Experiences with surveying and mapping Pune and Sangli slums on a geographical information system (GIS)

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SUMMARY: *This paper describes how the NGO Shelter Associates and an organization of women and men slum dwellers worked together to collect information on each household in slum settlements in Pune and Sangli and to map this, along with infrastructure and service provision and each slum's position within the city. This permitted data on slums to be superimposed on these cities' development plans using a geographical information system. This provides an important information base for improving infrastructure and services within slums and for integrating slums into city-wide planning. The paper also discusses the contrasting experiences in the use made by the two different city governments of this information (little interest in Pune, great interest in Sangli) and how communities, governments and NGOs can work most effectively together to ensure the inclusion of slums within city plans.*

I. INTRODUCTION

THIS PAPER DESCRIBES how the NGO Shelter Associates and Baandhani ("building together"), an organization of women and men slum dwellers worked together on collecting information on slum settlements in Pune and, more recently, in Sangli. All the data were mapped on a geographical information system (GIS) and superimposed on the development plans of the cities of Sangli and Pune. The project approach, the two municipal corporations' responses and the outcomes are discussed. This is part of the work that Shelter Associates undertakes in partnership with Baandhani, to facilitate and support community housing and infrastructure projects. This is based on the philosophy that poor people are the best people to find solutions to their housing problems, so Shelter Associates and Baandhani work together to empower poor communities to seek solutions for themselves.

One of the main obstacles to effective urban planning in India is a lack of up-to-date, comprehensive and sufficiently detailed information about urban areas.[1] This lack of information is a major reason behind the failure of urban municipalities to include informal settlements (known as slums in India) in city-wide planning and urban development. In the cities of Pune and Sangli, large proportions of the urban population live in slums but major urban projects tend to exclude the informal city. In the absence of information about and understanding of slums, these settlements are typically considered to be chaotic masses rather than coherent urban

areas. They are easily ignored or else are planned for through programmes aimed specifically at slums, and not with slums understood as an integral part of the city.

To address this, over the last few years, Shelter Associates/Baandhani, a Pune-based NGO–CBO partnership, has been working to develop approaches for collating information about slums for inclusive urban planning. Since early 2000, it has worked on projects in Pune and Sangli that aim to introduce slum surveys and geographical information systems (GIS) as tools for integrating low-income settlements into urban planning and development.

This paper describes these two projects and considers the factors which have made the Sangli slum survey considerably more successful to date than that in Pune. The main focus of the paper is the contrasting experience of working with two municipal corporations on similar projects and the factors which have contributed to how the projects were received. The final section considers the ways in which the capacities of the NGO and the CBO have been built up as a consequence of the projects.

II. BACKGROUND

THE CITIES AND district centres of Pune and Sangli are located in the Indian state of Maharashtra, approximately 200 kilometres east and 400 kilometres southeast of Mumbai, respectively. Pune is a major city and industrial centre with a population of 2.67 million. It is India's seventh largest city and benefits economically from its location close to Mumbai and the Mumbai–Pune industrial corridor. Sangli, with a population of 478,500[2] is significantly smaller but is also an important regional centre for agricultural processing, and is industrializing and expanding rapidly.

Both cities suffer from inadequate infrastructure provision, which has not kept up with the rapid pace of urban growth. The provision of basic infrastructure across the city of Sangli is much less than in Pune, but the latter's infrastructure is often old and poorly maintained. This pattern of inadequate provision is reflected in the slums in each city, where inadequate basic amenities result in poor living environments.
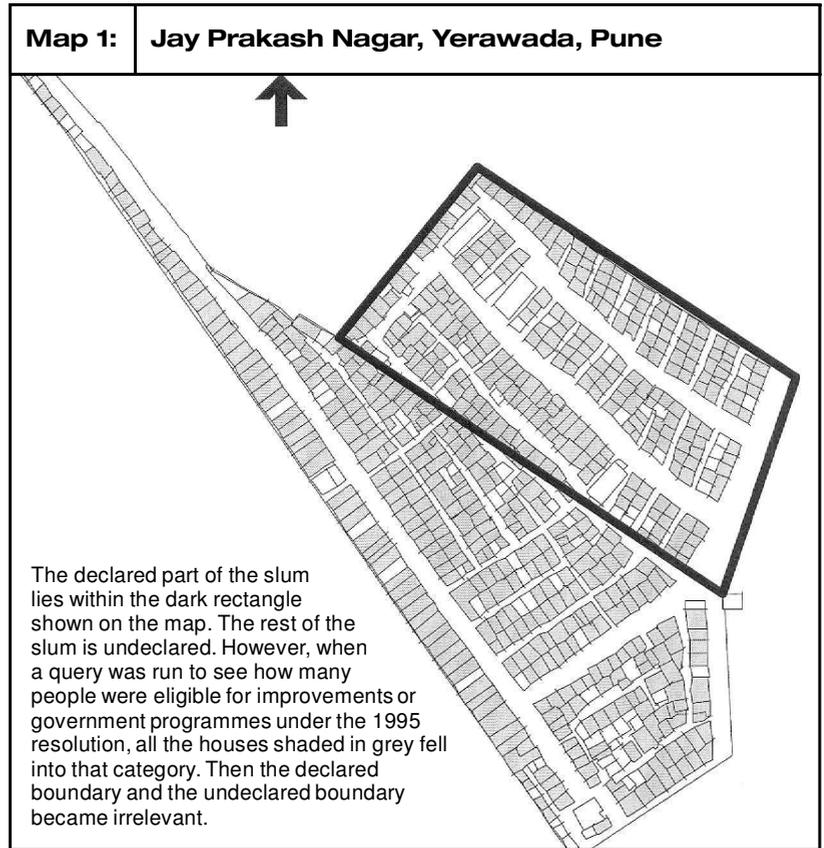
a. Slum settlements and urban development

Large proportions of each city's population live in slums. Shelter Associates/Baandhani estimates that some 45 per cent of Pune's population live in slums and although the official figure for Sangli is below 10 per cent,[3] this is most likely a significant underestimate. A slum settlement can be defined loosely as an irregular low-income urban settlement with poor living conditions. The term "slum" is commonly used in India to denote informal settlements. The definition of "slum" is further complicated by the process of "declaration", which applies to settlements on privately owned land. When a settlement is recognized by the local municipality as being one where living conditions are below a specified standard, it is "declared" under the Maharashtra Slum Improvement Act (1971). Once declared, a slum is eligible for basic improvements including water supplies, common toilets, paving, electricity and drainage. In practice, many slums with poor living conditions have not been declared. Slums located on land owned by the public sector can be provided with basic amenities without being declared, although in practice this seldom

happens: many lack basic infrastructure and are similar to the undeclared slums. Whilst a declared slum is eligible for basic improvements, this only applies to the area of the slum which lies within the declared boundary. In Pune, many slums were declared many years ago, often during the 1970s, and by now most have extended significantly beyond the boundaries drawn at that time. The result is settlements where certain areas have some provision for services whilst others are completely unserviced. The relevance of a declared boundary is questionable, when 50 per cent of a settlement may fall outside these limits (Map 1). Whilst a number of slums in Sangli have been declared, very few have been provided with basic infrastructure.

Map 1:	Jay Prakash Nagar, Yerawada, Pune

The declared part of the slum lies within the dark rectangle shown on the map. The rest of the slum is undeclared. However, when a query was run to see how many people were eligible for improvements or government programmes under the 1995 resolution, all the houses shaded in grey fell into that category. Then the declared boundary and the undeclared boundary became irrelevant.

4. This was a partnership project in which Pune Municipal Corporation worked together with eight NGOs, including Shelter Associates, to build and maintain over 200 communal toilet blocks in settlements across Pune. The blocks constructed by Shelter Associates benefited from considerable community input, and are maintained by the communities with support from Baandhani.

Slums are further affected by Government of Maharashtra legislation which recognizes certain rights of people who can prove that they were residents in the city on 1 January 1995. This legislation further complicates development for slums, as part of a settlement may be "undeclared" according to its boundaries, but its residents may be considered legitimate city dwellers.

In Pune, slums are handled separately from the rest of the city, under the Pune Municipal Corporation's Slum Clearance Department. With the exception of the toilet-building drive of 2000–2001,[4] which was undertaken on a relatively large scale, most slum improvements are carried out slum by slum, on a piecemeal basis. Slums are also handled separately in Sangli, by the very small Poverty Alleviation Department of the Sangli–Miraj–Kupwad Municipal Corporation (SMK–MC), which coor-

dinates with government officers who implement schemes for slums.

While slum improvements in Pune proceed without a clear systematic approach, major urban development projects tend to ignore the existence of slums. For example, in a presentation in mid-2001 about a light rail system planned by the Municipal Corporation to a considerable level of detail, the designers mentioned that slum dwellers would be affected but were unclear about the precise implications for slums and had no concrete plans for resettlement. In 1998, the high-profile Mutha River Improvement Project, initiated by the Municipal Corporation, brought together a number of experts and prominent citizens to discuss proposals which included a riverbed road and leisure facilities. Residents of the six flood-prone slum settlements located along the river were not included, although their combined population of almost 9,000[5] would have been directly affected by the proposals. In slum areas which would have to be cleared for proposed road-widening schemes and similar projects, Municipal Corporation departments have been investing in constructing community halls and sanitation blocks, demonstrating a lack of coordination between different departments, which results in a waste of public resources.

Resettlement is also compromised by a lack of information. Slum dwellers who were resident prior to 1995 are eligible for resettlement if evicted by a development project or for other reasons. In practice, however, this resettlement rarely materializes. One reason for this is that the municipal corporation and other authorities have no data or system of data collection with which to establish which houses are affected by a development scheme, the size of the affected population or other relevant information. Thus, either the development proceeds without provision for resettlement or else, if local councillors supported by the slum dwellers are sufficiently influential, the project itself is simply blocked, with implications for overall urban development.

5. Shelter Associates/ SPARC (1998), *By the Water: A Study of the Flood-affected People in Six Slum Pockets along the River Mutha: An Interim Report*, Shelter Associates, Pune.

III. SLUM SURVEYS AND GIS

ONE OF THE first actions of a newly established Baandhani community collective is to carry out a survey of the slum to see exactly how many people are resident in a settlement. This process brings people together and provides an opportunity to talk to other people in the slum. The community members collect and therefore own the information about their settlement which can be crucial when they negotiate with officials for amenities or when evictions are threatened. During 1997–2000, Shelter Associates/Baandhani carried out a number of projects through which they started to develop systems for combining slum surveys with the use of GIS (Box 1).

Shelter Associates/Baandhani starting using GIS for their slum surveys on the basis that slums need to be considered spatially, both internally and in relation to the rest of the city. Slums in Pune have not previously been mapped in detail and tend therefore to be considered as chaotic and disordered masses. In fact, they contain patterns of lanes, houses and facilities like any other part of the city. For the purposes of infrastructure provision, for example, it is essential to know the layout within a slum, as shown in Map 2.

GIS is useful for mapping the locations of the slums in relation to the city as a whole. In both cities, this has resulted in maps which clearly show

Box 1:	Some previous Shelter Associates/Baandhani slum survey and GIS projects

Pune slum database

In response to the overall lack of information about slums in Pune, Shelter Associates started compiling a database of slums in 1994. In 1998, detailed information for 394 slum settlements had been digitized on the development plan of the city. (The development plan was the most detailed map available, but unfortunately inaccurate and outdated.) The first ever slum map was created for the city, where each settlement was seen as a boundary, and had a name and a location instead of simply a dot approximately placed on the map.

Survey of pavement dwellers

In 1997, Shelter Associates, together with women's collectives of slum dwellers, carried out a socio-economic survey of nine pavement settlements in Pune, which aimed to increase visibility and understanding of this group of the urban poor.*
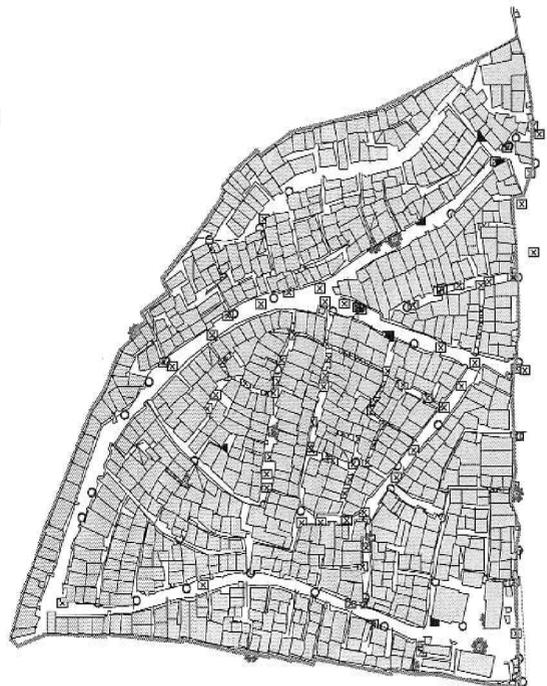
River slum surveys

After severe floods hit Pune in August 1997, which particularly badly affected slums along the river, at the request of the municipal corporation, Shelter Associates and community groups surveyed the slum settlements situated along the river. The settlements were mapped and all the household data were connected to the maps using GIS software. The GIS allowed a calculation and visual presentation of exactly how many houses had been fully or partially submerged during the floods.

* Shelter Associates (1997), *The Forgotten People: A Report on a Survey of Pavement Dwellers in Pune*, Shelter Associates, Pune.
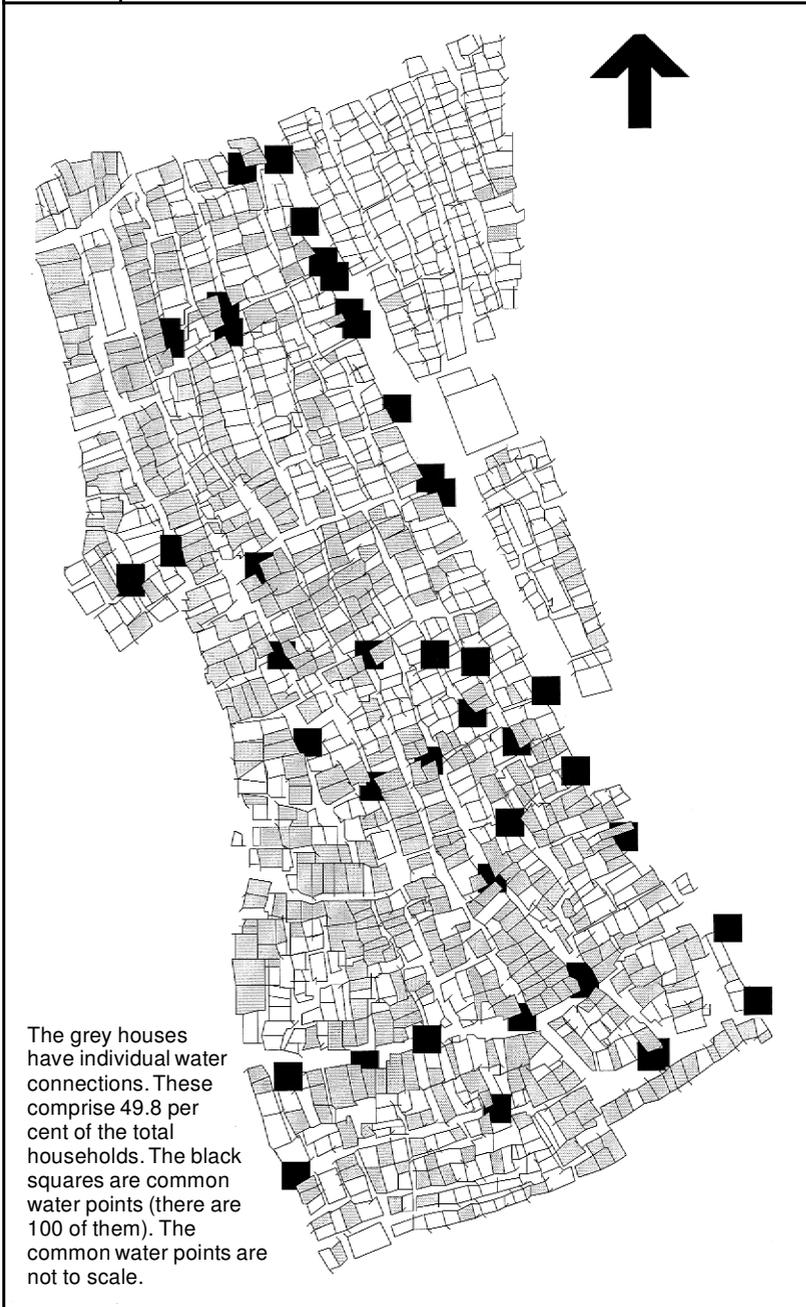
Map 2:	Panmala Slum, Parvati, Pune
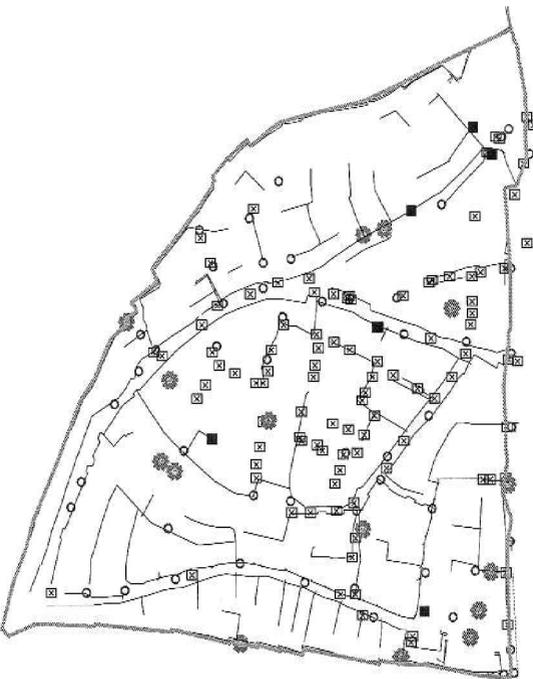
Panmala without houses, but with open gutters, manholes, electric lines, water points and trees shown

Panmala with the houses shown

Map 3:	Hanuman Nagar, Pune, water supply

The grey houses have individual water connections. These comprise 49.8 per cent of the total households. The black squares are common water points (there are 100 of them). The common water points are not to scale.

the location of slum settlements across the urban area, in a form which can be easily updated and manipulated. GIS can also be used to analyze different aspects, for example service provision, on a city-wide level.

In Pune, one issue that has been highlighted by the project is the uneven and inefficient water supply system. Under the current system, politicians can provide for areas in their own wards and this influence also extends to obtaining permission for individual connections. Whilst

increased provision for people is undoubtedly positive, some areas receive investment at the expense of others, which continue to lack very basic provision. For example, Hanuman Nagar, a hillslope settlement in the Kothrud area of Pune, has 100 communal taps despite the high cost of providing these to a hillslope slum. In addition, 54 per cent of households have their own water connections, a household:communal water tap ratio of 5.5:1 (Map 3).

In contrast, Jai Bhavani Nagar, on the Parvati hillslope, has 20 water taps shared by 603 households. Only 2 per cent of households have individual connections, a household:communal tap ratio of 28:1. Other settlements have even higher ratios or no communal tap provision at all. The GIS can take a case such as water distribution and demonstrate inefficiencies such as these over the entire city. A visual picture of the overall situation can draw the attention of urban planners and citizens to the issue.

Overall, it was clear that one of the main obstacles to inclusive planning was a lack of information – both spatial and socioeconomic – about the slums. This was the main starting point for the Pune slum census and, later, the Sangli slum survey.

IV. OUTLINE OF THE PROJECTS

a. The Pune slum census

THE PURPOSE OF the Pune slum census was to combine the processes of community surveys carried out by slum dwellers with the application of GIS, in order to provide an information base for inclusive planning (Box 2). The Pune project aimed to provide different urban groups, including municipal officers, slum dwellers, ward committees and other citizens, with comprehensive information to allow slums to be included in planning and to improve accountability in decision making.

The 74th Amendment of the Indian Constitution aims to increase transparency and accountability in municipal decision making through an emphasis on devolving planning, financial and administrative responsibilities to the local ward committees. In view of this, Shelter Associates were able to include a clause in the contract with the municipal corporation requiring the final data to be made available to the ward committees. The Pune project also aimed to challenge pervasive myths about slum dwellers, who are typically considered non-valid or illegal city dwellers, by presenting concrete information showing how slums and slum dwellers are economically and spatially integral to the city.

The output of the project was to be the creation of a comprehensive socioeconomic and spatial database of all Pune slums. With the strong support of the incumbent municipal commissioner of Pune, the Municipal Corporation agreed to fund the project and work started in April 2000.

b. The Sangli slum survey

For Shelter Associates/Baandhani, the Sangli slum survey was an outcome of the Pune project. On the basis of the Pune slum census, Shelter Associates/Baandhani was approached by the Indo–USAID Financial Institutions Reform and Expansion Project (FIRE). The aim of FIRE is to

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Box 2: | **Pune slum census methodology**

Socioeconomic census and settlement surveys
The census involved the completion of a survey form for every household in every slum. This survey was led by Baandhani members and Shelter Associates social workers, who employed teams of local people from the slums. The data concern slums and slum dwellers, so the latter were involved as far as possible in the data collection. This system also increased the authenticity of the data collected. In addition, local teams were in a position to return easily to houses that were locked during earlier survey rounds, working in the late evenings or early mornings if necessary. Houses where no one was at home on initial visits were visited three times to try and collect the information.

At the same time, settlement-level surveys were carried out in each slum to record information about the physical location and features (including hazards), infrastructure provision, NGO activity, legal status and nearby amenities.

The household and settlement data were then entered into databases.

Mapping
The census teams also numbered each house, and these house numbers were included by the plane-table surveyors when they drew the detailed maps of the settlements. The maps were checked by Shelter Associates and Baandhani on site and then digitized on a GIS.

GIS
In the first data set, all settlement boundaries are digitized on a map of Pune. The database of settlement information is connected to the relevant slum boundaries using the GIS, so that clicking with the mouse on the slum boundary causes a dialogue box to appear which gives settlement information. The second data set includes detailed maps of each settlement, showing every house, manhole, water point, electric pole, light pole, etc. Household-level data are connected to each house on the map, so clicking on a house brings up a dialogue box of information about the residents. Querying and analysis can be a compilation of data as required.

"*...institutionalize the delivery of commercially viable urban environmental infrastructure and services to all, including the urban poor.*"[6] Shelter Associates/Baandhani's role has been to identify poor settlements within the Sangli–Miraj–Kupwad Municipal Corporation (SMK–MC) area as part of a wider project which aims to lay the basis for private sector provision of basic services. Shelter Associates/Baandhani's interest is in ensuring that the urban poor are included in this process from the start, and its initial role has been to collect the necessary information. Among the aims of the project were that the work should have the potential to be replicated in other cities, that the poor should be integral to the project and that real pilot projects should be initiated during the project. Work started in September 2001 and the survey work for Phase 1 was completed by December 2001 (Box 3).

Whilst the two projects had different parameters, many of the aims were similar, namely to introduce information bases (both spatial and other) as a tool for planning. The thrust of each project was to create an information base on slums and slum dwellers. For the municipalities, it was a demonstration of how various kinds of data could be connected to this "slum database" and worked on using the GIS. Through the process, the municipalities would learn to work with the GIS and be able to upgrade data and add other information. This database would be the foundation of a large urban planning information base. Crucially, both projects included poor women and men in the process.

Box 3:	Sangli slum survey methodology

Phase 1

Existing settlements, including declared and undeclared slums and *guntewaris* (unauthorized lower-middle-income settlements*) were identified using existing municipal information and also field surveys by Shelter Associates/Baandhani field workers (social workers and Pune Baandhani members), with SMK–MC officials. These were recorded by Shelter Associates/Baandhani to create a computerized database of the number of urban poor in the city by location and legal status of settlements.

Ward, zone and city-level maps were prepared by Shelter Associates/Baandhani, showing existing low-income settlements and their connection to existing water and sewerage networks.

Settlement-level surveys were carried out for each slum settlement. Data collected included: settlement name; address; ward number; survey number; ownership of land; number of years established; number of households; whether in a disaster-prone location; existing level of community services; number of community taps; number of community toilets and toilet seats; whether there are separate toilet seats for men and women; number of municipal bins; number of street lights; availability of drainage (covered/open); community organizations; ongoing education/health/micro-credit programmes; and proposed use of land for public purposes, if any.

The data were cross-checked in a random survey of ten slums by municipal officers.

Phase 2

The proposed Phase 2 of the project will broadly include:
• sharing slum-level information with councillors and community leaders;
• declaration of slums by the SMK–MC;
• city-level development options, which could range from providing public facilities to individual services;
• developing approaches to converge various government programmes for the urban poor;
• developing criteria for selecting slums for preparing community-level action plans;
• implementing projects on a pilot basis in settlements.

* Some 30 per cent of SMK–MC residents live in *guntewaris*. These are housing plots on farmland which were sub-divided and sold by farmers. Although residents can prove ownership of the land, land use remains zoned as agricultural which means that provision of basic services to these areas is illegal. Following a recent Government of Maharashtra regulation, SMK–MC is regularizing the *guntewaris*. This will bring in considerable revenue to the SMK–MC through a tax levy on the *guntewari* residents.

V. CURRENT POSITION OF THE PROJECTS

a. Pune

IN PUNE, OF a total of some 450 slum settlements, about 300 have been completely surveyed and computerized, covering more than 130,000 households. However, despite describing the project in promotional literature as one of its innovations, the Pune Municipal Corporation is currently showing a lack of interest in and understanding of the project. The first 213 completed slum surveys have been submitted to the Municipal Corporation which has yet to purchase the necessary GIS software, as agreed in the contract, and therefore cannot use the data. It has since stopped funding the project, so work is currently stalled and, as a result, relations between Shelter Associates/Baandhani and the municipality are strained.

The Pune project has, however, had positive outcomes for Shelter Associates and Baandhani, as the experience of carrying out such a large project has built up the capacity of both organizations, despite the frus-

trations of the current stalling of the project. The process has increased considerably their specific knowledge of very different slums right across the city. It has established, even within the Municipal Corporation, that over 100,000 slum dwellers live in these 213 settlements. Whilst the Municipal Corporation refuses to accept that the maps have been drawn accurately, this does not invalidate the data collected. The very refusal to accept the project has also created, through the media, a higher awareness of the slums. During the project, people in various slums expressed an interest in Baandhani and set up local collectives. A number of individuals in these collectives have worked intensively on the project and continue to work full-time on city-wide Shelter Associates/Baandhani activities. A further tangible outcome of the Pune slum census has been the opportunity to develop the project in Sangli.

b. Sangli

In Sangli, the first phase of the project is complete and has been met with interest and enthusiasm by officials and councillors. Junior officials see the data as being immediately useful to carry out work which they had previously started but had been unable to complete because of a lack of information. One example of such work includes "declaring" slum settlements so that they are eligible for basic improvements. Another is the provision of photo passes to prove slum dwellers' residency in the city and their eligibility for resettlement in cases of eviction under the 1995 rule. The data will also be useful to officials in the implementation of various government schemes for the poor.[7]

The Sangli slum survey has also provided an opportunity for Shelter Associates/Baandhani to work with communities in slum settlements in Sangli, where there has been relatively little NGO–CBO activity. Members of Pune Baandhani have visited Sangli to help set up Baandhani groups and to explain to the communities how Baandhani works. Sangli Baandhani members have visited Pune to see the work of the collectives, community-managed toilet blocks and other projects. An interesting outcome has been the connection of the federation with another local NGO in developing micro-credit systems in the Sangli slums. This kind of networking is essential for the growth of a federation, as a young federation works most effectively in an NGO–CBO partnership. Eight savings groups have been set up in the slums.

The positive reception of the project by the SMK–MC has had other outcomes. Shelter Associates/Baandhani has been participating in a media–urban government–civil society forum organized by the Canadian Institute on Governance, which decided to locate its India city study in Sangli and not in Pune as originally planned. The SMK–MC is now one partner in the forum. A central part of the forum's activities involves a small-scale infrastructure project which targets the urban poor. In Sangli, two community toilet blocks are to be built in slums where Shelter Associates/Baandhani made contact during the survey process, and where interest in working as a community-based organization has been high. These toilets are being constructed by Shiv Sadan, a Sangli-based NGO which specializes in low-cost biogas plants, and the blocks will be managed and maintained by the local communities with support from Shelter Associates/Baandhani.

The Sangli slum survey has started a process of raising awareness among SMK–MC officials about the slum dwellers, exposing them to working with

7. Interviews, see reference 1.

poor communities and thereby increasing their capacity to work with the urban poor. Baandhani members from Pune have been prominent throughout the project, in the initial presentation of the Pune slum census, in working on the project, and in presenting the completed Phase 1 data. The collection of data by slum dwellers has been well received at the SMK–MC.[8] Senior officials have gained new exposure to slum settlements and communities through the surveys and related new projects, as exemplified by the attendance of the municipal commissioner at the ground-breaking ceremony for the toilet construction at Sangliwadi slum.

The Sangli slum survey has already led to other projects, whereas work in Pune has slowed considerably. As part of our reflection on the projects, we have attempted to analyze the different factors which have led to these contrasting situations, and these are discussed in the following section.

VI. INSTITUTIONALIZING SLUM SURVEYS AND GIS IN MUNICIPALITIES AS A TOOL FOR PLANNING

a. Working with municipal officials

THE PUNE CENSUS was approved primarily on the basis of the incumbent commissioner's enthusiasm for the project and his ability to generate sufficient interest among elected councillors for the funding to be approved. Shelter Associates/Baandhani had a good working relationship with this commissioner, Ratnakar Gaikwad, who was interested in the NGO–CBO's work and had visited their offices to see examples of previous work (for example, the use of GIS in the river slum surveys of 1998). He felt that the project was innovative and "historic"[9] on the basis that urban development, particularly planning for the poor, was hindered by the lack of information about the city. He was keen to support a non-governmental organization that was proposing to collect much-needed information about almost half the city's population. He promoted the project strongly within the Pune Municipal Corporation and the municipality took a radical step in agreeing to provide the funding.

However, after this commissioner was transferred in December 2000, interest waned considerably. The project is not a priority for the new municipal commissioner and this feeling has filtered down the ranks. This scenario has been repeated in numerous urban projects and partly reflects a flaw in the system of frequent post rotation among top-level Indian administrative service officers.[10] However, whilst it is possible that the SMK–MC commissioner might also be transferred during the Sangli project, the impact on this project is likely to be significantly less for a number of reasons.

Relations with more junior officials in each municipal corporation have been different from the start. The Municipal Corporation is an older and more established organization,[11] where officials have been working in similar jobs for many years and tend not to welcome innovation and change. It is possible that they viewed the project as increasing their workload or they may have been afraid of what it might reveal. In contrast, the SMK–MC is just four years old as an institution[12] and this is reflected in the more proactive attitude of its officials. Thus, despite the contractual agreement that Pune officials accompany Shelter Associates/Baandhani field workers to check data, they were very unwilling to do so. They came only after several postponed meetings to check plane-table maps in settle-

8. Interview with Gajanan Ghate, SMK–MC Deputy Commissioner, on 24 April 2002, in his office at the SMK–MC, Sangli.

9. See reference 1, interview with Ratnakar Gaikwad.

10. In this respect, Ratnakar Gaikwad has said that on a future similar project with an NGO he would take steps to see that the contract would ensure project continuation in the event of a change of municipal commissioner (see reference 1, interview with Ratnakar Gaikwad).

11. Pune Municipal Corporation was established in 1950.

12. Sangli Municipal Council was upgraded in 1998 to a municipal corporation, which also governs two adjoining urban centres as one urban administration, the Sangli-Miraj-Kupwad Municipal Corporation (SMK–MC).

ments. SMK–MC officials were, however, involved from the start and worked together with field staff, for example travelling together across the city to identify different settlements.

Having worked with Pune Municipal Corporation officials on previous projects, Shelter Associates was aware of their approach to work and their limitations. Moreover, the project was the initiative of the NGO and not of the municipality. Therefore, a central feature of the project should have been to find ways of building up the interest and capacity of officials at all levels and to increase their understanding of the project and its uses. In Sangli, the more junior officials and the councillors were present at the initial presentation given by Shelter Associates/Baandhani about the proposed work, whereas in Pune only top officials and politicians were at the equivalent presentation. Sangli officials were already familiar with FIRE's work and aims in Sangli. In that context, Shelter Associates/Baandhani's work was part of a broader project, which officials were informed about and which made sense to them, so they welcomed it.[13]

In Sangli, the relationship between Shelter Associates/Baandhani and SMK–MC officials was more reciprocal, which also helped the project. For example, SMK–MC agreed to include slums identified by both its officials and by Shelter Associates/Baandhani staff, thus trusting the judgement of the field staff. In turn, Shelter Associates/Baandhani agreed to the inclusion of *guntewari* areas in the surveying process. These are unauthorized lower-middle-class residential areas and not slum settlements, and so fall outside the usual focus of Shelter Associates/Baandhani.

The involvement of SMK–MC officials in this way also meant that they had a sense of ownership of the project in that they have participated in the early stages and helped Shelter Associates/Baandhani field staff become acquainted with the city. There has also been a feeling among officials that the NGO–CBO partnership has been able to complete work for which the municipalities do not have the motivation nor the necessary staffing levels.[14]

Whilst Pune's municipal commissioner was very clear about the uses of the data and had the necessary power to introduce its use, other officials either have not understood the point of the project or have to work on projects prioritized by the present civic chief. Pune has always been a politically "active" city and politics at the state level immediately affect Pune's local politics. The political dynamics are very volatile and Pune's municipal commissioner has a difficult task finding the best balance between urban development administration and local politics. Projects therefore develop or are called off according to the inclination of the civic chief. Sangli is less sensitive politically which, within the state's current political situation, works very well for urban development. It is local politics which have to be handled in Sangli and the administration is able to do this very well. Development projects there do not suffer as much from changes in government as they do in Pune. Officials throughout the hierarchy understand the purposes and uses of the slum surveys and are given the necessary free hand to improve their capacity to implement infrastructural and other urban improvements in the city which include poor settlements.[15]

b. Introducing GIS as a tool for slum surveys in the municipalities

Certain departments in both municipalities had had some prior experience of GIS (for example, in the preparation of development plans).

13. See interview, reference 1.

14. See interview, reference 1.

15. See reference 8.

However, neither senior nor junior officials were familiar with the technology, since GIS work has always been carried out by consultancy firms selected on the basis of their bid in a tendering process. No department concerned with slums in either municipality had used GIS previously.

Whilst Pune's former municipal commissioner, Ratnakar Gaikwad, saw GIS as a useful tool for managing large quantities of data and for easy visualization of the data,[16] GIS was not an appealing aspect of the project for other officials and it is likely that the project appeared daunting from the start. Most of the more junior Municipal Corporation officials are unfamiliar with computers, so a project based on specialist (GIS) software was inevitably intimidating. The project also involved a high level of detail – perhaps in retrospect more than necessary – for both the maps and the survey data, which may have made the project appear more complicated than it was. In addition, Shelter Associates staff, who are familiar with the software and the project, having worked on its development for a number of years, did not appreciate fully the skills that they had developed over this period, which enabled them to deal with this type of work. Thus, even if the Municipal Corporation had remained interested in the project and had eventually received the completed slum census on the GIS, it is likely that they would have experienced some difficulty in using the final product without considerably more training than had been anticipated.

Training for officials was included in the proposal for the Pune project. However, in the event, the officials were unable to see the point of the project and unable to understand how they could use it themselves in their own work, so they had little interest in turning up for training sessions. Their reaction of blocking the project at basic levels, for example quibbling about the inclusion of certain details of drainage lines and manholes in the maps, was therefore understandable, if frustrating, for Shelter Associates/Baandhani.

In Sangli, the project was not introduced as a GIS project. The purpose of the project was to identify and survey low-income settlements, an aim which was clear and of obvious use to SMK–MC officials, particularly in the context of FIRE's wider project. GIS was not a major initial focus and was introduced to the project as a tool used by Shelter Associates for processing and presenting data. Thus, once the data were ready for presentation on the GIS, the project was accepted and the benefits of GIS became clear through the visual presentation. The municipal commissioner of Sangli, Ashwani Kumar, considered that GIS had improved the Sangli slum survey through its ability to link spatial and non-spatial data, to combine maps and provide easy access to the data. Two senior officials saw one main advantage of using GIS in this project, that of speeding up the project.[17] For the more junior officials, the project is more about the survey data than the GIS itself,[18] although senior officials can envisage GIS being used for future projects by junior officials, if suitable training is arranged.[19]

In terms of the more general uses of GIS for municipalities, Municipal Commissioner Ashwani Kumar considers GIS to be a useful tool for several purposes, including infrastructure provision and management, and increasing the efficiency of tax collection. However, he also pointed out some disadvantages, namely the costs of investing in both hardware and software and the need to train staff to use GIS.

Overall, the approach of introducing GIS later on in a project as a tool for a tangible survey rather than making it a more central focus of a project

16. See reference 1, interview with Ratnakar Gaikwad.

17. Questionnaire completed by Ashwani Kumar, SMK–MC Municipal Commissioner, 2 May 2002; also see reference 8, interview with Gajanan Ghate.

18. See reference 1.

19. See reference 17.

from the outset has been significantly more successful. Sangli officials at different levels see GIS as a tool with a number of potentially useful applications for their work and which could be used by officials at all levels. Whilst training was not a focus of this project, it could be included at a later stage or in another project.

c. Project funding

One major difference between the two projects was the source of project funding. A substantial part of the funding for the Pune slum census came from the Municipal Corporation. On the one hand, the Corporation's decision to fund the project was innovative and exciting as it meant that it was fully supporting a project which aimed to provide comprehensive information needed to include slums in urban planning. However, this also meant that the Corporation was able to withhold funds and thus jeopardize the project. Had the funding come from an external source, Shelter Associates/Baandhani would have been able to complete the work and then attempt to interest the municipal officials in using the finished product. It would also have been possible for Shelter Associates/Baandhani to release complete city-wide information to other interested organizations.

Funding for the Sangli slum survey came from external sources, namely FIRE (Phase 1). The project itself was therefore less vulnerable to changes in priority within the municipality. The municipality is also freer and has more flexibility to work on the project as it is not obliged to justify constantly to councillors the spending of public money. One senior official said that working with NGOs and CBOs allowed for more flexibility than the municipality can achieve within its bureaucratic constraints.[20]

20. See reference 8.

VII. BUILDING NGO AND CBO CAPACITY

BOTH PROJECTS HAVE been a major learning and capacity-building process for Shelter Associates and Baandhani. The Pune project was a massive undertaking from which staff at all levels in the NGO learnt a considerable amount. Sangli has been an important experience of working for the first time in another city.

The Sangli project built on the experience of the Pune slum census, allowing Shelter Associates/Baandhani the opportunity to put into practice skills and lessons learnt during the Pune process. The Sangli project presented new challenges to Shelter Associates/Baandhani, as Sangli was a city for which there was negligible data on slum settlements, unlike Pune, where Shelter Associates/Baandhani had already built up a database of basic information on nearly 400 slums. In Sangli, it was necessary first to locate all the settlements to be surveyed, with few available maps of the scope available in Pune, and Shelter Associates/Baandhani coordinated intensively with municipal officers. It was therefore a process of learning to liaise with municipal officers in actual work. Field staff had to interact with officers at different levels in the municipal corporation and with ward officers. In this, they succeeded in building up a good rapport with the officers which, as discussed above, significantly helped the project. At one stage in the project, there was some opposition from a few local councillors, but relations have improved to the point where some councillors have been actively supportive, for example in attending and

sponsoring the ground-breaking ceremony for one of the new toilet blocks.

Baandhani has grown considerably in strength during the two projects. The Pune project was an opportunity for Baandhani to mobilize slum dwellers in many settlements to work on the surveys, ensuring the participation of slum dwellers in the process. Whilst the scale of the project was too large for community groups to be consolidated in each of the slums, it helped considerably in broadening the geographical range of Baandhani activities across Pune. In addition, a number of very committed Baandhani members have continued to work full-time on the projects. As well as working on household and settlement surveys, they have built up useful skills in checking plane-table maps in settlements. Having developed many skills during the Pune slum census, these Baandhani members were able to apply them to the Sangli slum survey. Baandhani members have also built up their capacity through working directly with the Sangli municipal corporation, and Baandhani members took the lead in reporting on the work through presentations at the SMK–MC.

One key outcome of the Sangli project has been the process of community building in a number of slums. So far, eight Baandhani savings collectives have been established, with 120 members. Relations between Pune Baandhani and Sangli Baandhani are also being fostered through community exchange visits. In addition, at the suggestion of a local NGO which specializes in micro-credit savings, Sangli Baandhani has set up a system for savings modified from that used in Pune. This is an example of a new process in Sangli which, if it works well, may in time be transferred by Baandhani to Pune. In addition, the experience of working with NGOs other than Shelter Associates is starting to increase the strength and independence of Baandhani.

VIII. CONCLUSION

THE PUNE SLUM census and the Sangli slum survey represent a major attempt by an NGO–CBO partnership to develop an information base for the urban poor for including slum settlements in mainstream urban planning and development. Both projects continue to be valuable learning processes for Shelter Associates/Baandhani and a number of key lessons have emerged from the experience so far.

The Pune slum census project stalled because of strained relations between administrators and, perhaps, due to political pressure. However, it demonstrated that if even one official has the conviction to go through with a project, such projects will make an impact. The fact that the NGO–CBO had so much field experience, had prior knowledge of slums and had built up enough credibility with its previous work also contributed to the richness of the project where, at one time, 100 community people were surveying slum houses, detailed slum maps were being drawn, data were being worked on and a real spatial and social database was emerging.

The Sangli project grew out of lessons learnt from Pune, but although Sangli has similar administrative structures and boundaries to Pune, at all times the data-collecting included various officials and engineers from the SMK–MC. In Pune, the community participated but in Sangli, the community and the local government participated, which led to much closer ties between the three different bodies. The SMK–MC was definitely

more interested in participating in the surveys whilst the Pune engineers were finding reasons to avoid every training session. This shows that, in such projects, the involvement of all three partners at all levels is essential – and this involvement is one of the success stories of Sangli.

The Pune project grew and developed within the confines of Shelter Associates/Baandhani. Perhaps more of the project should have been carried out on Municipal Corporation premises, for example setting up a "GIS cell" in the municipality. After a while, the entire project could move over, with the NGO, the CBO and the Corporation participating at all times. The output would be richer.

Also, too much emphasis has been put on the project as a "computerization of slums" rather than the building of a database with maps and data which would eventually be processed on a GIS. In Sangli, the GIS was presented as a tool but in Pune, even the initial presentations were on the slum data being generated on a GIS. The process looked difficult and the designated training time not long enough to de-mystify the GIS. In Sangli, this was not a problem as the officers did not have to start working on the database immediately. They had time to observe and absorb it without the pressure of having to master the techniques.

The project in Pune has stalled because the Municipal Corporation has stopped its funding. The radical action taken by Commissioner Gaikwad later became the reason for the Corporation to stall. However much the NGOs want to work with the municipalities on projects funded by them, this financial dependence is the greatest risk of all.

However, in Pune, 130,000 families have been surveyed and mapped. Even the Pune Municipal Corporation cannot deny that. The database is there, and growing. What is really needed is coordination between other municipalities, for them to come together and develop systems from these two experiences so that this constant effort by the poor to validate their existence and be empowered to their rights continues in the urban areas, within the key triangle formed by the communities, the government and the NGOs.