourhood relationships. They became aware of the materiality of their livelihoods as in the way their homes are organised and build (what kind of layout, what are the entrance and main escapes, what kind of materials are used, etc.).

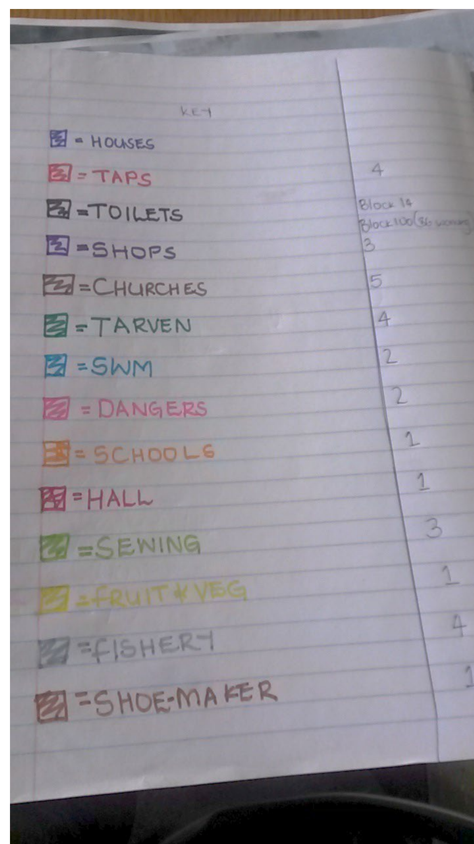


FIGURE 48 The first map legend elaborated spontaneously by S section volunteers enumerating the neighbourhood (Figure 6 in paper 3) [JB, March 2018]

Knowing their neighbours and who is living where is a powerful form of mutual emercengy support and surveillance. For instance, informal settlements are highly at risk of fire incidents causing immense human and material damage. In case of a fire outburst, those who are present in the settlement act as first responders – they need to know who might be at home, in which shack they live, as well as help them rescuing their belongings. Mutual surveillance and support are vital for informal dwellers (Brown-Luthango, 2019). Through datafication this "safety net dynamic" is enhanced and strengthened. First, PME produced actionable knowledge about the community and households. Then, participants running the data-collection process became experts of their own neighbourhood and were identified as such by their fellow residents.

5.4.2.3 Clarifying political responsibilities and channels for claiming

The PME process also enhance empowerment by visibilising actors responsible for specific actions related to the community's claim. PME makes this possible through the coordination meetings necessary for verifying the data collection process and gathering various actors involved in the urban development process. In the case of S section, this especially meant to clarify the role of the ward councillors and community leaders. It was necessary to know who is recipient of which kind of information and towards who one has to direct claims, and, therefore, to make the knowledge actionable.

During a PME-related public meeting, a question was raised on the role of community leaders and local councillors when it comes to support informal dwellers' claims for housing improvements.

> *"Those are the things that help us to know each other so that when there are benefits from the councillor saying, I want the amount of people who struggle, the leaders do not hesitate, they know that they go to which number. As a leader to know your area. (…) So, the leaders, more than looking for the councillor and what s/he does, be responsible in your area ..."* (DAG Human settlement meeting, 17th March 2018)

This intervention highlights that leaders are in charge of the collected information and guarantee the collective ownership of the information about the community. Thus they become the gatekeepers of the claims towards the local government level – in this case the ward councillor. The community knows that leaders have this information, and leaders know that their discussions with councillors or with other representatives of the government are backed by data and maps as mediators for negotiation. The process also allows for a better communication between community leaders and local councillors.

> *"Chair (NGO facilitator): (…) People expect councillor to have something to do with the houses or to deliver the houses. Let me ask …, what is the role of the councillor? And not beat the wrong person and burn a person's house for something that is not in his power…"*
>
> *Voice: A councillor is people's messenger to do something for us to the government, not necessarily that the councillor has money to build houses …, I think a councillor is a people's messenger… From people to the government." (ibid.)*

Lastly, clarifying actors' responsibilities was also suitable in order to protect all parties from the (badly oriented) burst of frustrations directed towards members of the local government – as in suggested in the quotation.

Clarifying political responsibilities is empowering since it optimizes the channels for claiming and makes easier to hold people accountable. This is particularly important in similar contexts, where people take on different roles at different times and it is difficult to assign unique 'values' to people since they participate to various collective operations (Simone and Pieterse, 2017) – for instance one of the community leaders is also an entrepreneur and runs a local car washing activity.

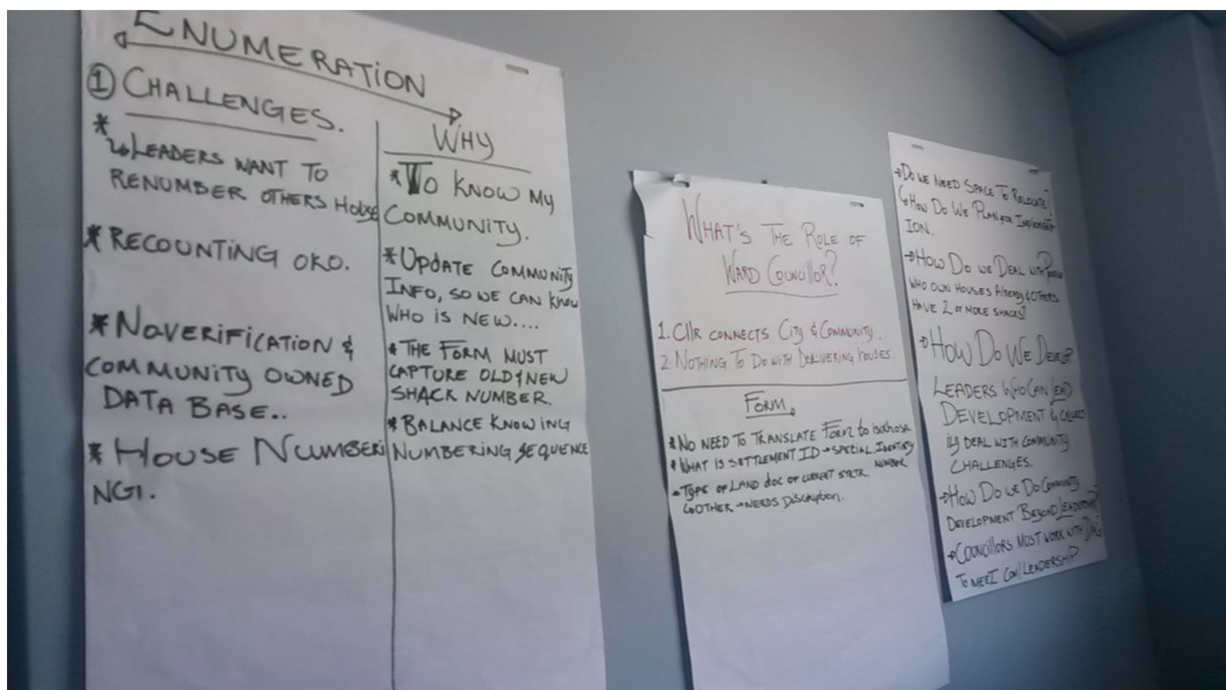


FIGURE 49 "What is hte role of the ward councillor?" Posters resulting from a brainstorming and discussion led at Andile Msizi Hall in Khayelitsha (Figure 7 in paper 3) [JB, March 2018]

Connectedness – Individual level

5.4.2.4 Unexpected access to short-term resources

Empowerment also occueed through PME as a mean of configuring a different access to ressources. During PME, participants were defrayed by the NGO as a compensation for their time. This was not intended as a form of salary, since the NGO cared about selecting community volunteer who were firstly motivated by the purpose of the project. Snacks and breakfast were offered at some times. The NGO members leading the PME activities on the ground would collect food and beverages on the way to S section (Figure 50). Nevertheless, one participant explicitly said this financial and food resource were the main reasons for taking part into the PME. S/he had a child, s/he was not touching social grants at the time. The modest defrayal and food represented a great way for alleviating a bit of the stress caused by her/is living condition. Although not

the main intentional goal, these strategies contribute to redistribute resources even if just for a specific moment in time during the long waiting for livelihood improvements. In this case, for the PME duration, the participant could get some kind of material resource as a short-term coping strategy. Eventually, s/he was not less engaged into the PME compared to participants who had a more political motivation for embarking on the project.

A similar example is provided by the "ambivalence" of a participant who was strongly involved into the process but also managed to take advantage of the resources provided. In order to guarantee an immediate synchronisation of the data collected, the household enumeration was conducted with tablets equipped with SIM card and a generous data bundle. Within 24 hours, s/he used all the data connection bundle on the tablet s/he was responsible for. The utilization was mainly for surfing the net, live streaming and downloading games on the tablet. This amount of "digital enjoyment" would have been otherwise difficult to appreciate for him/her due to the high costs of data services.

These examples show a form of short-term intrapersonal empowerment – although very ephemeral in the second example. It was enabled by connectedness as a form of resources redistribution brought on the table by the PME process.

FIGURE 50 The last slice of a nourishing lunch break offered by NGO members (Figure 8 in paper 3) [JB April 2018]

5.4.2.5 Networking and negotiating positions

An illustration of connectedness as trigger for change at an individual level is provided by the attitude of a community volunteer during the PME activities. One volunteer wanted to highlight his leadership skills to the community leadership and NGO members. S/he aimed to integrate the pool of leaders and become part of

the local authorities. S/he used this space in his/her own personal strategic way. On the ground, s/he was always keen to take the lead when beginning a new activity and to explain to comrades the unfolding of the operations. During the first phase of the mapping, s/he personally took responsibility of verifying the information collected about toilets and water points. During the set-up of the household questionnaire, s/he actively suggested ways for rephrasing some questions. Overall, s/he charged himself with ensuring the report back to the community leaders. This volunteer was perceptive of power relations and sought an interstice within the hierarchy in which s/he could rise himself into. S/He was more interested in the opportunities that the participatory space unlocks rather than in the PME for S section in itself, or the housing improvements end goal. During a personal conversation s/he stated that s/he saw PME as a platform that could provide job opportunities, social connnections (including NGO members), and strategic knowledge. Nevertheless, his/her proactivity and willingness to connect came in handy for fostering the PME activity, since other participants were relying on him/her taking the lead.

This example shows how connectedness is necessary for individual and interpersonal empowerment, as it allows to discover spaces of manoeuvre for finding vantage points and opening up new networks. The volunteer's strategies for advertising his/her own leadership position within the mapping activity, within the volunteers' groups, within the community, allowed to gain visibility. In return, these strategies shaped the PME activities. This example shows that power relations are inherent to the practice of PME tasks since PME opens up a space for such makeshift strategies to be deployed.

5.5 Conclusion

Informal settlements livelihoods in South Africa are characterised by a structural waiting for improvements. NGOs and organisations supporting informal dwellers' claims push for civil society to be self-critical and responsive – and not to rely on dwellers' patience to wait indefinitely for commitments that should be within reach. PME acts as tool for empowerment during the waiting phase. It is a trigger for deepening democracy since it represents a tool for activating that waiting phase and for putting public accountability measures into place.

This paper analyses empowerment fostered by PME practices during that phase of waiting in the S section informal settlement (Khayelitsha). It is built around two main arguments. Firstly, the paper considers NGO- and community-led PME as an empowering tool for active waiting for livelihoods improvements in South Africa. While the existing literature have discussed empowerment in the form of the final PME output and highlighted the production of data and maps, this paper grasps the importance of the interstitials empowering dynamics happening during the process. Secondly, a specific form of empowerment enabled through PME is conceptualised as "topological resonances", borrowing from Simone and Pieterse (2017). Two modalities of

empowerment as the actualisation of topological resonances were observed and applied to the S section informal settlement case study (Khayelitsha). Translation and connectedness relate to mechanisms for gathering up existing resources and make them actionable through the enactment of PME process. It shows that different forms of empowerment are triggered by placing people, materials and resources in contact with each other. Figure 51 summarizes main findings of the paper.

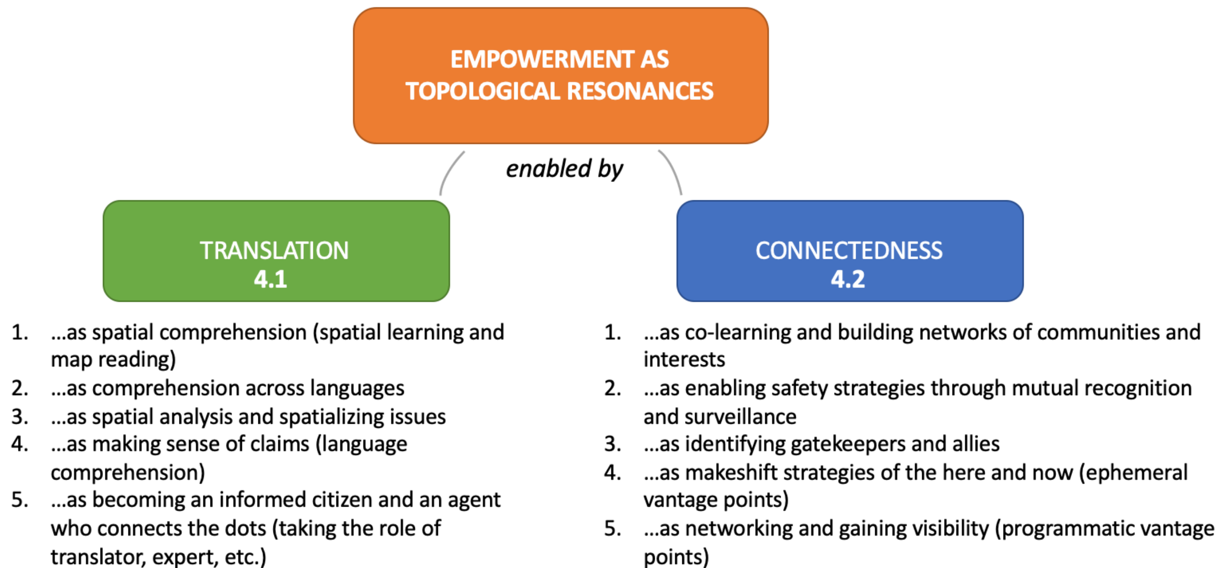


FIGURE 51 Summary of main results in terms of empowerment as topological resonances. The bulletpoints number correspond to the sub-sections of the paper.

For Capetonian NGOs « empowerment » must work towards a broader transformative change within society to overturn unjust structures. The findings show that empowerment is part of the process of PME, and not only its output, since PME makes power lewerage visible while activating mechanisms of accountability. In return, these elements are key for determining the success of housing programmes implementation (Sikhakane 2011).

For the S section experience, physical and material compresence appears as key factor for 'translation' and 'connectedness' to operate. When leading PME practices, in order to maximise the collateral learning for participants, materiality and space settings determined the type of 'topological resonances' that occurred or could be seized by them.

The paper emphasises the importance to go beyond the expected outcome when talking about PME for empowerment and, rather, to focus on interconnections between people, materials and circumstances that are established throughout the process – at times programmatically and at times circumstantially. Any large-scale ambition of claiming or empowering through PME has to be tempered by the micro impacts that the process of PME itself will carry in tow – these were visible through the translation/connectedness framework.

This discussion invites to go beyond instrumental purpose of PME, and to dive into a detailed picture of how resources are used and reallocated. Treating empowerment as a process enhances the capacity to grasp individual and collective learnings acquired through the process. These are forms of sustainable gain that people take beyond these participatory exercises and beyond a punctual PME outcome. Participatory spaces offer a theatre were citizens roles can be played and actors are forced to be visible – and where mutual control and exposure is secured by the presence of NGO as a mediator. Within this setting people can identify which resource is relevant for which type of claim, who is accountable for what, who to turn to for specific claims, and how to speak to those actors. The relation with welfare state is crucial in South Africa for shaping this vision. Seeing the state as "the house provider" urge to consider empowerment as a mechanism for holding authorities accountable, rather than disenfranchise them from their development duty. Moreover, the preponderant role of NGOs induces a risk of superimposing empowerment (Author 2020b). By framing empowerment as topological resonances, translation and connectedness, we focus on communities and individuals' capacities to play different roles at different times, and therefore turning the opportunities enabled by participatory spaces into vantage points.

Far from suggesting a one-size-fits-all solution, this paper explores other ways of assessing PME impacts going beyond the Capetonian context solely and speaking to the widespread use of these techniques regardless of their specific field of application. The importance of framing empowerment differently is highlighted by the peculiarities of the context and the fact that the instrumental goal in itself (the production of data or of a cartographic artefact) is not enough to guarantee an actual improvement of people's life and of daily strategies. Anywhere where these participatory techniques are implemented to answer to an urgency or a struggle for housing and appropriate living conditions, there will be a need for investigating and making unappreciated leverages for change visible and actionable.

ADDENDUM to 3rd paper – Conceptual clarifications

[*Author's note: This addendum replies to a revision required by the thesis committee in June 2022. The revision will be integrated to the paper draft during the official process of revision of the paper for publication.]*

The aim of the paper is to recalibrate PME as means for empowerment by analysing PME practices beyond the most expected results (e.g. gathering data for elaborating a redevelopment plan) but as small unacknowledged steps. The paper renews the definition of empowerment as a sum of circumstantial transformations allowing to make power leverage visible and to turn the long waiting for social housing and housing improvements into an opportunity. In order to do so, it integrates conceptual interventions from *New Urban World. Inhabiting dissonant times.* by AbdouMaliq Simone and Edgar Pieterse (2017).

This paper uses Simone and Pieterse's conceptual framing of "enabling topological resonances" (2017) to apprehend unacknowledged dimensions of empowerment. A topological resonance is the event/capacity to put different places, materials, services, discourses and institutions in contact with each other. According to Simone and Pieterse's definition "it is the affective process of people and things associating with each other, (…) of acting as components in the enactment of operations larger than themselves and their own particular functions and histories" (2017: 16).
A resonance represents a modality of people "feeling each other out" or attending each other – humans, circumstances and objects alike. According to Rosa, resonance can be described as the dual movement of "*af<-fection*" and "*e->motion*" (Rosa, 2018: 2 – spelling from the same publication). It entails a sense of responsivity to external inputs and the capacity to turn this "feeling" into a transformative process of appropriation, which can be intrinsically unpredictable. Just as for empowerment, this concept requires the existence of a difference (i.e. in terms of resources) as well as the perception of being able to reach out to it and/or to appropriate ourselves of it. It involves an agency and a transfer, although the directionality of the transfer is not clearly established – i.e. one can empower oneself, and does not need to "be empowered" by someone else necessarily.
The epithet "topological" characterises the relative positioning of elements resonating, and highlights the absence of hierarchy between these elements once they are connected with each other. In particular, it characterises a framework that focuses on resources, places and people that are used for purposes for which they were not intended.
Topological resonances allow to analyse events and materials that possibly enable the creation or (re)activation of linkages opening up new opportunities and therefore enabling empowerment.

During the case study of S section PME, I observed two main modalities of these linkages that I encapsulated under the umbrella terms of "translation" and "connectedness".

Translation is defined as a capacity to make knowledge (data or information) actionable within a particular context, through a specific channel or towards certain actors. According to Holi (2017), translation is the process through which a contextually-bound expression is made intelligible into another context. It implies the capacity to listen and to understand other actors as well as the capacity to manipulate the information according to the situation and one's goal (Wiegand 2006). Within translation, information is actionable since this act of synchronisation is capable of generating an effect – of mutual recognition, of communication of a need, etc. (Terranova 2004). Translation is the main tool for navigating social and political situations, and therefore for positioning within a power relation (Bertin, 1967). As a modality of topological resonance, translation is indented beyond its mere linguistic acceptation. When considering translation as resonance, thus encompassing affects and emotions according to Rosa's definition (2018), language is certainly one but not the sole way to interpret communication and the relation with the world.
Translation is a modality of empowerment since it is a source of social transformation through the transfer that it enables.

Connectedness as a modality of topological resonance is defined as the state of being in connection or being part of a network. Networking involves interacting, establishing and developing connections of (mutual) benefit with people one can meet in different places – regardless of these relations being makeshift or long-term. Building on the overall definition of topological resonance developed above, connections are concrete opportunities to take each other into consideration. "Concrete opportunities" designate a space, a time, a setting that allow to expand spaces of political, economic and cultural operation that becomes available to residents with limited means (Simone & Pieterse 2017). Therefore, connectedness is a function of people playing out different versions of themselves according to the situation and opportunity. This modality involves enlarging the number of relations people have access to and through which they can discover and perform plural roles and skills. This definition resonates with the idea of "people as infrastructure" developed by Simone, since it positions "residents, territories and resources in specific ensembles where the energies of individuals can be most efficiently deployed and accounted for" (Simone, 2004: 407).

Drawing on these conceptual intuitions, the paper redefines empowerment as a strategic redistribution of agency resulting from an improved capacity to navigate situations and identify power leverage that are within one's reach. In this interpretation, empowerment is the capacity to analyse power leverage which comes from different forms of translation – e.g. learning new languages as maps, data, official documents, governmental documents, political procedures and claims, political responsibilities – and from forms of connectedness – e.g. meeting new actors, and to identify the causal agents such as NGOs, local councillors, government officials, communities struggling with similar issues (de Moor 2018). These capacities result from specific circumstances that can be enabled an individual or collective level within PME practices, such as those developed in the empirical part of the paper and summarized by Figure 52.

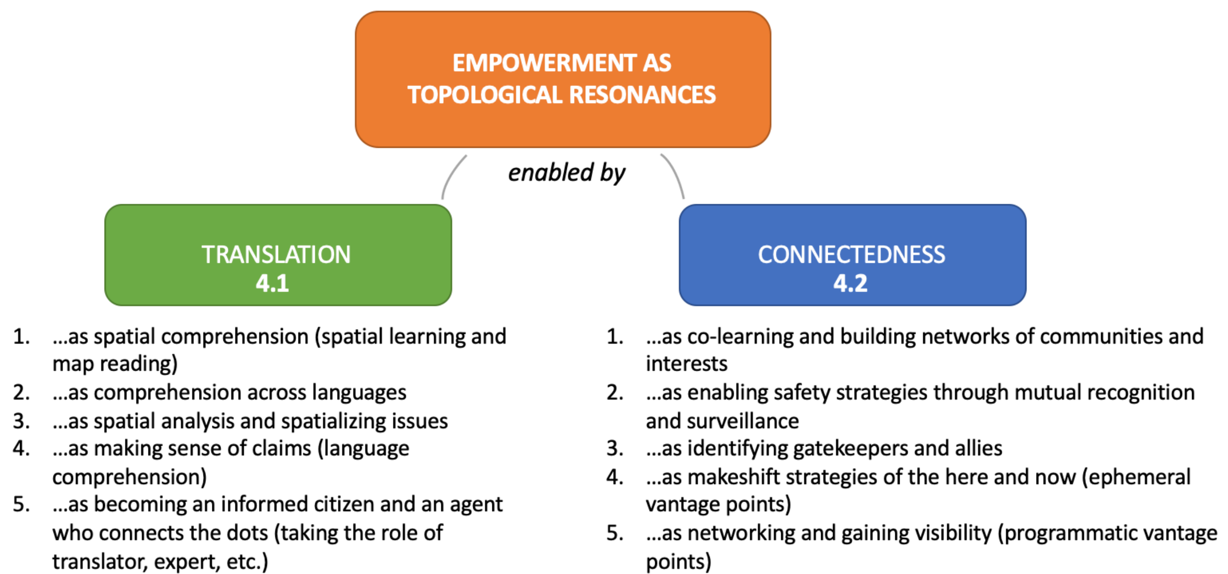


FIGURE 52 Summary of main types of empowerment as topological resonances observed through the case study (Figure 9 in paper 3)

6. CONCLUSION AND THESIS DISCUSSION

6.1 Introduction

This research began by asking the following questions:

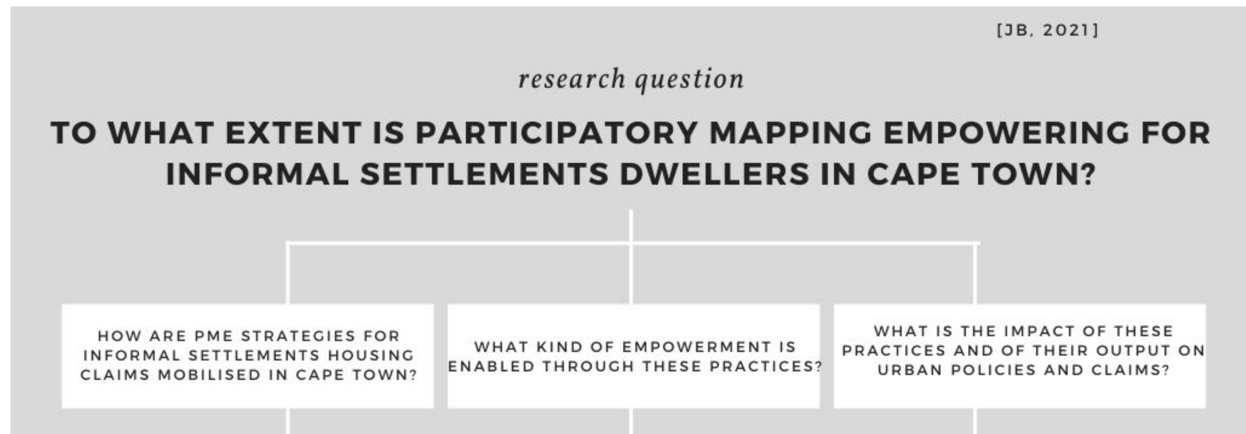


FIGURE 53 research question and sub-questions

This chapter consider these questions in light of the theoretical, methodological and empirical engagements that were made in this research. The chapter is developed around four main movements.

First, I provide a summary of the main results in relation to the questions above. I restate the aim of the research and discuss how this aim was fulfilled.

Second, I discuss the implications and impacts of the research.

Third, this section discusses strengths and shortcomings of the conceptual and methodological framework I have used in this thesis. Also, it evaluates the limits of the empirical analysis and of its academic report back.

Fourth, this section opens up paths and raise insights for further research in the field of participatory mapping and GIS in Cape Town.

6.2 Answering The Research Questions

This section is organised in two main parts. Firstly, I reiterate the structure of the thesis, the publications, as well as the research questions, and how these three elements are intertwined. Secondly, I address each of the three research sub-questions in order to summarize and discuss the main findings that provide an answer to the main research question. Specific contributions of this thesis are highlighted directly through each sub-question.

6.2.1 Structure of the thesis and research questions

This thesis is organised around three main peer reviewed publications corresponding to three main phases of research – theory, methods, "application" (Figure 54). As stated in the introductory chapter, the papers

give the backbone of a classic thesis structure going form theoretical considerations to more empirical ones. Nevertheless, every publication provides a different piece of literature and conceptual discussion contributing to the overall theoretical framework. Each paper contributes to aspects of the main research question and sub-questions in a different fashion – as shown in the figure hereafter.

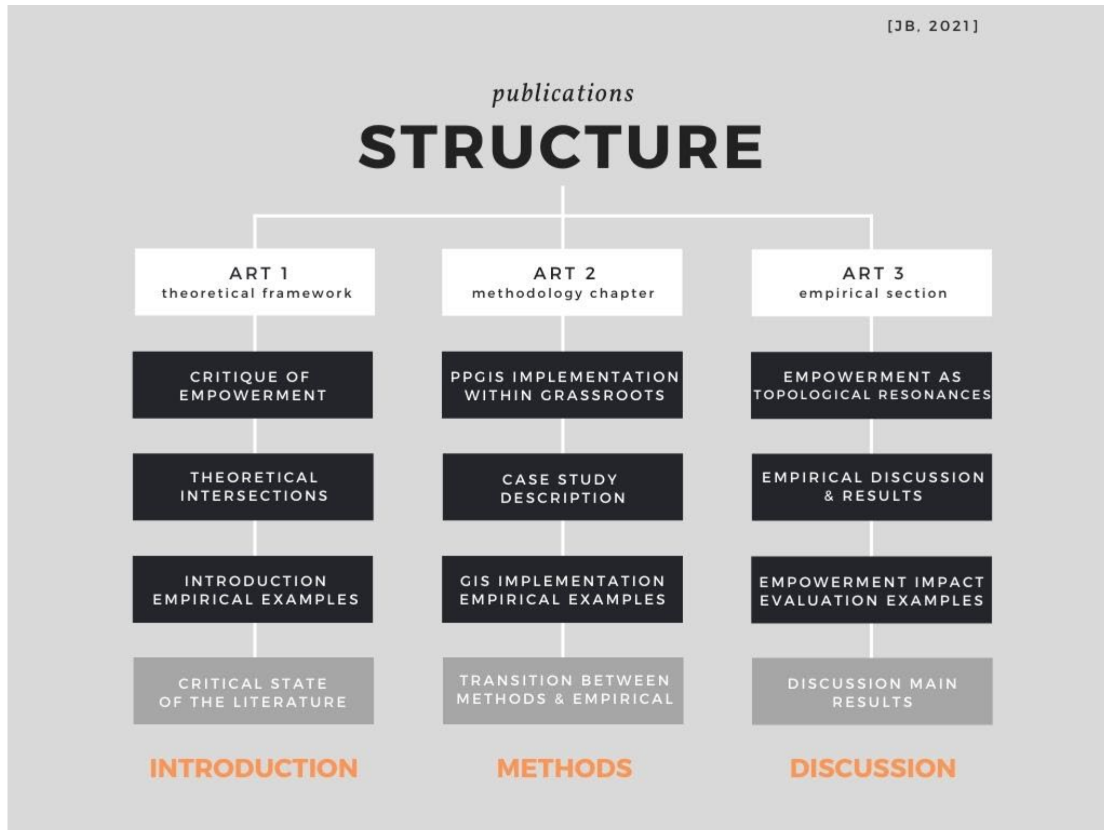


FIGURE 54 : Publications structure and position within the thesis manuscript

The research started with a very broad question tackling the impacts of participatory mapping and enumeration (PME) practices on informal dwellers: *to what extent is participatory mapping empowering for informal settlements dwellers in Cape Town?* The research question was then split into three sub-questions informing and developing specificities of the main one: (1) *how are PME strategies for informal settlements housing claims mobilised in Cape Town?;* (2) *what kind of empowerment is enabled through these practices?;* (3) *what is the impact of these practices and of their output on urban policies and claims?*

While I address the three sub-questions separately, there is an overlap between some of the aspects that the questions consider. Also, despite the research design started with the idea to focus mainly on "informal dwellers", during the fieldwork the scope was enlarged to take other actors into account – in particular, NGOs. Hereafter, Figure 55 and 56 aim to explicit the link between publications and research sub questions.

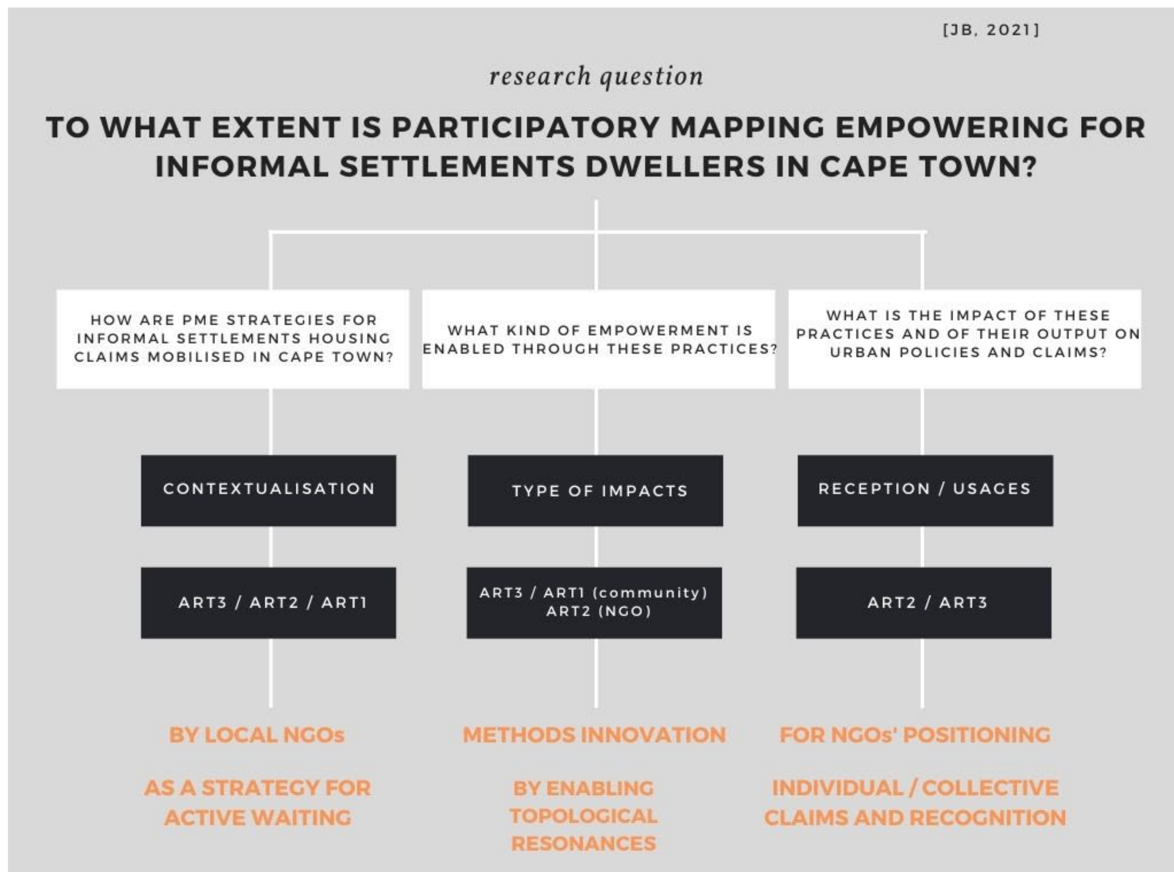


FIGURE 55 Visual synthesis of research questions and main findings

		Sub Question 1	Sub Question 2	Sub Question 3
	Type of paper	**How are PME strategies for informal settlements housing claims mobilised in Cape Town?**	**What kind of empowerment is enabled through these practices?**	**What is the impact of these practices and of their output on urban policies and claims?**
1	Theoretical reflection; Critique of main concept	• gives a broad view of uses of participatory mapping and GIS for empowerment/advocacy • summarises a broad state of the literature of PME practices and their origins	• positions the reflexion of the rest of the thesis by stating a critique towards classic empowerment frameworks	• presents some unexpected results of the PME process
2	Methodological; Tech-centred (GIS); NGO-centred	• highlights the role of GIS for NGOs and community-based organisations working for informal settlements upgrading • PME as NGO's political strategies	• discusses NGO-centred capacity enhancement in terms of innovation • highlights specific limits and advantages in implementing GIS for community-based empowerment actions	• considers the impact on NGO and GIS-centred PME as strategies for positioning the NGO within a broader game
3	Empirical; Theoretical (reframing of main concept)	• clarifies contextual uses of PME in Cape Town • discusses "datafication" as a form of PME strategy in Cape Town	• reframes empowerment through PME as "topological resonances" • discusses "translation" and "connectedness" as dimensions of topological resonances	• offers an impact assessment based on the new framework • discusses collective / individual / organisational dimensions

FIGURE 56 Synthesis of papers' contribution to each research sub-question

6.2.2 SQ1: How are PME strategies for informal settlements housing claims mobilised in Cape Town?

This research has shown that in Cape Town PME strategies are mobilised by NGOs and community-based organisations for filling the governmental gap regarding urban development claims and improvements for informal settlements. The "S section" settlement case study in Khayelitsha has shown that PME is also mobilised for: (1) "activating" the waiting phase for housing delivery and settlements improvements by enabling empowerment; (2) positioning the NGO implementing PME in a broader context of competing community-oriented organisations.

PME is mobilised for urban development purposes such as producing data and actionable information on a neighbourhood "off the official map" that needs urgent public service intervention – or whose information is not easily available to NGOs and to citizens. When it comes to informal settlements' policies, the City of Cape Town (CoCT) has a wide GIS and data-driven strategy oriented towards risk assessment, disaster management and monitoring informal settlement's growth from a desktop. The CoCT focuses on emergency response and on overseeing informal settlements' evolution, rather than on orienting its strategy towards informing and fulfilling the mandate in terms of welfare improvement, housing development and livelihood improvements for informal dwellers. First, this leaves a big gap in terms of actionable data on informal dwellers eligible for governmental support, which hinders the citizens' own self-determination and capacity to claim for their rights. Second, this gap reveals how the government's under-prioritisation of services and housing delivery reinforces the ongoing post-apartheid socio-spatial injustice by hampering the creation of sustainable human settlements.

In Cape Town, NGOs have bridged this gap by extensively using PME to produce actionable data, enable specific types of community empowerment, as well as for providing spaces of encounters and contestations between rationalities, levels of government and communities. Through PME-based actions, NGOs are increasingly filling the role of the State where government service is limited and neglected. On the one hand, as shown through the *S section case study,* NGOs define and update governmental information – such as community registers, the nation-wide Community Survey – with regard to who lives where and is eligible for what kind of housing and social grant; and they act as urban planners by elaborating "re-blocking" plans or on-site integrated upgrading of the settlements based on the information collected. On the other hand, PME becomes a strategy for "activating" the waiting phase for housing and settlement's improvements. This "activation" enables communities to gain knowledge about housing rights, strategies for claiming and to become active and informed citizens while waiting for a proper change to happen – such as discussed in the

3rd paper and in the following research sub-questions. In this sense, PME is mobilised for political purposes enhancing community claims and interstitial empowerment.[21]

Moreover, this research shows that NGOs too benefit from the implementation of PME methods. The thesis discusses how PME are strategically used to position the community-oriented organisation in a broader game of competing NGOs and organisations acting towards common goals and using similar tools. This finding brings evidence to the peculiar and programmatic use of these strategies in the Capetonian context, in which NGOs are competing for resources, agency and power. Through the 2nd publication in particular, the thesis shed light on the way the PME is mobilised in a multifaceted way by the facilitators (the NGO) for their internal innovation, rather than as a solely community-development-oriented tool. For NGOs, the innovation potential lied in the intent to test the use of GIS within PME as a way to streamline the PME process and to optimize the allocation of their limited resources. This finding, thoroughly discussed in the 2nd publication, contributes to critically discuss the geopolitics of these mainstream data gathering practices.

This thesis has focussed on a single PME case study led by a specific NGO (DAG) in collaboration with an informal settlement community (S section, in Khayelitsha). The findings suggest that there is no unified practice of PME amongst the Cape Town-based NGOs. On the one hand, the case study shows that PME methods are tailored to the circumstances of the context and of the project's purpose. For advocacy NGOs such as DAG – which are people-centred – it is essential to follow communities' momentum in order to keep communities on board of their projects and to guarantee long-lasting engagement that prevents other agendas from hijacking community voices. On the other hand, it raises questions of transferability and of the "scaling-up" of PME-based development projects. In fact, the absence of harmonisation potentially leads to a lack of development coordination, sustainability of the projects, difficulties in transferring capacities, and weak representation of informal dwellers' knowledge.

[21] These findings are related to impact and uses of PME and are tackled in the 2nd and 3rd sub-questions.

6.2.3 SQ2: What kind of empowerment is enabled through these practices?

This research has shown that through PME: (1) actionable data is collected and sustains communities' claims – therefore enabling empowerment as "distributive change"; (2) the "collateral learning" of citizens participating in these practices is enhanced beyond the PME's main scope. In the S section case study, the PME process enabled an interstitial and unexpected kind of empowerment defined as "the enabling of topological resonances" which operated through the dynamics of "translation" and "connectedness" – and at individual, collective and organisational levels.

FIGURE 57 Synthesis of empowerment framework elaborated throughout the thesis (cf paper #1 empowerment according to the literature and paper #3 empowerment as topological resonances)

The results of this research tackle two levels of the sub-question. First, they address the way we look at empowerment within the PME and PPGIS literature. Second, they document and assess the type of empowerment enabled in the specific case of the S section and DAG PME project.

Complementing studies by Elwood (2002), Ghose (2011), Mukherjee (2015), the findings prove the importance of considering empowerment as part of both the PME main outcome and the PME process itself. In light of the S section experience, this approach to PME becomes crucial for analysing projects which do not end as expected or end up in temporary impasses, and for understanding their often invisible effects.
Through the 1st publication, the thesis argues that the mainstream approaches to PME – and to development projects in general – tend to assess empowerment goals through neoliberal lenses by focussing on the project outcome solely. However, even when the end goal is not achieved, PME still holds an empowering potential during its implementation that it is necessary to investigate. This potential lies in the "leverages of change" that these methods offer – at an individual, collective and organisational levels – by providing spaces of encounter and learning through its activities and materials. In that respect, the research illustrates some of these leverages, that I called "topological resonances", observed during the action-research with DAG and S section. The 3rd publication demonstrates that empowerment as "topological resonance" through the PME process is enabled by two modalities: identified as "translation" and "connectedness". Translation and connectedness correspond to mechanisms of gathering up existing resources and make them actionable through and beyond the enactment of PME process. It shows that different forms of empowerment are triggered by putting people, materials and resources into a different contact with each other.[22] (cf. Figure 58)

[22] As conceptualized in the 3rd publication, topological resonance is the event/capacity to put different places, materials, services, discourses and institutions in different contact to each other. A resonance represents a modality of people "feeling each other out",

A first kind of empowerment observed through PME is "distributive change" (Elwood, 2002; Barella, 2020a), and it created the link between the lived and the executive city through data. Findings show that the data gathering process allowed to update the land management register of S section informal settlement, by collecting information about the residents and their demographic status. This info was necessary to speak to the welfare state and to support the claims and direct access to the social security system. This is a system of targeted social grants and the eligibility to the public aid is evaluated through specific information about the beneficiary such as income, marital status, and other characteristics of the household which need to be evidenced. Following the same type of empowerment, in a second project led by DAG in collaboration with Architects Sans Frontières (not directly analysed in this thesis), the mapping and data stemming from the PME process allowed to open up a discussion with CoCT in terms of housing claims and housing development in situ (cf. 1st publication). Regardless of the outcome of said encounter with the authorities, being heard by the government is a form of empowerment as "distributive change", since it granted greater access to services and goods as well as a direct participation into a political process of development.

A second set of types of empowerment observed through PME are seized through the empowerment framework tailored to the S section case study and presented in the 3rd publication of this thesis. The finding details the unexpected ways in which people reinforce their safety net and/or uncover new opportunities for changing their life quality and public visibility. As stated in the 3rd publication, these strategies can be game changers for some of the residents. They represent sustainable improvements in terms of holding authorities accountable, understand policies, understand the organisation of collective action, and building citizens as agents of change – without disenfranchising the state from its development duty. The figure below provides a synthesis of the empowerment framework, as well as a synthesis of the findings, elaborated through the thesis in order to answer this sub question.

attending each other: "It is the affective process of people and things associating with each other, (…) of acting as components in the enactment of operations larger than themselves and their own particular functions and histories" (Simone and Pieterse, 2017: 16). Whereas, topological, characterises the relative positioning of elements resonating, as well as it highlights the absence of hierarchy between those elements once they are in touch with each other. This theoretical framework allows to think empowerment as a process and not as a finality, by revealing two complementary modalities for putting places, people, institutions, materials, in different contact with each other: Translation and Connectedness. Translation refers to the capacity to make knowledge (data or information) actionable within a specific context, through a specific channel or towards specific actors. Translation is the process through which a contextually-bound expression is made intelligible into another context. Connectedness refers to the state of being in connection. Connections represent concrete opportunities: a space, a time, a setting that allow to expand spaces of political, economic and cultural operation that becomes available to residents of limited means.

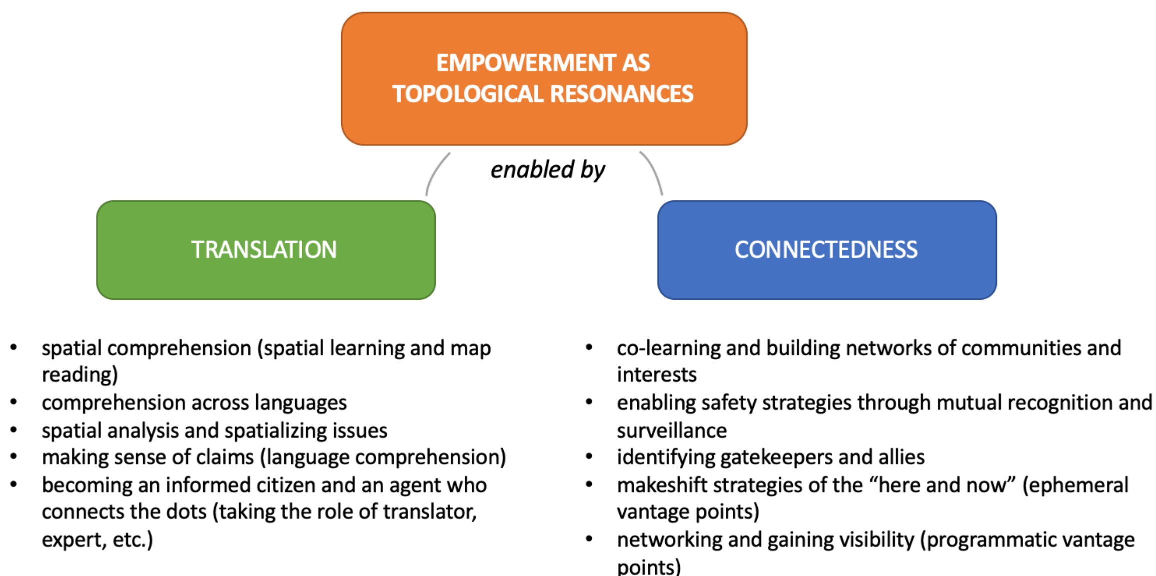


FIGURE 58 Main types of "translation" and "connectedness" observed thorugh the S section case study in the 3rd publication (Barella, forthcoming)

The findings are far from suggesting that PME is the ultimate answer for enhancing community empowerment. In the case of S section PME project, disempowerment or elements undermining the PME scope were identified mainly in technology-related limitations or in the inherent difficulties in defining a mid-long term cohesive consensus for collective action.

As for technology-related issues, the research highlighted difficulties in guaranteeing transferability of GIS-skills and post-treatment of data which slowed down the action for the NGO and for the delivery of results towards S section community. Moreover, some data produced was not fully harnessed and eventually it is still sitting on some NGO local computer. In the S section case study, as explored in the 2nd and 3rd publications, this seemed to occur for two main reasons. First, because of a lack of relevant use of the data itself, supposedly due to an inadequate initial design of the data collection, or to the incessant adaptation of the process. Second, as a result of a lack of internal capacity to manipulate a set of GIS-structured data especially during the post-treatment, which was intensified by the internal staff renewal and departure of the main implementers of the PME process.[23]

As for organisational limitations, the inability to find an internal community consensus and to stick to it remains central for determining the effectiveness and relevance of PME practices. On the one hand, these limitations were related to S section community's internal quarrels. Not everybody has the same interests or vision of development and housing improvements. Collective consensus is temporary and it does not represent a harmonised voice. On the other hand, limitations are linked to the risk of hijacking by other

[23] These methodology-related limits are also addressed in the section "Limits of the thesis", since the participatory methodology adopted in this research implies that the researcher is an inherent part of the successes and pitfalls of said PME project. In this sense, my role ad interim as international volunteer has to figure amongst the elements undermining the full empowerment potential of the project.

actors trying to seize the participatory spaces provided by PME for their own political benefits. This risk was highlighted, for instance, through the analog/digital map example presented in the 1st publication of this thesis.

Finally, no empowerment as "procedural change" (Elwood, 2002; Barella 2020a) was observed either, since the overall PME experience did not operate any substantial shift in the way the contributions of S section community or their knowledge was incorporated into the decision making process. This may be linked to the findings discussed in the answer to the 3rd sub-question: the fact that PME operates within the status quo of a data-driven urban policymaking.

6.2.4 SQ3: What is the impact of these practices and of their output on urban policies and claims?

This research suggests that PME practices tend to maintain a status quo in how social and urban local development policies are elaborated and conducted. PME is mainly facilitated by NGOs who use these methods to position themselves in relation to the government and to secure their role in between government and communities. In the S section case study, PME-based practice enabled social and housing improvements claims for the community, however it did not substantially change the way policies are elaborated or implemented. The same goes for dynamics of claiming, where findings show that in order to achieve public visibility, data production is at the core of advocacy. Yet, when considering PME as an empowering process (2nd sub-question), the thesis shows that through these methods the "modalities of claiming" available to citizens are multiplied and go beyond the PME main scope.

At first view, these practices and their output have limited or no impact on how urban policies are conducted in response to the informal settlements crisis and lack of adequate housing conditions in the metropolitan area of Cape Town. Such as observed in this thesis, PME act as a strategic multipurpose tool for NGOs rather than as a *proper game changer* in terms of policies and modalities for claiming. As suggested by the literature, the advantage of these practices is to create information that speaks the language of the government and that can be channelled towards opportunities to rapidly gain visibility within a competitive landscape of NGOs and communities in need for urgent welfare action. In the case of S section community, the data collected through the PME project eventually allowed to open up a discussion with the City of Cape Town – which ultimately ended in an impasse. In terms of the PME output – data production and a cartographic artefact – these practices maintained the status quo, since they aligned with the government workings, rather than substantially challenging it. For instance, this research shows that the mapping and data gathering were structured in such a way to abide by social policies' criteria of eligibility. Social housing policies define the information required for claiming and therefore the data that is collected through the PME household survey and mapping is formatted accordingly. In this sense, the NGO deployed PME in adaptation

with the data-driven policy promoted by the municipality, somehow contributing to reinforce this mainstream practice across the city.

The main influence of these practices, as shown in the 1st sub-question, is their availability for NGO as a tool for articulating their work and explore new possibilities for action within, in parallel to, or against these policies. PME act as programmatic methods enabling the positioning of such organisations within a landscape of competing development actors interfacing communities and local government. This finding is developed in the 2nd publication of this thesis. I notably show that, the S section experience contributed to enhance the organisation's capacity and resulted in the NGO taking a prominent role in a provincial development project in collaboration with other grassroots organisations.[24] This consolidated the organisation's position amongst leading NGOs within the Capetonian and provincial context. Ultimately, these mapping and surveying techniques appear to be used as a statement of power through which NGO cas assert their authority on some aspects of the urban development realm. In this sense, NGO-facilitated PME practices maintain a satus quo since they contribute to a further bureaucratisation of urban development (previously mainly State-led, see Edney, 2018).

When considering PME as a process, the findings suggest a more nuanced picture. No substantial challenge to urban policies was observed within the timeframe of the research fieldwork. However, building on the findings discussed in the 2nd sub-question and in the 3rd publication, a micropolitics of claiming can be observed. The case study shows how, through the PME process, some participants were able to gain and arrange vantage points, get access to opportunities beyond the PME scope and enlarge their network. These transformations do not guarantee a structural change in welfare and housing policies' implementation, but can represent a significant improvement for daily livelihoods. They highlight the existence of an informal, and therefore less procedural, politics of claiming at an individual and collective level that is enabled during the PME process. In order to access welfare improvements, strengthen their visibility and influence policies, citizens needed to master (or at least to know) a combination of mechanisms of collective action, such as: identifying which resource may be relevant for which type of claim, knowing the types of informal settlements programmes, knowing who is accountable for what, who to turn to for specific needs and claims, and how to speak to those gatekeepers. Via tools such as PME, people may seize windows of opportunities for action, therefore reframing and gaining access to spaces of policy deliberation. As shown in the 3rd paper, in informal settlements this micropolitics is particularly important, since people take on different roles at different times and they participate to various collective operations simultaneously – for instance a community leader can also be an entrepreneur running a local car washing activity and owner of a shebeen; a tailor can also be a pastor and a landlord of a shack on the informal housing rental market, and so on. As a makeshift strategy, many informal dwellers need to wear different hats and represent contingent interests at the same time in

[24] I refere here to an Informal Settlement Support Program project mandated by the Western Cape province. The project started towards the end of this research fieldwork and it is not presented in this thesis.

order to make a living. In some instances, these citizens will be more likely to tailor the claiming tactic to their advantage – "right here and right now" – rather than to wait and rely on the PME output or on a collective organised action solely. For instance, a landlord of a shack may position himself against an *in situ* housing development and in favour of a settlement's reblocking, since its source of income comes precisely from the consistency of the informal housing market. This micropolitics of claiming is key in context of urgency and it may clash with the rather procedural, slow and deceitful response of the local welfare. These tactics are difficult to apprehend, yet they influence the socio-spatial dynamic of the city.

The answer to this sub-question may feel partial. An in-depth analysis of PME impacts on policies should be provided through findings gathered on a longer period of time than I was able to observe during this PhD's timeframe. The *Further Research* section of this chapter will shed light on elements worth considering when addressing the impacts of these practices on policies. Also, it may be worth expanding the analysis by explicitly including the different scales of government intervening in defining and implementing urban development and housing policies. Nevertheless, the answer to this 3rd sub-question affirms the existence of a political analysis that tackles the micropolitics of the everyday life of informal dwellers and the realm of policies and official governance simultaneously. This level of analysis stems from the tension between considering the impacts of PME practices from the perspective of the final output or from the perspective of the overall process.

6.3 Beyond Empowerment and Directions For Future Publications

This thesis started from the realisation that PME practices have a high failure rate and that this impacts informal dwellers and actors committing to these methods for livelihoods improvements. Amongst causes of such failure, the research identifies the de-politicization of PME practices and theories associated to it.
This research has chosen to focus on the "what else" is left when a PME development project fails, and it tackles the question through the lenses of an empowerment assessment as a modality of "activation" of the waiting phase for livelihoods improvements. This framing touches dynamics happening at an almost micro-level, and speaks about tactics that residents of S section used to turn the PME project to their advantage – despite the overall failure of housing development provision. The "what else happens" is worth investigating because it helps with understanding power dynamics and resources reallocation at a micro-level, how people mobilise (or not) for change on an individual level, when, with whom. In a context of scarcity of employment and livelihood instability, these elements and little "hackings" of the main project's goal are a central part of livelihood's tactics (Simone, 2009). However, the view on the "activating" of the waiting phase is also biased. When living in conditions of vulnerability and mistrusts towards development actors, such as it is the case for many informal dwellers in Cape Town, the dangers of "activation" without proper change due to PME failures are even weightier. Failure might thwart the collective action as a response to not seeing the change they mobilised for and consequently resulting in frustrations and political (de)legitimation. In the South African

context, but not solely, this often ends up fuelling violence as an alternative means for claims (Bénit-Gbaffou et Katsaure, 2014). The stakes are therefore very high, not only in terms of housing quality *per se* but as well as in terms of the residents' safety, their sense of belonging and the capacity of young generations of citizens to believe in and build a better future less defined by the next-door violence outburst. In order not to silence these elements, a more radical way of addressing the de- and re-politicization of PME practices would consist in exploring the reasons of such common failures with PME implementation straightforwardly.

PME emerge as highly bureaucratic practices that seem to eventually perpetuate the same inequalities they supposedly try to counteract. By analogy with the Capetonian example of community-based waste collection strategies (see Miraftab 2004), PME practices are part of the development anti-politics machine (Ferguson 1994) by contributing to a bureaucratisation of urban development and NGO/CSO actions. These mapping and surveying techniques enable empowerment just as the "empowerment fantasy" that sustains the local self-perpetrating development discourse. As conceived by Ferguson (1994), the development discourse is a tool for co-opting actors in a common apparatus, which justifies its perpetration through its inadequacy and continuing failure (too). This development and empowerment imperative of PME "*Map Again. Fail Again. Map and fail Better*"[25], therefore fosters the overlapping of existing and brand new socio-spatial injustices.
Residents of more affluent neighbourhoods can dispose about most of the data and maps, and of the public management that comes with knowing the city cartographically, about the place they live in as part of their citizen's entitlement. Whereas many informal settlements' residents have to invest their own resources (time, energy, trust, shoes, etc.) in "community-schemed" PME projects for mapping out their own neighbourhood according to governmental standards. Their neighbourhood is that same neighbourhood in which they barely receive the minimum they are entitled to as citizens, from that same mistrusted government that PME tends to align them with. In such a setting, empowerment stems as a 'fantasy' that contributes to the reiteration of socio-spatial injustices experienced by informal dwellers.
Likewise, when looking at the way social cohesion is constituted, for (supposedly) maximising the impacts of residents' claims, residents are urged on to organize themselves collectively. They try to find a temporary consensus in order to constitute a united front, for instance when they approach NGOs seeking support for their claims. However, under a harmonious term such as "community" a strong heterogeneity of agency, needs, aspirations and programmes collide and/or are kept silenced for the sake of collective action (Kepe, 1999). For instance, like for any other form of collective organisation, the internal differences may lead to weaker groups being stepped on by more powerful groups with stronger political capital (Bénit-Gbaffou et Katsaure, 2014). The power games within said "community" are just as important as the broader analysis of PME practices and urban development policy, since the inherent challenges of building a collective action on the ground should also inform PME methods and urban policies in return.

[25] adapted from the overused quotation « Try again. Fail again. Fail better » by the Irish novelist Samuel Beckett in his prose Worstward Ho!, (1983).

In sum, not only citizens living in informal settlements are already deprived of basic adequate livelihoods conditions, but many of them are also investing their unpaid (or largely underpaid) labour in projects aiming to fulfil another one of those basic governmental mandates they should benefit from (and not volunteering for): the production of official actionable information about their own neighbourhood and their city. On top of that, amongst the main reasons for a project failure, such as in the case of S section and the NGO withdrawal from the project, the community incapacity to find an internal consensus and stick to it is eventually called out against them, putting the blame on those in need alone for the overall development impasse. PME practices seem to emphasize their technical component rather than the creation of cohesion around shared objectives. More critically, PME might stem as an exercise implemented by NGO without thoroughly questioning its own potentially disruptive impact on social cohesion and collective organisation dynamics.

When observing these ambiguities, one is left wondering whether, in such a context, claiming through PME practices actually serves the governed – by obtaining what they need and are entitled to – or the governing – by keeping the governed busy in a perpetual state of (re)organisation and mobilisation, which is in fact an impasse?

This research shows that some informal dwellers take advantage from resources and settings created by/during PME practices, by benefitting from specific resources, by trying to ascend local hierarchies, etc. Undoubtedly, those "side effects" have an impact, and some positive ones, despite an overall PME failure. And it is towards these positive impacts that NGOs work towards. Nevertheless, some small micro-level changes remain too often individual and ephemeral for actually transforming the collective and structural basis of inequalities and disadvantage. Eventually, the poor map the poor, and for free, and within PME practices too often inadvertently directed towards failure or framed by NGOs' programmatic outcomes.

What actually causes these projects to fail? And who actually benefit from the informal settlements' status quo? These are the main questions that this research could take further building on existing research material. The following reflections give directions for complementary paths pointing at the (re)politicisation of PME and at a more critical and situational understanding of types and dynamics of (dis)empowerment.

The first possible publication would aim to chirurgically dissect the details of S section PME project and the political-organisational reasons leading to the impasse. The second publication would focus less on the residents and more on the actor that I followed closely, the NGO. This in order to clarify what the research, such as it was conducted, reveals about the NGO practices, about their methodological and political self-reflexivity, and the researcher's entanglement in these reflections. The third complementary publication could build on considerations from Blake (forthcoming) on CSO/NGOs data politics in South Africa, and thoroughly tackle at the Capetonian scale, the modalities or rhetoric through which the landscape of competing Capetonian NGO is maintained. This by discussing how NGO create their own 'niche' for action by differentiating methods and positioning between each other, informal dwellers, donors and the State.

6.3.1 Dissecting S section project and "stand with the failure"

The first publication should embrace the PME failure and dissect some untreated elements of the S section mapping and surveying project. In particular, the paper should reconstruct the modalities of the failure that emerged in an advanced stage of the process. Although some elements of the PME were empowering and mobilising, some others contributed to foster division. For S section case study, this would imply to thoroughly discuss the housing provision layout elaborated by DAG and *Architectes Sans Frontières*. This development plan was based on the translation of data gathered by S section residents during the data-collection studied in this thesis into a layout. During the last phases of the project, the inclusive housing development plan was then used to engage a conversation with the City of Cape Town. The unexpected counterproposal of the municipality, consisting in a map with empty land plots associated to title deeds, clearly introduced an element of discordance amongst actors. In particular, within S section residents that eventually re-calculated the nature of their collective consensus and found themselves disaggregating the sense of "collective action" and belonging that was set as a base for embarking the PME project with DAG in the first place. This was likely to be linked to people's discordances relating the type of development for their household and the area (i.e. is a land plot better than a formal housing solution?). This internal quarrel led DAG to pause the whole development project. DAG's choice to step away as an internal political quarrel emerged, just as the NGO's need to have "everyone on board", are elements that should be discussed with regard to the PME failure and NGO positioning towards local political actors. Perhaps, by dissecting the emergence of this quarrel, the local government and maybe the NGO may emerge as the main actors responsible of the project's impasse, but more importantly as the ones responsible of the fuelling of internal "community's" disagreements.

6.3.2 Looking at the NGO as a research object per se

Another complementary publication could build on critical approaches to NGO (such as Mosse, 2020; Murray Li, 2007; Ferguson, 1994) as well as integrating specific PPGIS insights from work done on NGO/CSO GIS implementation by Sieber (2000, 2006), Ghose (2001, 2018) and Elwood (2006, 2018). This publication could focus on the NGO as a research object *per se*.

In fact, due to the fieldwork (re)organisation and my close involvement with the NGO, much more could be investigated in terms of the NGO practice "from within". In particular, the organisation could be analysed with regard to its own internal questioning of their PME workings and impacts. The urgency here is to question how the NGO contributes (perhaps involuntarily) to the developmental mantra of tackling only contained and solvable problems that can be rendered technical (i.e. solvable through PME practices) (Murray Li 2007). Parallel to this, and with specific focus on PME practices, the publication could then open up a discussion on "if" and "how" such kind of organisation could implement PME practices as means of social cohesion consolidation, rather than focussing solely on the technical aspects – which are necessary yet also partly misleading.

This query would imply to thoroughly discuss organisational elements such as how the NGO is organised internally, who were the main people carrying out the project, how they interfaced with S section leaders, S section “mappers”, as well as with other actors possibly having a presence in the area in the first place. Some (partial) data produced during the PME in S section, such as data on local actors intervening in the area and of households’ civic behaviour, could then be integrated to this analysis (after verification and discussion with the NGO).

6.3.3 Another piece on the self-reproduction of NGO landscape dynamics

Building on existing work on data politics and analysis of NGO/CSO working in informal settlements (Cinnamon 2020) the third publication could contribute to debates on the peculiar and hermetic landscape of NGO/CSO in Cape Town. This complementary paper could build on the insights developed in the methodological section (cf. 2.6 Data sources about informal settlements in Cape Town, sub-section “NGOs”) as well as on insights from NGO comparison at the South African national scale (Blake, forthcoming).

The paper could tackle both technical and organisational aspects with regard to Capetonian NGO implementing PME.

As a first statement, the paper could show how PME methods across NGO self-replicate. Firstly, the paper could compare the heterogeneous terminology employed by NGO in their methodologies and PME practices, as well as the unreliable spatial extent of datasets and projects across City, Province and NGOs. The first point refers to the existence of a variety of terms used to identify similar processes of data collection such as: enumeration / household survey / profiling, or to specific terms coined by one or the other organisation (cf. “baseline”, VPUU’s enumeration based on sampling). The second point highlights the deployment of PME projects on a variety of geographical scales: informal settlement / neighbourhood / precinct / household. Once again, this variety resonates with the difficulty encountered with delimitating these urban settlements. These terminological and geographical inconsistencies are then reflected in the production of fragmented sets of data across NGOs and communities – which cannot, or are difficult to, be consolidated. In addition to these two points, the NGOs’ competing interests preclude a full transparency with one another – which in return reinforces the self-reproduction of methods.

Then, the debate could be opened up to the how in Cape Town this self-reproduction exists, for instance, compared to the Gauteng City-Region. An institutional question that could be explored in order to explain Capetonians peculiarities is the absence/presence of a partnership-based actor centralising data collection and analysis at a provincial and urban scale (i.e. such as the GCRO in Johannesburg).

6.4 Other Contributions to Literature and Debates

Theoretically, through the South African case, the thesis links the two main realms of application of PME: urban planning and development studies. Building on postcolonial urban studies, in the first and second publication I argue that these disciplines are often treated as distinct literatures stemming from the global North, for the former, and from the global South, for the latter. Through its theoretical positioning, this thesis tries to build a bridge between the two by considering PME as part of a broader picture of urban development and housing rights claiming. For instance, the second publication engages with PPGIS sub-literature tackling models of GIS implementation within community-based organisations, and shows that without a cross-context comparison the heuristic potential of said models is limited (cf. Barella 2020b, page 267-271). In the paper, the literature review shows that the multidimensional models' framework stems from North American case studies exclusively, implementing GIS for neighbourhood planning purposes solely. The paper proceeds by testing these models against the South African case study and eventually enriches them through a thorough analysis of the organisational context and inter-/intra-actors' relationships. Through this Global North/South transposition of GIS implementation models, the analysis nuances the very role of GIS implementation models –which in the Global North literature are based on routinization of GIS – by adding the "strategic and/or acupunctural GIS implementation" observed through the Capetonian experience.

This research mobilises a variety of literatures that benefit from interfacing each other in this original way. The innovative "mashup" occurs at the scale of individual publications as well as within the overall thesis manuscript. The first publication draws from postcolonial urban studies, development studies and science and technology studies (STS). The second publication brings together postcolonial urban studies and public participatory GIS (PPGIS). Whereas, the third publication builds on postcolonial urban studies, data politics and PPGIS.

Drawing on these theoretical resources, this research contributes to debate around PME as an empowerment tool. In particular, it tailors the concept of "empowerment" through the lenses of the South African case study. The definition and discussion of "empowerment" is treated in the different papers. The first paper tackles the story of the concept empowerment as a buzzword of development in its neoliberal fashion, and introduces Elwood's PPGIS empowerment framework (2002). The second publication discusses the role of PME facilitators and the way technology adoption within community-centred organisations can shape the PME process and its empowerment goals. Whereas, the third publication suggests a fine-tuning of the concept by focussing on the process of PME as a space providing opportunities for empowerment and highlighting the relational aspects. This new conceptualisation is then tested against DAG and S section case study. The reframing of empowerment as "topological resonance", observed through the modalities of "translation" and "connectedness" (cf. third paper), empirically shows how connections and programmatic vantage points happen in the making. As opposed to the often theoretical wishful thinking of PME and (P)PGIS as a self-evident empowering practices.

Although, a suggestion for a conceptual refinement was not envisioned at the beginning of the thesis project, the research process led to customise the lenses through which "empowerment" was apprehended in the S section case study. This contribution does not go without some flaws, and some of its limits are discussed in the following sub-chapter.
As for the three publications, each piece of writing contributes in its own fashion to the literature and debates. The first paper contributes to debates of PME and (P)PGIS by positioning these methods within the postcolonial approach. The paper argues that academic PME and (P)PGIS literature is ill-equipped to truly examine the potential of the methods for enabling social justice. Firstly, this is due to the PME empowerment framework having shifted from an emancipatory aim to a neoliberal governing tool. Secondly, this shift does not allow for the consideration of the power relations inherent to PME to be engaged with. This paper responds to the lack of postcolonial approaches within the field highlighted by other authors such as Irène Hirt (2008). Also, following Hirt (2008), it engages with and contributes to the French-speaking body literature on the subject – which is less developed compared to its English-speaking counterpart due to the global gap in science. Except for the first publication, this thesis manuscript is written in English since the research case study takes place in a mainly English-speaking country, this for ensuring the reporting back of the empirical results. Still, the main theoretical discussion and position paper is presented in French, because I believe that to generate multilinguistic alternatives may promote diversity across a thematic field of study while conserving a communication channel.

The second paper contributes to (P)PGIS literature by showing the local contextual organisation of actors and their own uses of PME methods in their mutual power relations. It exposes and in-depth analysis of PME methods as strategies for forwarding NGOs visibility, sustainability and relevance within a broader context of specific actors competing with each other. In the South African case, the pilot GIS implementation emerged as a way for the NGO to understand what kind of role it could play in the post-apartheid urban planning agenda for marginalized groups, among tech-driven NGO and navigating a political space in between levels of government (tech-savvy) and marginalized groups (less tech-oriented). This because negotiation and adaptability skills appeared to be the most important for resource-poor community-oriented organizations. All things considered, this analysis sets the ground for other studies on (P)PGIS and GIS implementation within NGOs. Further research could stem on GIS uses within NGOs, community-based organizations, and grassroots, since these actors (1) constitute a diversified body of agents and their workings are highly contextual and (2) are increasingly called to take the lead as intermediaries in more and more tech-led urbanism. This diversity needs to be documented so that other organizations considering GIS as an innovative tool for supporting their actions can refer to evidence-based studies to guide and ponder their decisions and strategies. From the PPGIS point of view, this would make it possible to theorize across contexts more than is done today – perhaps by introducing comparative approaches such as theorizing within postcolonial urban studies (see Oldfield 2015; Robinson 2016; Simone and Pieterse 2017) into the PPGIS literature (cf. Further Research chapter below). Challenges stemming from the second publication and the acupunctural and

strategic GIS implementations can be apprehended as an opportunity to explicit contextual power relations rather than technical or organizational issues solely.
Alongside the conceptual contributions discussed above, the third paper empirically highlights the strategies and connections "in the making" that actors create and seize programmatically during the PME process. This gives empirical substance to broader debates within developmental studies around the creation of alliances and of a sense of consensus between actors (Gilmore, 2008). As stated in the results, not everybody has the same interests or vision of development and housing improvements. What may seem to be an expected development – for instance, to help dwellers become homeowner – may not always correspond to the lived experience of the residents. The third publication contributes to discuss the inherent temporary and circumstantial nature of collective consensus and that it is far from representing a harmonised voice. Anywhere where these participatory techniques are implemented to answer to a situation of urgency, there will be a need for investigating the unappreciated leverages for change – the 'topological resonances' – that contribute in defining the modalities of the collective consensus.

As for the fieldwork, the S section case study and the collaboration with Development Action Group, are unique to this research. This in-depth ethnographic focus, developed over the PhD years and over several months *in situ*, represents a unique documentation of a single PME project, as well as an original contribution to the literature on PME and PPGIS uses within grassroots and NGOs. Although contextually bound, the case study sheds light on dynamics observable in other informal settlements in Cape Town and in other advocacy organisations. Notably, this thesis highlights the power games at play between some local actors of development. Other than the case study itself, my stay in South Africa included personal experiences of the townships and informal settlements when visiting places or for leisure activities with colleagues and friends. Such engagement with the context beyond the places and moments of the case study itself have enabled to delve into the complexities of the livelihoods and have inspired a rather embodied experience. This is not a fully ethnographic piece of research, yet it was fully lived as such – as the self-reflective methodological chapter of this thesis foregrounds.

Another contribution regards the nature of knowledge that is channelled and produced through PME and GIS adoption. As stated in the publications, PME as it was mobilised in the case study focusses on rapidly actionable information. PME allows room for community knowledge to emerge as in, for instance, to shed light on the settlement's history and to allow personal narratives to gain visibility through the data collection. Nevertheless, the main NGOs focus prioritized the use of information that rapidly enables a set of tangible livelihood changes – or, more broadly speaking, of development actions such as a development layout proposition. This implies that the "actionable information" stems from a strategic selection of information and narratives, rather than on putting the whole package of "raw dwellers' knowledge" upfront. This selection does not make PME or the claiming less community-centred or less political. On the one hand, as it is shown by the controversy of water taps mapping (1st paper), the pitfalls of cartographic visibility are real and NGOs

can at times authoritatively decide to omit information out of caution for protecting communities' makeshift strategies. On the other hand, the thesis shows that these practices are entangled in a geometry of actors' agendas that need to be cautiously exposed in order to understand the form and the impacts of these practices and of the knowledge produced. "Community knowledge" in some kind of "pure, fully bottom-up form" does not exist, since it is inherently part of a broader power agenda and it is formatted by the actors and the channels through which it emerges.

6.5 Limits of The Thesis

6.5.1 Incomplete fieldwork

Back in 2016, the thesis project started with a focus on informal settlement communities as main actor. Throughout the PhD journey, the main focus shifted in relation to the material collected and to the way the participatory fieldwork was shaped. The thesis produced a work more oriented towards NGO strategies since, due to fieldwork circumstances, I was closely involved into NGO processes and workings. Due to my proximity with this actor, I felt more entitled to report about narratives and tactics that I experienced (and contributed to) first-hand and at more length. The time spent with S section community was mainly related to the implementation of PME activities and workshops. Whereas, on a daily basis, I was based at the NGO headquarter – in the Observatory neighbourhood – and in charge of more GIS-related and desktop technical work for the setting up of the mapping process and materials for the enumeration.
Moreover, as mentioned in the sub-chapter *Fieldwork organisation* in the Methodology chapter, my last fieldwork lacked (1) an important community-centred verification step and (2) a collective workshop gathering a variety of actors for which I obtained funding from the University of Neuchâtel.
As stated in the Methodology chapter:

> *I was unable to organise a one-day activity on participatory mapping and enumeration for informal settlements in the Cape Town metropolitan area. The aim of this workshop was to bring together scholars, people working for Western Cape province based NGOs, and community members working with participatory mapping and enumeration. The interest for such a space of sharing clearly emerged during my 2nd and 3rd phases of fieldwork through observations such as a lack of collective discussion and coordination on a broader city/regional scale between main actors of participatory mapping and enumeration. The intention was to raise the discussion around issues of data sharing, spatial knowledge fragmentation, consequences of "pop-up" implementations of participatory mapping etc. […] Additionally, in terms of my research, the event was supposed to be an interface for reporting back and making (collective) sense of part the material collected*

throughout my work. In order to organise the workshop, a funding was allocated by my host institution. However, the event did not occur.

These observations fuel the reflections presented in the *Further Research* sub-chapter hereafter.

Other methodological limits are identified in the answer to the 2nd sub question when addressing the disempowering side of PME practices. These limits were related to: (i) circumstances and design of the PME, (ii) NGO internal turnover and how responsibilities were dispatched. The PME process was people-led and technology adjustments had to follow that pace. Therefore, from a technical point of view the process was a bit rushed at times – which then demanded a thorough verification of some data. Also, the previous sections have identified transferability issues within the NGO undermining the sustainability of the project.

6.5.2 Limits of the publications and thesis structure

Amongst limits of the writing process and report back of results, I can cite specific aspects of papers if taken individually. The second paper is more tech-centred and might seem more descriptive, compared to the other papers of the thesis. Due to the literature it mobilises and its technical breakdown of the PME process and GIS implementation during the fieldwork, the paper might resonate with a more GIS-focussed audience – compared to the first and third publications. This is not a sign of disjointedness of the thesis, but rather the result of the integration of more tech-focussed literatures – such as PPGIS – with more epistemology- and conceptual-centred works – such as postcolonial urban studies. The third paper is the more "applied" one which, nevertheless, provides a renewal of the empowerment framework used for assessing PME impacts. This paper is currently under review.

In conclusion, the overall thesis structure and the paper structure as well sound slightly messier than envisioned. Perhaps, this messiness reflects the inherent fluidity of the PME such as it was implemented in the development project I followed and contributed to. Perhaps, this "patchwork feeling" is inherent to the thesis-by-article, since publications are written at different stages of the research process and tackles different parts of the work. Also, every research conducted on such a mid-long-term requires ongoing adjustments and rectifications. However, I kept a theoretical and conceptual coherence throughout the publications and chapters composing the thesis.

6.5.3 Broader limits of the academic delivery of a PAR-inspired research

The academic writing process was mainly a solitary process. This does not fully align with the "participatory" epithet scattered all over the publications and manuscript.

A PAR thesis but with a less participatory restitution process does not sound like by-the-book PAR PhD and might raise questions of power relationships and of knowledge ownership (Klocker, 2012). This lack of fully

collaborative analysis and co-authorship was, and still is, a poignant limit for the researcher. *How did I end up working on the academic writing "alone"? Was it a flaw in the research design? Was it a personal inability to produce a collaborative publication? Was it a matter of circumstances? etc.*

I tried to come to terms with it by analysing my own experience as inherent part of the research results – since in a PAR PhD the researcher is fully engaged into the object s/he is studying. This reflection is scattered in the three thesis publications. The main reasons that have influenced the introverted academic rendition were: (i) circumstances and planning of the fieldworks (see also previous methodological limits); (ii) the NGO internal turnover which made it difficult to stay in contact with the NGO colleagues that were involved into the PME process; (iii) finally, perhaps a personal difficulty in adapting to the academic writing process.

If I were to start all over again I would make sure key actors and writing partners have been identified from the beginning of the process. In terms of the research design, this implies perhaps to set a "simpler" and shorter term goal. In retrospect, I see that some of the limits regarding the academic delivery of this research may be related to the weakness of the PAR implementation itself. As said by Klocker (2012), the promises of PAR PhD are an appealing prospect for researchers believing that the resources given to academics have to be invested into research producing a "difference" and direct societal impact. Perhaps, this PAR PhD experience started as a too ambitious project for a "know-little" early career research. Eventually, it was realised with limited support in terms of "*how to do it*" and "*what to be aware of and how*", except for academic literature and for some first-hand advices that I gathered while I was already doing fieldwork. Despite the difficulties, findings of the research are not less engaged or less relevant. Realistically, every research takes unpredictable twists and is "emergent" in its findings just as in its design. The unpredictability of PAR research does not go without flaws and unforeseen learnings, that eventually can be valued as inherent material and observations of the thesis.

6.5.4 Limits related to the terminology

The analysis conducted in this research was possible only without a rigid predetermined notion of whether or how PME might be empowering in the first place. For this purpose, the term "empowerment" was broadly discussed and redefined throughout the three publications. In this sense, the thesis "lack" of a clear and cohesive definition of the main concept from the very beginning to the end of the manuscript. This could cause the reader to perceive the thesis as a document impacted by the iterative nature of the research process (a "patchwork"), rather than as a smooth and linear piece. Nevertheless, this conceptual fluidity serves the purpose of the analysis, and the redefinition of "empowerment" itself is an inherent element of the findings. Moreover, the reframing of "empowerment" develops incrementally throughout the three publications and the methodology chapter. Although the chosen path may be questionable, this theoretical limit is also a contribution of the thesis.

Another limit is the lack of discussion or clarification about some of the terminology employed. In particular, a thorough discussion around terms such as "data", "information", "knowledge". A clear definition of these terms, their mutual relation – and perhaps their hierarchy – could have been beneficial for nuancing the analysis. This would have also given more depth to the analysis of some of the dynamics through which PME seemed to enable empowerment. Nevertheless, this limit may be symptomatic of the absence of a univocal definition of such terms throughout the literature and NGOs practices (see also discussion on intra-urban comparativism in *Further Research* sub-chapter). Or perhaps of the inherent inconsistency of definitions across the theoretical disciplines adopted in this thesis. This would certainly merit a further investigation.

With regard to terminology and the main conceptual framework, the term "translation" was identified as a sub-dimension of empowerment in the 3rd publication. The general concept of translation has a precise connotation in literatures such as, for instance, the Actor-Network Theory. In this thesis, the term is used in a general meaning, but a circumstantial definition is attributed to it and it is tailored to the empowerment framework elaborated and tested in the 3rd publication. Nonetheless, there may be a tension in the use of this concept in this research.

Las but definitely not least, in this thesis there is a broad use of the term "community", without a proper discussion of the underlying issues raised by said concept. The term is used sucha s it was during fieldwork with the NGO, namely as a way to indicate . In this sense, community never represents a consensus-based homogeneous collective entity.

6.6 Broader Future Research Paths

6.6.1 Intra-urban and transnational comparative studies

In each of the three papers composing this thesis, I argue that more comparative case studies are necessary to better grasp the participatory mapping empowerment dynamics. Broadly speaking, the thesis findings push for more comparative research in the realm of PPGIS and participatory mapping and enumeration academic literature. Such comparative approach could open up spaces for enabling research on social and epistemic (in)justice thought PME in different settings and contexts characterised by the need of urgent livelihoods improvements while waiting for reliable political commitments.
Within postcolonial urban studies (cf. Robinson, 2006) there is a wide tradition of comparative studies. With regard to informal settlements, the research provides more transnational comparative analyses – such as for instance the work of McFarlane on the Slum Dwellers International network – than intra-urban comparison. As for participatory mapping and enumeration as an empowering tool, the implementation of these methods is rarely studied in a comparative way, and when it is the comparison highlights international case studies –

often focussing on the same international developmental actor within the Global South or Global North, rarely bypassing this divide.

Hereafter, I suggest two possible comparative further researches tailored to this thesis and stemming from my personal working experience with participatory and GIS-based data collection methods during and previous to the PhD experience. The first one is an intra-urban comparison of PME methods and strategies in the Capetonian urban area; the second one is an unusual transnational comparison between the implementation of GIS-based data collection methods in Cape Town and Geneva.

6.6.1.1 Intra-urban comparison

Throughout the fieldworks, in order to position the actors that I encountered and spoke to, I had to elaborate a broad vision of their relationships and interactions. The 2nd publication of this thesis mobilise a part of this information. Based on multiple observations, interviews and the work done with DAG, I sketched my own personal comparative case study of three of the main developmental NGOs working in Cape Town area – namely Development Action Group, Violence Prevention Through Urban Upgrading, Community Organisation Resource Centre (from the South African SDI Alliance). These three NGOs were identified because they are the main PME implementers, and because I often came in contact with every single one of them during interviews and collective meetings.

The main purpose of the comparison is to empirically show that, according to my observations, there is no unified practice of participatory mapping and/or of enumeration methods in the Capetonian context[26]. This is observed through two variables manifesting the impossibility to create a common ground: (1) a heterogeneous terminology employed by NGOs methodologies, (2) the unreliable spatial extent of dataset and projects across NGOs. The first point refers to the use of a variety of terms used to identify the same process such as: enumeration / household survey / profiling, or to specific terms coined by one or the other organisation (cf. "baseline" for VPUU). The second point highlights the deployment of PME projects on a variety of geographical scales: informal settlement / neighbourhood / precinct. These terminological and geographical inconsistency are then reflected in the production of fragmented sets of data across NGOs and communities – which cannot, or are difficult to, be consolidated.

Despite the fact that the actors work towards a similar goal of social justice, the lack of coordination of their actions in terms of participatory mapping and data gathering for informal settlements improvements undermines the capacity to join their organisational forces and to scale-up at the city level their efforts towards communities in need. This comparison could allow to explain how NGO uses these methods for

[26] These observations were drawn on the 29 interviews conducted during the exploratory fieldwork in 2017, and based on the insights gathered during three collective meetings in particular that were attended by tech-GIS specialised members of the three NGOs (2018 and 2019). A particular meeting informed the need for such analysis. The meeting was held on March 20th 2018 at VPUU offices, gathering the main PME/GIS staff of the three organisation, which aimed to start a conversation for the ISSP project that would see the light a year later. At the time of that meeting I was part of the DAG staff leading the PME project for S section, and therefore took an active part to the conversation.

positioning themselves in relation to governmental actors – at the local, and provincial level – as well as to show how these methods allow them to be concurrent towards each other. The lack of a unified practice may be the symptom of a lack of mutual trust amongst organisations. Hence, even though NGO work towards a similar goal, the idea of consolidating and creating a solid constituency through PME (or any other data-driven action) might not be a suitable option. Most NGO work following the funding they get and are project-based (Barella, 2020b). This functioning does not allow for a long term strategy anyway and it put NGOs in a paradoxical situation of concurrence. In order to be competitive every NGOs as to define its own identity in terms of urban development and civic action – which translates into a variety of heterogeneous PME methods, terms and implementations. This lack of common ground may result in hindering the realisation of social-spatial justice on a broader city or provincial scale for those who are supposed to benefit from the NGOs advocacy in the first place.

Even though the material is enough to provide comparison for the Capetonian example only, the fieldwork in Johannesburg and preliminary fieldwork interviews suggest that these findings may be partly generalized to the South African context. In fact, despite the household surveys of the South African National Census and the Community Survey practices, amongst grassroots, CSOs and NGOs a unified, replicable and transposable spatial enumeration method does not seem to exist (*Personal communications Motebang Mtsela from CORC, Johannesburg 2017; Nomcebo Dlamini from Planact, Johannesburg, 2017*). On a similar fashion, a recent publication of Blake (et al., forthcoming) debates and categorises CSOs data mediated practices of three South African organisations, focussing on data and knowledge politics.

This is intended as a "future research" since it is not thoroughly developed in this thesis manuscript. In retrospect, I would give this material a central role in my work, despite the thesis being mainly focussed on the action-research and collaboration with Development Action Group solely. As a matter of fact, many points raised in this proposal directly resonate and reiterate elements developed in the three publications chosen for this thesis. For instance, the positioning of NGOs in the urban development game at a local and provincial level is touched in the 2nd publication.
Broadly speaking, the empowerment critiques raised in the theoretical paper (1st) and empirical paper (3rd) are based on the observation that, despite a multidimensional conceptualisation of empowerment, the use and assessment of this dynamic does not allow to capture power relations at play between actors. In the Capetonian context, but not exclusively, this is to extend to NGOs as facilitators or initiators of these practices. The considerations raised in this further research plan are key to consider because they impact the way PME is implemented by and across NGOs.

6.6.1.2 Transnational comparison

Stemming from first-hand work experience, an international comparison of digitalisation of data collection methods could have also be relevant. Before embarking on the PhD adventure that allowed me to collaborate

with DAG, I worked as an intern in geomatics for a public department of environmental planning in Geneva (Switzerland). My task during the internship was to test ways for optimizing the data collection workflow of a specific office of the department. The general set up and workflow I provided at the time is still in use today. Although not related to mapping an unmapped neighbourhood, the GIS-based tools implemented in Geneva for ensuring the data collection from the field up to the offices were the same as the ones presented in the case of S section settlement enumeration. The two settings were very different from each other, just as the end goal of the project, the end-users of the technology and data, and the scope of my work with the two actors. Within traditional approaches to comparativism this would raise questions of inherent comparability of the two very distant cases. As Jennifer Robinson puts it "*instead we could seek to put a comparative imagination to work to consider: the range of urbanization processes and connections which stretch far beyond the concentrated territorial form of cities; the diverse array of social and spatial forms which emerge in different urban settlements; the repeated instances and circulating phenomena (such as policies, forms, visions) which insistently draw differentiated urban outcomes into the same frame of analysis.*" (Robinson, 2016 : 21) Following Robison's intuition, the joint analysis of the Cape Town case study in relation with the Swiss one goes beyond the preconceived aspiration of comparing discrete bounded cases by focussing on comparing a specific element or process shaping the urban: in this instance, the modalities of implementation of GIS-base data collection technologies.

As stated by Gilmore (2008:34) to compare is *« a method for discovering crucial distinctions within and between the similar, comparison is also a means for bringing together— or syncretizing—what at first glance seems irreconcilable […]. »* Notably, in the case of PME, this relational approach would open up conversations across contexts, across "Global North" and "Global South" and across case studies that might look unparalleled at first glance.

6.6.2 The role of the ward councillor

The relationship between ward councillors, NGOs/CSOs and communities' leadership is mentioned in the three publication of this thesis. The role of the ward councillor in shaping the PME practices in Cape Town and in the use of these tools by NGOs is a topic that should be tackled in future researches. Post 1994, the government committed to public participation at a local level as a principle for sustaining democracy, and for deepening the access to the deliberative citizenship that the majority of people have been deprived of under Apartheid. The geopolitical subdivision in wards and the election of ward councillors are a fairly recent democratic experience. Official local participatory spaces, or 'invited spaces' (Cornwall, 2005), revolve around this political figure. Amongst ward councillors' tasks there are duties such as: representing communities' needs and claims, and holding the municipality accountable for its (in)actions. Nevertheless, this thesis and other studies (Cirolia et al., 2016) have shown that the interface between communities and municipalities is taken by NGOs/CSOs. On the one hand, this is explained by historical reasons, placing NGOs/CSOs at the core of advocacy since decades (Parnell and Pieterse, 2014). These organisations have a long and solid experience of advocacy rooted into the anti-apartheid fights that still sustains their current drive and legitimacy in the eyes of civil society.

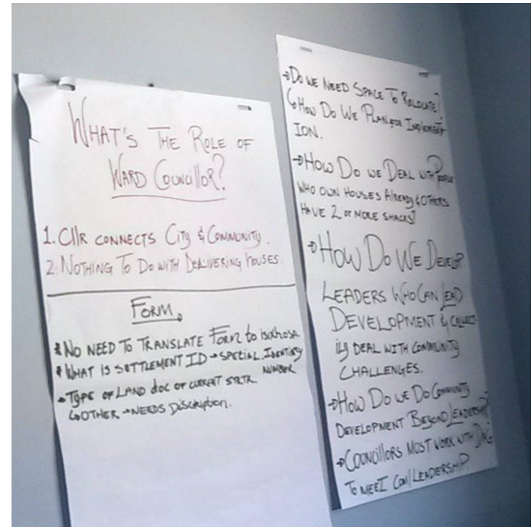


FIGURE 59 Poster resulting from a brainstorming and discussion at Andile Msizi Hall (Khayelitsha): "What is the role of the ward councillor?" "Councillor must work with DAG to meet with community leadership?" [JB March 2018]

On the other hand, studies on participation in South Africa (Bénit-Gbaffou, 2015) show how problematic the acceptance and the practice of the role of ward councillor are, and how this figure is often perceived with distrust by communities. Throughout the PME with S section community, the role of the ward councillor often became a subject of debate during data collection workshops and meetings (Figure 59).

The risk of seeing participatory spaces hijacked by councillors for personal political purposes (such as propaganda previous to election time) of for superimposing his/her own authority onto the PME collective map is discussed through examples in the three publications – and are far from being an exception.

The relationship between these actors (councillors and NGOs, as well as community leadership) might unveil a structural problem in the South African local government which needs to be examined with regard to advocacy actions. It would be important to investigate how ward councillors and NGOs could find synergies and establish joint strategies and tactics for supporting communities when interfacing with the municipality. Also, on the contrary, it would be important to observe whether or why NGOs distance themselves from councillors, in terms of reliability or else, in order to keep their privileged position in the urban development realm. This is a provocative and perhaps a superficial thought, but in some instances, advocacy NGOs might see councillors as (unreliable) antagonists operating in the same sphere of in-between communities and state.

Another hypothetical scenario might suggest that, by aligning themselves with municipal data-driven tools, NGOs are about to go a step further by positioning themselves at the same level of the centralised municipal government (for instance by going from data producers to actual implementers and urban contractors), leaving then ward councillors in the murky in-between.

Within a broader data-driven policymaking in urban development, the analysis of PME – in terms of effectiveness, relevance, and sustainability – would greatly benefit from discussing the role of the ward councillors in relation to the landscape of the non-governmental organisations and communities.

6.6.3 The "battle of rights" and the affordable housing gap market

The current situation of informal settlement's and lack of appropriate access to housing for people is still related to the deliberate underinvestment in urban infrastructure and housing of Apartheid's policies, as well as to the enduring lack of spatial approaches within social housing legislation and jurisprudence (Strauss, 2014). Moreover, a non-state-subsidized housing market that shelters more poor households that the state's subsidized housing programmes (DAG, 2018) is dramatically under-researched and not accounted for within urban policy.

Beyond the materiality of a house, social goods associated with housing are key for defining the "adequacy of housing" (Strauss, 2014). The same goes for the perception of mutual safety (Brown Luthango, 2015) and the consistency of that social-network support – or safety-net through connectedness as called in the 3rd paper. These elements make of a roof not only an "adequate house" (RSA, section 26: Housing) but also a home. In this sense, the informal settlements crisis is not only a housing crisis but also a "home" crisis. Yet, Cape Town metropolitan area is still extremely segregated and the municipality's urban policies reinforce inequality.
In theory, great emphasis is put by legislation as well as by civics organisations and NGO for bringing spatial justice at the core of the integration of marginalised groups to the city-wide urban development patterns. Nonetheless, a "battle of rights" contributes to slow down the accomplishments and implementations for informal settlements upgrading and housing rights (Strauss, 2014 and 2017). There are frictions between the Right to Property (Constitution section 25) and the Right to Housing (Constitution section 26), which create a grey area of action and inadequacy of legislation and jurisprudence when it comes to tackle issues of spatial justice – for instance in the case of evictions and the promotion of integrated housing development.
Integrated housing development focusses on "where" in the metropolitan area the social and affordable housing is built. Spatial injustice manifests itself through the construction of affordable housing in areas that are less expensive since located far from social facilities, job opportunities, schools and amenities. Yet, high valued land, often located around the city centre, remains more accessible to private investors than to marginalized groups. PME practices could intervene in this debate by spatializing households' livelihoods,

struggles, narratives and aspirations, in order to make this urban gap visible and cater the government with more spatialized evidence about the ongoing policy's incongruences.

Small-scale rental housing markets represent another overlooked housing solution participating to the issue. Many households relying on informal and/or backyard rental markets fall into a "gap market created between the poles of government subsidies and mortgage requirements" (DAG, 2018). Households whose income is higher than governments eligibility threshold for subsidized housing and yet lower than the amount needed for subscribing to a mortgage loan to buy a house, lean on this affordable (in)formal private rental system. When conducting PME actions in informal settlements such as enumeration and profiling, the important place of this gap market should be conveyed and accounted for. As a matter of fact, this phenomenon goes way beyond informal settlements and encompasses a wide array of demographic groups and of construction typology – although informal dwellings may be the bigger chunk of this market, the structures can vary from shacks to formal micro-flats in backyards, formal rooms, etc. In this sense, this gap market should be understood as a city-wide experience. To look closely at this market would give a better insight on the urban dynamic and on the materiality of the city as a whole – and it will focus on what actually unifies the city and citizens rather than on what creates disjuncture (city bowl VS township, formal housing VS informal housing, etc.)

Where spatial planning fails to consider spatial justice – for whatever reason – it will also fail in providing a viable social system for viable communities, and it will therefore fail in fulfilling normative human rights.

A further research on PME in South Africa should directly integrate and investigate these elements.

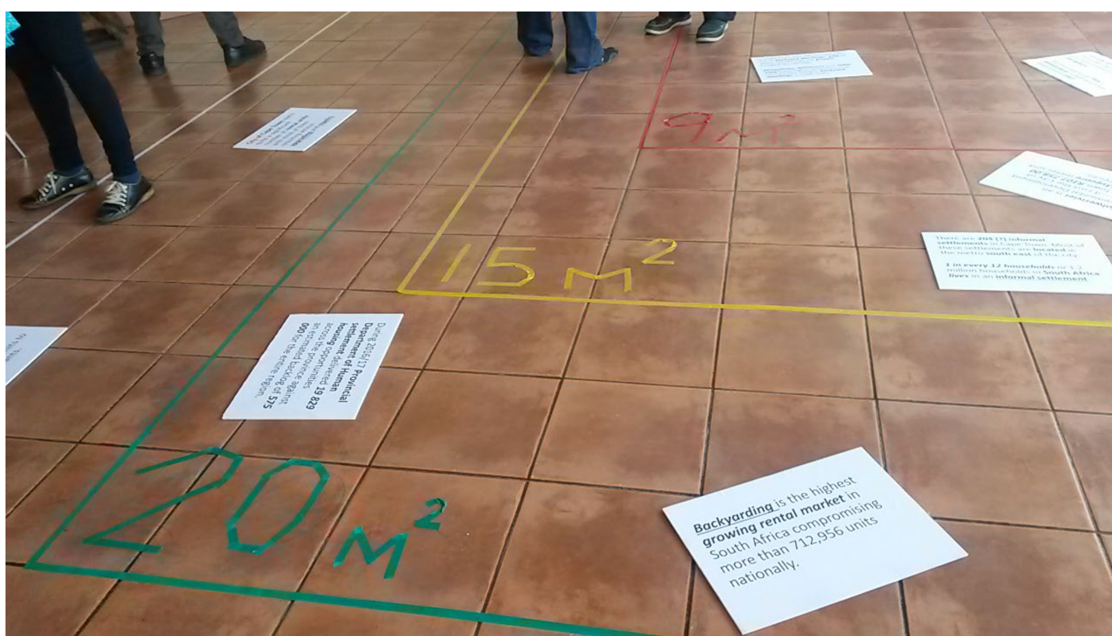


FIGURE 59 DAG Exposition on informal housing and rental market at Lookout Hill (Khayelitsha) [JB 2018]

FIGURE 60 Backyard shack in BNG housing near Fort Beaufort (Eastern Cape) [JB, 2018]

7. REFERENCES

Abbott, J.: The use of GIS in informal settlement upgrading: Its role and impact on the community and on local government, Habitat International, 27, 575-593, 2003.

Alkire, S.: Valuing Freedoms: Sen's Capability Approach and Poverty Reduction, 2001.

Altamore, S. "*Living apart: pratiche di urbanizzazione in territori contesi. Il caso di Cape Town.*", doctoral thesis, IUAV Venezia, 2020.

Anciano, F. and Piper, L.: Democracy Disconnected: Participation and Governance in a City of the South. 10.4324/9781138541061. 2019

Anderson, W.: Introduction: Postcolonial Technoscience, Social Studies of Science, 32, 643-658, 2002.

Appadurai, A.: Grassroots Globalization and the Research Imagination, Public Culture, 12, 1-19, 2000.

Appadurai, A.: Why enumeration counts, Environment and Urbanization, 24, 639-641, 2012.

Bacqué, M.-H. and Biewener, C.: L'*empowerment*, une pratique émancipatrice, La Découverte, Paris, 2013.

Bacqué, M.-H., Rey, H., and Sintomer, Y.: Introduction. La démocratie participative, un nouveau paradigme de l'action publique ? In: Gestion de proximité et démocratie participative, La Découverte, Paris, 2005.

Barella, J.: "Ramener la justice sociale au centre de la carte: propositions pour un renouvellement critique de la cartographie participative axée sur l'empowerment." Geographica Helvetica 75: 271–84. https://doi.org/10.5194/gh-75-271-2020. 2020a.

Barella, J.:"Strategic and Acupunctural GIS Implementation within Community-Oriented Organizations: Evidence-Based Insights from a South African Participatory Action Research for Informal Settlement Upgrading" Cartographica, 55:4, pp. 266–280 doi:10.3138/cart-2020-0013. 2020b.

Barella J., and Rousselot Y., « Gevisser M., 2014, *Lost and Found in Johannesburg. A memoir*, New York, Farrar, Straus and Giroux, 352 p. », *Cybergeo: European Journal of Geography* [En ligne], Revue de livres, , URL : http://journals.openedition.org/cybergeo/28814 ; DOI : https://doi.org/10.4000/cybergeo.28814, mis en ligne le 23 novembre 2017

Barbeito, C.L., J.P. Bowman, and Applied Research and Development Institute International. *Non-profit Compensation and Benefits Practices*. New York: Wiley. 1998.

Barthes R., *Le Bruissement de la langue*. Essais critiques IV, Paris. 1984

Baud, I., K. Pfeffer, D. Scott, E. Denis, and J. Sydenstricker-Neto. "Participatory 'Spatial' Knowledge Management Configurations in Metropolitan Governance Networks for SD." *Archives ou- vertes en Sciences de l'Homme et de la Société*. Available at https:// halshs.archives-ouvertes.fr/halshs-01069905. 2014.

Bekker, S. and Leildé, A.: "Residents' perceptions of developmental local government: Exit, voice and loyalty un South African towns", *Politeia*, vol. 22 (1), pp. 144- 165. 2002.

Bénit-Gbaffou, C., ed. *Popular Politics in South African Cities: Unpacking Community Participation*. Cape Town: HSRC Press. 2015.

Bénit-Gbaffou, C. and Katsaura, O.: Community leadership and political legitimacy in Johannesburg. International Journal of Urban and Regional Research, 38: 1807-1832. https://doi.org/10.1111/1468-2427.12166 2014.

Bertin J., *Sémiologie Graphique. Les diagrammes, les réseaux, les cartes*, Paris, 1967.

Bhabha, H.: Of Mimicry and Man: The Ambivalence of Colonial Discourse, October, 28, 125-133, 1984.

Blake, E., Söderström O. and Odendaal N.: Data and knowledge politics in South African urbanism: a comparison of three civil society tactics, Submitted to the International Journal of Urban and Regional Research, *forthcoming*

Bond P., South Africa's "Developmental State" Distraction, Mediations. Journal of the Marxist literary Group, vol 24 (1), pp. 9-28. 2008.

Bond P. in Amini B.: Scholactivism:A Roundtable Interview with RicardoAntunes, Pietro Basso, Patrick Bond, Michael Löwy, JoséPaulo Netto, and Leo Panitch, Cultural Logic: Marxist Theory & Practice 2015-2017, 22, pp. 46-53. 2017

Boulila, S.C.: Race and racial denial in Switzerland, Ethnic and Racial Studies, 42:9, 1401-1418, doi: 10.1080/01419870.2018.1493211 . 2019.

Brandt, M. "A Model for Evaluating Public Participation in GIS." In *Community Participation and Geographic Information Systems*, ed. W. Craig, T. Harris, and D. Weiner, 346–56. London: Tyler & Francis. 2002.

Brown, G. and Kyttä, M.: Key Issues and Research Priorities for Public Participation GIS (PPGIS): A Synthesis Based on Empirical Research, 2014.

Brown-Luthango, M et al. "Informal Settlement Upgrading and Safety: Experiences from Cape Town", *Journal of Housing and the Built Environment,* DOI 10.1007/s10901-016-9523-4. 2016.

Bryman, A.: Social Research Methods (2nd edition). Oxford: Oxford University Press. 2004.

Burini, F.: Cartographie et participation pour la coopération environnementale : le terrain et la restitution des savoirs traditionnels en Afrique subsaharienne, Annales de géographie, 687-688, 487-512, 2012.

Castells, M.: Le pouvoir de l'identité. L'ère de l'information, Fayard, Paris, 1999.

Chambers, R.: From PRA to PLA and Pluralism: Practice and Theory, Brighton : IDS, 2007.

Chambers, R.: Participatory Mapping and Geographic Information Systems: Whose Map? Who is Empowered and Who Disempowered? Who Gains and Who Loses?, 2006.

Chipkin, I.: *Do South Africans Exist? Nationalism, democracy and the identity of 'the people'*, Johannesburg, Wits University Press, 261 p. 2007.

Choplin, A. and Lozivit, M.: Mapping a slum: learning from participatory mapping and digital innovation in Cotonou (Benin), CyberGEO, doi: 10.4000/cybergeo.32949, 2019. 2019.

Cinnamon, J., Visual Data Justice? Datafication of Urban Informality in South Africa Using 360° Imaging Technologies. *Datafication of Urban Informality in South Africa Using, 360*. 2019.

Cinnamon, J., Power in numbers/Power and numbers: Gentle data activism as strategic collaboration. *Area*. 2020.

Cinnamon, J. Attack the data: Agency, power, and technopolitics in South African data activism. *Annals of the American Association of Geographers*, *110*(3), 623-639. 2020.

Cirolia, L.R., T. Görgens, M. van Donk, W. Smit, and S. Drimie. *Upgrading Informal Settlements in South Africa: Pursuing a Partnership-Based Approach*. Cape Town: University of Cape Town Press. 2016.

Cochrane, L., Corbett, J., and Keller, P.: Impact of Community-based and Participatory Mapping, Working Paper, 2014. 2014.

Convery, M., and D. Ives-Dewey. "Champions of GIS: Municipal Implementation and Organizational Diffusion of GIS in Pennsylvania Governments." *Middle States Geographer* 41: 9–18. Available at https://digitalcommons.wcupa.edu/geog_facpub/13/. 2008.

Cornwall, A. and Brock, K.: What do buzzwords do for development policy? a critical look at 'participation', 'empowerment' and 'poverty reduction', Third World Quarterly, 26, 1043-1060, 2005.

Craig, W., Weiner, D., and Harris, T.: Community Participation and Geographical Information Systems, CRC Press, 2002.

Crampton, J. W.: Mapping: A Critical Introduction to Cartography and GIS, Wiley, 2011.

Crang M., Cook I.: Doing Ethnographies. Sage Publications, London. 2007

Crankshaw, O.S., & Hart, T.G.: The Roots of Homelessness. South African Geographical Journal, 72, 65-70. 1990.

Dakouré, E.: TIC et développement en Afrique : approche critique d'initiatives et enjeux Revue française des sciences de l'information et de la communication 4, 2014.

Davies, R.J.: The Spatial Formation of the South African City, GeoJournal Supplementary Issue 2. 1981

Dawson, H., Youth Politics: Waiting and Envy in a South African Informal Settlement. *Journal of Southern African Studies*, *40*(4), 861-882. https://doi.org/10.1080/03057070.2014.932981. 2014.

Day, P., Farenden, C., and Gross, H.: Participative community profiling: a method for community informatics research: maps, networks, and stories, Constructing and sharing memory community informatics, identity and empowerment, 2007. 24-36, 2007.

de Moor A., Common Agenda Setting through Participatory Collaboration Mapping: a Knowledge Base-Driven Approach. In *16th Prato CIRN Conference 24-28 October 2018, Monash Centre, Prato, Italy*. 2018.

Dennis, R. A., Mayer, J., Applegate, G., Chokkalingam, U., Colfer, C. J. P., Kurniawan, I., Lachowski, H., Maus, P., Permana, R. P., Ruchiat, Y., Stolle, F., Suyanto, and Tomich, T. P.: Fire, People and Pixels: Linking Social Science and Remote Sensing to Understand Underlying Causes and Impacts of Fires in Indonesia, Human Ecology, 33, 465-504, 2005.

Dunn, C. E.: Participatory GIS — a people's GIS?, Progress in Human Geography, 31, 616-637, https://doi.org/10.1177/ 0309132507081493. 2007.

DWAF. *Section 9 regulations: Compulsory National Standards Regulations under section 9 of the Water Services Act (Act 108 of 1997),* Department of Water Affairs and Forestry, Pretoria: Government Printers. 2011.

Edney, M. "The rise of systematic territorial surveys". In *The Routledge handbook of mapping and cartography,* ed. Kent A et Peter Vujakovic, P., 159-72. Milton Park, Abingdon, Oxon ; New York: Routledge, 2018.

Edwards R., Holland J.: What is qualitative interviewing? University of Edinburgh, Graham Crow, 2013.

Elwood, S.: GIS Use in Community Planning: A Multidimensional Analysis of Empowerment, 2002.

Elwood, S., and R. Ghose. "PPGIS in Community Development Planning: Framing the Organizational Context." *Cartographica* 38(3–4): 19–33. https://doi.org/10.3138/R411-50G8-1777-2120. 2004.

Elwood, S.: Volunteered geographic information: future research directions motivated by critical, participatory, and feminist GIS, GeoJournal, 72, 173-183, 2008a.

Elwood, S.: Volunteered geographic information: key questions, concepts and methods to guide emerging research and practice, GeoJournal, 72, 133-135, 2008b.

Elwood, S."Geographic Information Systems; Public Participation." In *International Encyclopedia of Human Geography*, 2nd ed., ed. A. Kobayashi, 63–68. Oxford: Elsevier. 2009.

Elwood, S. "Participatory Approaches in GIS and Society Research: Foundations, Practices, and Future Directions." In *The SAGE Handbook of GIS and Society*, ed. T.L. Nyerges, H. Couclelis, and R. McMaster, 381–99. London: Sage. https://doi. org/10.4135/9781446201046. 2011.

Elwood, S., and A. Leszczynski. "Feminist Digital Geographies." *Gender, Place and Culture* 25(5): 629–44. https://doi.org/ 10.1080/0966369X.2018.1465396. 2018.

Farinelli, F.: La crisi della ragione cartografica, Einaudi, 2009.

Fassin, D.: Why ethnography matters: On anthropology and its publics. *Cultural Anthropology* 28(4), p. 621-646. 2013.

Ferrell, J., Hayward, K, and Young, J.: Cultural Criminology, London: Sage. 2008.

Foucault, M.: Surveiller et Punir, Gallimard, Paris, 1975.

Freund, L., Hawkins, B., and Saewyc, E.: Reflections on the use of participatory mapping to study everyday health information seeking by LGBTQ youth, Proceedings of the Association for Information Science and Technology, 53, 1-4, 2016.

Friedmann, J.: Empowerment : the politics of alternative development Blackwell, Cambridge, Mass, 1992.

Geertz, C.:The Interpretation of Cultures. New York: Basic Books. 1973.

Ghose, R. "Politics and Power in Participation and Gis Use for Community Decision Making." In *The Sage Handbook of GIS and Society*, ed. T.L. Nyerges, H. Couclelis, and R. McMaster, 423–38. London: Sage. https://doi.org/10.4135/9781446201046. 2011.

Ghose, R., & Welcenbach, T., "Power to the people": Contesting urban poverty and power inequities through open GIS. *The Canadian Geographer / Le Géographe canadien*, *62*(1), 67-80. https://doi.org/10.1111/cag.12442 . 2018.

Gilmore, R.W: "1. Forgotten Places and the Seeds of Grassroots Planning". *Engaging Contradictions: Theory, Politics, and Methods of Activist Scholarship*, Berkeley: University of California Press, pp. 31-61. https://doi.org/10.1525/9780520916173-005. 2008.

Graeber, D.: Direct Action An Ethnography. AK Press, Edinburgh, 2009

Görgens, T. "Facilitating State–Community Interfaces: The Role of NGOs as Intermediaries in Participatory Informal Settlements Upgrading Processes in South Africa." In *Upgrading Informal Settlements in South Africa: Pursuing a Partnership-Based Approach*, ed. L.R. Cirolia, T. Görgens, M. van Donk, W. Smit, and S. Drimie, 261–77. Cape Town: University of Cape Town Press. 2016.

Guillaume, P. and Houssay-Holzschuch M.: Territorial strategies of South African informal dwellers. Urban Forum, Springer Verlag, 13 (2), pp.86-101. 2002.

Gutiérrez, L.: Working with Women of Color: An Empowerment Perspective, Social Work, 35, 149-153, 1990.

Hagen, E.: Open mapping from the ground up: learning from Map Kibera, Brighton, 2017.

Hall, P. A., & Lamont, M., Why Social Relations Matter for Politics and Successful Societies. *Annual Review of Political Science*, *16*(1), 49-71. https://doi.org/10.1146/annurev-polisci-031710-101143. 2013.

Harley, J. B.: Deconstructing The Map, Cartographica: The International Journal for Geographic Information and Geovisualization, 26, 1-20, 1989.

Harris, T. and Weiner, D.: Empowerment, Marginalization, and "Community-integrated" GIS, Cartography and Geographic Information Systems, 25, 67-76, 1998.

Harris, T.M., and D. Weiner.. "Implementing a Community-Integrated GIS: Perspectives from South African Fieldwork." In *Community Participation and Geographic Information Systems*, ed. W.T. Craig, T.M. Harris, and D. Weiner, 246–58. London: Taylor and Francis. 2002.

Harvey, D.: Social Justice and the City, University of Georgia Press, 1973.

Hirt, I.: Redistribuer les cartes: Approche postcoloniale d'un processus de cartographie participative en territoire mapuche (Chili) PhD, Faculté des Sciences Economiques et Sociales, Université de Genève, Genève, 477 pp., 2008.

Hirt, I. and Lerch, L.: Cartographier les territorialités indigènes dans les Andes boliviennes : enjeux politiques, défis méthodologiques, Cybergeo : European Journal of Geography, 2013. 2013.

Holi A. & Al- Rushaidi S., *Translating Idiomatic Expressions from English into Arabic: Difficulties and Strategies,* Arab World English Journal (AWEJ) Volume.7 Number.4 http://dx.doi.org/10.2139/ssrn.2898623 . 2016.

Holloway, I.: Basic Concepts for Qualitative Research. London: Blackwell Science. 1997.

Houssay-Holzschuch M.: *Crossing boundaries: vivre ensemble dans l'Afrique du Sud post-apartheid,* Habilitation à diriger des recherches en géographie, Université de Paris I Panthéon-Sorbonne, Paris. 2010.

Houssay-Holzschuch, M., Ninot, O. and Thébault, E..:Watch this space! A Visual Essay on vacant land in Cape Town. Cybergeo. 2018. 10.4000/cybergeo.28974. 2018.

Huchzermeyer, M.. The new instrument for upgrading informal settlements in South Africa: Contributions and constraints. Informal settlements: A perpetual challenge, 41-61. 2006.

Huchzermeyer, M and Karam, A. 2006. Informal settlements: A perpetual challenge?, Juta and Company Ltd. 2006

Huggan, G.: Decolonizing the Map: Post-Colonialism, Post-Structuralism and the Cartographic Connection, ARIEL A Review Of International English Literature, Vol 20, 1989.

Hyysalo, S., N. Pollock, and R.A. Williams. "Method Matters in the Social Study of Technology: Investigating the Biographies of Artifacts and Practices." *Science and Technology Studies* 32(3): 2–25. https://doi.org/10.23987/sts.65532. 2019.

Jacobs, J. M.: Edge of empire : postcolonialism and the city, Routledge, London, New York, 1996.

Jenkins, R.: 'Bringing It All Back Home: An Anthropologist in Belfast'. *Social Researching: Politics, Problems, Practice*, 147–164. 1984.

Kennedy, H., Poell, T., & van Dijck, J., Data and agency. *Big Data & Society*. https://doi.org/10.1177/2053951715621569. 2015.

Kindon, S. & Pain, R. & Kesby, M.: Participatory Action Research Approaches and Methods: Connecting People, Participation and Place. 2007.

Klocker, N.: "Participatory action research: The distress of (not) making a difference", Emotion, Space and Society, 17 37-44. 2015.

Krygsman, S. and de Jong, T.: Cape Town And Its Employment Centres: Monocentric, Polycentric Or Somewhere Inbetween?. Conference: Proceedings of the Centenary Conference of the Society of South African Geographers. Stellenbosch University. 2016.

Layder, D.: *Sociological Practice: Linking Theory and Social Research*. Sage Publications Ltd. 1998

Lefebvre, H.: La production de l'espace, L'Homme et la société, 1974. 15-32, 1974.

Leitner, H., S. Elwood, E. Sheppard, R. McMaster, and S. McMaster. "Models for Making GIS Available to Community Organisations: Dimensions of Difference and Appropriateness." In *Community Participation and Geographic Information Systems*, ed. W.T. Craig, T.M. Harris, and D. Weiner, 37–52. London: Taylor and Francis. 2002.

Lemay-Hébert, N., M. Louis Herns, S. Pallage, and T. Cela. "The Internal Brain Drain: Foreign Aid, Hiring Practices, and International Migration." *Disasters* 44(4): 621–40. https://doi. org/10.1111/disa.12382. 2020.

Lerch, L.: Mondialisation et digitalisation des territoires indigènes: rôles de l'aide internationale et des technologies de l'information géographique dans les politiques du territoire et du développement en Bolivie, doi: 10.13097/archive-ouverte/unige:40573, 2014. 2014.

Ley, A., *Housing as Governance -Interfaces between Local Government and Civil Society Organisations in Cape Town, South Africa* [Doctoral Thesis, Technische Universität Berlin]. http://dx.doi.org/10.14279/depositonce-2165. 2009.

Lin, W., and R. Ghose. "Complexities in Sustainable Provision of GIS for Urban Grassroots Organizations." *Cartographica* 43(1): 31–44. https://doi.org/10.3138/carto.43.1.031. 2008.

Lukes, S.: Power, a radical view, Macmillan, London ; New York, 1974.

Mabin, A.: "On the problems and prospects of overcoming segregation and fragmentation in Southern Africa's cities in the postmodern era" , *in* S. Watson et K. Gibson, *Postmodern cities and spaces*, Oxford, Cambridge, Blackwell Publisher, pp. 187-198. 1995

Mbembe, A.: Qu'est-ce que la pensée postcoloniale ?, Esprit, Décembre, 117-133, 2006.

McDonald, C.: Understanding participatory action research: a qualitative research methodology option. Canadian Journal of Action Research Volume 13, Issue 2, pages 34-50, 2012.

Mitlin, D. "The NGO Sector and Its Role in Strengthening Civil Society and Securing Good Governance." In *Civil Society and International Development*, ed. A. Bernard, H. Helmich, P.B. Lehning, Organización de Cooperación y Desarollo Económico, and North–South Centre of the Council of Europe, 81–96. Paris: North– South Centre of the Council o Europe. 1998.

Miraftab, F.: Neoliberalism and casualization of public sector services: the case of waste collection services in Cape Town, South Africa. International Journal of Urban and Regional Research, 28: 874-892. https://doi.org/10.1111/j.0309-1317.2004.00557.x 2004.

Mlungwana P. and Kramer D.: Fragments of activism. Blackman Russouw Publishers, 2019.

Mukherjee, F.: Public Participatory GIS, Geography Compass, 9, 384-394, 2015.

Nora, F. and Niina, K.: Participatory mapping and geographical patterns of the social landscape values of rural communities in Zanzibar, Tanzania, Fennia - International Journal of Geography, 187, 2009.

Odendaal, N.: Information and communication technology and urban transformation in South African cities, PhD, Faculty of Engineering and the Built Environment, University of Witwatersrand, Johannesburg, 2010.

Oldfield, S. "Between Activism and the Academy: The Urban as Political Terrain." *Urban Studies* 52(11): 2072–86. https://doi. org/10.1177/0042098013515942. 2015.

Oldfield, S., and S. Greyling. "Waiting for the State: A Politics of Housing in South Africa." *Environment and Planning A: Economy and Space* 47(5): 1100–1112. https://doi.org/10.1177/03085 18x15592309. 2015.

Onsrud, H., and J. Pinto. "Evaluating Correlates of GIS Adoption Success and the Decision Process of GIS Acquisition." *URISA Journal* 5(1): 18–39. 1993.

Pain, R., & Francis, P.: Reflections on Participatory Research. *Area*, *35*(1), 46–54. http://www.jstor.org/stable/20004288. 2003.

Pánek, J. "How Participatory Mapping Can Drive Community Empowerment – A Case Study of Koffiekraal, South Africa." *South African Geographical Journal* 97(1): 18–30. https://doi.org/10.108 0/03736245.2014.924866. 2014.

Pánek, J.: Participatory and Public Participation GIS: A Phenomenon of Neocartography with a High Potential in Developing Countries, The Scale of Globalisation, 2011. 235-243, 2011.

Parnell, S. and Pieterse, E.: Africa's Urban Revolution, Zed Books, London, 2014.

Patel, S., and C. Baptist. "Editorial: Documenting by the Undocumented." *Environment and Urbanization* 24(1): 3–12. https:// doi.org/10.1177/0956247812438364. 2012.

Peluso, N. L.: Whose Woods Are These? Counter-mapping Forest Territories In Kalimantan, Indonesia, Antipode, 27, 383-406, 1995.

Pickles, J.: Ground Truth 1995–2005, Transactions in GIS, 10, 763-772, 2006.

Putuma, K.: Collective Amnesia, Uhlanga Press, 2017.

Qiu, X., Wen, L., Wu, C., Yang, Z., Wang, Q., Li, H., & Wang, D., Impact of Learning Methods on Spatial Knowledge Acquisition [Original Research]. *Frontiers in Psychology*, *11*(1322). https://doi.org/10.3389/fpsyg.2020.01322. 2020.

Radil, S. M. and Anderson, M. B.: Rethinking PGIS: Participatory or (post)political GIS?, Progress in Human Geography, 43, 195-213, 2019.

Ranslem, D.: "'Temporary' relocation: spaces of contradiction in South African law", *International Journal of Law in the Built Environment*, Vol. 7 No. 1, pp. 55-71. https://doi.org/10.1108/IJLBE-12-2013-0041. 2015.

Reason, P., & Bradbury, H. (eds) : Handbook of action research: Participative inquiry and practice (pp. 1-14). London: Sage. 2016.

Republic of South Africa. 1996. Constitution of the Republic of South Africa (Act No 108 of 1996). Pretoria: Government Printers. 1996.

Republic of South Africa. 2000. Local Government: Municipal Systems Act (Act No 32 of 2000). Pretoria: Government Printers. 2000.

Reynaud, A.: Société, espace et justice. Inégalités régionales et justice socio-spatiale, Presses Universitaires de France, Paris cedex 14, 1981.

Ricker, B., J. Cinnamon, and Y. Dierwechter. "When Open Data and Data Activism Meet: An Analysis of Civic Participation in Cape Town, South Africa." *Canadian Geographer/Géographe canadien* 64(3): 359–73. https://doi.org/10.1111/cag.12608. 2020.

Robins, S.: 'Day Zero', Hydraulic Citizenship and the Defence of the Commons in Cape Town: A Case Study of the Politics of Water and its Infrastructures (2017–2018), Journal of Southern African Studies, 45:1, 5-29, DOI: 10.1080/03057070.2019.1552424 . 2019.

Robinson, J.: "Thinking Cities through Elsewhere: Comparative Tactics for a More Global Urban Studies." *Progress in Human Geography* 40(1): 3–29. https://doi.org/10.1177/0309132515598025. 2016.

Robinson, J.: Ordinary cities : between modernity and development, Routledge, London; New York, 2006.

Robinson, J.: Global and world cities: a view from off the map. International Journal of Urban and Regional Research, 26: 531-554. https://doi.org/10.1111/1468-2427.00397. 2002.

Rose G.: Situating knowledges: positionality, reflexivities and other tactics. *Progress in Human Geography*. 21(3):305-320. doi:10.1191/030913297673302122. 1997.

Roy, A.: Slumdog Cities: Rethinking Subaltern Urbanism, International Journal of Urban and Regional Research, 35, 223-238, 2011.

Roy, A.: Who's Afraid of Postcolonial Theory?, International Journal of Urban and Regional Research, 40, 200-209, 2016.

Said, E. W.: Orientalism, Pantheon Books, New York, 1978.

Schreier, M.: Qualitative content analysis. In *The SAGE handbook of qualitative data analysis* (pp. 170-183). SAGE Publications Ltd, https://dx.doi.org/10.4135/9781446282243. 2014.

Schurr, C. and Segebart, D.: Engaging with feminist postcolonial concerns through participatory action research and intersectionality, Geogr. Helv., 67, 147-154, 2012.

Scott, J. C.: Seeing Like a State How Certain Schemes to Improve the Human Condition Have Failed, Yale University Press, 1998.

Scott, J. C.: Weapons of the Weak Everyday Forms of Peasant Resistance, Yale University Press, 1985.

Sen, A.: Development as Freedom, Oxford University Press, 1999.

Sieber, R. "GIS Implementation in the Grassroots." *URISA Journal* 12(1): 15–29. 2000.

Sieber, R. "Public Participation Geographic Information Systems: A Literature Review and Framework." *Annals of the As- sociation of American Geographers* 96(3): 491–507. https://doi. org/10.1111/j.1467-8306.2006.00702.x. 2006.

Sikhakane, B.H.; Reddy, P.S., Public accountability at the local government sphere in South Africa, African Journal of Public Affairs, 4(1). 2011.

Simone, A.M.M. People as Infrastructure: Intersecting Fragments in Johannesburg. *Public Culture 16*(3), 407-429. https://www.muse.jhu.edu/article/173743. 2004.

Simone, A.M., and E. Pieterse. *New Urban Worlds: Inhabiting Dissonant Times*. Cambridge: Polity. 2017.

Soja, E. W.: The city and spatial justice, justice spatiale | spatial justice, 1, 7, 2009.

Solomon, B. B.: Empowerment: Social work in oppressed communities, Journal of Social Work Practice, 2, 79-91, 1987.

South African Government: White Paper on Local Government. 1998.

Spivak, G. C.: Can the Subaltern Speak?, Die Philosophin, 14, 42-58, 1988.

Strauss, M.: A Right to the City for South Africa's urban poor. doctoral thesis . University of Stellenbosch. 2014

Strauss, M., A historical exposition of spatial injustice and segregated urban settlement in South Africa. *Fundamina* , *25*(2), 135-168. https://dx.doi.org/10.17159/2411-7870/2019/v25n2a6. 2019.

Sui, D.: The Wikification of GIS and Its Consequences: or Angelina Jolie's New Tattoo and the Future of GIS, Computers, Environment and Urban Systems, 32, 1-5, 2008.

Söderström, O., Blake, E., & Odendaal, N., More-than-local, more-than-mobile: The smart city effect in South Africa. *Geoforum*, *122*, 103-117. https://doi.org/https://doi.org/10.1016/j.geoforum.2021.03.017. 2021.

Terranova, T., *Network Culture: Politics For the Information Age*. LONDON; ANN ARBOR, MI: Pluto Press. doi:10.2307/j.ctt183q5pq. 2004.

Thompson, M. M.: Upside-Down GIS: The Future of Citizen Science and Community Participation, The Cartographic Journal, 53, 326-334, 2016.

Townley, G., Pearson, L., Lehrwyn, J. M., Prophet, N. T., and Trauernicht, M.: Utilizing Participatory Mapping and GIS to Examine the Activity Spaces of Homeless Youth, American Journal of Community Psychology, 57, 404-414, 2016.

Turok I.: Persistent Polarisation Post-Apartheid? Progress towards Urban Integration in Cape Town. *Urban Studies*. 38(13):2349-2377. doi:10.1080/00420980120094551. 2001.

Turner, A. *Introduction to Neogeography*. Sebastopol, CA: O'Reilly Media. 2006.

Umberson, D., & Montez, J. K., Social relationships and health: a flashpoint for health policy. *Journal of health and social behavior*, *51 Suppl*(Suppl), S54-S66. https://doi.org/10.1177/0022146510383501. 2010.

UNHabitat: Habitat III : New Urban Agenda, United Nations Habitat, 66 pp., 2017.

van Dijk TA.: Principles of Critical Discourse Analysis. *Discourse & Society*. 4(2):249-283. doi:10.1177/0957926593004002006. 1993.

Watson, V. "Seeing from the South: Refocusing Urban Planning on the Globe's Central Urban Issues." *Urban Studies* 46(11): 2259–75. https://doi.org/10.1177/0042098009342598. 2009.

Webb, V., Multilingualism in South Africa: The challenge to below. *Language Matters*, *40*(2), 190-204. https://doi.org/10.1080/10228190903188591. 2009.

Weiner, D., T. Harris, and W. Craig. "Community Participation and Geographic information Systems." In *Community Participation and Geographic Information Systems*, ed. W.T. Craig, T.M. Harris, and D. Weiner, 3–16. London: Taylor & Francis. 2002.

Weiner, D., T. Warner, T.M. Harris, and R.M. Levin. "Apartheid Representations in a Digital Landscape: GIS, Remote Sensing, and Local Knowledge in Kiepersol, South Africa." *Cartography and Geographic Information Systems* 22(1): 30–44. https://doi. org/10.1559/152304095782540537. 1995.

Weyer, Bezerra, & Vos., Participatory Mapping in a Developing Country Context: Lessons from South Africa. *Land*, *8*, 134. https://doi.org/10.3390/land8090134. 2019.

Wiegand, P., Learning and Teaching with Maps (1st ed.). Routledge. https://doi.org/10.4324/9780203477793. 2006.

Willis, K.: Informal Settlements. In: International Encyclopedia of Human Geography (Second Edition), Kobayashi, A. (Ed.), Elsevier, Oxford, 2020.

Willis, J. W.: Foundations of qualitative research: Interpretive and critical approaches. SAGE Publications, Inc., https://dx.doi.org/10.4135/9781452230108 2007.

Young, C. J.: Refining a Conceptual Basemap : Critical GIS and Political Theory, Master of Arts, Department of Geography, University of Washington, 138 pp., 2012.

Zimmerman, M. A.: Empowerment theory: Psychological, organizational, and community levels of analysis. In: Handbook of community psychology., Kluwer Academic Publishers, Dordrecht, Netherlands, 2000.

8. ANNEXES AND APPENDIX

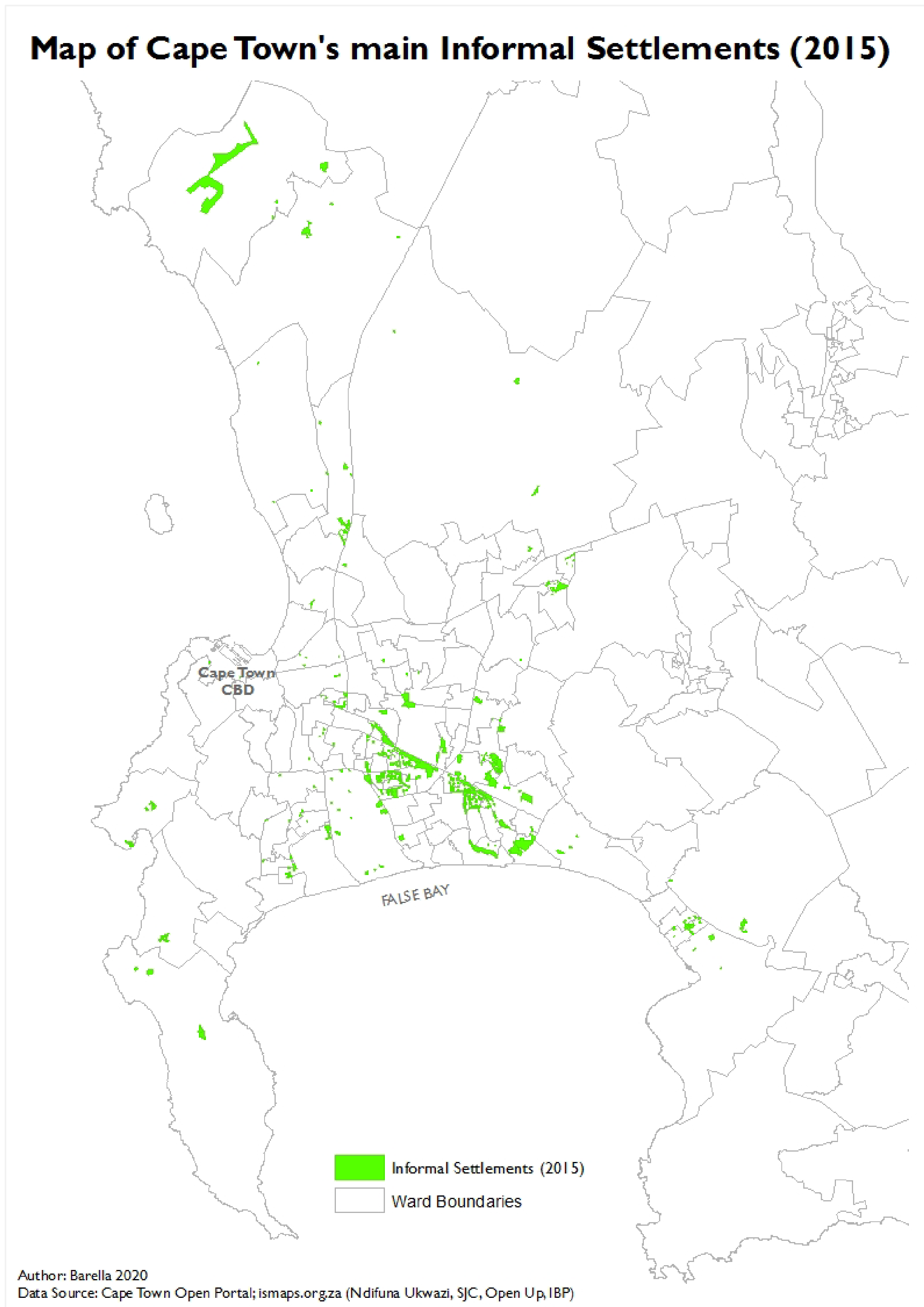


FIGURE 61 APPENDIX 1 Cape Town, Informal settlements Map

FIGURE 62 APPENDIX 2 S section settlement zoning scheme

101 Lower Main Road, Observatory, 7925
Cape Town, South Africa

Telephone: +27(21) 448 7886
Facsimile: +27(21) 447 1987
Email: dag@dag.org.za

www.dag.org.za

29 November 2017

To whom it may concern

The Development Action Group is pleased to offer Jennifer Barella a volunteer position from 19 January 2018 to 21 May 2018. Jennifer will not be remunerated for the services she will be rendering to the organisation. Please see below a list of the activities she will be involved in.

The Development Action Group (DAG) is a leading non-profit organisation working throughout South Africa to fight poverty and promote integrated urban environments. DAG supports communities to lead and engage their own development and influences State policy and practice through partnerships, research, training and lobbying activities.

DAG has an established and successful track record in land negotiation and acquisition processes, informal settlement upgrading and the implementation of community-led housing developments. Over the past thirty years DAG has developed a wealth of experience in working with poor and marginalised communities.

PURPOSE OF THE JOB

- To assist in conducting research and design related to housing and urban development
- To provide research and writing assistance to project teams
- To assist with general organisational administration

ACTIVITY AREAS

To assist in conducting research and innovative design concepts related to housing and urban development

- To provide planning and other technical input in the development of participatory and pro-poor human settlements proposals and housing typologies
- To undertake tasks related to the collection and processing of information for participatory planning workshops/meetings
- To, with assistance, write up preliminary research/workshop findings
- To participate in community capacity building programmes and activities

To assist with general organisational administration

- Drafting of reports and preparing workshop material
- Assistance in DAG workshops and events

For further information, please do not hesitate to contact Kathy Aranes on +27 21 448 7886 or e-mail kathy@dag.org.za

Yours sincerely

ADITYA KUMAR
Executive Director

S:\Volunteers\Jennifer Barella\Volunteer_Confirmation.docx

Directors: R. Edwards / O. Henwood / S. Kahanovitz / A. Kumar (Executive Director) / T. Mashologu / T. Mohamed / Q. Nagdee / C. Stone / W. Trout
DAG is a Non-Profit Company without Members: Registration number 1993/006859/08.
DAG is a Public Benefit Organisation with South African tax exemption: Registration number 930016961.
DAG is also a registered Non-Profit Organisation: Registration number 006-194 NPO.

FIGURE 63 APPENDIX 3 Volunteer Confirmation Letter