8 Mapping as a basis for sanitation implementation in Pakistan: The case of the Orangi Pilot Project

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Abstract

In Pakistan, the Orangi Pilot Project - Research and Training Institute (OPP-RTI) and its partners use mapping predominantly in informal urban settlements. Mapping is part of OPP-RTI's wider approach to development, based on research and extension applied to support people in the informal settlements of Orangi Town in Karachi. Mapping started in 1981 to help people design local sewerage systems and has since been extended to mapping all major drainage channels and the entire sewerage system of Karachi. The production of maps is kept in-house at OPP-RTI and carried out by youths from informal settlements with low-tech and low-cost technologies. Apart from helping one million people in Orangi and elsewhere in Karachi to gain access to safe sewage disposal, mapping has had profound repercussions on sanitation policy and practice in Karachi and elsewhere in Pakistan. The major factors for OPP-RTI's success in using mapping are linked to (1) the production of maps themselves, which is oriented at the capabilities of mapping agents in informal settlements, (2) the advocacy strategies employed including multiple channels of dissemination such as academia, media, CBO networks, informal contacts with government officials, etc and (3) to OPP's philosophy, which encourages critical assessment of past mistakes and internal learning processes.

Introduction

Rapid urbanisation left many in Pakistan's cities without access to basic needs, especially water and sanitation. This case study is about how a Karachi based NGO set out to address the multiple challenges involved in addressing the problems in meeting these needs; especially in how its approach is based upon:

- Separating responsibility between the community and the utility, and
- Conducting community-based mapping as a basis for advocacy and planning.

It draws on interviews with government officials, local politicians, donors, academia, the OPP-RTI and partners, and on a review of background literature including newspaper articles, published and unpublished reports and studies.

Extensive lessons are drawn on the activities of OPP, the impact of the activity is highlighted, as are the issues around scaling up.

Urbanisation and its repercussions

Since its foundation in 1947, Pakistan has undergone a rapid process of urbanisation. The urban population increased as a proportion of the total from 14.2% in 1941 to 32.5% in 1998 (Hasan & Mohib, 2003). In the same period, the population of Karachi, where OPP-RTI is active, has grown from around 436,000 to 9.8 million inhabitants (Hasan & Mohib, 2003) and to approximately 13 million in 2005 (Hasan, 2005). For a full appreciation of the rapidity of this urbanisation, there has been a 22-fold increase in less than 60 years.

With this rapid population increase a housing crisis emerged in Karachi that the government was unable to resolve. In the 1970s, an informal system of acquiring land evolved in Karachi. This involved "professional" land grabbers, who parcelled out vacant state land on the periphery of the city, based on the official pattern of planning. They sold small plots of land to people on low incomes for cash, without providing official documentation. As a result, all urban dwellers who acquired land informally do not have a legally recognised ownership of their plots. With the growing occupation of these informal settlements, known as *Katchi Abadis*, services such as roads, electricity, street-lighting, water supply and sewage disposal were partially extended to the areas through political "gifts" on an ad hoc basis.

Yet, the inhabitants of *katchi abadis* themselves have developed the majority of theoretically "public" facilities, including sewage disposal, water supply, schools and clinics, through self-help initiatives[2]. These *katchi abadis* today accommodate approximately six million people, a little under half of all Karachi's inhabitants.

Since 1975, a policy of katchi abadi regularisation was adopted, aiming to formalise the leasehold of occupied plots and upgrade services. The Sindh Katchi Abadi Authority (SKAA) was created to facilitate the process but, despite temporary successes, regularisation remains cumbersome and slow with only 1.5% of *katchi abadis* being regularised per year (Siddiqui, 2004; Hasan, 2005).

As noted below, due to the lack of sanitation in the *katchi abadis* living conditions were grim, with

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[2] In those 334 *katchi abadis* in Karachi, surveyed by OPP-RTI (out of a total of 539 *katchi abadis*), documentation shows that local charities and individuals have established some 1,041 clinics. This figure compares to the 12 government clinics and 773 schools that were built and run by private initiatives, and to 143 government-run schools (Rahman, 2004).

open drains carrying faeces. Sanitation was considered by communities as the priority issue. Before discussing the activities of OPP, the next section presents the context in which OPP was to operate.

Devolution and responsibilities for sewage disposal in Karachi

Pakistan is a federal state divided into provinces, rural districts/urban city-districts, rural and urban sub-districts/towns, and urban and rural union councils (UCs). A UC, the lowest administrative tier of an urban administration, covers between 25,000 - 100,000 people. Since 2001, Pakistan has been undergoing a process of devolution whereby the

mayors, deputy mayors and 21 councillors of the union councils are directly elected[3]. In Karachi, the city government has been subdivided into 18 towns comprising 178 UCs. Each town has between nine and 13 UCs and comprises up to one million inhabitants (OPP, 2005).

When it comes to sewage disposal in Karachi, the co-existence of formal and informal settlements, and the use of natural channels for sewage disposal in many areas has led to confusion over responsibilities between different government agencies. This resulted in a general negligence of sewage disposal. The official responsibilities of the different agencies, their sources of funding and the

TABLE 1 Responsibilities for drainage and sewerage by agency

	Areas of responsibility	Budget sources	Inconsistencies and problems
CDGK	- development of storm drains - any other functions that the government may assign	- taxes and levies - budget for sewerage passed on to KWSB	- dispute with KWSB on who is responsible for drains used for sewage disposal (until 2000)
Towns	- the same responsibilities as CDGK, within their geographical boundaries	- CDGK	- lack of coordination with UCs and CDGK
UCs	- identification of infrastructure development and maintenance within their jurisdictions, including sewerage and drainage	- CDGK, towns	- lack of technical capacity, human and financial resources and of information - weak coordination with higher tiers of local government
KWSB (former KMC)	- water and sewerage infrastructure development and maintenance across Karachi	- CDGK, service charges, special funds from provincial and national governments, foreign loans (until 2000)	- insufficient revenues - dispute with CDGK (see above) - dependence on federal/ provincial government grants
SKAA	- training and support to town staff on infrastructure services in katchi abadis	- own resources	- still implementing rather than supporting infrastructure development in katchi abadis

Sources: OPP-RTI 2000, Interviews

[3] In theory, non-party based candidates present themselves for election. However, growing pressure from dominant political parties at the local level has intimidated many independent citizens who, consequently, have not run for the most recent local elections in autumn 2005 (Interviews).

discrepancies and problems in fulfilling their roles are summarised in Table 1. However, much of that past confusion is now gradually being resolved.

Obstacles to coherent infrastructure development

However, there are a number of issues that were widely held to hinder the coherent planning, development and maintenance of sewerage and drainage infrastructure in Karachi.

Encroachment by other agencies: There is a tendency for agencies and individuals to intrude into the responsibilities of the City District Government of Karachi (CDGK) and the Karachi Water and Sewerage Board (KWSB), leading to overpriced, ineffective infrastructure development and to inefficiencies in management. Concerning the development of infrastructure, there is also substantial pressure from IFIs and bilateral donors wishing to carry out major infrastructure development projects. Such projects have proven to be based on unnecessary, expensive designs and overpriced contracts: leading to substantial increases in foreign debt, according to OPP-RTI's assessment (Source: Interviews by the author; Daily Dawn newspaper, 19 February 2006).

Lack of sanitation infrastructure information: Urban infrastructure maps, the essential basis for any coherent infrastructure planning, are generally lacking. Mapping efforts of the Survey of Pakistan and UNDP, for the Karachi Master Plan, have not been updated since the 1970s and mid 1980s respectively. In addition, informal settlements are generally neglected when it comes to infrastructure planning, and are not coherently captured in maps produced by government agencies (Interviews).

Lack of accountability: In the absence of information, clear responsibilities and funding, sewerage and drainage infrastructure development and maintenance in Karachi has been ad hoc and piecemeal. The lack of information about existing infrastructure, in particular, has opened the doors for corruption and wasted resources in large sewerage and drainage infrastructure projects. A powerful partnership between government officials, engineers and contractors resulted in substandard, yet expensive work. The problem underlying poor sanitation infrastructure in Karachi is, thus, not a financial one but rather the lack of transparent processes and systems.

It was these cumulative shortcomings that gave rise to the formation of OPP and to the specific methods that it adopted. The work of OPP and, in particular, its use of mapping as a planning and advocacy tool, is the subject of the remainder of this paper.

Mapping

The Orangi Pilot Project and a brief history of its sanitation mapping

OPP's sanitation mapping needs to be understood within the wider context of the Orangi Pilot Project (OPP). OPP was established in 1980 in Orangi, one of the 18 towns which form Karachi. Orangi is a *katchi abadi* of approximately 1.2 million inhabitants. The philosophy behind OPP is based on the concept of research and extension and consists of four steps: seeing, observing, learning and teaching. The objective of OPP is to:

- Understand the problems of Orangi and their causes
- Through action research, develop solutions that people can manage, finance and build

- Provide technical guidance and managerial support for implementation, and
- Overcome constraints that governments face in the upgrading of *katchi abadis*.

So, OPP does not itself carry out project implementation but promotes community activities and provides technical support to such initiatives, and to government bodies, in overcoming constraints to development. It acts as a resource and training centre that is open for community activists and government officials alike.

In 1980, participatory research identified sanitation as the most important problem in Orangi. To confront this, OPP developed a low-cost sanitation programme[4]. The methodology is based upon dividing responsibility between community and government as follows:
- "internal development" developed and built by communities (sanitary latrines in the house, underground sewers in the lane, neighbourhood collector sewers); and

- "external development" (main sewers, treatment plants) carried out and financed by the government (Hasan, 2005a; Rahman, 2002; Interviews)

This model, called internal-external component sharing, forms the basic principle of OPP's approach. It is further explained in Box 1 and Figure 1 below.

Over the last 27 years, OPP-RTI's approach has achieved enormous successes. In Orangi, nearly 100,000 households (representing approximately one million people) have now developed their own sanitation systems. Outside Orangi, another 40,000 houses in 11 other Pakistani towns have built their internal sanitation systems (Hasan, 2005a).

This has been possible because the approach has been replicated by CBOs and NGOs outside Karachi. Today, OPP-RTI has more than 30 partner organisations, which are linked through the Community Development Network (CDN), a regular

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BOX 1 OPP's internal-external component sharing model

In OPP's model, the internal component for sanitation and sewage disposal stands for the construction and maintenance of sewage lines in primary and secondary lanes. As shown in Figure 1, a primary lane is a street of around 16 - 20 houses, which, at both ends, leads into a secondary lane. The secondary lanes connect to the main streets. Neighbours, with the help of community organisations and local social activists, organise themselves to finance, construct and maintain these sewerage systems. The internal component covers 70% of the total sewerage system. Figure 1 shows that, from secondary lanes, sewage is directed into main streets or natural channels and drainage systems. The sewage system at this level is called the

external component by OPP. It needs to be developed and maintained by the government.

The internal-external component sharing model is based on an understanding that the development of service provision in any given settlement does not start from a blank sheet. A certain level of service provision has usually been built up through self-help initiatives and ad hoc government interventions. People are willing to contribute to an improvement of service provision in their immediate neighbourhood but need technical and organisational guidance to make their efforts sustainable. Their work needs to be complemented by the government in those areas that cannot be sustained by individual efforts.

Source: Interviews with OPP-RTI

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[4] OPP supports the urban poor in improving their livelihoods. In addition to the low-cost sanitation programme, the organisation has developed four other basic programmes of housing, health education and credit for micro-enterprise (Rahman, 2002).

forum to exchange experiences. OPP-RTI's model of internal-external component sharing has also been taken up by international donors working in Pakistan and by one government agency, the Sindh Katchi Abadi Authority (SKAA). Over the years, the model has been adopted as a policy by two of the four provinces and, most recently, has been included in the national sanitation policy.
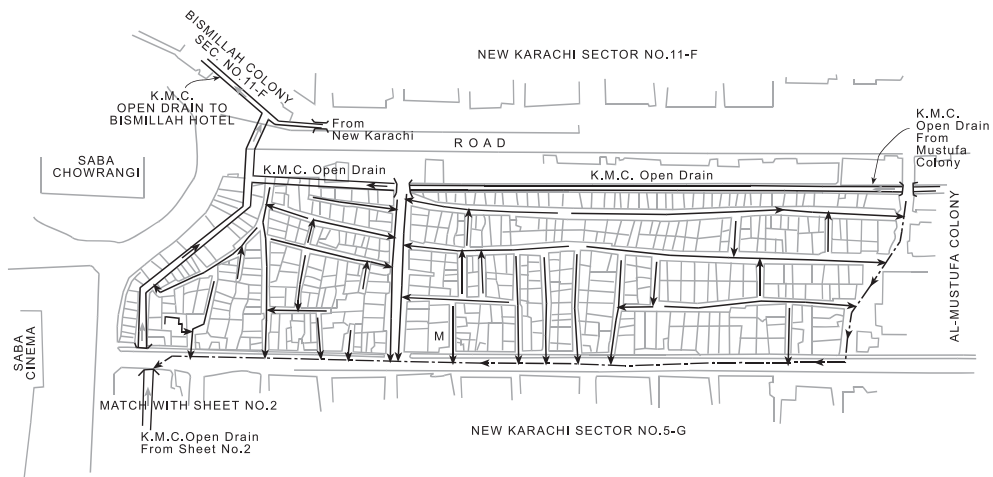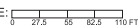
Objectives and target groups

The purpose of mapping is twofold. The first objective is to document the reality on the ground, and to reduce the cost of laying pipelines by developing low-cost designs and by linking up peoples' own efforts at the lane and neighbourhood level. The immediate target groups for this are the people living in Orangi and other low-cost housing areas.

The second objective is to influence the government so as to supplement, rather than ignore, people's initiatives, and to reduce the corruption and waste of resources in infrastructure projects (see "Obstacles" section above). Mapped areas have expanded from maps of settlements to maps of Union Councils (UC), towns and the entire sewerage system of Karachi. Accordingly, UC mayors, CDGK and KWSB engineers and the International Financial Institutions (IFIs) are the other target groups of OPP's mapping activities.

FIGURE 1 Map of a settlement showing sewerage lines

Sheet 1 of 2

| KEY: Sewerage Lines Laid By People
Sewerage Lines Laid By Government | SCALE: 0 27.5 55 82.5 110 FT. | MAP SHOWING SEWERAGE LINES IN
ASHRAF COLONY |

Inputs

Mapping at OPP is an ongoing process, a service provided to *katchi abadis* and to the wider city for the development of a Karachi-wide sewerage system. The mapping department at OPP-RTI is the backbone of the organisation. OPP's sanitation mapping is a low-cost activity because the development of maps also serves as a training activity for young people in *katchi abadis*, and salaries at OPP are modest. OPP-RTI finances its core expenses through a yearly grant provided by international charities on an open-ended basis. Based on the calculation of time and material, OPP has recently estimated that the production of a Union Council Plan Book, covering a population of around 75,000 people and providing maps displaying different types of services, costs around PKR 10,000 (GB £100). This includes staff time and all the material needed for the production of related maps and statistics.

The **technical inputs** for sanitation mapping are oriented on the capabilities and conditions in the unplanned settlements. To produce a settlement map, all work is done by hand and only requires a drawing board, scales, paper and pencil. For more sophisticated maps of drains or larger proposals, plain tables (GB £20) and level machines (GB £250) are used. Since 2004, OPP has increasingly digitised hand-sketched maps with Autocad, a database software that can be obtained free of charge. Most recently, OPP has also started to use satellite images as a means of documenting neighbourhoods, downloaded for free using Micro Media Freehand software from Google Earth[5].

The low technical inputs required for OPP's mapping methodology mean that the **human resources** required during the process are high. OPP's mapping department employs 15 people. Of these, six to eight mappers are supported through a Youth Training Programme (YTP) lasting between one to two years and the remaining people are employed on a permanent basis. The whole process of producing a map, which indicates the basic services of a settlement of around 500 houses, takes six to eight weeks. Producing a Union Council Plan Book takes around three months.

Sanitation mapping methodology and process

In OPP's model, sanitation mapping is the first step of a wider process leading to the development of a sewage disposal system in a settlement, a town or city.

Surveying and drafting: On average, a settlement comprises of 60-70 lanes with around 500 houses. A pair of students[6] conducts the survey by "walking houses and lanes", taking measurements and sketching a "proxy-map" by hand. During this process, interested community members are informed about the rationale and process of mapping. Then, back at the office, the proxy-map is drafted - it is put into scale (Interviews).

Documentation of existing services: The students return to the settlement - this time documenting all existing water supply and sanitation services, their technical specifications, costs, state of functionality and who constructed them, based on

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[5] http://earth.google.com
[6] Students may come from a variety of backgrounds. They include university civil engineering or architecture students but have in recent years predominantly been drawn from young men in the settlements themselves. The programme has thus provided these young people with skills for future employment.

information by local community leaders or CBOs. At this stage, the map and additional documentation is also double-checked by a supervisor. Back at the office, the existing sewerage lines are added into the map (see Figure 1 above).

Proposal development: For maps used by OPP-RTI to work with government agencies, a proposal is developed based on the existing map. This proposal consists of a number of suggestions for improvement of sanitation infrastructure, based on the status of the documented infrastructure and a cost estimate.

Various mapping outputs

The basic output of mapping is a **map of a settlement** and detailed maps of individual lanes displaying technical details for the construction of sewerage lines. This map is used as guidance for constructing the internal and external components of sewerage systems. An example for such a map is shown in Figure 1.

As sewerage systems in *katchi abadis* built through people's initiatives expanded, the need arose to focus on wider problems such as improving the main drainage systems cutting across different settlements, Union Councils and towns within Karachi. Accordingly, OPP started to map major drains and natural channels cutting across Orangi and other *katchi abadis* in Karachi.

The improvement of major drains brought the entire sewerage system of Karachi into the picture. OPP-RTI felt that, without the documentation of all natural channels and drains, which are the main means of disposal for sewage and rainwater in Karachi, it would be impossible to develop a realistic concept of a city-wide sewage disposal system[7]. OPP-RTI therefore produced **city-wide maps showing all existing main channels and drains** and, based on this, developed detailed proposals with conceptual plans for Karachi's future sewage disposal. One such conceptual plan is shown in Figure 2 below.

With the devolution plan introduced in 2001 (see "Devolution" section above), OPP-RTI felt the need to support Union Councils in the *katchi abadis* of Karachi with their new planning and development tasks. OPP-RTI did so through the production of detailed maps showing the settlements and different types of social services in their jurisdictions. These so-called Union Council Plan Books contain seven maps showing (1) sewerage systems, (2) water systems, tanks and pumping stations, (3) schools and training centres, (4) maternity homes, health centres, clinics and hospitals, (5) playgrounds and parks, (6) solid waste disposal points and (7) religious spaces. The UC Plan Book also contains detailed statistical and technical information, and a proposal for each UC concerning possible repairs and upgrading of the sewerage system.

In addition, OPP-RTI has produced maps of various towns in Karachi, and its partner organisations have developed maps of other towns in Pakistan. In total, around 650 maps have been produced by OPP-RTI and its partners, with OPP-RTI's guidance.

Use of mapping and its political repercussions

The internal-external component sharing model, advocated by OPP-RTI, has had repercussions on

[7] The model of converting open storm drains and natural channels into covered box trunks carrying sewage was highly disputed on technical grounds when first proposed by OPP-RTI. However, over time, OPP-RTI has been able to convince the different government agencies of its technically sound approach by providing examples from other countries (ie Japan) where this system is common practice.

FIGURE 2 OPP-RTI map showing natural nalas and drains in Karachi
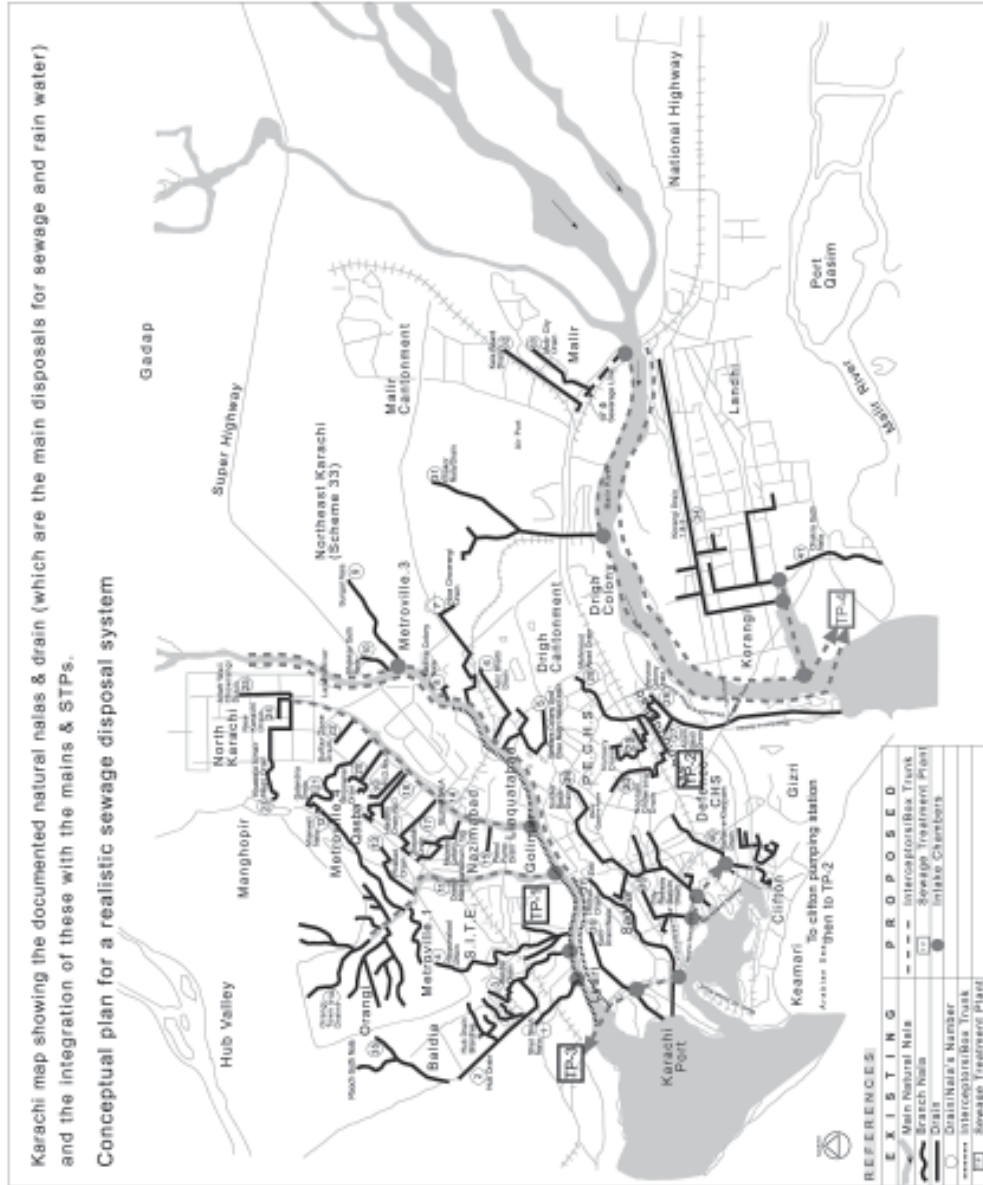
Karachi map showing the documented natural nalas & drain (which are the main disposals for sewage and rain water) and the integration of these with the mains & STPs.

Conceptual plan for a realistic sewage disposal system

S.NO.	NAME OF DRAIN/NALA	Length (ft)
	Nalas/drains no 1 to 25 dispose into the Lyari Nadi and then into the sea.	
1.	Sher Shah Nalo	6663
2.	Hub Drain + Branches	36438
3.	Baldia Nala/Drain	15715
4.	Haroonabad Drain	25998
5.	Welfare Colony Aid	16671
6.	Aziz Bhatti Drain	13856
7.	MPA Chowrangi Drain	15588
8.	Madina Colony Nala	1888
9.	Sangsi Nala/Drain	8668
10.	Bhakkar Goth Nala	3565
11.	ORANGI NALA MAIN (Dispose to Lyari River)	38250
11A.	Orangi Town Drain/Nala (+ Branches)	94234
12.	Mianwali Colony Nala	11256
13.	Pirabad/Paulinabad Drain	6550
14.	GUJJAR NALA	49998
15.	Petrol Pump Drain	3350
16.	Mujahid Colony Drain	12598
17.	Ziauddin Hospital Drain	7808
18.	Haidary Drain - I	8998
19.	Haidary Drain - II	7698
20.	Shipowner College Drain	6570
21.	Qalandaria Drain	17208
22.	Buffar Zone Drain	1598
23.	Khawaja Ajmeir Nagri Drain	10698
24.	New Karachi Drain	2598
25.	Allah Wali Chowrangi Drain	10598
	Nalas/drains no 26 to 34 dispose into the Malir Nadi and then into the sea.	
26.	Manzoor Colony Drain	11790
27.	Azam Basti Drain	1750
28.	Mahmoodabad Drain (Main)	13488
29.	Nursery Drain (Branch H.O.)	6605
30.	Noorani Chowrangi Drain (Branch e.k.)	15958
31.	Chakor Nala/Drain	23888
32.	Kala Board Drain	9310
33.	Malir City Drain	9555
34.	Korangi Drain 1 & 2	48496
	Nalas/drains no 35 to 41 dispose into the back water and then into the sea.	
35.	Mipoh Goth Nala	23598
36.	Kairi Drain / Nala	94234
37.	Pitcher Drain	12124
38.	City Railway Station Drain	10825
39.	Soldier Bazar Drain + 4 Branches	49998
40.	Nahr-e-Khayyam Drain	5628
41.	Chdria Goth Nala	7898

REFERENCES:

EXISTING
- Main Natural Nala
- Branch Nala
- Drain
- Drain/Nala's Number
- Interceptor/Box Trunk
- Sewage Treatment Plant

PROPOSED
- - - - Interceptor/Box Trunk
- Sewage Treatment Plant
- Intake Chambers

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the planning, operation and maintenance of infrastructure, and on the relationships between local communities, NGOs and the government throughout Karachi. Using maps has played a crucial role in this process. In general, maps documenting the existing infrastructure and people's efforts have brought to the fore what was previously invisible and therefore conveniently ignored by government officials and contractors. OPP-RTI has identified a variety of stakeholders at different levels for exerting political influence through the use of maps.

Use by communities

When working with communities, OPP-RTI has mainly used settlement maps (see Figure 1) illustrating the individual lanes and infrastructure specifications (material inputs and designs) to assist them with the development of the internal sanitation component. Starting from the early 1990s, the maps have mainly been produced by youths from these settlements. The mapping process itself thereby also has the positive side effect of providing many local youths with additional skills and livelihoods.

In addition to the settlement maps, OPP-RTI provided the communities with maps depicting the design and specifications of main sewer lines. These maps enabled community members and CBOs to monitor the construction of the external sanitation component in their neighbourhoods, making the relationship between dwellers in informal settlements and local government representatives more equitable.

Use by different government agencies

The Sindh Katchi Abadi Authority: The Sindh Katchi Abadi Authority was the first government agency to take on the approach. In 1994, the agency adopted the internal-external component sharing model as a policy. In the same year, SKAA hired OPP-RTI as a consultant to document the existing sanitation and water supply infrastructure in the settlements, and to supervise the process of upgrading. In the process, as many as 150 *katchi abadis* were documented, which represents more than a quarter of all *katchi abadis* within Karachi (Hasan, 2005b). With the help of maps provided by OPP-RTI, the authority was able to identify particular areas for regularisation and to set priorities - in cooperation with the communities - in upgrading based on the already existing infrastructure. Based on mapping, the agency has been able to substantially speed up the upgrading process. In addition, the existing maps of *katchi abadis* have provided their inhabitants with a negotiation tool for future infrastructure development (Interviews; Ismail, 2004; OPP, 2005)[8].

The Karachi sewerage agencies: According to various chief engineers at CDGK and the deputy Managing Director of KWSB, both agencies use OPP-RTI's maps regularly. They mainly rely on OPP-RTI for maps of *katchi abadis*, of which they have no documentation of their own, and for maps of the major natural channels and drains, as well as the entire drainage system of Karachi. The close collaboration between OPP-RTI and the city government is best illustrated by CDGK 's recent invitation for OPP to become part of a focal group on the development of natural channels and drains throughout Karachi. The collaboration is based on a proposal for a Karachi-wide sewage disposal system by OPP-RTI, taking existing natural channels and storm drains as a starting point. Converting these channels into covered box trunks, rather than creating a parallel system has considerably reduced

[8] Yet, this process has slowed down again since SKAA has a new director. In addition, the role of the organisation has changed with the recent decentralisation process in Pakistan.

the total cost of sewerage development; thereby making CDGK less dependent on foreign loans.

Yet, the relationship between OPP-RTI and the major agencies responsible for sewerage and drainage across Karachi has not always been so good. Rather, it has developed very slowly over time. OPP-RTI's growing documentation of the success of its own approach in working in *katchi abadis*, and its documentation of failures of IFI supported projects, slowly built up a body of evidence that could no longer be overlooked.

Union Councils: In Karachi, UCs have very limited technical personnel/support and information about their newly created governance areas. To support the newly elected local mayors, OPP has developed the UC Plan books described above. Some mayors have used the mapping and statistical information to make decisions about infrastructure projects in their areas.

The development of a national sanitation policy: An important demonstration of OPP-RTI's subtle influence on sanitation policies in Pakistan is the current formulation of a national sanitation policy. The Government of Pakistan appointed Arif Hasan (Chairman of OPP-RTI and the Urban Resource Centre) as the national consultant to draft the document. The policy relies heavily on OPP's model for implementing sanitation (MoE, 2006). This includes mapping as a fundamental step before any intervention, and the sharing of internal and external infrastructure development between citizens and the government. While this does not mean that the OPP model will automatically be adhered to in the future, this is an important step to further strengthen the influence of OPP-RTI's approach to sustainable sanitation development.

Policy repercussions in summary

1. Documenting of *katchi abadis* brought people's involvement and investment in sanitation development to the fore. As a result, planning agencies and local government responded to the need to support, rather than duplicate, people's efforts.
2. People have acquired skills and knowledge that allow them to engage in a more equitable relationship with government agencies, to improve their settlements and to build local institutions.
3. The documentation of infrastructure provides the foundations for bringing into question government and IFI planning policies and development projects, and for promoting viable alternatives based on a sound knowledge of ground realities.
4. Through the extensive documentation of sanitation infrastructure throughout Karachi, OPP-RTI's concepts have been reinforced by statistics and maps. This has increased its standing and credibility over the period of more than 25 years. Today OPP-RTI's guidance on sewerage and katchi abadi upgrading is sought after at national, provincial, city and community level.

Replication of OPP-RTI's component sharing model

The OPP-RTI sanitation model has been replicated by many CBOs and NGOs inside and outside Karachi, as well as by various donor and government programmes in Karachi and throughout the country[9]. Not all attempts have been successful, and OPP-RTI has learned a number of lessons concerning which factors are likely to lead to successful replication.

[9] CBOs and NGOs replicating OPP-RTI's sanitation model, generally receive financial support for their administration and overhead costs from WaterAid.

Factors for successful replication

Supporting organisations with local roots: For any organisation that wants to take on this sanitation model, it is important for it to have close relationships with the community it aims to serve, as well as an ability to establish dialogue with local government. Therefore, OPP-RTI has seen most successes with neighbourhood-based organisations, initiatives and activists that want to bring about changes to their areas and already has experience in dealing with local government bureaucrats and politicians.

Building a team with social organisation and technical skills: It is important to develop social organisation, technical mapping, construction supervision and accounting skills within the team that approaches OPP-RTI. Hiring a technically skilled person has led to high staff turnover, with the organisation repeatedly having to start from scratch. A crucial skill that the organisation needs to develop in-house over time is the preparation of maps. In this sense, OPP-RTI has also found it important to match the technology used with the skills of the people employed.

Allowing for institutionalisation based on a continuous engagement with OPP-RTI: The process of developing a programme based on the component-sharing model can be cumbersome, and requires patience and the commitment to a long-term engagement by any CBO/NGO. During this process, it is important that the organisation regularly documents and reviews progress, assesses weaknesses and how to overcome them. OPP-RTI can best support the organisation in this process if it stays in close contact with OPP-RTI for advice and training on accounting, reporting, research and monitoring.

Transparency in account keeping and resistance to large donor funding: Over the years, OPP-RTI has seen a number of NGOs collapse after accepting substantial donor funding while still immature. Along similar lines, transparency in account keeping has proven to be a major factor for trust in the organisation.

Dealing with the conditions of the sewerage systems in place: When OPP-RTI started sanitation mapping in Orangi Town, the conditions of the existing sewerage systems were such that new lines could easily be connected to the existing main sewers. In other towns, though, this is not always the case. Where disposal points for sewage are not available through natural drains or existing sewers, "external" development by the government needs to precede "internal" development. This is a more difficult task since it requires negotiation with the local government before commencing work with communities.

Lessons from OPP-RTI's approach to mapping

OPP-RTI's mapping documentation is being used by community activists, CBOs and NGOs, mayors and government agencies alike. The documentation of existing infrastructure has led to significant policy repercussions including the government's withdrawal from IFI-funded sanitation infrastructure projects in Karachi. Most impressively, OPP-RTI has, at least in some cases and increasingly so, managed to change people's mindsets about development and the informal institutions governing these processes until then. It has been instrumental in making apparent the reality on the ground - in this case the existing infrastructure created by people's efforts - and in building on this existing reality rather than ignoring it. Through its development proposals, OPP-RTI has not only

managed to get this alternative reality accepted by all major government agencies, but has also been able to considerably improve the process of development. Based on OPP-RTI's proposals, corruption is reduced and through a process of continuous monitoring of works through CBOs, sub-standard construction is diminished. In a mega city whose population in 2006 was approximately 13 million inhabitants, this is a considerable achievement. The changes brought about by OPP-RTI's mapping are well summarised in the phrase used recently by a high-ranking government official in Karachi that "a map is for a planner what an x-ray is for a doctor" (Interviews).

There are a number of reasons that explain OPP-RTI's success in sanitation mapping, which can serve as lessons for other organisations wishing to replicate its model.

Evidence

The production of evidence is a basic ingredient to change a policy process. For evidence to be taken up, it must be trustworthy, readily understandable and easy to produce by those who intend to use it. The following examples highlight some factors that have made OPP-RTI's mapping process very successful.

Technology compatible with capacities: The technical inputs used by OPP for mapping are low-cost and low-tech. They therefore stand in a direct relationship with the skills available in the settlements where the organisation works. The organisation is very cautious when it comes to introducing new methodologies but does not close its eyes to new developments. One example of this is the recent introduction of satellite images, which considerably shorten and simplify the mapping process.

Who creates maps, matters: In Karachi, various government agencies have produced maps showing sanitation infrastructure. Yet, maps produced by KWSB for the Korangi Waste Water Management Project in the 1990s only showed the infrastructure put in place by KWSB. Infrastructure put in place by local people and other agencies, in contrast, was completely ignored. This means that 'who maps, matters'. A map will always reflect the concern of the mapping agent. OPP-RTI, therefore, produces all its maps in-house and has introduced a thorough process of cross-checking all information documented to ensure that mapping information is accurate and comprehensive.

Time and consistency is important: OPP-RTI has gained trust and strength through a coherent approach that it has continued to promote for more than 25 years. The internal-external component-sharing model itself has taken on an internal dynamic, where the people that OPP mobilized have become promoters of OPP's approach.

Through mapping, OPP-RTI brought people's efforts in their own services to the surface. Through its technical advice, it helped to expand these services, which it then documented again. Over time, this alternative reality has grown immensely. In Karachi alone, 60% of all informal settlements and all major drains and natural channels have been documented. Now, OPP-RTI's documentation has increased so much that it cannot be overlooked any more. In addition, it has become much easier for OPP-RTI to reach government officials in recent years because a number of engineers, who have been working with OPP-RTI for more than 15 years, have now been promoted to high-ranking positions in government.

Continuous and thorough documentation: In thorough quarterly reports, OPP has documented

all its steps, reflections, failures and achievements since it began more than 25 years ago. These reports provide a rich source of information about the entire process surrounding the component model, including mapping. In addition, OPP-RTI and others have published numerous reports dealing with different aspects of OPP-RTI's approach and people's engagement in their development.

Links

Communicating evidence to target audiences and stakeholders is another important element for changing policy processes. Established practices are generally supported by special interests and changing them involves attacking existing preferences. Thus, communicating evidence effectively and creating networks of support for new practices, is crucial in this process.

Building up support networks: In the beginning of its engagement in sanitation, OPP mainly collaborated with engineers working in Orangi settlements. With the two main government agencies responsible for sanitation, KWSB and CDGK, it first established contact with the sewerage and drain maintenance wings. Personnel in these departments were confronted with the same shortcomings of the existing infrastructure as the people living in *katchi abadis* and were therefore more ready to listen. In addition, OPP-RTI also built up its own support networks from among CBOs and NGOs working on similar issues. It was, for example, instrumental in establishing the Urban Resource Centre (URC), a watchdog institution that investigates and provides information on city-wide issues ranging from sanitation to transport and

the defence of public spaces[10]. The URC was thus consciously established to address a wider audience at city-wide and international level. The Community Development Network, in turn, which is made up of OPP-RTI's partner organisations, serves to exchange experiences and create a public space for those CBOs and NGOs supported by OPP-RTI.

Using multiple channels for communicating information: OPP uses a variety of communication channels to promote its messages, including local and national media. OPP's chairman and befriended journalists regularly publish opinion pieces revealing shortcomings of infrastructure projects in major national newspapers[11]. In addition, the director and chairman of OPP promote OPP-RTI's approach through their university teachings and academic publications. Furthermore, OPP-RTI's director is regularly invited to present at the School for Public Administration where all government employees are trained. OPP-RTI also receives delegations of government representatives, NGOs, academia and donors from all over and beyond Pakistan.

Employing different means of communication: OPP-RTI is very conscious of the importance of presenting evidence effectively to make it understandable and accessible to different audiences. To communicate with community activists, it produces information leaflets and posters as well as holding meetings; it reaches out to government officials and professionals through presentations at their own training institutions and through university teaching, various publications and maps; the wider public is

[10] http://www.urckarachi.org/home.htm
[11] See for example: Daily Dawn (19 February 2006): IFI Loans and the Failures of Urban Development, by Arif Hasan

engaged through video production, pamphlets and newspaper articles; and in academic circles, articles and books reflecting on OPP's approach, as well as teachings, spur discussions.

Context

The wider political context greatly impacts on how readily new evidence is adopted. Some policy processes are defined as more 'closed' than others, thereby making it difficult for new evidence to be taken up. In the case of sanitation mapping, for example, the informal institutions surrounding the distribution of land and services in informal settlements serve important personal interests, and is therefore difficult to reform.

Ability to adapt to changes: The latest local elections in Karachi, which form part of the official devolution policy in Pakistan, have brought militant groups to power in many informal Karachi settlements. Since their election, mayors supported by these groups have strongly discouraged any independent interventions by CBOs and NGOs in their jurisdictions, which has considerably closed the political space where OPP-RTI operates. Yet, OPP-RTI is able to take on a wait-and-see approach since it is not pressured by short-term advocacy objectives. Furthermore, its function as a resource centre, and its well established contacts, lead to UC mayors continuing to approach OPP for support.

OPP-RTI's approach to development

In addition to the above mentioned factors for OPP-RTI's successes, there are some aspects that differentiate OPP from many other development organisations.

Firstly, OPP's approach of seeing, observing, learning and teaching is fundamentally different from the approach followed by typical development organisations. OPP-RTI acts effectively as a resource centre and does not provide funding for implementation. This function puts it in an ideal situation for producing and providing mapping evidence. Because mapping is OPP-RTI's core activity, updating information is not a problem.

Secondly, OPP-RTI's success is closely linked to the people working at the organisation. Most OPP employees have never left the organisation, thereby accumulating an impressive wealth of information, skills and contacts. This high retention rate helps to retain the spirit of development as a process of self-help, and commitment to transparency and accountability towards people.

Lastly, the process of continuous and self-critical engagement with its own work is a unique characteristic of OPP.

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