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Mapping for Environmental Justice

An Assessment of the
Power of Maps in Karachi's
Informal Settlements

Rita Lambert

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An Assessment of the Power of Maps in Karachi's Informal Settlements

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Abstract. This paper adopts environmental justice as the broad normative framework. It departs from the premise that there is relevance in exploring tools that can be appropriated by communities, at the local scale, to facilitate the navigation of institutional barriers and work towards more just processes and outcomes. This paper proposes maps as political tools to advance interests and seeks to understand the role they play in the struggle for environmental justice. It begins by understand-

ing the notion of power and how it is enacted in maps, in order to arrive at an analytical framework through which the emancipatory extent of maps is assessed. It subsequently analyses the case of mapping for sanitation in Karachi. And finally, it concludes with reflections on the importance of the 'ownership' of maps by local communities, and the care needed in their adoption, due to the inherently complex entanglement of power, which can be contested and reproduced all at the same time.

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List of acronyms.

- ADB – Asian Development Bank
CBO – Community-based organisation
CDGK – City District Government Karachi
ESD – Environment and Sustainable Development MA
KWSB – Karachi Water and Sewerage Board
IFI – International Finance Institution
GIDA – Ghana Irrigation Development Authority
GIS – Geographic information system
GKSP – Greater Karachi Sewerage Plan
KMC – Karachi Metropolitan Corporation
NGO – Non-governmental organisation
OPP – Orangi Pilot Project - the parent institution which began its work in 1980 and continued to function as OPP till 1988, when it evolved into four separate institutions.
OPP-RTI – Orangi Pilot Project-Research and Training Institute – one of four institutions which came into being as a result of OPP being devolved into four separate institutions. OPP-RTI is responsible for the low-cost sanitation, housing, and education programmes
UC – Union Council – lowest tier of local government
YTP – Youth Training Programme- part of OPP-RTI

1. Introduction

1.1 Overview

Cities can provide healthy, safe and stimulating environments for its inhabitants (Hardoy, Mitlin, & Satterthwaite, 2001), however they can also be associated with the worst environmental problems which affect human health and the natural ecosystem. Rapid urbanisation worldwide has been linked to the deterioration of the environment and the depletion of natural resources at all levels (Allen & You, 2002). It is especially within cities, and particularly in urban centres of the Global South, that the worst environmental impacts are felt by its inhabitants. Moreover, in these contexts, it is the poor and marginalised in society that are disproportionately affected and bear the greater burdens of environmental hazards and risks, namely due to insufficient water, sanitation and even land (Hardoy et al., 2001).

However, as argued by Hardoy et al (2001), in the context of the Global South, environmental problems are not always due to shortages of environmental resources, such as water or land, but stem from political roots. Poorer groups are excluded from economic and political processes that prevent them from acquiring these goods and from “organising to demand changes” (Hardoy et al., 2001, p. 10).

In the light of these inequities and injustices, this paper focuses on the urban context of the South and seeks to explore tools through which the poor and marginalised in society can be empowered to attain more just processes and outcomes.

Maps, as spatial tools, are useful to represent and communicate environmental inequities. Because of this, they have been adopted by environmental movements to advance their arguments (Soja, 2010). For example, in one of the first documented instances, Love Canal in the 1970's in the USA, maps were useful to demonstrate the unequal exposure of ethnic minorities to toxic wastes.

A growing body of literature demonstrates the use of mapping as a tool of empowerment and mediation for local communities (Alcorn, 2000; Fox, Krisnawati, & Hershock, 2005), where it has enabled them to successfully claim rights that were previously unacknowledged by the state (Peluso, 1995).

However, at the same time that maps can be used as tools that contest injustices, scholars have highlighted them, historically and in the present day, as part of processes leading to social exclusion (Harley, 1989a; Wood, 2010)

Acknowledging that maps advance interests and are increasingly used in decision-making processes, this paper seeks to gain a better understanding of their agency. It focuses on the notion of power and asks the central question of whether maps are tools for state control or community empowerment.

Using the case study of mapping for sanitation in Karachi, it assesses the extent to which maps can play a role in navigating institutional barriers, and approximating the marginalised in society to environmental justice.

1.2 Environmental Justice

In the urban context of the Global South, many of the injustices faced by inhabitants can be analysed through the relationship between power, inequity and environments (Dobson, 1998). These three elements are related to the political-economic processes which exclude the poor and marginalised in society from participating (Schlosberg, 2009; Young, 1990) in the co-production of space and place. They are thus central for understanding how environmental injustices and inequities are brought about.

Environmental justice does not only pertain to a society free of environmental burdens but also implies that all members of that society are able to have a normative say on how such an environment should be. To enable this, citizens should have not only a voice in decision making, but also a recognised right to express this voice (Schlosberg, 2009). Schlosberg (2009), defines environmental justice as encompassing three main aspects: *recognition* of the previously marginalised in society, *participation* of all excluded in decision making to affect policy processes, and *fair distribution* of benefits and burdens in a society (Schlosberg, 2009). These are interlinked and reinforce one another, but recognition and participation are prerequisites for fair distribution. Hence, in tackling distributional injustices, one has to focus on procedural aspects (Fraser, 1997; Young, 1990). Who, how and what gets decided affects outcomes. Therefore understanding how inequalities and injustices are produced and sustained in the first place requires an examination of the social structures and processes involved “that produce distribution rather than the distribution itself” (Young, 1990, p. 18). Schlosberg (2009) emphasises that “justice must focus on the political process as a way to address both the

inequitable distribution of social goods and the conditions undermining social recognition" (Schlosberg, 2009, p. 26). Power relations are determinants in political and social processes and therefore the analysis of power is key in order to develop strategies, and tools of empowerment, through which the marginalised can work towards environmental justice.

1.3 The Location of Power and the Scale of Action

How power is conceived and where it is located also points to how and at what level it can, or should be tackled. I have identified two polar positions within the Environmental Justice literature. These can be looked at in terms of their scale of analysis, as well as their attitudes towards the possibility for change. The first position sees power as located in each and everyone, and states that incremental change is possible. Hence the focus is on the local scale of injustices where resistance is conceived through a bottom up approach (Towers, 2000). The second position locates power at the structural level and the political and geographical scales of analysis are broader (Swyngedouw & Heynen, 2003). In this view, achieving environmental justice requires challenging the structural level and change is much harder to achieve.

Although these different scales exist in environmental justice, it does not mean that the scale of action needs to be necessarily at the scale of discourse. As Towers (2000) points out, the choice of a workable scale is important, as the local or "tactical environments may encourage radical goals and visions" (Towers, 2000, p. 25). Therefore, the scale can be consciously chosen for its "political efficacy and radical analysis" (Sze et al., 2009, p. 814). This means that the environmental justice discourse can be directed at the broader geographic scale, whilst the first steps are taken at the grass root level (Towers, 2000). Sandercock (1999) and Levy (2007) advocate for incremental empowerment of civil society and 'micro-transformations' which can challenge dominant values and shift institutional barriers.

Moreover, Healey (1997) argues that although structures shape people, they are created by people in the first place and therefore can be changed. She argues that "we, 'have power' and, if sufficiently aware of the structuring constraints bearing in on us, can work to make changes by changing rules, changing the flow of resources, and most significantly, changing the way we think about things" (Healey, 1997, p. 49).

This paper sides with Towers (2000), Healey (1997) and Levy (2007) to focus on the local scale of action. It departs from the premise that there is relevance in exploring tools, that can be appropriated by communities, at the local scale, and through which marginalised groups can

be empowered to navigate institutional barriers towards attaining more just outcomes. Power is here understood in Foucauldian terms, as diffuse, present in all social relations and action constraining (Foucault, 1982). If power is seen as a game of strategy (Foucault, 1997, p. 298), in this view, everybody can be a player. Through its very existence, the mechanisms of power open up opportunities for resistance (Foucault, 1982).

1.4 Tools of Power/Knowledge

The focus on Power/knowledge¹ is central because it affects distribution of material resources and institutional aspects which are the "access and control that organisations and individuals have to influence and change decision-making structures and processes" (Levy, 2007, p. 2).

Knowledge is used to make decisions (Davies, 1994). Davies (1994) distinguishes between data, information and knowledge whereby information is the transformation of raw data into knowledge, and the use of knowledge refers to "acting on the content of information received" (Davies, 1994, p. 4). Therefore since knowledge determines action through influencing decisions, any tool adopted in the struggle for environmental justice must enable a community to produce its own data, process it into information and subsequently knowledge.

As Foucault (1977) argues, "knowledge is power: there is no power relation without the correlative constitution of a field of knowledge, nor any knowledge that does not presuppose and constitute at the same time power relations" (Foucault, 1977, p. 27). Power uses knowledge as a resource to subject people (Fardon, 1986, p. 181), but in the same manner, knowledge can be used to contest power. Hence participation in knowledge production is a means of empowerment for the marginalised, and a way to influence decision processes that determine the distribution of benefits and burdens. It is a means to shape their environment and strive towards a more just society.

Overall, in order to deliver environmental justice, any framework adopted must tackle power relations and 'deliberative democracy', enabling the previously marginalised groups of society to collectively co-produce consciousness, space and knowledge. Tools are required in the performance of power. Maps, as specific tools for diverse forms of power/knowledge are the focus of this paper.

1.5 Why maps?

Maps are increasing being used in the world. They are taken up by many disciplines and by various actors from industry, governments, academia as well as

the general public. They are adopted as organisational as well as analytical tools (Fox et al., 2005). Moreover they provide a useful means of visual representation and communication.

In relation to environmental justice, maps have played a central role as evidence to corroborate claims of injustice. As distributive justice has been and still is predominantly the focus of many studies of environmental justice, most of the preoccupation lies in addressing equity of outcomes. Therefore methodologies that are inherently spatial in nature, such as maps, are dominant (Maantay, 2002). The increasing availability and adoption of technologies such as geographic information system (GIS), are especially useful to demonstrate disproportionate exposure of certain populations to environmental hazards. For example, In the Unites States, several studies using GIS, look at the disproportionate exposure of minorities to air pollution and its high incidence of asthma, such as in the Bronx (Maantay, 2002). Also GIS is used to show the inequitable distribution of goods affecting minorities, such as transportation network or recreational facilities which lead to disparities in physical activity (Wendell & Myron, 2007). Through the superimposition of various data from income, race, ethnicity, location of hazards ect, maps are able to visually capture and represent inequalities.

However beyond being adopted as technical tools which can effectively show distribution, maps need to be primarily understood as political tools, especially because they are increasingly being used in decision making processes and can advance interests. The process of making a representation results in knowledge that did not exist prior to that representation. Therefore mapping and map-use are processes of knowledge construction rather than transfer only (Black, 1998, p. 21). They are not neutral (Crampton, 2001; Harley, 1988) as they are created by someone who wants to communicate a particular point of view. Also they have capacity beyond the technical because they influence the way we perceive the environment as well as frame problems within it . Consequently, they provide inherent solutions and foreclose those solutions which cannot be accurately represented in the map.

Engaging in mapping could potentially open up a space to influence decisions and hence actions. This is particularly vital for communities who are marginalised and excluded from policy processes. The emergence of new mapping technologies as well as their relative accessibility means that many more local groups can now engage in

mapping allowing for their own self represent as well as their own knowledge production (Fox et al., 2005; Peluso, 1995; Wood, 2010).

Although the emancipatory aspect of maps has been backed up by recent community mapping literature, this paper seeks to acquire a critical stance vis a vis the tool. This interrogation is important so that when adopted to meet social objectives, it is done so in an informed manner, and with knowledge of the possible unintended consequences.

1.6 Structure of the Paper

This paper is organised into four chapters. All the material used is mainly from academic literature and published papers. The current **Chapter 1**, introduces the relevance of maps for environmental justice. Understanding maps as tools of power/knowledge. **Chapter 2** seeks to first analyse the different conceptions of power and their relationship to knowledge. The ways in which maps operate are related to these different conceptions, making a distinction between the way they reproduce or contest power. This dichotomy is established because, in line with Foucault (1997), the presence of power is also an opportunity for resistance. Moreover, Safier's 'Room for Manoeuvre' framework is also adopted, as it provides a systematic approach. This can be related to the ways maps operate to restrict or expand the action space of individuals or groups to influence institutional processes. This chapter ends with a more extensive analysis of the ways maps reproduce or contest dominant regimes. It borrows literature from Geography and Critical Cartography, as well as case studies on mapping located in the Global South.

Chapter 3 applies the analytical framework to one case study: the mapping of sanitation in Karachi. This particular case has been selected because it is urban and more specifically, an informal settlement. Such settlements are increasing (Graham & Marvin, 2001; UN-Habitat, 2003) and in need of attention. Also, the case study exemplifies many of the injustices faced by such contexts, namely the mis-recognition from the state which impacts the inequitable access to basic services like water, sanitation and infrastructure. **Chapter 4** concludes by looking back at the key learnings on maps. It revisits the analytical framework and finally proposes recommendations.

NOTES TO CHAPTER 1

1. Terms used jointly by Foucault showing their interdependency

2. Power and Maps

"We chart our cities, so we chart ourselves. To chart the external world is to reveal ourselves, our priorities, our interests, our desires, our fears, our biases. We believe we are mapping our knowledge, but in fact we are mapping what we want and what we want others to believe. In this way, every map is a reflection of the individual or group that creates it" (Turchi, 2004, p. 140).

2.1 What is a map?

According to most, a map is an accurate representation of the earth's surface (Thrower, 1996, p. 245) and is seen as an ideal tool, due to its precision and objectivity, to understand a place. However, as extensive critical cartographic literature pertains (Crampton, 2001; Harley, 1989a; Pickles, 1991; Wood, 2010), maps do not merely present the world but re-describe it: "like any other document in terms of relations of power and cultural practices, preferences and priorities" (Abrams & Hall, 2006, p. 15). Because in the act of making a map, a decision is made about what to include and by extension what to exclude, the process and product of mapmaking can only be political and has to deal with power relations. Hence it can be stated that maps are political tools and sites of power/knowledge (Black, 1998; Crampton, 2001; Harley, 1989a; Pickles, 1991; Wood, 1992). Not only are they created by knowledge, but they also create knowledge, as argued by Dodge et al (2009), stating that: "mapping is epistemological but also deeply ontological- it is both a way of thinking about the world, offering a framework for knowledge, and a set of assertions about the world itself"(Dodge et al., 2009, p. 1).

Maps have, as inherently spatial tools, not only the ability to produce spaces but also social relations. Their power precisely lies in their ability to 'do work' (Wood, 2010), and in so doing, they can create and transform places according to the wishes of those who own them. Maps have agency and can reproduce power, but in the same manner, they also have the ability to contest it.

This chapter first explains different conceptions of power and their relationship to knowledge in order to then understand how maps, as tools of power/knowledge, can operate within these different conceptions. Secondly, Safier's 'Room for Manoeuvre' framework is adopted as

it provides a strategic approach for analysing different paths through which institutional processes may be influenced. Finally, an analysis of the various ways in which maps both reproduce and contest dominant regimes, is presented at the end of the chapter.

2.2 Conceptions of Power

The notion of power is highly contested. Power can be understood as held by actors (powerful and powerless), as a Zero-sum game (to gain power others must lose), as 'negative' or in 'control', as more pervasive and embodied in all relationships and discourses, as more fluid and cumulative, as more 'positive' therefore necessary for agency and positive action (Gaventa, 2007). Referring to Lukes and Foucault, these different views and their relationship to knowledge are captured by Gaventa (2008), in four conceptions of power summarised below and in Table 2.1.

The first view regards **power as domination** (associated with Dahl "Who Governs?" 1961). In this view, power is overt, intentional and active. Some have it while others lack it. A clear division is established between those that are considered at the possessing end usually structures, organisations, experts and those at the other end, 'the powerless'. Power here is seen as a "Zero-sum" game, where in order for a group to have it, it must accumulate it at the expense of others. Knowledge is used to dominate because it is a "resource to be mobilized to influence public debates" (Gaventa, 2003, p. 71). Power is in the hands of not only the more knowledgeable, but also of those with 'better' knowledge. The approach does not take into account who produces the knowledge and how it is produced. This is taken up as a critique by the second view of power which highlights "who gets what, when and how and who gets left out and how" (Bachrach + Baratz 1970, p.105 quoted in Gaventa, 2003, p. 71). In this view, **power determines conditions for participation**.

The focus is placed on the hidden processes that exist to prevent some from being part of the decision making in the first place. The public agenda is thought to be set by those that have control over the production of knowledge and over what gets decided; those who are consequently able to ignore or deflect existing grievances. Hence being part of the knowledge production, which informs decisions, is key for the powerless to gain influence.

In reaction to the two views presented above, Lukes (1974) proposed that **power operates by influencing consciousness** and shaping desires, ideologies and beliefs. In this way, both conflict and grievances can be averted. He summarised this in a single question: "Is it not the supreme and most insidious exercise of power to prevent people, to whatever degree, from having grievances by shaping their perceptions, cognitions and preferences in such a way that they accept their role in the existing order of things, either because they can see or imagine no alternative to it, or because they see it as natural and unchangeable, or because they value it as divinely ordained and beneficial?" (Lukes, 2005, p. 28).

He argued that knowledge shapes consciousness. Consequently, the way to contest this form of oppression is to raise awareness and critical reflection on issues and power relations that affect people. Participation in knowledge production becomes a method for "building greater awareness and more authentic self-consciousness of one's issues and capacities for action" (Gaventa & Cornwall, 2008, p. 72).

The fourth view, put forward by Foucault regards **power as determining action**.

For Foucault, power is shaped by discourses, institutions and practices that delimit the space for action. In his essay "Subject and Power", he explains that what defines a relationship of power is that it is a mode of action which does not act directly and immediately on others. Instead it acts upon their actions (Foucault, 1982, pp. 788–789). Also, power determines the conception of what is possible. So in his view, "freedom is the capacity to participate effectively in shaping the social limits that define what is possible" (Hayward, 1998, p.21 quoted in J Gaventa & Cornwall, 2008, p. 72). Knowledge here is a resource used to establish what is important, what is possible, by whom and for whom.

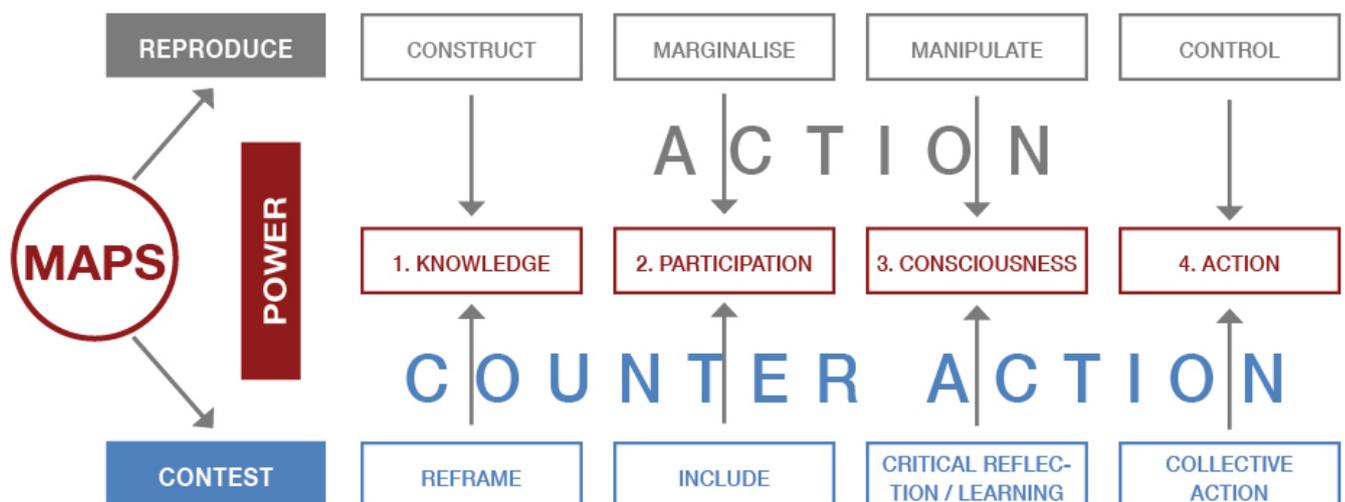
The obvious form of counteraction would challenge the established understandings of the possible, by taking part in knowledge production, use and dissemination.

2.3 Conceptions of Power Related to Maps

Departing from the premise that, where there is power there is also resistance, the four categories above provide a useful departure point through which maps, as tools of knowledge, can reproduce or contest power. Figure 2.1 shows how maps operate in the four conceptions of power.

1. Where knowledge is used to dominate public debates, maps reproduce power by constructing and upholding a certain order of things. For this to be counteracted, maps must be able to challenge accepted notions and reframe views through evidence which is deemed legitimate.
2. Where knowledge is used to determine the public agenda, maps can reproduce power through the marginalisation and exclusion of people in knowledge production and decision making. On the other hand, they can be used to contest this form of power by being a means to include the previously marginalised.
3. Where knowledge is used to influence consciousness, maps can manipulate and hence reproduce power or contest it by raising critical reflection and learning.
4. Where knowledge is used to determine the space for action and what is possible within it, maps can reproduce power by controlling action. On the other hand, maps can be used to foster collective action.

Figure 2.1. Relationship between four conceptions of power and ways in which maps reproduce or contest power.



2.4 Room for Manoeuvre

Since this paper sides with the idea that the local scale of action can lead to transformations, maps adopted at this scale must be appropriate by community groups. For maps to be empowering, they must enable the community to navigate the institutional barriers that prevents them from participating in determining what kind of environment they want and hence, from attaining the broader goals of environmental justice. In order to do this, a map as a tool, needs to work in multiple ways. Michael Safier's (2002) devised the 'Room for Manoeuvre' framework, in the context of urban planning, taking into account multiple pathways where resistance can be applied. He recognises four dimensions to expand the potential action space of organisations and individuals and influencing decision making structures and processes; the technical/behavioural dimension, the institutional/inter-organisational dimension, the social relations/mobilization dimension and the strategic response dimension. The Room for Manoeuvre framework (Figure 2.2) is useful here because it provides a systematic approach which can be directly related to the ways maps operate to reproduce or contest power, thereby respectively restricting or expanding the action space of individuals or groups to influence institutional processes.

The specific ways in which maps reproduce or contest hegemonic power are described in the following section.

These, together with the dimensions of Safier's 'Room for Manoeuvre', provide an analytical framework which is captured in Table 2.3 at the end of this Chapter.

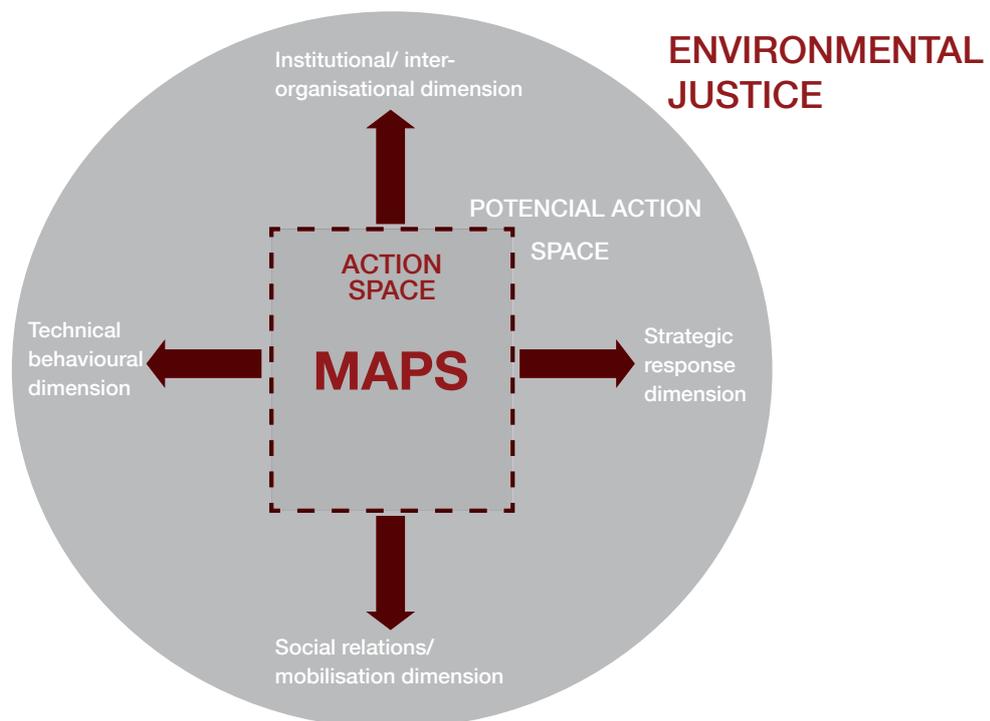
2.5 Maps Reproduce Power

Maps Marginalise

Marginalisation occurs, as in Young's (1990) words, through mis-recognition or mal-recognition which prevents the participation of people in determining their actions, or conditions for their actions (Young, 1990, p. 31). Applied to maps, this occurs primarily in three ways: through trivialisation, through calculated omission/exclusion, or conversely, through inclusion which leads to homogenisation and the mal-recognition of diversity.

Marginalisation through trivialisation is especially evident in colonial maps, in which natives are purposefully depicted as primitives, unable to develop the land and its resources, thereby giving colonizers the licence to appropriate (British-Library, 2010). Moreover, another imperialist tactic was the representation of large expanses of the new world as blank and terra nullis, legitimising its occupation (Dodge et al., 2009, p. 10).

Figure 2.2. Room for Manoeuvre (adapted from Safier, 2002) showing four dimensions and the action space and potential action space towards environmental justice.



Through the omission of particular places and what they represent, the invisibility of the people who occupy them was achieved, contributing to their oppression.

This oppression through cartographic omission is still practiced by states today. For example, in many cities of the Global South, slums such as Kibera in Nairobi, and Dharavi in Mumbai, are left as empty spaces on state maps, implying their non-existence. One of the ways to pressure the state in recognizing the inhabitants of these areas as citizens who contribute to the economy, and have a right to secure tenure, is through the creation of their own maps. This is with the aim of being inserted into official maps and take part in urban planning and infrastructure development (SPARC).

This kind of marginalisation is also found in conservation maps where certain social groups and livelihoods are excluded (Harris & Hazen, 2006, p. 101). In East Africa for example, the territory labelled as national park is ever increasing and sees the exclusion of people over the economic benefit that ecotourism and trophy hunting bring (Hodgson & Schroeder, 2002). This is also the case of forest maps used to appropriate resources by the state and allocate logging rights to multinationals which writers such as Peluso (1995) and Fox (2005) have explored in Indonesia.

Indigenous knowledge in many instances is also excluded or displaced in favour of Western techno-scientific ideas even when the latter has been shown to involve complex understandings of ecosystem processes which require contextual knowledge to maintain a balanced ecosystem over a long term (Harris & Hazen, 2006; Hodgson & Schroeder, 2002). This displacement or even erasure documented by geographers, of indigenous topographic, cosmological and geographical knowledge through occupation and subsequent national programs is a means “to create and settle ‘empty’ lands” (Harley, 1989b; Radcliffe, 2009, p. 430). Furthermore, the west-

ern knowledge system on which maps are based, may not be able to capture indigenous spatial conceptions because these are much more complex and dynamic than the resultant ‘abstract’ space that maps inherently produce (Roth, 2009). This means that even if not intentionally, the adoption of maps will inherently lead to the exclusion of indigenous knowledge (Fox et al., 2005; Peluso, 1995; Roth, 2009; Wood, 2010).

As for the marginalisation through the denial of diversity, Christophers (2007) demonstrates this in his article focusing on the mapping of ‘creative industries’ in the UK. Under the UK Labour government of 1997, creative industries were identified as a critical area of economic growth and a focal point for policy development and hence, underwent extensive mapping. Christophers argues that the act of ‘bundling’ these industries under one term, effaces the very diversity which defined them as ‘creative’ in the first place, leading to their homogenisation which ‘can subsequently be mobilized to powerful effect in policy arguments’ (Christophers, 2007, p. 240).

This is also in effect how state maps work, as Radcliffe (2009) point out using the case of independent Ecuador, mapping of national space is bound up with statehood and national identity. They represent a unitary territory, effacing diverse ethnic groups, and by so doing, are able to “silences the profound regionalist tensions threatening to pull the newborn republic apart” (Radcliffe, 2009, p. 427).

It is precisely this silencing, with limited participation, which maps can work towards. By negating diversity as well as excluding people and their knowledge, they can also restrict their action.

Maps Manipulate and Convince

Maps exercise power through their ability to manipulate consciousness and persuade publics of their value free

Table 2.1. Four conceptions of power and their relationship to knowledge

CATEGORIES	CONCEPTIONS OF POWER	RELATIONSHIP TO KNOWLEDGE
1. DOMINANCE WITH KNOWLEDGE	Power through dominance upholding a certain order in the world	‘Better’ (more expert) knowledge used to influence debates.
2. PARTICIPATION	Power through determining conditions of participation.	Control over knowledge production used in decision making.
3. CONSCIOUSNESS	Power through Influencing consciousness	Knowledge used to shape consciousness, values and beliefs.
4. ACTION	Power through enabling or restricting action	Knowledge used to determine space for action and what is possible.

and truthful nature. How they manage this is explained by Harley (1989b). In the process of mapmaking, the patron and mapmaker are two voices that negotiate with each other and by so doing, neither is visibly dominant in the final product, and in fact, go so far as to annihilate one another. The result is an apparent authorlessness of the map (Wood, 2010). It is precisely this authorless projection which, according to Harley (1989), gives the map its power, because it is able to convince as “the map appear to be a window on the world (instead of an *argument* about it)” (Wood, 2010, p. 147).

For Harley (1989) and in turn Wood (1992), this naturalizing effect, is also promoted by the scientific aspect of the map, which gains authority from its apparent accuracy and technical know-how.

The scientific endeavour of maps also means that they seek to be truth documents, that is, they represent the world “as it really is with a known degree of precision” (Dodge et al., 2009, p. a). Hence they are legitimated and accepted as being true.

The status of truth gained, as Foucault highlights in conversations about power/knowledge, controls how we define and organize both ourselves and our social world (Gordon, 1980). In this act, other alternative discourses are marginalised and subjugated. Truths are constructed by the map as well as upheld by it, leaving no space for other kinds of truths. In the case of the mapping of the UK ‘creative industries’ (Christophers, 2007) for example, the final map suggests objectivity through mapping and statistics which lead to the production and validation of truth. It moreover uses expert knowledge which “not only makes government possible but depoliticises it” (Christophers, 2007, p. 243).

The tactics of manipulation and persuasion can be subtle and make use of the confident hard lines made on paper. For instance, by making visible various development efforts, maps are able to convince of progress (Pickles, 1995). Also, as seen in the case of conservation mapping, Harris (2006) highlights how the delimitation of zones to conserve species, convinces map audiences that we can actually achieve such an endeavours, ignoring flux and dynamism in the natural system. Alternatively, conservation maps may justify human use, and over-use outside the conservation zones (Harris & Hazen, 2006, p. 111).

Therefore one can argue that maps exercise power through their ability to affect our behaviour because through the manipulation of consciousness, they can determine our beliefs, which in turn determine several aspects of our individual and collective representation, our production of knowledge, our group ethics and ultimately our actions.

Maps Construct

Through the act of ‘enframing’¹, maps can give shape to something, give it a form it never had before. In fact, the rise of the modern state can be associated with the rise of maps which used them to form and organise their many interests (Wood, 2010). It is especially in the 17th century that maps and mapmaking really took off and became indispensable. As many contemporary scholars note, the map had the ability to give the state a concrete, territorially unified form, not only for those living inside it but also those outside. This is turn projected a “national union between disjointed regions and politically disparate people” (Bruckner referred to in Wood (2010, p. 31). It can be therefore argued that maps helped construct the state and in turn the state itself affirms the map. As Black notes, cartography was an important tool in “staking and sustaining territorial claims during the process of their definition and defence” (Black, 1998, p. 145)².

Moreover, maps construct new geographies and histories because they are able to imagine new possibilities such as international trade and territorial conquest (Crampton, 2001). They also construct ‘communities’, as several scholars (Peluso, 1995; Wainwright & Bryan, 2009) have argued, referring to the grouping of people which might not otherwise refer to themselves as belonging to one single community. In the case of Nicaragua and Belize, for instance, Wainwright et al (2009) explore how the ‘Maya community’ was defined “spatially and ontologically” (Wainwright & Bryan, 2009, p. 163) through boundaries on a map which fixes their otherwise trans-village social life at the regional scale.

The act of enframing also focuses attention on specific things which in turn extend the potential of the things enframed (Mitchell referred to in Christophers, 2007). This is understood as the new perceived ability to contribute and ‘do work’ as is the case of the creative industries mentioned earlier (Christophers, 2007). Enframing the ‘creative industries’ not only enabled the creation of a new sector or institution (called ‘creative industries’) but also brought attention to them, positioning them as important contributors to the economy³. This in turn makes them available to exploitation by other economic sectors. The delimitation of natural parks also serves to demonstrate this aspect because as Hodgson et al (2002) argue, it potentialises them to contribute to the economy through tourism.

The construction of the economy through maps is also explored by Radcliffe (2009) who argues that replacing blurred boundaries or overlapping usufruct claims with precise, plotted borders leads to the “abstraction of rural areas” and opens them to neo-liberal endeavours (Radcliffe, 2009, p. 439). She argues that titles are viewed as “a basis for creating collateral and releasing the poor’s entrepreneurial potential as well as generating government revenue” (Mitchell, 2005 referred to in Radcliffe, 2009, p. 439). Therefore maps play a role in strategising and tactically opening up new possibilities and unleashing potential.

Overall, maps exert power through their ability to construct territories and their contexts (social, economic, physical) in which new situations can be envisioned in order to benefit the dominant regime.

Maps Control

Because maps have the ability to construct and convince, they also have the ability to control. Control here, although it can be approximated to manipulation, is differentiated as it refers specifically to the restriction of action. Wood (2010) states that “the work of maps is to apply social forces to people to bring into being a socialized space. The forces in question? Ultimately, they are those of the courts, the police, the military; but what maps are really good at is replacing, reducing the necessity for, the application of armed force” (Wood, 2010, p. 137). In this way, maps discipline because by enframing and thus focusing attention, they bring about the auto-discipline⁴ of the object under surveillance. Christophers (2007) notes that “mobilizing geographical knowledges is seen to be central to the creation of institutions and the envisioning and control of the economy” (Christophers, 2007, p. 245). This control relies on organisation and order and he demonstrates how ‘creative industries’ were ordered making them available to “new forms of government calculation and discipline” (Christophers, 2007, p. 240). Once mapped, they are quantified and assigned a performance that can be measured and regulated.

The restricting aspects of maps is also seen in conservation mapping where delineating protected zones in maps are understood as means to control potential conflict between particular groups. For instance, some areas which are resource rich and may be the focus of conflict are preferentially protected over others, thereby asserting state power and control over the possible reactions of people (Harris & Hazen, 2006, p. 108).

Control by the state not only happens through mapping places but also through what Roy (2009) refers to as “unmapping”⁵. In her article on informality, she argues that systems of deregulation and unmapping are not casual and that regimes of urban governance can operate through them. She explores how the state purposefully leaves the peri-urban areas of Calcutta as unmapped, because it allows it considerable “territorialized flexibility to alter land use, deploy eminent domain, and to acquire land” (Roy, 2009, p. 81). Thus ‘unmapping’ becomes a means of control as well as accumulation.

What is clear, through the many examples highlighted above, is that the control through maps is most often covert. It uses several techniques to purposefully restrict action, but these techniques are not always visible in the map’s performance.

2.6 Maps Contest Power

History suggests that if “more territory has been won through maps than guns...more territory can be reclaimed and defended by maps than by guns” (Nietschmann, 1995, p. 37).

The way in which maps constrain action through discipline, exclusion, restricted participation and the influencing of consciousness and conceptions of space, offer paths for counter action. As Foucault argues, the existence of power is also an opportunity for resistance. Maps can similarly contest through inclusion, critical reflection and learning, reframing established views and enabling collective action.

Maps Include

A growing body of literature explores the way in which participatory mapping is used as a means to include previously marginalized groups in society, such as school children, indigenous people (Fox et al, 2005; Peluso, 1995; Hodgson et al, 2002) or slum dwellers (Fox et al., 2005; Hodgson & Schroeder, 2002; Peluso, 1995; SPARC)

For instance, the analysis of enumeration and mapping of informal settlements across Asia and Africa, report that mapping served to bring the inhabitants together to participate in the process of consensus building (Alcorn, 2000), and create a space where “the inclusion of all residents is negotiated” (Karanja, 2010, p. 218). The production of previously inexistent maps of their settlement also enabled their visibility and lead to their recognition as important contributors to the economy of the city⁶. This includes the recognition of their technical know-how in the production of information, which in most cases, goes beyond the capacity of the authorities.

In more practical terms, mapping allows to establish a home address, which is a big part of a person’s identity, because without it one does not exist for the authorities. In Mumbai, for example, the mapping of pavement dwellers, has been a means to affirm their existence in the eyes of city officials who treated them as transitory and therefore without rights to the city, even though some of them had been living in the same location for more than 30 years.

Also an address, as well as facilitating political rights such as voting, enables the ability to access services. In the slums of Kisumu, Kenya, developing streets and allocating street names in turn enabled utilities companies to plan services and bill individual households (Karanja, 2010, p. 221) who would otherwise buy water from vendors, sometimes of uncertain quality and at exorbitant rates.

Also, in terms of the recognition of knowledge, Parker (2006) argues that community mapping “legitimizes a diversity of authors and images by altering technical and access barriers” (Parker, 2006, p. 475). She adds that in some cases it “legally and practically affirms local knowledge”(Ibid).

Maps, therefore, when produced through the participation of community members, are seen as a means for the recognition of the previously marginalised (and their knowledge), not only at the scale of the community, but also at the institutional scale. Potentially maps could enable broader participation of the marginalised in urban affairs.

Maps Raise Critical Reflection and Learning

Critical consciousness needs to happen at multiple levels; from the individual's awareness of his own self-esteem to a group's collective consciousness of their position in relation to the wider social, physical, political, and economic context. Both require the awareness of the processes that affect their behaviour in a conscious or unconscious manner. Mapping can contribute towards this, through raising awareness of the surrounding and opening up debate about problems, priorities and solutions (Karanja, 2010). Moreover by making their own maps, neighbourhoods can represent themselves. Not only do they understand their situation better but they can contest other representations of their community (Parker, 2006, p. 478 -referring to US neighbourhoods and the proposed representations from developers).

The bioregional movement is an example where the focus is on consciousness of place in order to re-inhabiting it (Aberley, 1993). By mapping entire watersheds, inhabitants make evident the interrelationships and bring coherence to an otherwise fragmented understanding of what makes a place. Through raising awareness, mapping seeks to promote social change as well as address pressing environmental problems. Moreover, it seeks to promote the acceptance of other ways of knowing by incorporating “intangible knowledge, feelings and attitudes” (Aberley, 1993, p. 23) into their maps. The confidence to produce alternative knowledge comes from the awareness of the potentially oppressive effects of mainstream knowledge but also the inadequacy of the latter to capture certain subtleties and better practices. For example Fox et al (2005) explore how indigenous knowledge is being reaffirmed in Thai villages and how community mapping forms the basis through which new conservation and development activities are formulated with foresters.

Thompson & Mitlin (1995) point to the fact that the collection of information by the community is shown to affect self-esteem and improve capacities because people

realise that they have valuable knowledge to contribute and “gain confidence in their capacity to be important agents in development” (Thompson & Mitlin, 1995, p. 237). In many slum enumeration and mapping instances, the inhabitants accomplish the technical task themselves and are able to produce accurate and comprehensive data which demonstrates their capabilities in the eyes of outsiders and places them in a better position for decision-making negotiations (Burra, 1999; SPARC).

The ability of maps to raise awareness of one's surrounding and the powers at play that restrict action requires as Harley (1989) says, to question the ‘silences’ in dominant maps. Positioning oneself critically vis a vis maps requires the acquisition of skills not only to read western maps but also to interpret them. These skills in turn permit a more informed type of resistance.

Maps Reframe

New causal relationships can be established by bringing previously disparate elements on the same map. This is particularly useful in situations where the space for negotiation can only be expanded through casting a different light on an otherwise ‘set’ situation. For example, a personal experience I encountered in Ghana, while focusing on the promotion of urban agriculture in Ashaiman, is the role that mapping played in reframing the Roman Down farm⁷ as fundamental for the town's management of water and waste. The farm was under treat as local chiefs, who owned the land, referred to the farmers as squatters and sought to evict them in order to develop housing on the land.

Through mapping the relationship of the farm to the wider context and superimposing the flow of water and waste from the town (Figure 2.3 and 2.4), it was possible to argue for its vital purpose as a flood plain and its supporting role in the proper functioning of the Ghana Irrigation Development Authority (GIDA) dam further upstream.

The argument brought forward was highlighting the fact that the flow of water would be restricted and the accumulation of waste exasperated by building on the land. This would then cause the water to backflow, jeopardising the dam itself. The physical mapping of causes and effects potentially reframed the importance of urban agriculture on that site, and portrayed the framers as beneficial, thereby enhancing their recognition as valuable contributors and subsequently increasing their negotiating power.

Another example is that of Nairobi, where information gathered provided the basis for negotiations, and prioritization of settlements for infrastructure development, from actors such as Nairobi City Water and Sewerage Company, the Water and Sanitation Programme of the World Bank and other utility companies (Karanja, 2010, p. 221).

Maps give people credence and confidence to contribute to key debates and influence decision-making. They are therefore strategic and tactical tools. Opening up spaces for negotiation and conceiving new possibilities and situations depends on transforming the relationship between different stakeholders in one that is mutually beneficial (Ostrom, 2009). Mapping, as a participatory technique, has been shown to positively change relations within communities as well as between communities and government officials (Thompson & Mitlin, 1995, p. 248, referring to Tony Gibson's experiences through using Planning for Real) and enhance collective action (Alcorn, 2000).

Maps enable Collective Action

The participatory mapping process has the potential to enhance cohesion within a community by bringing people together and opening up debates, as well as formulating a common intent. In some situations it has successfully tackled internal conflict. For example in the informal settlement of Kisumu, in the process of mapping, conflicts between landlords and tenants were brokered and agreement reached so that all households could be accommodated in the upgrading scheme (Karanja, 2010, p. 220).

In many of the informal settlements, mapping has enabled the identification of various skills within the community and facilitated interaction and exchange, thereby strengthening internal networks.

Moreover, in many cases of slum enumeration, the mapping process opens up the way to many other collective endeavours such as savings groups, community based finance systems and micro- business support (Burra, 1999; SPARC) which all contribute to building commu-

Figure 2.3. Waste problem mapping showing farm in relation to wider context (own source)

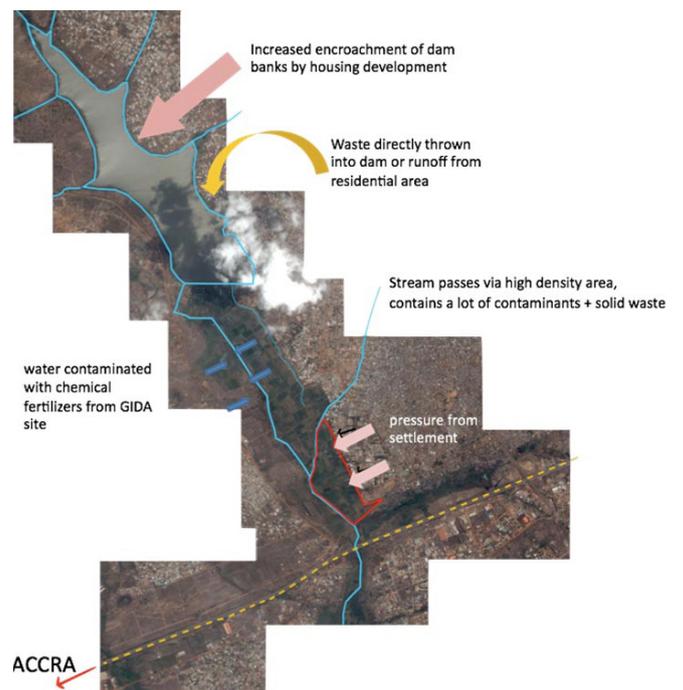
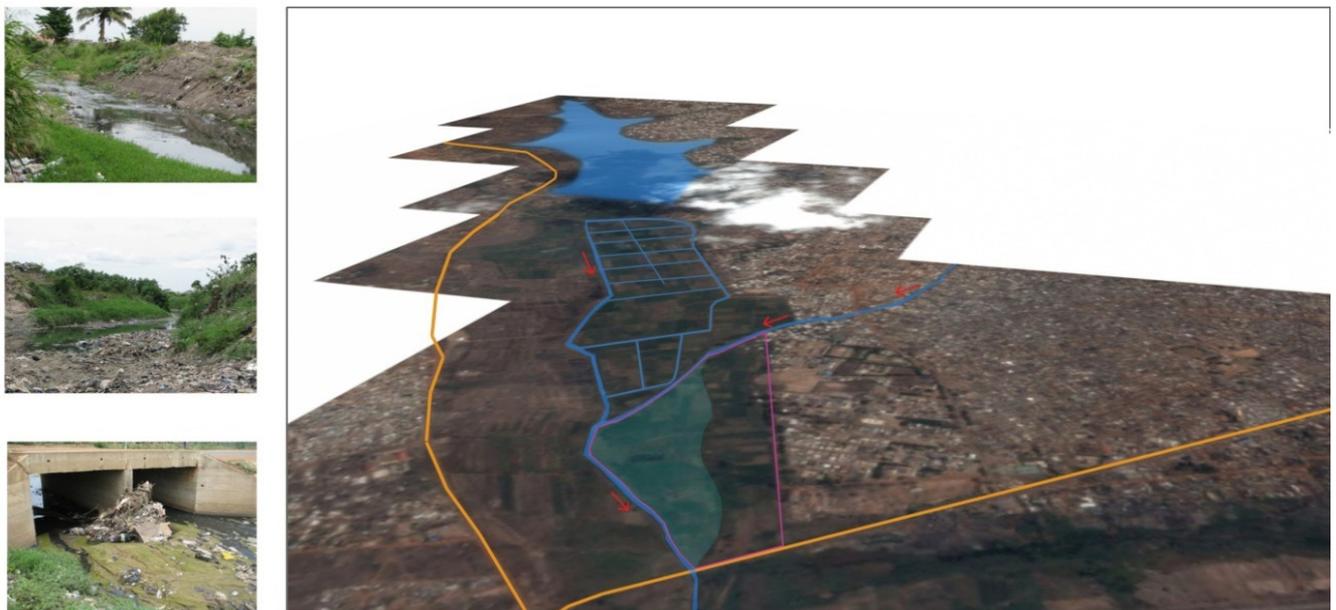


Figure 2.4. Map showing extend of flooding on Roman Down Farm (own source)



nity capacity. The formulation of an organized group, facilitates their power to acquire services. In the case of savings groups, they are able to enlarge their finance base through recognition from the bank and its willingness to lend (Levy, 2007). Maps and map-making are therefore useful as an initial tools for mobilization which can then be taken up by other processes.

Maps and map-making processes are also effective in contesting discriminatory power, through collective pressure, and producing desired outcomes. Many indigenous communities for instance, have effectively managed to secure legal control over resources and rights (Aberley, 1993; Peluso, 1995). In urban areas in the Global South like Dar Es Salam and Karachi, they have also empowered citizens in acquiring services such as water and sanitation, not only through pressuring the state for these basic needs, but also through their own collective efforts (Glockner, 2004; Hasan, 2006; Welle, 2006).

At a larger scale, the mapping process was one of the means used to bring community organisations together into larger federations (Burra, 1999; Karanja, 2010). This scalar possibility also includes the collaboration with state and private sector to collectively co-produce information and services.

The collective acquisition of skills, politicized consciousness, and participation in knowledge production all inform and inspire collective action (Parker, 2006, p. 477) and counteract the controlling nature of state maps. Through their mobilization and organization, marginalised inhabitants can better defend their socio-environmental rights.

2.7 The Framework

The 'power of maps' and the dimensions in Safier's 'Room for Manoeuvre' are brought together under one framework. This is captured in Table 2.3. Under each of the four dimensions, one can assess how maps affect the action space. Using the indicators, one can determine the extent to which maps reproduced or contested power and assess their emancipatory nature.

Technical/behavioural Dimension:

This dimension refers to the ability to affect the action space by determining behaviour and skills. Through their technical know-how, maps have the ability to persuade and hence influence behaviour. One's self worth and capabilities may be affected because dominant regimes, through their own maps, have control over the representation of an individual or collective as well as their actions. Acquiring a critical consciousness vis a vis these

regimes, as well as the technical skills to contest them, can enhance self worth and capabilities and therefore push the boundaries of the action space.

Determining whether maps expanded or contracted the action space in this dimension can be measured by assessing whether awareness of the physical/social/economic/political context was achieved, as well as the technical skills for self representation and critical consciousness regarding the type of knowledge used and its effects.

Institutional/inter-organisational Dimension:

This dimension refers to the ability to play a role in institutional affairs and create inter-organisational links which determine the action space. Both are dependent on recognition. Maps through their ability to include or marginalise, determine recognition and hence participation. They affect the possibility for collaboration between organisations and therefore influence institutional and organisational capacity. Moreover, maps determine participation in decision making by influencing knowledge production.

The way maps affect the action space is here measured through assessing the recognition of the marginalised, their participation in knowledge production and decision-making, and the effect on inter-organisational networks and the organisational and institutional capacity.

Social relations/mobilisation Dimension:

In this dimension, the action space is affected by the capacity to enhance social relations and mobilisation. Maps have the ability to control or restrict social action on the one hand, or strengthen collective action by mobilising a community to resist oppression. Maps therefore relate to this dimension because they can determine social capacity by having an effect on interaction between individuals or groups.

The extent to which new alliances and collaborations as well as social interaction and mobilization are fostered, determine the expansion of the action space within this dimension.

Strategic response Dimension:

This dimension refers to the opening of new possibilities and situations that affect opportunities for negotiations. Maps as strategic tools directly relate to this dimension because they construct a certain reality and frame possibilities within it. Hence they can be utilised strategically to reframe and formulate new situations, as well as determine the opportunities for negotiation, thereby affecting the action space.

Table 2.2. Summary of the ways in which maps reproduce and contest power.

REPRODUCE POWER		CONTEST POWER	
MARGINALISATION	<ul style="list-style-type: none"> • un, mis or mal-recognition • trivialisation • omission or exclusion • homogenisation, effacing diversity • exclusion of other knowledges 	INCLUSION	<ul style="list-style-type: none"> • participation in knowledge production and decision making • visibility and recognition
MANIPULATION	<ul style="list-style-type: none"> • persuasion of value free truths through scientific aspect • no space for other truths • manipulation of consciousness 	CRITICAL REFLECTION /LEARNING	<ul style="list-style-type: none"> • self-worth and collective consciousness • awareness raising of context • validation of other knowledges • acquisition of skills for self-representation
CONSTRUCTION	<ul style="list-style-type: none"> • enframing gives new shape and construct entities • focusing of attention potentializes 	REFRAMING	<ul style="list-style-type: none"> • formulation of new contextual relationships • community as resource • improve space for negotiation • formulation of net benefits
CONTROL	<ul style="list-style-type: none"> • discipline through focusing attention • order and organization • efficiency and efficacy • dissipate potential conflict • maintaining flexibility 	COLLECTIVE ACTION	<ul style="list-style-type: none"> • mobilization • addresses conflict within + outside • organize efforts • builds capacity • alliances and collaboration

Table 2.3 Framework to determine how the use of maps enacts power

Room for Manoeuvre Dimensions	Conceptions of power		INDICATORS
	contest	reproduce	
<i>Technical/ behavioural</i>	Critical consciousness/ learning	Manipulate	<ul style="list-style-type: none"> • Awareness of physical, social, economic, political context • Technical skills for self representation • Critical awareness of tool
<i>Institutional/inter-organisational</i>	Inclusion/ Participation	Marginalise	<ul style="list-style-type: none"> • Recognition of the marginalised • Participation in knowledge production and decision making • inter-organisational networks • Organisational and institutional capacity
<i>Social relations/ mobilisation</i>	Collective action	Control/restrict	<ul style="list-style-type: none"> • Social interaction and mobilization • Alliances and collaboration
<i>Strategic response</i>	Reframe	Construct	<ul style="list-style-type: none"> • formulation of new contextual relationships for the marginalised • opportunity for negotiation

NOTES TO CHAPTER 2

1. Term used by Mitchell referred to in Christophers (2007)
2. Black notes that much of European cartography has a military rationale and application, and that it was prepared under military aegis or for military purposes.
3. Even though it is debatable, as highlighted on Christophers,2007:239 “ it has been widely and uncritically accepted that these industries are important, dynamic and growing, even though pockets of academic research strongly query these conclusions.”
4. Auto-discipline is explored by Foucault in his analysis of the panopticon prison where the knowledge or belief of being watched leads to self-discipline.
5. This term can also be understood as mapping leaving spaces blank.
6. Enumeration and mapping in slums found in various SPARC initiatives.
7. Roman Down Farm is a farm south of the main GIDA Dam in A

3. ASSESSMENT OF CASE STUDY

Mapping for water and sanitation in Karachi: The Work of Orangi Pilot Project-Research and Training Institute (OPP-RTI)

3.1 Background

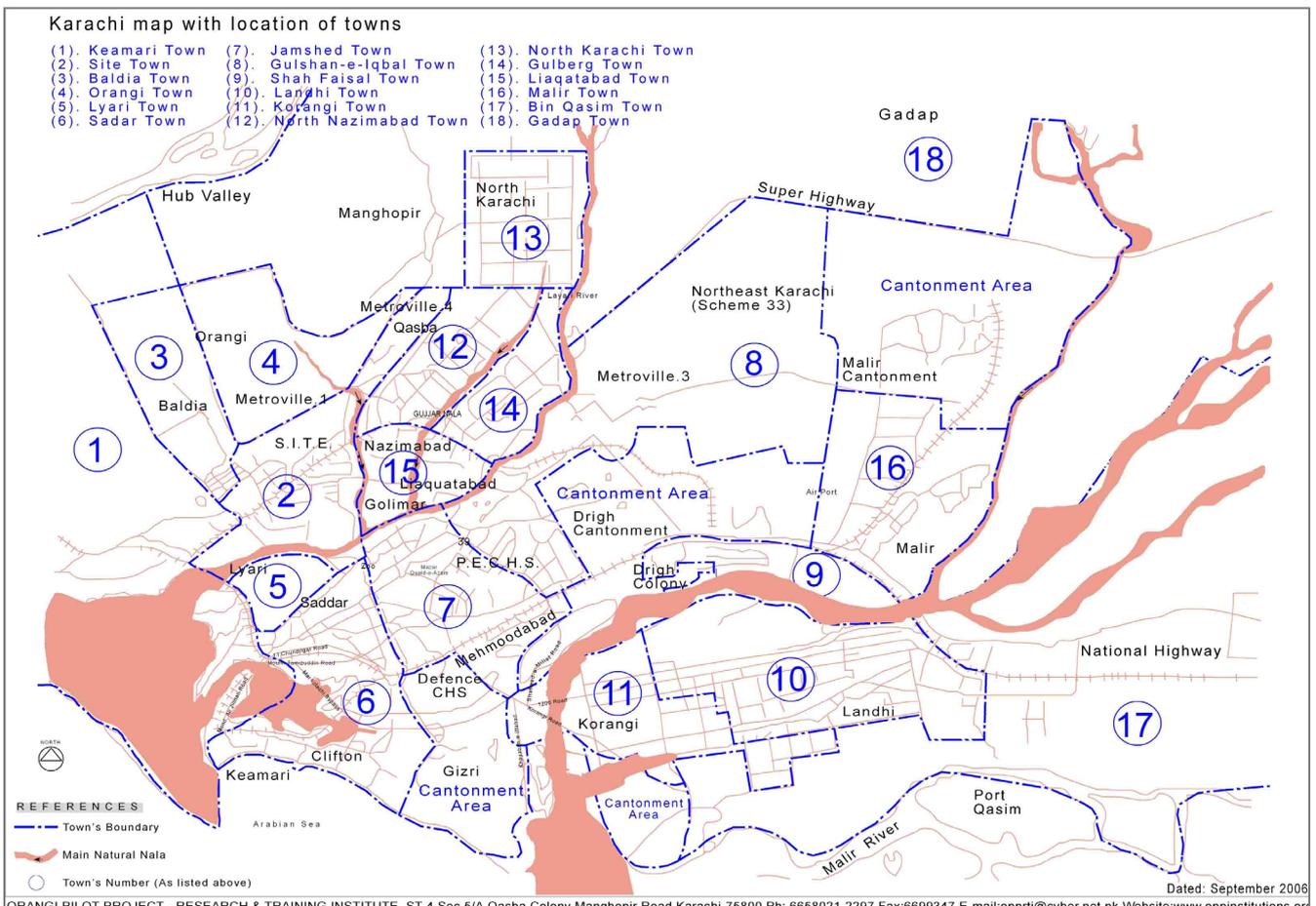
Karachi, is the only port city in Pakistan, located in the Sindh province. After the enactment of Local (city) Government Ordinance 2001, under the Devolution Plan, Karachi became a district divided into 18 towns (Figure 3.1) which are in turn sub-divided into 178 Union councils (UCs), each with its own elected mayors and deputy mayors.

Karachi’s population has undergone a considerable increase and it is now estimated at 13 million (Welle, 2006, p. 1). This rapid increase of urban population and the inability of the authorities to keep up with the housing demand, has resulted in the proliferation of

unauthorized settlements on government land called katchi abadis, which account for 61% of Karachi (Master Plan Group of Offices, 2007). These settlements are characterised by lack of government infrastructure and services (Welle, 2006).

Due to the rapid physical urban expansion, the sewerage of the city has not kept pace and only 40% of the city’s population is served (Pervaiz, Rahman, & Hasan, 2008, p. 1). In the absence of a planned disposal system, katchi abadis as well as more formal new urban settlements, built their underground sewers or open drains which dispose into the natural drainage system (nalas), eventually making it to the sea untreated (Hasan, 2006).

Figure 3.1. OPP-RTI Karachi map showing location of towns and natural nalas. Source: OPP-RTI <http://www.oppinstitutions.org/>



3.2 The relevance of mapping and infrastructural information in Karachi

One of the main obstacles identified for the development of a coherent sewage infrastructure in Karachi is the lack of information and comprehensive maps of the urban infrastructure. This has contributed to many challenges, especially unclear responsibilities between government agencies for sewage disposal leading to inefficiencies and confusion in service delivery. Moreover, the coordination between the UCs, towns and CDGK in sewerage development and maintenance is difficult as the maps used by planners are outdated and the maps used by various agencies are not always consistent in scale. Also, the absence of information of the existing infrastructure (which can serve as a basis for new proposals), evidences the lack of transparent processes, corruption and waste of resources. This is especially so with regards to the use of external loans by the government for large sewerage and drainage infrastructure proposals (Welle, 2006).

The case study chosen here, is the mapping for sanitation undertaken by the Orangi Pilot Project-Research and Training Institute (OPP-RTI) in Karachi in support of the inhabitants of the katchi abadis to develop a sewage system and negotiate for investment from the government.

This case study is particularly relevant for this paper because it illustrates how maps have been successfully used to navigate institutional barriers leading to the recognition of informal settlements and securing their access to sewage disposal. It is also interesting to analyse OPP-RTI, in particular, because as an organisation, it has gone beyond its initial focus on the katchi abadis: its sanitation model was so successful that it has been adopted in many other towns in Pakistan. Moreover it has contributed in the production of maps in a context which was lacking it. Its mapping activities have expanded from katchi abadis to UCs, towns and the entire sewerage system of Karachi. This information has been institutionalised and is now being used by various government agencies including planners and engineers (Hasan, 2006; Pervaiz et al., 2008; Welle, 2006).

Figure 3.2. OPP-RTI map showing the natural nalas and drain. Source: OPP-RTI <http://www.oppinstitutions.org/>

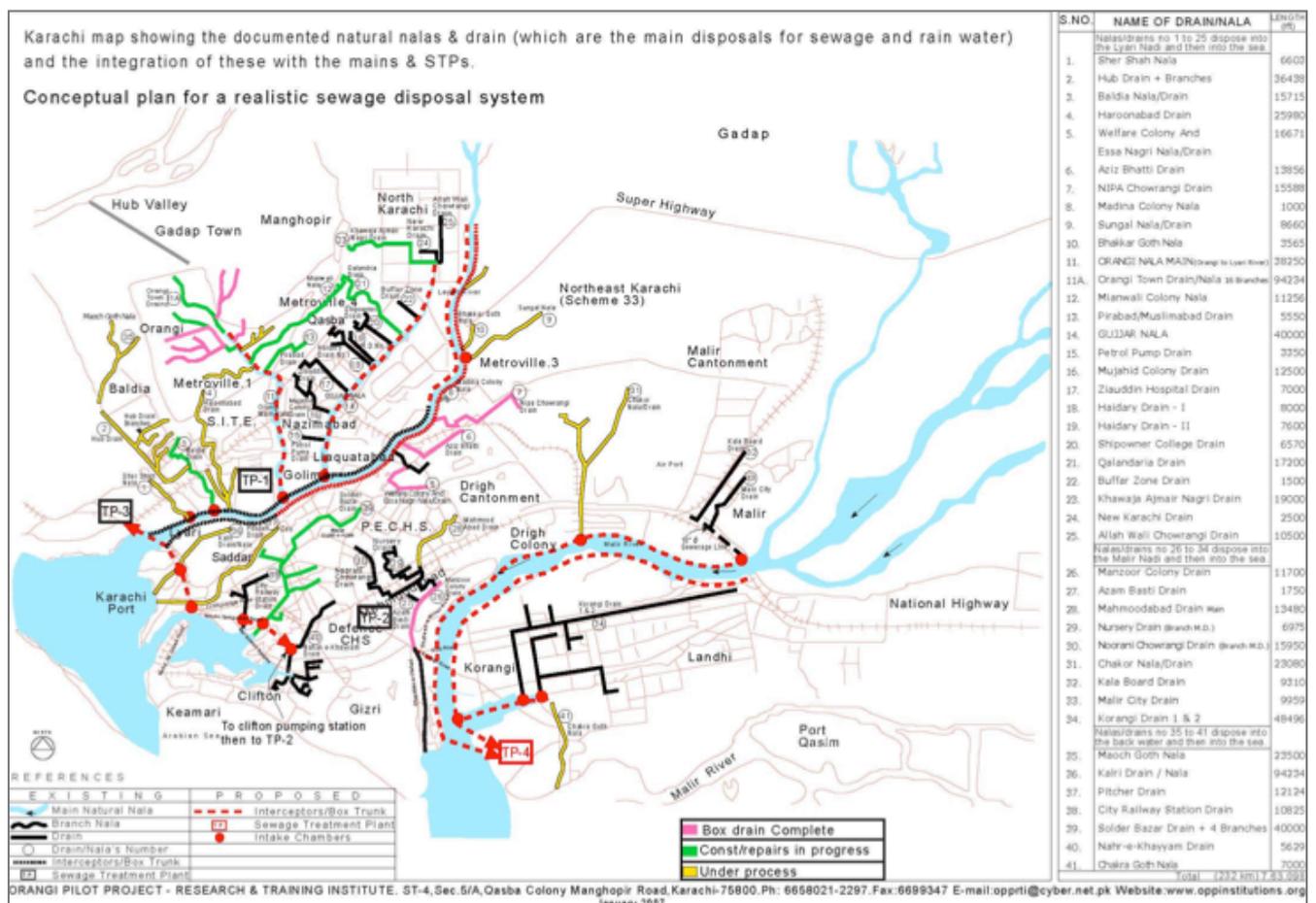
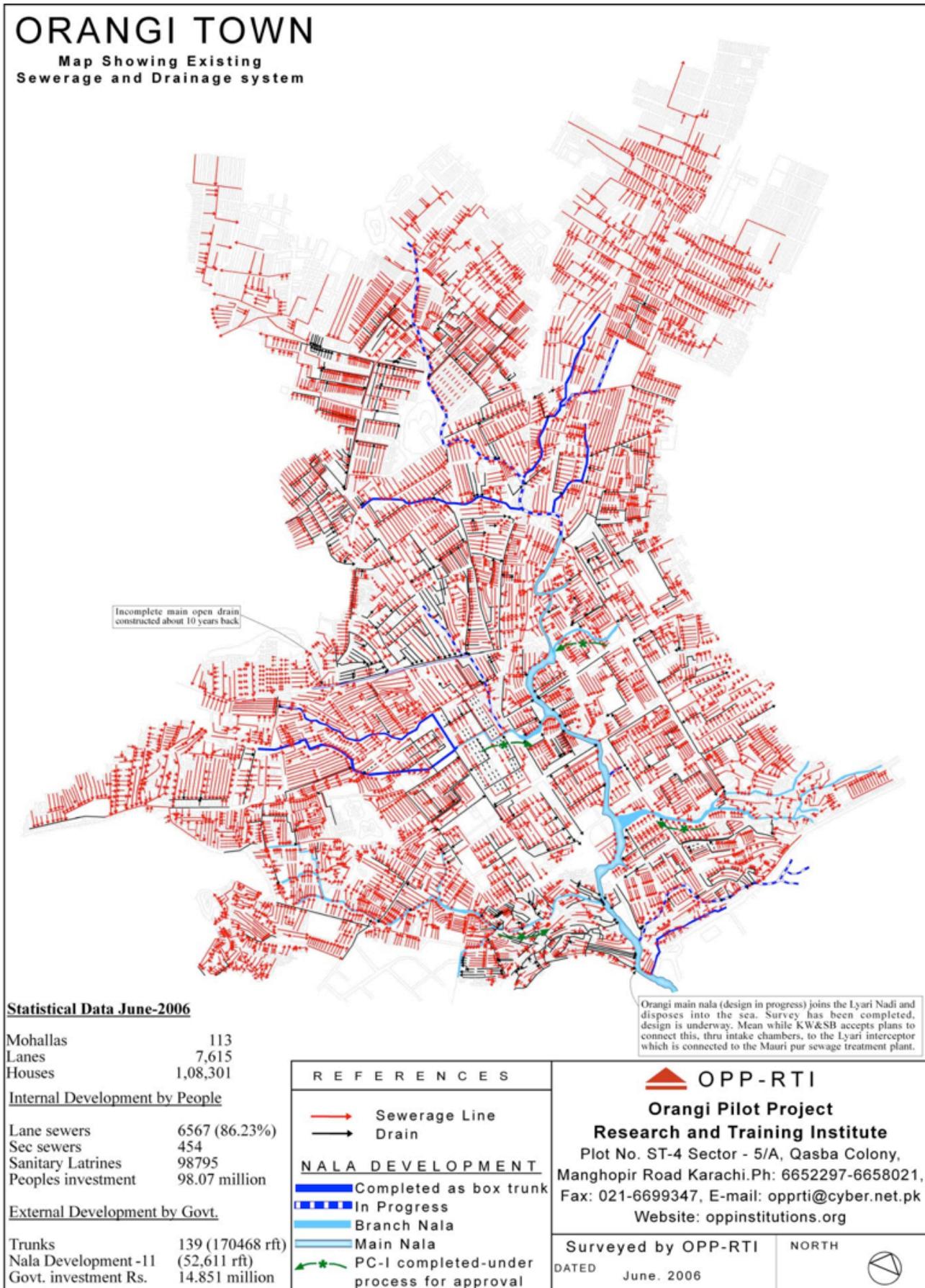


Figure 3.3. OPP-RTI map showing progress on the nalas development. Source: OPP-RTI <http://www.oppinstitutions.org>



3.3 The Orangi Pilot Project-Research and Training Institute (OPP-RTI)

The OPP-RTI, founded in 1988, is a Pakistani NGO working in the informal settlements of Orangi Town in Karachi. It followed from the Orangi Pilot Project (OPP)¹. Its main focus is on the development of a low cost sewage disposal system² by providing communities of katchi abadis with the technical support and managerial guidance identified as very important from lesson learnt in OPP. OPP-RTI does not carry out the development work itself but supports the community to do so.

The main nature of OPP-RTI's technical assistance is in map-making and plans for the community as well as providing the estimates of materials and labour, training for how to build the system and how to supervise work done by contractors (Figure 3.2 and 3.3 show some of the maps produced).

The mapping is mainly targeting two levels:

1. **At the community level** - to document the existing context so as to develop a system which is affordable, effective and helps to organise the inhabitants' efforts at lane and neighbourhood level (OPP-RTI).
2. **At the institutional level** - to influence government in recognising people's initiatives and contribute to them, as well as tackle corruption and waste of resources on large infrastructural projects (OPP-RTI).

3.4 OPP-RTI Mapping Methodology

The production of maps is carried out in a low cost, low tech manner. There are principally four mapping stages (Welle, 2007, p. 18):

1. **Surveying and drafting stage** consists of students under the Youth Training Programme (YTP)³, accompanied by area activists and/or an OPP social organizer to survey the houses and lanes, taking measurement and hand sketching maps. These maps are then drafted at the OPP-RTI office
2. **Documentation of existing services** is carried out by YTP students based on information given by local community leaders or CBOs. All existing water supply and sanitation services, including their technical specifications, costs, state of functionality and who constructed them are documented.
3. **Proposal development** is done by OPP-RTI staff. The proposal is developed on the basis of map of the existing in order to work with government agencies showing suggestions for sanitation infra-

structure improvements. Cost estimates are also prepared for proposals based on current market prices of labour and material.

4. **Updating and Institutionalising mapping** is done by OPP-RTI staff. This involves the preparation of handbooks for UCs with maps showing natural drainage system, existing infrastructure and proposed collector sewers. Once the people form confederations of lanes, money is collected and the collector sewers are built and updated on the map.

3.5 Assessment of the Case Study Using the Framework

The framework developed in Chapter 2 is hereby applied to assess the extent to which maps reproduced or contested power. This section is divided into the four dimensions of 'Room for Manoeuvre' and, within each of these, the relevant indicators are organized as questions which can be answered with 'Yes', 'No' or 'Unclear'. 'Yes' indicates that maps contested power, 'No' indicates that maps reproduced power. An 'Unclear' suggests that both are the case or that there is not enough evidence for a definite answer. The summary table 3.1 shows the assessment.

Technical / Behavioural Dimension

Maps raised critical consciousness and learning

Awareness of context- Through the preparation of maps, the inhabitants of the informal settlement, as well as the city authorities, were able to have a better understanding of the physical context and the drainage system of the whole city and its interrelationships (Hasan, 2006). The maps also raised awareness about the political context as they opened up debates and led to a critical attitude towards responsibilities and functions, particularly those of the government institutions. The maps were able to capture all the main players in sewage disposal system as well as their progress in its development.

Also, maps raised awareness about dominant development paradigms, critically challenging the planning of infrastructure projects and the use of foreign loans (Pervaiz et al., 2008, p. 2). The maps documenting the infrastructure were used to put into question government and IFI planning policies and development projects. Convincing estimates were prepared on their basis. These were within the budget affordable by the Sindh government and therefore lead to cancellation of loans and the acceptance that development can hap-

pen from the bottom up without foreign interference. For example, an ADB loan of US\$ 70million to the Korangi Waste Water Management Project (KWWMP) was cancelled by the governor of Sindh after the OPP-RTI successfully argued for the 'internal-external 'sewage model using the maps produced (Hasan, 2006, p. 474).

Technical skills- The lack of confidence in technical issues was seen as one of the main barriers by the community (Hasan, 2006; Welle, 2006, 2007). During the mapping process, some members of the community did acquire technical skills which had an effect on self-esteem and subsequently affected behaviour. This in turn enhanced equitable relationships with others. For example, residents who trained to read maps and plans supervised contractors' work on external sanitation (Hasan, 2006, p. 466). They were able to identify substandard work and ask for its rectification. This assertive position, backed up by the documentation, placed them at the same level as the contractors and the local government officials, enabling them to

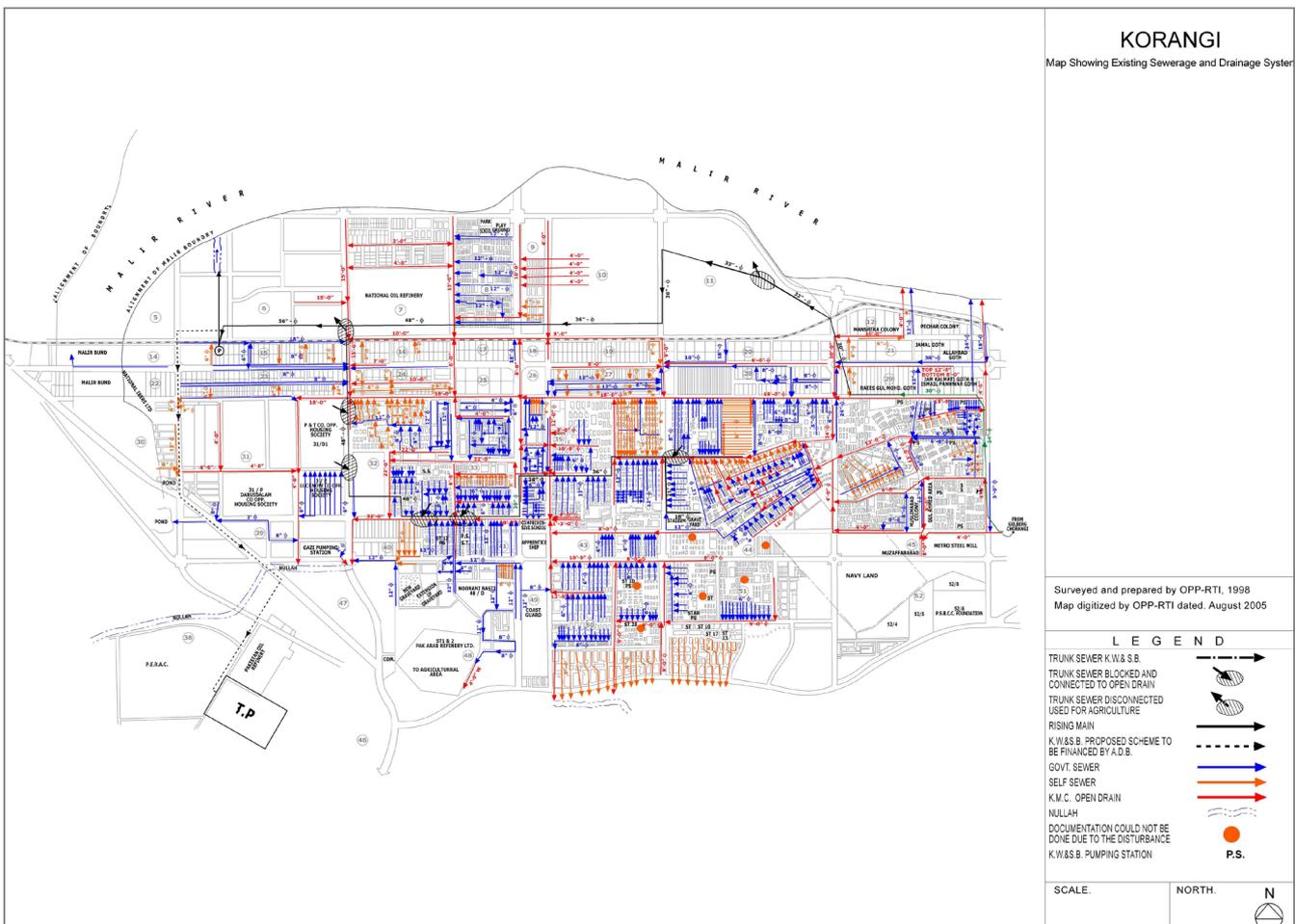
engage in a more informed manner⁴. As Welle (2006) notes through interviews, members of the community mentioned that they had more confidence for future interaction with government officials with regards to improvement of their settlement (Interviews; Rashid, 1998- referred to in Welle, 2006, p. 23)

Maps manipulated /convinced

Awareness of the tool: Maps were adopted uncritically and there was not a deeper learning about how they are tool of power, embedded in western knowledge. This would have required not only learning skills about how to read and make maps but how to interpret them and understand the way representation works to manipulate beliefs. It would require a consciousness of western cartographic knowledge systems (Johnson, 2006).

Therefore the manipulative aspect of maps at a higher level of consciousness is still present. In a sense, there is no escape from this because when a community adopts maps uncritically and uses them to advance their interests,

Figure 3.4. OPP-RTI map of Korangi showing existing sewerage and drainage system and main actors. Source: OPP-RTI, <http://www.oppinstitutions.org/>



they have to revert back to the same techniques used to reproduce power because they have to rely on their apparent objectivity and technical accuracy. This is needed in order to be legitimated, and hence proliferate the idea of maps as truth documents, which are inherently manipulative. In this sense, in order to contest power, maps reproduce it. This aspect is explored by Peluso (1995) and Hodgson et al (2010) as the unintended consequences of counter-mapping, where indigenous communities adopt a legal-cartographic strategy to bolster the legitimacy of their customary claims to resources. But by doing so, they end up effacing indigenous knowledge and ways of life because the maps lead to the undesired effect of fixing boundaries in what is an otherwise fluid relationship with the landscape and people. This then may actually lead to an increased privatization of land (Fox et al., 2005).

Institutional / Inter-Organisational Dimension

Maps included

Recognition- Recognition is a pre-requisite for participation (Fraser, 1997; Schlosberg, 2009; Young, 1990), and the case study clearly shows how the maps, fostered the recognition of the inhabitants of the katchi abadis as able contributors to the city.

Previous to OPP-RTI's efforts, katchi abadis were invisible in urban maps. Under the UNDP-supported Karachi Master Plan 1975-85, land use plans for the city were prepared using aerial surveys, as well as digital mapping systems under the 2000 plan (Hasan, 2006). However, the scale of these maps were too big to capture the grain of the informal settlements. But more importantly, there was no proactive effort to map these settlements in other ways because they were not recognised. The fact that there were indeed maps made of settlements that were regularized (Hasan, 2006) leads to the assertion that the lack of maps of informal settlements is not due to technical difficulties but rather a calculated exclusion. Hence it can be said that the OPP-RTI maps helped in the recognition of the previously marginalised inhabitants of katchi abadis.

Participation in knowledge production and decision making- Not only were the previously marginalized informal settlement made visible on maps that became widely used in institutional settings but they were also recognised as valuable players in development. In a context which lacks basic information, and its acquisition is costly and time consuming, the data collected by the local community enabled them to play a role in institutional knowledge production. In effect, the maps are widely adopted by the planning authorities and engineers who praise their accuracy and reliability and use them because they are "more detailed, up-to-date and coherent than their own recording system" (Welle, 2006).

Inter-organisational networks- The creation of coherent maps did foster stronger links between CBO's, NGOs, government, and even academia (Pervaiz et al., 2008). A clear, shared vision was established towards which all could work. Also the maps exposed the different agencies working on sewerage⁵ and enhanced their organisational capacity as it provided the basis for co-ordination between the various government agencies as well as the local inhabitants. Moreover, they encouraged more transparent processes as they provided a clear basis for the preparation of estimates (Hasan, 2006).

Maps Marginalised

Participation in knowledge production and decision making- Although, as demonstrated above, recognition and participation were enhanced, one can argue that it only happened to a limited extent. The literature review (chapter 2) explains how maps can marginalise through 'mis- mal or un recognition' which is encapsulated in maps through omission, trivialisation and homogenisation. But the case study points out that beyond the actual map as a finished product, marginalisation can occur as a result of the mapping process itself.

Examining the mapping methodology adopted, one can argue that it leads to differential empowerment and participation. This is not only seen within members of the community but also between the community and OPP-RTI as an organisation.

The map-making process, even though low tech and low cost, only allowed a selected few from the katchi abadis communities to be included. In the surveying and drawing stage, as well in the design and costs estimation stage, students from the YTP and a few chosen activists of the settlement were involved. Other inhabitants mainly took the role of informants. In the implementation stage of the internal infrastructure, although all households participated (due to the fact that they each had to build their own internal sewage development), not all acquired map and plan reading skills. The marginalisation here can be said to occur because of differential exposure to skills, where those that had the opportunity to acquire the technical skills are more empowered than the rest of the community.

Moreover, beyond the mapping process itself, understanding the differential empowerment and how different groups expanded their action space with the use of those same maps, may indicate that the potential boundary of action space of those marginalised in society has not been maximised to its full potential. This is the case when examining OPP-RTI. Although its objective was to produce maps and information to support the katchi abadis, they themselves, as an organisation, have advanced their position in institutional context much further than the inhabitants which they intended to empower. They became

main consultants for sewerage and katchi abadis upgrading at the national, provincial, city and community level (Hasan, 2006; Welle, 2006). Moreover they had a central role in drafting the National Sanitation Policy of Pakistan published by the Ministry of Environment in March 2006 which also included their maps (Pervaiz et al., 2008, p. 3).

The participation of the informal settlement in broader decision making, beyond the development of their own sanitation system, was limited. It can be argued that OPP-RTI 'owned' the maps as, unlike the local community, they were able to instrumentalise them beyond their initial scope to secure a place for the participation in institutional processes and decision-making.

The case study points out that marginalisation can also be understood as occurring because of relative empowerment where there is a greater appropriation of knowledge by one group over another.

Social Relations / Mobilization

Maps enhance collective action

Social interaction and mobilization- As seen in the literature review, maps have been known to mobilize communities and formulate a common intent through which collective action can be strengthened. In this case study however, it is not clear that the maps themselves were big players in this aspect. Inhabitants were brought together initially in the explanation of the internal-external model and the use of mapping to survey existing condition and proposed designs. However, unlike the case of SPARC mentioned above, the process of map-making was exclusive. It did not involve mobilizing the community to participate in the process. Hence it was not fully instrumentalised as a tool with the potential to strengthen cohesion and collective action at the community level. Even once the maps were produced by those 'knowledgeable in mapping'⁶, the verification of those maps was done by the OPP-RTI office (Welle, 2006) and without further input from the community. The debates which took place seem to have happened haphazardly between lane inhabitants during data collection by the youths of the YTP⁷. The chance to form organised groups and foster debates was missed.

Collective action in the development of the sanitation system was already taking place in Orangi, long before the support of OPP-RTI (Pervaiz et al., 2008) it cannot therefore be attributed to the mapping process. The inhabitants had already coordinated between themselves and built the sewage disposal channels towards the natural drainage system. However, the preparation of the maps did strengthen further the coordination of the work as well as the implementation and supervision. Therefore it did contribute towards the communities' organisational capacity.

Alliances and coalitions- The organisational and social capacity of communities was strengthened at different scales. Collective action was achieved at the wider scale as larger alliances and coalitions were formed with government institutions to tackle the sewerage disposal of the informal settlements. Especially OPP-RTI as an organisation, by owning the maps, was able to make progress in the social dimension. By documenting and mapping settlements and infrastructures in the whole of Karachi, it increased its engagement with stakeholders such as the Karachi Metropolitan Corporation (KMC) and Sindh *Katchi Abadis* Authority (SKAA), as well as Karachi community-based organisations (CBOs) (Pervaiz et al., 2008, p. 2).

Although maps did play a role in strengthening the social dimension, they have to be understood as tools which have to go hand in hand with other parallel processes. In this case study especially, one can argue that the internal-external model for sanitation is itself based on co-production, which inherently had to involve the fostering of strong social relations, cooperation and collaboration of communities with local government. Hence beyond the maps, the co-production of sanitation was the main driver for the formulation of collective intent and collective action.

Moreover, maps on their own cannot sustain the relationships between organisations and need to be taken up by other processes.

Control / restrict

In this dimension, maps enabled rather than restricted collective action. However, it can be argued that much of the progress made through maps was in their ability to evoke a sense of social control through their technical aura. The maps visually represented this by ordering the development efforts made by the community, clarifying the hierarchy of the different systems (ie primary, secondary, tertiary pipes for sewage disposal). This sense of order and control also transcends how the community is seen by others. One might say that the maps convey a strong collective and a sense of cohesion within the community, which in turn facilitates the possibility of government officials, NGO's and CBO's to collaborate with them.

Strategic Response

Maps Reframe

The case study strongly illustrates how maps were central in opening up new possibilities for negotiation and increasing the negotiating power of the community. This was mainly done through strategically repositioning the previously marginalised inhabitants of the

informal settlement as central in enhancing governance in the city. The documentation of the katchi abadis showed people's involvement in development in clear terms and their capacity to contribute to the improvement of the environment (Hasan, 2006; Welle, 2006). Hence the community was reframed as a resource which improved their space for negotiation regarding sewage development. Moreover, it is believed that the maps produced also provided the inhabitants of katchi abadis with a negotiation tool for future infrastructure development (Interviews; Ismail, 2004; OPP, 2005-referred to in Welle, 2006, p. 23)

The maps were used as evidence in negotiations and as tools to pressure the state. For example, in the case of Mansoor Colony in Karachi, maps were used in hearings, in which community organisations managed to secure that the maintenance of sewers, built by the people, be taken up the Karachi Municipal Corporation (KMC) who had initially refused (Welle, 2006, p. 462). The maps were used to substantiated arguments in court, where it was ruled that Karachi Water and Sewerage Board (KWSB), whose responsibility includes the construction, improvement, maintenance and operation of sewage works and industrial waste disposal systems in Karachi, should take over the maintenance charges of sewerage lines. Furthermore, Mansoor Colony's CBOs used the maps to negotiate with KMC their regularisation and lease agreements (Welle, 2006, p. 463).

Maps Construct

Since 'construction' through maps is inherently part of every representation, the reframing of a given situation and its subsequent acceptance and legitimisation, leads to the construction of a new reality. Hence through reframing one is also constructing. Therefore in contesting power one may also be reproducing it.

As Christophers (2007) notes that the act of focusing attention potentialises, opening up an entity to new forms of exploitation. It can be argued here that the 'enframing' of the katchi abadis and their reframing as valuable players may be used to the benefit of others. For example, the responsibility of the state for the development of sewage disposal is reduced since it is done by the inhabitants. In the same way, participatory mapping may simply take the form of co-production of information which many have argued, is a cost-cutting strategy under neoliberal governance where more responsibility is placed on local communities whilst reducing external support (Christophers, 2007; Parker, 2006; Radcliffe, 2009; Thompson & Mitlin, 1995). This resonates with Thompson & Mitlin's explanation on how the meaning of 'participation' has changed. "In addition to participation in national elections and planning, the concept involves people's participation in the delivery of services that were previously the responsibility of the state" (Thompson & Mitlin, 1995, p. 233).

Table 3.1. Summary of findings for the mapping of katchi abadis by OPP_RTI

Dimension	Questions to assess whether maps contested or reproduced power	YES Therefore maps contested power through <u>raised critical consciousness and learning</u>	NO Therefore maps reproduced power through <u>manipulating/convincing</u>	UNCLEAR
Technical/ Behavioural	Was awareness of the context raised?	✓		
	Were technical skills acquired for self representation?	✓		
	Was critical awareness of the tool acquired?		✓	
Institutional / Inter-organisational	Were the previously marginalised recognized?	✓		
	Were the previously marginalized able to participate in knowledge production and decision making?	✓	✓	✓
	Were inter-organisational networks built?	✓		
	Was organisational and institutional capacity improved?	✓		
Social relations / mobilization	Was social interaction and mobilization enhanced?	✓		
	Were new alliances and collaboration fostered?	✓		
Strategic Response	Were new contextual relationships formulated to benefit the marginalised?	✓	✓	✓
	Were new alliances and collaboration fostered?	✓		

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1. It was demonstrated in the OPP case that communities could fund, manage and build the internal sewage provided they are organised and supported technically (Hasan, 2006:458).

2. The low cost sanitation model promoted by OPP-RTI, consists of communities developing the 'internal' sewage infrastructure (sanitary latrines inside homes, underground sewers in lanes, and neighbourhood collector sewers) and the government building the 'external' infrastructure (trunk sewers and treatment plants).

3. YTP is a section of the OPP-RTI which trains youth in mapping

4. Hasan (2006) explains the experience of one community activist which is shared by many.

5. OPP-RTI maps clearly showed all people's- built infrastructure marked in pink, all local government-built trunk sewers marked in green and the open paved drains built by the KMC marked in black.

6. This refers to YTP students and OPP-RTI staff

7. Hasan (2006)-He point out that students specifically chosen in this process as OPP-RTI felt that it would generate more debate in front of students rather than experts or officials.

4. Conclusion

In the light that maps advance interests, this paper was prompted by their increased use in decision making processes as well as their adoption by local communities in their claims to rights and resources. The aim has been to understand what role maps play in the struggle for environmental justice. This paper has tried to understand the notion of power and how it is enacted in maps in order to arrive at an analytical framework through which the emancipatory extent of maps can be assessed in particular cases. The case of mapping for sanitation in Karachi, has hereby offered a good insight into the use of mapping in urban centres of the Global South and how it can be instrumentalised in institutional settings.

4.1 Key Learnings

Overall, the case study illustrates that maps positively contributed to expanding the action space of the previously marginalised. They were instrumental in the recognition of the katchi abadis and securing their access to sewage disposal. They were empowering in their ability to raise awareness of the physical/economic/political context as well as broaden capabilities through the acquisition of technical skills. Moreover, they enhanced inter-organisational networks as well as improved organisational and institutional capacity and were important in opening up new spaces for negotiation.

Although mostly emancipatory (Table 3.1), the maps were less successful in enhancing social interaction and mobilization as well as participation in knowledge production of inhabitants. This is mainly due to the design of the mapping process which was not participatory and limited the involvement of the community in the various stages. It is therefore important to make a distinction between the process and the product. The maps as products may be seen as emancipatory in their ability to increase the action space of the marginalised vis a vis the institutions while at the same time the process, which was used in the creation of those same maps, may have been exclusive, creating divisions within the community itself.

Moreover, the process and product of mapping may be monopolized by the 'experts'¹. Although the case study shows that the katchi abadis were recognised and were able to have an impact on distribution of goods

by developing their sewage system, they were not able to increase their participation in wider decision making processes. It is clear that maps can actually go beyond the use that they were initially intended for, since this is demonstrated by the way OPP-RTI has further instrumentalised them to increase their role in institutional affairs. Empowerment needs to be understood in relative terms. OPP-RTI as an organisation was more empowered than their intended target group because they were able to have relative 'ownership' of the maps. Therefore the distinction between the 'experts' and the community has to be made in any analysis, even though, the intention was for the experts to put the case forward on behalf of the community.

The ability of the community to appropriate their own maps and understand how far they can use them, needs to be part of the knowledge transferral which experts need to engage with. Otherwise empowerment falls short because the maps may remain at the level of data collection rather than leading to knowledge which can inform further action for that community.

Relating to this transferral of knowledge, a crucial issue is the ability to acquire a critical literacy of maps and being able to question the codes and systems of representation which they are embedded in. It is as important for a community to acquire the technical skills in map reading and map making as it is to understand the ways maps work to manipulate consciousness as well as social relations. Unless this happens, it is difficult for a community to have control over the maps and intentionally include or exclude certain aspects, which are of benefit to them. The 'ownership' of maps not only requires making them and knowing how to use them, but also being able to foresee how others may appropriate them and the resultant unintended consequences.

The analysis demonstrates that advancements were made in the institutional processes mainly because the maps were accepted as technically sound. Hence it can be deduced that the opportunity of maps to enhance environmental justice depends on their ability to convince and for this they have to rely on using the system and codes, rooted in traditional western mapping knowledge, which are inherently manipulative. Therefore maps are rooted in a complex understanding of power and one cannot separate them into the neat categories of contesting or reproducing power.

It is also important to note, from the case study, that the use of maps went hand in hand with the co-production of sanitation, which was an important aspect contributing to the formation of alliances and collaborations which also enhanced the opportunity for negotiation. Therefore, in order to have a greater influence in policy, maps have to be adopted in conjunction to other processes.

Overall, maps are top down products and they can be emancipatory in so far as local people can appropriate them. This depends on an inclusive map-making process as well as a control over the content and use of the maps. The control over the content of maps requires knowledge in representation in order to control what they communicate. Control over their use requires an understanding of decision-making processes and a critical clarity of the multiple interests of other actors. Because power resides in contradiction, a comprehensive understanding of both intended and likely unintended consequences of maps are necessary in order to control their effect.

4.2 Revisiting the Framework

Several aspects, which are not reflected in the framework, have surfaced in the course of this paper. These aspects are important in order to better understand maps and to improve the framework.

- The current framework does not make a clear distinction between the process and product of mapping. This distinction is important because the case study analysis shows that power can be reproduced or contested in the process without necessarily being apparent in the product.
- It has been shown, in this paper, that there are links between the different ways in which maps reproduce or contest power. Indeed these work in combination to such an extent that in some instances, in contesting power, one might also reproduce it. Therefore the framework could be improved by highlighting these links.
- The analysis shows that the various dimensions of the framework are inter-linked however there is no distinction made between elements which are prerequisites or outcomes of others. For instance,

the technical dimension is the main determinant of the other three because the advancement made in the institutional, strategic and social dimension are all dependent on the maps being legitimated as technically sound and accurate.

- Although it was beyond the scope of this paper to look at the use of technology in mapping and its effect on society, it is an important determinant of power and would therefore add an valuable dimension to the discussion and the framework, especially because of the availability of new technologies and their ever increasing use in participatory mapping.

4.3 Recommendations

The following recommendations are intended for individuals or groups who want to adopt mapping as a strategic tool to advance social objectives and to enhance their 'ownership' of the maps.

- The design of the mapping process needs to be scrutinized closely in order to ensure that it is done in an inclusive way, and users are actively involved in the process.
- The use of maps needs to go hand in hand with other processes in order to maximise their ability to affect policy.
- The power implications of maps need to be better understood. Maps need to be used with care because as tools of power they inherently deal with a complex relation that reproduces or contests power.
- The acquisition of mapping skills should also include a critical consciousness vis a vis representation.
- A comprehensive understanding of the multiple interests of different actors needs to be acquired and how they can gain knowledge and appropriate the maps to advance their own interests. This, in combination with an understanding of the power of maps, may enable a better control of the intended and unintended consequences of mapping.

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The Development Planning Unit, University College London (UCL), is an international centre specialising in academic teaching, research, training and consultancy in the field of urban and regional development, with a focus on policy, planning, management and design. It is concerned with understanding the multi-faceted and uneven process of contemporary urbanisation, and strengthening more socially just and innovative approaches to policy, planning, management and design, especially in the contexts of Africa, Asia, Latin America and the Middle East as well as countries in transition.

The central purpose of the DPU is to strengthen the professional and institutional capacity of governments and non-governmental organisations (NGOs) to deal with the wide range of development issues that are emerging at local, national and global levels. In London, the DPU runs postgraduate programmes of study, including a research degree (MPhil/PhD) programme, six one-year Masters Degree courses and specialist short courses in a range of fields addressing urban and rural development policy, planning, management and design.

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