AN ANALYSIS OF INFORMAL SETTLEMENTS AND APPLICABILITY OF VISUAL SETTLEMENT PLANNING (ViSP) IN SOUTH AFRICA

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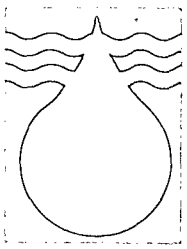

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by

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EXECUTIVE SUMMARY

1. Background and introduction

The ten years from 1990 to the present time have witnessed a major change in attitudes and approaches to urban development in South Africa. The most significant aspect of this change has been the growing commitment to community participation in decision-making, particularly with respect to physical infrastructure and housing provision, and the democratisation of local government. However, the new local authorities that have been created in metropolitan areas have very large populations by international standards. So there remains a need to create further participatory structures at an area level, in order to decide upon issues such as levels of service, cost recovery, local community management potential etc.

Community participation at a local level is an essential component of sustainable urban development. But it is constrained by several factors, the most important of which is the lack of capacity at this level. Many local community organisations lack the knowledge, resources and expertise, which are essential if they are to play a meaningful and constructive role in development. This constraint may be addressed by training and capacity building programmes and the encouragement of support for local NGOs. But this takes time and requires medium- to long-term programmes. It also requires appropriate training material. An important contribution to that process, which would also facilitate greater participation in the short-term, would be the use of technological advances in computer software for interactive decision-making. The goal should be the creation of innovative interfacing systems, which can then be used as tools in the interaction between development professionals and community organisations. These should be designed to simplify and contextualise the issues which are central to the decision-making process.

The UNCHS (Habitat) has developed a system, which is appropriate to the achievement of this goal. It is called the Visual Settlement Planning (ViSP) approach and is designed to operate with IBM compatible computers. Designed originally as a planning tool, this approach uses the concept of user-friendly imaging to interface with different parties on a variety of social, planning and engineering issues, which are central to the urban development process. The approach has been piloted successfully in Belo Horizonte, Brazil, but would benefit from further pilot studies in a different geo-political environment. South Africa provides an ideal environment within which to pilot a second project. The country is undergoing a process of rapid urbanisation, which requires innovative solutions. It is allocating significant financial resources to addressing the issue. It is committed to a participatory process of development. And, finally, it has a strong technical base with which to support the technology in the experimental development phase. Within South Africa, Cape Town provides a unique set of factors, which could ensure the most rapid return and the greatest potential benefits for such a pilot project.

2. Urbanisation and informal settlement growth

The starting point for any discussion on informal settlements begins with the urbanisation process itself. Urbanisation does not imply a growth in the urban population per se. An increase in urbanisation only takes place when the growth rate of the urban population exceeds that of the rural population. Hence it implies a combination of natural growth and rural-urban migration. The 1997 census indicates that only a little in excess of 50% of South Africa's population is living in urban areas. Thus, on the basis of international trends, and particularly if countries of Latin America are used as examples, South Africa is about to move into a rapid urban growth phase.

The current policy approach to addressing the housing needs of the urban poor is to provide starter housing on serviced sites, using the mechanism of the 'one-off' capital subsidy. This mitigates against informal settlement upgrading. Because the South African government operates through a line functional departmental structure, other departments, such as the Department of Water Affairs and Forestry for example, may adopt different approaches to informal settlements, based upon a pragmatic assessment of realities and population needs. Nonetheless, the amount of money committed to the housing budget means that it is the housing policy that determines the national approach to informal settlements.

When the first ANC government came to power in 1994, it set a housing target of one million new houses in five years. This target was based on an estimated backlog (in 1994) of 1,5M units (Business Day, 07/04/99). The intention was to build up to an annual production of 350 000 units per annum over five years and eradicate the backlog shortly thereafter. The situation in 1999 is very different. With more accurate data available, the housing backlog is calculated to be between 2,6 and 3,0 million, and increasing at a rate that exceeds, and will continue to exceed new housing delivery. The net result is that, far from being removed, informal settlements are likely to continue to grow in numbers in South Africa's major cities for the foreseeable future. Hence there is a need for a major policy rethink on informal settlements within the country.

3. The relevance of the research to the water sector

This study differs from the norm for Water Research Commission studies, in that its remit is wider than simply the aquatic environment of those settlements. At the same time, it has a direct bearing on the work of the Commission, and is intended to assist with the development of policy in respect of water and informal settlements. Work on informal settlement upgrading indicates that the water quality component may often be the most important from an external impact perspective. However, under conditions where the upgrading is likely to result in major changes to the spatial form of the settlement, water and sanitation provision becomes a secondary determinant, and water supply may even be the least important. This is because of their flexibility and adaptability. Providing these services first may lead to significant problems later when other services, with more rigid physical requirements, are to be installed. Hence an understanding of what constitutes the most appropriate upgrading methodology is valuable in determining water and sanitation, and environmental health, policy within informal settlements, as well as in establishing research priorities within the sector.

4. The international policy debate

The starting point for any discussion on informal settlements has to begin with an analysis of international experience. This is because the phenomenon has received much greater attention elsewhere during a period when South Africa was focussing on controlling migration by the majority of the population into the cities.

The past forty years has seen fundamental shifts taking place in the international thinking on informal settlements, as represented by influential organisations such as the World Bank and the UNCHS (Habitat) and the major academic institutions. An understanding of these shifts and critiques is central to any analysis of current practice regarding informal settlement upgrading in South Africa. This is because so much of the debate focuses on the provision of housing, even though other facets of development, such as water supply and sanitation, may often present a greater immediate need. This also helps to explain many current attitudes towards informal settlements, since they are perceived as constituting a point on a housing delivery continuum.

In the 1950s and 1960s the dominant practice was to produce public housing in the faith that this would eventually eliminate the squalor of informal settlements (Pugh, 1995). This was proved to be a false assumption, since these schemes failed to achieve significant reductions in informal settlements. In addition, they often failed to target the poor and simply provided subsidies to the middle class. In the 1960s and 70s liberal academics such as Turner analysed the housing mechanisms inherent in informal settlements and put forward recommendations for aided self-help, whereby housing would be understood as a process in which beneficiaries would have high levels of autonomy (Nientied and van der Linden, 1988). In 1972 the World Bank entered the housing sphere on the condition that there would be a shift away from public housing (Pugh, 1988). The twin approaches it advocated were sites-and-services and slum upgrading (*ibid.*). Though encompassing components of the aided self-help concept of Turner, the World Bank policy was based mainly on economic criteria of affordability and cost recovery.

Throughout the 1970s a series of conferences debated the concept of aided self-help. The concept was endorsed by the governments of many developing countries at the 1976 UNCHS (Habitat) conference (HABITAT I) in Vancouver (Vaa, 1995). However, implementation of the concept remained limited. Where it was adopted, this was motivated by the acquisition of World Bank funding and occurred as an exception to the existing policy framework. Notable for this period were, firstly, the absence of policy reform (Menzes, 1995) and, secondly, the favouring of metropolitan-wide implementation agencies over local authorities (Pugh, 1995). Marxist theorists explained the limited application of Turner's concept of

aided self-help through its conflict with the interests of the capitalist State, arguing that they would only be adopted as far as they were useful to lowering the cost of reproduction of labour (Nientied and van der Linden, 1988). However, the barriers to the adoption of this concept have been tackled by the mainstream in the subsequent decades.

In the 1980s the IMF and World Bank imposed macro-economic reform and, as a result, policy in developing countries shifted from Welfarism to a market driven approach. In this period the concepts of sites-and-services and slum upgrading were promoted within a wider policy framework (Baken and Van der Linden, 1993, Pugh, 1995). In 1986 the World Bank introduced a further shift, which focused on the growth and development of the housing sector and the urban economy in order to promote general economic growth (Pugh, 1995). This introduced the concept of enablement, which was understood as developing the housing sector through an appropriate financial, institutional and legislative framework (*ibid.*). The UNCHS proceeded to refine the concept of enablement, introducing a new role for the government as enablers (Vaa, 1995). By 1990 the World Bank recognised that enablement requires good governance (Pugh, 1995), and includes this in its new urban policy, which encompasses urban productivity, urban poverty, urban environment and urban research (World Bank, 1991).

At the same time there was an increasing recognition of the reality of informal settlements, and a realisation that the conditions that existed within these settlements could not be addressed by housing alone. On the contrary, when the residents themselves were involved in deciding upgrading strategies, a wide spread of priority needs emerged, from water, through sanitation, to access and economic development. This changing international perspective of informal settlements was encapsulated by the Recife declaration. The Recife International Meeting on Urban Poverty held in March 1996 in Recife, Brazil, was organised in preparation for the Habitat II Conference. 35 countries and organisations including community-based, non-government, private, municipal and United Nations agencies were represented. The declaration leading out of the meeting is titled *Urban Poverty: a World Challenge* (more commonly known as the Recife declaration) and provided recommendations to Habitat II as well as to the levels of organisation represented at the Recife meeting. Its area of focus was the urban poor, and it described a number of key principles that should be followed in addressing the needs of the poor. Of these perhaps the most important was the need to integrate the "informal city" into the wide city framework (UNCHS (Habitat), 1996c).

While at an international level sophisticated academic analysis and critique has lead to fundamental policy shifts and new commitments by funders and national governments, there are significant local barriers to the implementation of the required change. Local political agendas are driven by the building of political capital, while long term commitment of project-specific funding through national or international agencies form further barriers to change. The reality in most developing countries is one of contradictions within government around the question of what interests should be served by the state, and within funding agencies, where economic criteria continue to override social processes. Restricted by these broad contradictions, the debate at local level about implementation options is dominated by technical and cost factors. The mainstream solutions of sites-and-services and slum upgrading are continually compared in terms of cost and technical criteria, rather than the inherent social implications to poverty. As evaluations centre around the end results rather than the process by which the product came about, methodologies based on alternative processes seldom enter the debate (Angel, 1983, Martin 1983).

Three conclusions for overcoming local barriers to change can be drawn from the work covered by this report. Firstly, there is a need for consensus at the local level as to what constitutes successful intervention. It is here that the promotion of a common understanding of informal settlement processes and the urban poverty concepts of vulnerability, resilience and mobilising of assets can play an important role in shifting the local debate from purely technical and economic criteria to include those of social processes. Secondly, the analysis, dissemination and transfer of Best Practices, as well as other means of international collaboration, can play an important role in shifting the intervention debate from locally entrenched approaches. Thirdly, all stakeholders should participate in the search for appropriate intervention approaches. This requires the inclusion of informal settlement residents in the intervention dialogue.

5. Informal settlement formation

Turning now to the informal settlements themselves, the term is defined here as the occupation of land in the absence of a) legal rights to land, b) official approval of land use and development standards, and c) provision of infrastructure. Generally, these settlements are formed by some form of land invasion, the process of which falls into one of two broad categories. The first is gradual invasion, through individual action, while the second is sudden, through organised collective action. Such organised action may be orchestrated by homeless communities, by political parties (for political gain) or by government officials (usually for financial gain). The settlement development process can be broken down into the land invasion, the formation of social ties and community organisation, the consolidation of the physical environment, and the integration into the wider city (Alsayad, 1993). Physical intervention in the form of demolition, relocation or upgrading can occur during any of these stages.

6. Informal settlement processes

Planning for informal settlements requires a different set of norms and skills to planning for new development on greenfield sites. The most obvious difference is that people are already living there, and hence any development must take place around them, taking their needs into account. This requires a much greater understanding of the social processes and community dynamic than would otherwise be the case.

Such an understanding does not come easily. Informal settlements are continually subject to changes (physical, social, economic and political), which shape and either maintain or threaten the existence of the settlement. It is this process of change which, in turn, differentiates living conditions in informal settlements from those in formal settlements. The complex processes impacting on informal settlements can be separated into those at macro level and those at the settlement level.

At the macro level it is population dynamics and urban development processes that impact on informal settlements. Three factors at this level lead to the formation of informal settlements: a) the high rates of urbanisation (compounded by population growth concentrating in the poorest sectors of society); b) the high costs of infrastructure provision; and c) a slow rate of formal land release and infrastructure delivery. Among these factors the process of migration is important to a social understanding of informal settlements, as these generally house a high percentage of migrant population. Two approaches exist in the analysis of migration. Firstly, the structural approach deals with the contradictions inherent in the capitalist mode of production, which on the one hand attracts rural population to the cities, but on the other hand excludes this population from formal housing and infrastructure and in many cases employment (Hardoy and Satterthwaite, 1986). Secondly, the individualist approach deals with the experience of migration, and its dis-aggregation according to factors such as gender, the labour market and the duration of the move (Beall, 1993). These two approaches have also been applied to the analysis of informal settlements and broadly reflect the Marxist (structuralist) and Liberal (experiential) arms of theory, that have dominated the academic debate on informal settlements since the 1970s.

At the settlement level it is the experiential approach to understanding living conditions in informal settlement life, that has tried to understand the processes of commercialisation, competition, changing relationships with authorities, and physical risk. Commercialisation in informal settlements is understood as the capitalist process from communal rights to land (subsistence shelter) to individual rights to land (housing market) (Amis, 1984). Economic pressures arising from this process require compromises in other areas of household expenditure such as nutrition, and may lead to the selling off of informal housing to stronger competitors (*ibid.*). With competition understood as being strongest at the bottom end of the market, sublet rooms in informal settlements generally rank lowest in the housing market. These are occupied by the weakest competitors, generally female headed households, elderly women and young adults (Volbeda, 1989), who's only other option would be to join the new invasion of peripheral land, which is associated to high risk. Where land is scarce, new invasions increasingly occur on land that is vacant due to physical unsuitability for development (flooding, geological instability). Risk of eviction too is highest during initial stages of an informal settlement. Poor access to water and sanitation pose particular health risks, while temporary building techniques involve inflammable materials with a high risk for fire (consolidation with permanent building techniques generally occurs once the risk of eviction is significantly reduced).

The relationship between the settlement and the authorities, which defines the level of security of an informal settlement, depends on three factors: a) the stage in the settlement cycle, representing varying degrees of collective cohesion and organised demand, b) intervention by outside organisations, which might assist in community mobilisation and ease the dialogue with officials, and c) the political orientation of the authorities. Government response to informal settlements can broadly take four forms: firstly, tolerance of informal settlements, requiring no intervention or policy changes; secondly, demolition, implying the acceptance of overcrowding in other forms of low income housing; thirdly, relocation to formally laid out sites, requiring no changes to the legal and regulatory framework, and lastly legalisation and upgrading, requiring adjustments to the legal and regulatory framework such as the revision of infrastructure and layout standards (Alsayad, 1993, Amis, 1996). The relationship to authorities changes with political change or inconsistencies in government, dynamics related to mobilisation within the settlement, and the degree of continuity of the involvement of outside organisations.

7. The relevance of different upgrading experiences

In developing an approach to settlement upgrading which is appropriate to South Africa, the experience of other countries provides some valuable insights. Internationally, there are a number of different approaches to upgrading, although the number of detailed case studies of informal settlement upgrading remains limited. However the are a number of them, and they provide important lessons and experiences. A total of nine case studies were identified that had relevance to this debate, and they were divided into groupings that reflected the prime mover in the process (see Table 7.1 and section 7.2.2). This revealed that such projects have their origins in one of four groups: international agencies, governments (whether national, regional or local), NGOs and communities themselves. Belo Horizonte is not included in this table, as this project is described separately in details in Chapter 5.

The projects exhibit a diverse range of objectives. Lusaka provided one of the first attempts, internationally, at large scale upgrading. The primary objective was infrastructure provision, and external professionals took the major decisions. The project resulted in a large number of relocations, due primarily to the high standards of the services. Many of these problems were avoided in the Asian experiences, although it is important to note the different circumstances. In all cases plot sizes are very much smaller, footpaths take the place of roads in many places, and people are prepared to live under much more crowded conditions. Even so the results of these case studies were mixed in terms of their long-term success. The Indian experiences show the inappropriateness of a prescriptive approach. Where government attempts to dictate the process the success is limited. However, it is important not to draw the wrong conclusions from this. Both the Indonesian and Sri Lankan case studies have strong government involvement. Of the two the latter is the most interesting. The Sri Lankan One Million Houses Programme is considered to be a major international showcase for community-based decision-making. Certainly community decision-making at the level of detailed planning and implementation is one of the highest recorded. Government, however, laid down the basis framework within which the decision-making would operate. What made it successful was that the planning framework was in line with the reality of the settlements. A strong community-based network was established, with a social support system funded by government, to agree this framework at a community level, following which community-based decision-making took over.

The case studies that are driven by communities themselves, or by NGOs working with communities, tend to follow a different approach. There is generally little holistic planning. Instead, specific activities are highlighted, often one at a time, which reflect the perceived priority needs of the community. Once the first of these has been addressed, or is underway, then the group moves on to the next, and so on.

8. Brazil, Belo Horizonte and the Alvorada programme

Brazil has strong similarities to South Africa in a number of key indicator areas, which make caparisons in the field of development. However, the most relevant and important in this context is the experience of upgrading gained on the Alvorada programme in Belo Horizonte. A review of the history of favela intervention in Belo Horizonte gives some indication of the various factors and relationships on which the development and successful adoption of an informal settlement upgrading approach depend. In 1983, after over a decade of struggle, pressure from civil society, in association with unique personal and political circumstances led to the passing of a new Municipal Law. This was the Law for the Regularisation of Favelas (PROFAVELA - *Programa Municipal de Regularisacao de Favelas*), the first law in Brazil that recognised favela residents' rights to ownership of the land they occupied.

The PROFAVELA Law applies to 'densely occupied favelas with economically needy populations that existed up until the date of the aerial photography survey of 10 September 1981' (updated in 1996). These areas are assigned Special Sector 4 zoning [now referred to as ZEIS (*Zonas Especiais de Interesse Especial - Special Zones of Social Interest*) 1 and 3, which recognises, where possible, the characteristics of spontaneous occupation. They are therefore excluded from the general norms applying throughout the municipality. Instead, they are subject to specific norms issued by decree, together with the approved spatial plan. The areas are exempted from taxes and contributions for upgrading for a period of 5 years. Ownership of the regularised plots may be directly transferred to the occupants.

The Alvorada Programme methodology was developed in order to implement more effectively the PROFAVELA law; hence it is based on the principles set out in that law. The key principle embodied there is that the settlement structure of the favela be maintained. It should be noted, however, that the Guide Plan for Belo Horizonte, approved in 1996 allows also for vertical development as a form of intervention in the favela zones (Special Sector 4, now ZEIS 1 - Special Zone of Social Interest), that is the replacement of the favela layout structure and dwellings with multi-storey residential blocks. The local government development agency URBEL describes the Alvorada approach as one that accepts the favela as part of the housing stock. It is thus recognised that these settlements do not only represent risk and need, but also a potential for transformation. Raising the standard of living is understood to apply to all basic aspects of living - accessibility, security, comfort, health, recreation and the ability to socialise and to access urban services. Thus the approach is one whereby the process of spatial restructuring is based on a detailed evaluation of the problems and potentials of each favela.

URBEL defines the operational principles of the Alvorada Programme as follows:

- Participation of the community in all stages of the process, including planning, implementation, evaluation and maintenance (the latter is referred to as 'post-occupation');
- Integrating the activities of public and private institutions in the areas of education, health, urban cleansing/refuse removal, culture, human rights, nutrition, employment and income generation;
- Interdisciplinary work, with a technical team comprising the social, legal and urban professions.

A close interdependence exists between the three components of the programme methodology, namely, land regularisation, urban-environmental recuperation and social organisation. URBEL describes these components as follows:

- Urban-environmental recuperation. This means improving living conditions through the provision of infrastructure and urban services, the parcelling (division) of land, and integration with the surrounding areas and the city as a whole. This is based on a comprehensive evaluation of the problems and potential of the settlement. The residents participate in evaluating their settlement with the technical team and in identifying the possibilities for alterations.
- Land regularisation - two aspects pertain to the security of the residents, a) legalising the land use by municipal decree, b) transferring ownership of the plots to the residents.
- Organisational and participatory development - the programme invests in the participation of the residents in all aspects of the work. This requires a process of education, which develops critical attitudes and those necessary for collective work.

The level of detail required to implement this programme effectively required an accurate and detailed spatial referencing of all dwellings. Hence the development of the ViSP approach, which combines the use of a high resolution GIS-linked map with a comprehensive social and economic database of the favela population.

9. Moving this approach/methodology to South Africa

Two questions emerge when looking at the relevance or appropriateness of the Brazilian ViSP-based upgrading methodology for South Africa. The first is whether it is necessary to go for that level of complexity, given that there are other, simpler successful upgrading strategies elsewhere. The second asks whether the methodology is adaptable to community-based planning in a South African context, where there is far less investment in local capacity building than is the case in Brazil. The second question is addressed later. To answer the first, it is necessary to look at the specific, physical nature of informal settlements in South Africa, and compare these with conditions elsewhere.

The term 'nature of the settlement' refers in this context to the spatial relationship that one dwelling has to another. Informal settlements in South Africa can be divided into three broad categories. The first category is low-density peri-urban. The Winterveld area, to the northwest of Pretoria, is a good example of this type of settlement. This is a particularly South African form, and is a product of apartheid. People were forcibly relocated from urban area and literally "dumped" in the nearest "homeland", which in the case of the Winterveld was Bophuthatswana. Because there was a large amount of land available, densities were relatively low, and certainly less than the gross densities used for conventional formal low-cost housing developments.

The second type of settlement is typified by those settlements found on the outskirts of Durban, outside of the Metropolitan boundary. Here people from the rural areas moved onto tribal land on the outskirts of the city, where they were unaffected by apartheid laws. Yet they were close enough to the city to make the area attractive for settlement. The difference to the first is that the area is better located, and people move there of their own accord (which is not to say that it is their preferred choice). As a result densities tend to become much higher than in the previous case.

The third type of settlement is that of land invasion on pockets of land that lie within the municipal boundaries. Often these pieces of land are strategically located, but they are also physically marginal in many cases, or preferred public open space. In a minority of cases the land will be privately owned and planned for higher income residential or commercial development.

To these different spatial relationships can be added a series of social and economic factors that also help to differentiate informal settlement types. The net result is that the upgrading of different settlement types can be approached in different ways, but what is appropriate for one may not be appropriate for another. Hence there is a need to create a match between settlement types and settlement upgrading approaches.

The case studies outlined above reflect different approaches to upgrading. In addition, there have also been other developments in the area of settlement upgrading within South Africa. Thus both the Gauteng Provincial Administration and the Durban Metropolitan Council have introduced settlement upgrading policies, while the South African national Department of Water Affairs and Forestry is exploring the water quality conditions of informal settlements. When these are combined with the international case study experiences, a picture begins to emerge of different approaches to informal settlement upgrading, which can be quantified in terms of a key determinant that underpins the primary intervention. In total, six of these 'determinants' have been identified, and these are discussed briefly below.

- Formal tenure as a basis for upgrading.
- Water quality/public health improvement as a basis for upgrading.
- Infrastructure provision as the basis for upgrading.
- Community choice as a basis for upgrading.
- Housing as a basis for upgrading.
- The integrated approach to upgrading.

Of the different settlement types described, the most complex is infill development within the metropolitan boundary. It is when this settlement type reaches a high shack density, which is then coupled with the need for a high degree of mobilisation, that the upgrading options begin to narrow. Up to that point it is possible to use most determinant forms. Beyond this point, however, it is only the ViSP-based approach that is able to manage the extreme complexity of the upgrading process.

There are a number of important conclusions that emerge from this study. The first is that informal settlements in South Africa are likely to continue to grow, even with the current housing policy in place. The second is that upgrading does require a different approach from development professionals than greenfield sites. However, the extent to which this professional approach needs to change is related to the settlement type. Low-density settlements with low levels of service require less change than do high-density developments where higher levels of service and large-scale internal relocations are required. In the latter case the completely new methodologies are required. This is the situation for which the ViSP-based approach is particularly well suited, if not the only approach to follow.

The need for this approach is not recognised to any degree in South Africa at present, because these settlements are currently high priority areas for relocation under the government's housing subsidy scheme. However, as urban informal settlements continue to densify, the need for this approach will continue to grow.

10. The way forward

The report to this point has concentrated on the need for informal settlement upgrading and the potential for the use of the ViSP-based approach. This still leaves unanswered the practicality of implementing this approach, and the question of community involvement. The study was able to demonstrate the practicality by duplicating the Alvorada methodology at a desk study level using an informal settlement in Cape Town. It was also able to show that the approach could be managed by the community. However, this is not the same as demonstrating that the approach works in practice.

During the study period, contact was made with a number of civic and community organisations within the Cape Town area, it was a relatively straightforward matter to open up a dialogue with these organisations. The objective of these discussions was, in the first instance, to inform the organisations that in-situ upgrading of informal settlements was a feasible option for development. The result of these early discussions was really quite remarkable. They revealed a high level of frustration with the iSLP (integrated Serviced Land Project), but a resigned acceptance, since it appeared that there was no alternative available. Once the principles of in-situ upgrading were described, the community organisations expressed support for the process and requested more detailed information.

Interest had been expressed by organisations in the Black City, New Rest, Kanana and KTC settlements (all of which lay within the former IKAPA local authority's boundaries, and are now incorporated into the Central Cape Town Municipality), and parts of Crossroads. The latter were, however, too large to deal with and would have overwhelmed the research project. As a result, it was agreed that more detailed presentations would be held with representatives in the first three areas. Further discussion in Black City indicated that the process should not be taken further at the present time, although representatives would monitor progress in other areas. Kanana and New Rest, on the other hand, were enthusiastic to continue the process. Detailed presentations on in-situ upgrading took place in Kanana and New Rest.

Following the Kanana meeting, it was broadly agreed that there needed to be a visual medium for future discussions. A helicopter fly-over was arranged, and this led to the generation of a high-resolution aerial photograph of New Rest and Kanana. This was then warped and mosaiced to provide a single image, which was then presented to a meeting of the committee. Support for the project was forthcoming and work then began on gaining local authority approval. The use of Kanana and New Rest as Cape Town's first pilot project was formally given by the City of Cape Town in April 1998, and attempts to obtain external funding were started. Funding was obtained later in the year, and the project began formally in February 1999.

Given these developments, it was agreed that the current study should be presented in two parts. The analysis of informal settlement upgrading constitutes this report. The application of the approach will then be presented as an independent report, following an extension to the project contract and donor support from external sources. This second report (Abbott and Douglas, 2001) will describe the approach as implemented in New Rest, an informal settlement of approximately 1 150 shacks situated adjacent to the N2 near its point of access to Cape Town International Airport.

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1.1 Introduction

This report deals with informal settlements, with a specific focus on the upgrading of those settlements in-situ. Its initial focus was on a GIS-based planning methodology, which was known as Visual Settlement Planning (ViSP). The methodology had been developed in Belo Horizonte in Brazil, and the intention was to explore whether the methodology was applicable, and appropriate, for South Africa. In setting out the project, there had been an assumption that the principle of in-situ upgrading was fully accepted, and that the primary issue was how this should be achieved. In fact that assumption was presumptive. For although there were a number of upgrading projects underway in South Africa at that time (1995-96) the alternative approach of providing new starter homes, which was embodied in the housing subsidy policy, was in fact the majority view, both in government and among development professionals.

Given this situation, there was a clear need to move back one step. For if the underlying principle of upgrading were not accepted as being necessary, then there would be little point in discussing the mechanism. At the same time, there was a debate taking place, situated primarily within the NGO sector, about in-situ upgrading itself, where the focus was on the methodology. Here then was a second area of potential contention. For the reality is that the Belo Horizonte methodology is not the only one. The outcome was a widening of the area of study, in order to take both of these debates into account. This was considered necessary, but it then raised the issue of where the boundaries to the study should be drawn. For the reality is that informal settlements constitute a large and complex area of study.

This in turn led to a third issue, which related to the specific context within which the research was taking place. The Water Research Commission has commissioned the project, acting in association with the Settlement Upgrading Programme of UNCHS (Habitat), while the parties to the contract and the members of the steering committee covered a wider, and more diverse, range of interests. Given the mandate of the Water Research Commission, it is important to explore the extent to which a wide-ranging study is relevant to water and sanitation provision. Would it not, for example, be more appropriate to look at the provision of water and sanitation to informal settlements?

In 1998, (when this study was in its third year) the Department of Water Affairs and Forestry actually signed an agreement with DANCED, the Danish International Aid Agency, which reflected this specific, need. That brief was "to fund the development of a strategy to manage the water quality effects of densely populated, poorly serviced, informal settlements" (Department of Water Affairs and Forestry, 1998). This constitutes a sectoral study of informal settlements. This agreement showed how a specifically sectoral study is inherently limited in its scope. Thus it will be unlikely to look at the complex interaction between water quality provision and the other needs of the community, for example road access, housing, economic activity and exposure to physical risk.

The reality of informal settlements is that they are extremely complex social environments. Any sectoral intervention has to recognise and understand this complexity. Hence it was considered that there is a need for a study that is able to explore this wider context. For whatever sector people approach informal settlements from initially, all should have a common expectation, which is that of long-term viability and sustainability. Hence context is important. The nature of informal settlements, the expectations and the political climate are important. And all of these factors inform the upgrading approach.

Finally, before this discussion on scope can be brought to a conclusion, it is necessary to return to the issue of whether informal settlement upgrading is necessary at all. This may seem to be a regressive question in an international context, where the underlying concept of informal settlement upgrading is the starting point for any analysis. But this should not be an automatic assumption in a South African context. For there is a school of thought, which in 1996 was quite influential, that questions whether informal settlements should be upgraded at all. The rationale for this view is that South Africa has a housing delivery model, in which informal settlements play only a minor role. And that policy, which is centred on new housing delivery, was gaining momentum at that time, because of the importance attached to the government's commitment to build one million houses in five years. This is a difficult issue to grapple with. For the debate between informal settlement upgrading and new housing delivery

is fraught with historical political and social overtones. Informal settlements in South Africa are seen as one of the legacies of apartheid. There is some truth in this, but it is only partly true. Informal settlements are a phenomenon of all cities in the developing world. The reasons for their formation and growth are complex, and derive from a number of quite diverse causes. Given its legacy of apartheid, however, perhaps it is important for South Africa to understand these causes, and the different reasons why informal settlements exist. For these settlements are not going to disappear from the country's urban centres for many years to come. Apartheid may have played an important part in their early formation, but their future growth and development will be shaped by the impact of changes in the global economic environment.

This discussion has identified the issues, and the factors that have influenced the scope of the study and the choice in favour of exploring the wider context. This does not detract from its value at a sectoral level. Thus, within the water and sanitation sector, it can provide a basis for establishing whether sectoral intervention in informal settlements is likely to succeed. At the same time, however, it can also contribute to the wider national debate on whether the government should have a policy on informal settlements and what this should contain. And finally, it provides a firm theoretical base from which to explore the specific methodology that is, and remains, the core of the project.

The way in which this diversity of needs has been met is to divide the study into two parts, which will be covered by separate reports. The first report, which is this one, deals with settlement upgrading in a broad international context, where the importance of informal settlement upgrading as an approach to the provision of shelter is clearly demonstrated. It then goes on to situate the upgrading methodology within that context. This is intended primarily to stimulate a policy debate, and could form the basis for a national policy on informal settlement upgrading. The second report, on the other hand, is more specific, and describes the application of that methodology in a practical context, based upon a pilot study that is currently taking place.

In the light of the above discussion, this chapter continues by exploring the associated concepts of urbanisation and migration, following which it introduces the ViSP-based methodology of in-situ informal settlement upgrading. The chapter ends with a brief outline of the report, which covers the different sections.

1.2 Urbanisation

The starting point for any discussion on informal settlements begins with the urbanisation process itself. Urbanisation refers to the growth in urban population in proportion to the growth in rural population. Hardoy and Satterthwaite (1989) emphasise that an increase in urban population does not necessarily imply an increase in level of urbanisation. Natural population increase (an excess of births over deaths) in cities only causes a change in urbanisation level if this differs from the natural increase in rural areas. As natural increase in cities is paralleled by natural increase in rural areas, the main cause of changes in urbanisation levels is the movement of population. Hardoy and Satterthwaite point out that such movement is 'essentially a result of changes in economic structure; increased proportions of national populations in urban centres reflect an increase in the proportion of employment opportunities (or possibilities for survival) concentrated in urban centres' (Hardoy & Satterthwaite, 1989:339).

The relevance of this statement lies in the relationship between urbanisation and informal settlement formation. Two characteristics apply for most cities in the developing world. Firstly, formal land release and infrastructure provision is not in balance with rates of urbanisation. The United Nations estimates that in the 1980s 'nine new households were formed for each new standard dwelling built in low-income developing countries' (United Nations, 1993. 'Report on the World Social Situation,' New York, quoted in UNCHS, 1996:9). Secondly, the cost of authorised housing is excessive in relation to the wage structure (Amis, 1989:17). Overcrowding, land invasion and informal settlement formation are a consequence of these imbalances.

1.2.1 The factors underpinning urbanisation

Changes in urbanisation trends since 1950 reflect economic and political changes in the world. The increase in level of urbanisation reflects the fact that the world's economy has grown many times since 1950. Besides the growth in the world economy, national economies have become more open and there is increased integration between economies (production and services) internationally. There have been

changes in the types of economic activities people are engaged in. Whereas, in 1950 most of the world's workforce worked in agriculture, by 1990 most worked in services. In general the countries with the most rapidly growing economies since 1950 were generally those with the most rapid increase in their level of urbanisation while the world's largest cities are heavily concentrated in the world's largest economies (UNCHS, 1996a:13).

Political changes have also influenced urbanisation trends. Since 1950, almost all the former colonies of European powers have gained independence and the political impact of that de-colonisation has meant major changes in settlement systems. With the concentration of economic and political power in national capitals and in some nations, and the removal of migration controls on indigenous populations, there has been an increase in urbanisation. In addition, many countries experienced an unprecedented growth in their national populations. While rapid population growth does not, of itself, increase the level of urbanisation, it is the most important factor in increasing urban populations for most nations in the South (UNCHS, 1996a:13).

1.2.2 The relationship between economic growth and urbanisation

While a number of factors influence the scale of net rural to urban migration, there is considered to be a relationship between changes in economic development in a country and the level of urbanisation. Major cities generally have a significantly higher concentration of the nation's economic output than the country as a whole. And one reason given for this is that rising levels of urbanisation are strongly associated with growing and diversifying economies (UNCHS, 1996a:24). And yet rising levels of urbanisation, and rapid population growth in large cities, have often been considered problematic. This is because governments and international agencies fail to ensure that infrastructure and service provision keeps up with the growth in population, and governments often fail to enforce pollution control and other regulations needed to protect the quality of life in urban areas.

Countering this positive view is an alternative, which argues that urban growth has been detrimental to economic growth. Here the term 'over-urbanisation' has been used to describe countries where the level of urbanisation relative to national income is considered to be high in comparison to reference countries. One basis for the 'over-urbanisation' thesis is that specific urbanisation levels in the South have been achieved at lower levels of per capita income than those associated with similar levels in the North. It has been argued that increases in the level of urbanisation in the South have been achieved without economic growth, industrialisation and increases in agricultural productivity (UNCHS, 1996a:25).

This is a contentious point. On the one hand, Hardoy and Satterthwaite point out that it is primarily the chance for survival that causes people to migrate to cities. The result is that 'people will not move to Dar Es Salaam if there is no chance of an income or food' (Hardoy and Satterthwaite, 1989:250). On the other hand, Drakakis-Smith is sceptical of this view, arguing that 'there is immense variation in the circumstances inducing population movement from rural to urban areas' (Drakakis-Smith, 1996:676). One example he cites is from Southern Africa, where 'rural poverty brought about particularly by overcrowding on marginal lands has induced large-scale movement to towns and cities, irrespective of their own lack of economic development' (Drakakis-Smith, 1996:676). This too is the view of Castells, who regards the 'rush towards the towns . . . much more as the result of a rural push than of an urban pull, that is to say much more as a decomposition of rural society than as an expression of the dynamism of urban society' (Castells, 1972:46).

Beall mentions two broad categories into which these opposing views fall, firstly the 'individualistic approach which seeks to explain individuals' choices largely in terms of "pull" factors' and secondly the 'structural approach which focuses on extraneous forces which either act as "push" factors, ...or as "pull" factors' (Beall, 1993:4-5). Whatever the academic analysis, the overall conclusion that emerges from this debate in respect of the migrants themselves is that cities are not only perceived, but actually experienced, as containing some opportunities for survival, regardless of actual economic performance. On this basis they continue to attract migrants. What is less well perceived by those coming to the towns is that these opportunities for food, shelter and income are largely in the informal sectors of the urban system and are fragile and vulnerable to social and political change.

1.2.3 Internal and international migration

Internal migration flows in most countries are complex, constantly changing and include rural to urban, urban to rural, urban to urban and rural to rural. But they are not the only form of migration. Over the last ten to fifteen years, the scale of international migration has increased considerably. There is a great diversity in the types of international migrants and the forms that their movements take – contract labourers, students, professionals and skilled workers, immigrants joining their families through family reunification, people who retire to a foreign country and asylum seekers and refugees. The scale and nature of the flow of international migrants is greatly influenced by the attitude of the receiving country to immigrants and the provisions made to allow for control immigration. The increase in the number of refugees has been most dramatic among these different categories of international migrants. By 1994 23 million people qualified as refugees compared to about 2.5 million 20 years before. Another area of growth in international migration flows has been the migration of highly qualified or skilled labour migrants that include the professional and managerial staff transferred within the international labour markets of trans-national corporations (UNCHS, 1996a:22). Whatever the cause, this cross-border migration may be expected to be a significant factor in South Africa's urban growth in the future.

1.2.4 Adapting policy to the new urban reality

South Africa will witness enormous changes in its urban landscape over the coming decade. The level of urbanisation will increase drastically, moving from its present condition of just over 50% to well in excess of 60%. There will be major inflows of people from outside of the country's borders. And there may well be an outflow from the formal housing sector, particularly if the economic growth rate continues to be below the rate of natural growth of the population. This is an issue that has not been discussed so far, but which emerges as a major contributory factor in the international literature discussed in later chapters.

All of these factors will contribute to a major growth in informal settlements. This section has initiated this debate by looking at urbanisation, and some of the complexities of migration. Informal settlements are a reality of South Africa's urban landscape and will continue to be a reality into the foreseeable future. National policy needs to recognise this reality. One way to do this is to develop a coherent and integrated policy towards informal settlements. This report provides the basis for such a policy.

1.3 Background to the present study

In July of 1995, the UNCHS (Habitat), facilitated by the Water Research Commission (WRC) of South Africa, presented a seminar in Pretoria, to local authorities and research organisations active in GIS, on one particular approach to the upgrading of informal settlements, which involved a technique known as Visual Settlement Planning (ViSP). ViSP represented the GIS base of an integrated methodology for the upgrading of these settlements. It had been commissioned originally by the UNCHS and had subsequently been undergoing trials to test its appropriateness and viability in Nairobi, Kenya and in Belo Horizonte, Brazil. The results, particularly in the latter case, had been extremely successful, and the purpose of the Pretoria workshop was to demonstrate this success and to explore the potential for the application of the ViSP approach in South Africa.

In September 1995 Ivo Imperato of the UNCHS and John Abbott of the University of Cape Town (UCT) took up the subject again, this time at an international seminar in Belo Horizonte. Working in conjunction with the WRC, the possibility of developing the ViSP approach in Cape Town was explored. This was also discussed with City Planner of Cape Town, who supported the initiative, and a proposal was prepared. This proposal was accepted by the WRC, and the project commenced in January 1996. The research was to be based upon existing work being carried out in Belo Horizonte in Brazil. The objective was to use the development of a GIS as the basis developing a broader methodology for in-situ upgrading.

1.4 The components of informal settlement upgrading

The upgrading of informal settlements "in-situ", ie. while people continue to live in the settlement, requires a very different approach to that taken in the development of a new or greenfield site. Because people have shelter, and a settled pattern, the removal of every dwelling has deep personal and social consequences. Relocation therefore needs to be kept to a minimum, and the process of relocation must be planned with the concerned and affected people themselves. Building the infrastructure around

existing dwellings is a technically complex operation. The sites that are finally allocated will be variable. This is a tremendously sensitive issue. And then there is the fact that this is a functioning community, with social and economic linkages that need to be retained during the upgrading process.

If the housing density within the settlement is low, as is the case in rural or peri-urban areas, then the potential exists to carry out this upgrading slowly with the community, using paper plans and some of the recently developed participatory processes such as Action Planning (Hamdi and Goethert, 1996) or Planning for Real. The problem becomes far more complex once the densities begin to rise to 80 dwellings per hectare and greater, and where the settlement seeks to provide for vehicular traffic. At these densities and under these circumstances, it becomes extremely difficult to work with paper plans and time-consuming iterative processes, particularly when there is also ongoing shack movement taking place in the settlement.

There are three elements to in-situ upgrading under these conditions. The first is the planning methodology. This is the role played by ViSP. ViSP provides a GIS platform, which is coupled with a database, and a visual backdrop of the settlement obtained from low-level aerial photography. Together, these provide the environment that integrates the social and economic information, the spatial reality of the settlement and the planning and design process. The second element is the community. Upgrading deals with a defined community. The upgrading will only succeed if it has the total support of the community. Hence the community has to be an integral part of the entire decision-making process. The third element is the local authority. The upgraded settlement has to be integrated into the city's wider management programme. Hence the local authority has to be a full partner in the process. The section that follows describes these three elements in greater detail.

1.5 Defining the ViSP (Visual Settlement Planning) methodology

1.5.1 The Visual Settlement Planning (ViSP) methodology

The Visual Settlement Planning (ViSP) methodology was initially developed by UNCHS (Habitat), in co-operation with the Technical Research Centre of Finland (VTT) as a GIS tool for urban planners dealing with refugee camps. The present system is the product of years of international research and implementation. The system configuration has evolved considerably from the original system that was first implemented in Kenya, primarily due to advances in hardware and software. However, these developments owe much to the work carried out in Belo Horizonte over the past ten years.

Prior to the introduction of the ViSP approach in Belo Horizonte several years of collaborative research initiatives had already taken place in this field (Moura et al., 1993). For a number of years prior to 1993, an Italian development NGO, AVSI (Associazone Volontari per il Servizio Internationale) had been working with a number of favelas in the city of Belo Horizonte in Brazil in an attempt to upgrade those areas in-situ. Basic mapping techniques were utilised, using paper-based drawings, but these were difficult and cumbersome, given the extremely high densities that were found in those favelas. During 1989 - 1992 AVSI, together with the Pontifical Catholic University of Minas Gerais and the University of Bologna, began collaboration on the development of a computer-based approach to informal settlement upgrading. Computer science applications were developed in the CAD 126 Computerised Cartography Laboratory at the AVSI headquarters in Belo Horizonte. Moura et al (1993) discusses in detail the methodology and the thematic mapping scheme that resulted from these initiatives. Although some progress was being made, it was extremely slow. Thus when the UNCHS suggested using the ViSP techniques, the benefit was seen immediately. This was integrated into the existing work and provided the basis for the later development of the methodology, which is described in Chapter 7 of this report.

1.5.2 Steps in the ViSP approach

The sequence of steps employed in the ViSP approach in Belo Horizonte, with exception to the use of video, is essentially identical to the sequence followed in Kenya (Table 1.1). The capture and use of video imagery has been implemented in Kenya only. Very little, if any, video imagery based work has been done in Belo Horizonte. In contrast to the Kenyan methodology, which incorporates a video camera mounted to an aircraft, the methodology used in Belo Horizonte uses only a hand held 35mm camera for photographs taken from a helicopter.

Table 1.1 Steps involved in the ViSP approach in Kenya (modified from: Nieminen, 1995)

(i) Collection of existing map material of the target area
(ii) Preparations to take aerial videos, photos of the area
(iii) Flight over the area (aerial photos, slides, videos)
(iv) Processing of the material acquired from flights (film development, printing of paper copies)
(v) Capture of video images onto the computer
(vi) Capture of slides and aerial photos into the computer
(vii) Geo-referencing of captured material (also use of GPS)
(viii) Geometrical correction of images, when applicable
(ix) Building of photo mosaics
(x) Print-outs and "raw maps" for survey teams
(xi) Attribute data collection in the field
(xii) Preparation of GIS map base from picture/image material
(xiii) Linking collected attribute data to GIS map-base
(xiv) Statistical analysis, preparation of thematic maps
(xv) Visualisation of picture material (add texts, symbols)
(xvi) Preparation of plans, improvement options etc
(xvii) Awareness campaigns using processed picture and image material
(xviii) Implementation and follow up

1.5.3 Applying ViSP in the Alvorada programme

Belo Horizonte has a total population of 2.5 million people living within the boundaries of the city (as opposed to the Metropolitan Area). Of these, more than 337 000 people live in 139 squatter settlements ("favelas") (AVSI, 1997). These areas are characterised by a high risk of flooding and landslides. The programme designed for upgrading of these degraded urban areas is termed the Alvorada programme. It comprises a number of separate favelas. Amongst these are the Vila Nossa Senhora Aparecida, Vila Apolonia, Lixao, Vila Marcola, Vila Senhor dos Passos and Vila Ventosa. In the Vila Nossa Senhora Aparecida, which contains 1300 families, 15% of the area has a slope above 47%. In addition to difficult access, the Vila is faced with precarious sewerage, drainage and garbage collection. The Vila Marcola faces similar problems. In this case 50% of the area has a slope of above 47%. The Vila Apolonia (1100 families) is characterised by a low level of consolidation. The Vila is disconnected both internally and with the surroundings, and is also faced with an absence of infrastructure and services. The Lixao settlement (411 families) is situated on a garbage dump and, as such, represents a settlement in a critical risk area. Gas emissions from the decaying garbage dump are a serious fire hazard. The Vila Senhor dos Passos is well connected to the surroundings but has a disconnected internal passageway. There is also a considerable demand for land regulation facing this favela. The Vila Ventosa has no accessibility for urban services and is also characterised by a precarious sewerage system. Hence it can be seen that the project has been tested, and proven, in a number different physical environments.

1.6 The role of the community

ViSP provides the technical platform for the upgrading methodology. However, this can only be successful if the methodology gains a total 'buy-in' by the community. Hence the social component of the process is the second crucial element in the process. Hence it is important, on the one hand, to understand and define the role of the community. On the other hand, it is equally important to ensure that the technology is used to support the community, not to manipulate it.

1.6.1 Understanding the role of the community

One of the requirements of physical development projects that affect communities is that those communities must be involved in the decision-making process during the planning and implementation of these projects. This requirement is a key criterion for the approval of many project proposals submitted to the public sector by development agencies in South Africa. Whilst most of these agencies are committed to community participation, there is divergence in terms of its meaning in practice.

Different strategies, ranging from simple consultation to grand social compacts are used. Whilst some of these are commendable, they usually reduce 'the community' to the most vocal within that community, leaving the majority of those affected outside the decision-making process. This approach to community

participation inadvertently empowers those already in powerful positions within the community and marginalises the most vulnerable and weaker sectors of the community. If insufficient attention is paid to internal social dynamics, this approach leads to tensions and usually the breakdown of these community participation initiatives.

The development of a community's oneness, self-reliance, and capacity to engage meaningfully in community and development affairs, depends very much on how the individuals in that community perceive themselves. One of the indicators of a successful community participation process is in fact that the lowest of the group in the social order not only participates but also begins to exercise initiative and choice. It is at this level, and not only among the more articulate, that the core of the problem of community participation must be confronted. It is the individuals in the bottom 40% who are most handicapped by an internalised sense of powerlessness and low self-esteem. They may be living in fear of historically authoritarian, corrupt and brutal leadership or government that controlled their lives over the years and lack the capacity to envision a new social order in which they stand to benefit and in which they personally play a significant role. Without a change in the self-perception of the rank and file, there is serious question whether a participation culture and initiative, in a process that involves the leadership only, would continue to exist when the leadership moves on or is replaced.

Equally, the mere possession of knowledge and skills relevant to community affairs does not automatically lead to performance. Further, the simple fact of membership in an organised action group or community based organisation (CBO) might not suffice to bring out the full potential of individuals in terms of engaging meaningfully in development decision-making. Community participation is a learned behaviour. Urban infrastructure development projects are very technical and complex in nature. Even seasoned community leaders sometimes are reluctant to take decisions on behalf of communities for fear of being wrong. There is a need to build confidence, capacity and skills to support and sustain involvement in this field. Thus a more conscious and sensitive strategy to support and broaden the stakes in the decision-making process, within or outside group context, is therefore required. There is a need to create opportunities for broad community involvement in development decision-making so that more people do take part in different situations and given a chance at different roles. Working in small homogenous groups, providing non-formal education and experiential training, encouraging individual self-expression and initiative, can cause the weaker sections of the community both to be perceived and perceive themselves more and more, as effective contributors to the common good.

The nature of informal settlements makes this approach even more critical. Firstly, informal settlement inhabitants are relatively poor, illiterate and the leadership perceived to be prone towards brutal and authoritarian tendencies. Secondly, 'the community' already exists, and most importantly, every household is affected during an in-situ upgrading process. Thus the key to meaningful community participation in the case of in-situ informal settlement upgrading projects lies in using a decision-making process, that recognises the importance, and facilitates the involvement, of every household, supported by capacity building and project-linked training.

1.6.2 ViSP and the community

Exploring this interaction is a two-stage process. In the first instance it is necessary to recognise that qualitative and quantitative social and economic research is a crucial element of the above process. It is not an academic exercise, but a critical component of the upgrading process, to be used by the community in building their own knowledge base. In addition, the resultant data feeds into the infrastructure technical design and on-going settlement planning process. The data would also reveal the underlying patterns of social relations that are critical for designing relevant participation institutions. This type of data gathering is most effectively managed using advanced information technology. The second stage of the process is therefore building a relationship between the community and the information technology (IT) processes that are used to manage the information generated. This is a contentious issue. There is a school of thought, typified by the Peoples' Housing Process, which believes that communities should not be exposed to IT. This anti-technology bias is misguided. Communities cannot be "protected" from technology. That is dis-empowering those communities. What is needed is a process that ensures community control over that knowledge base. ViSP provides a tool that can be used in this way, by the communities themselves.

Once technology is accepted, then its use can be broadened to incorporate community support and development. It needs to be recognised that the type of community management process is hindered by a number of constraints, the most important of which is the lack of capacity at this level. Many local community organisations lack the knowledge, resources and expertise that are essential if they are to play a meaningful and constructive role in development. This constraint may be addressed by training and capacity building programmes and the encouragement of support for local NGOs. But this takes time and requires medium- to long-term programmes. It also requires appropriate training material. An important contribution to that process, which would also facilitate greater participation in the short-term, is the use of technological advances in computer software for interactive decision-making. The goal should be the creation of innovative interfacing systems, which can then be used as tools in the interaction between development professionals and community organisations. These should be designed to simplify and contextualise the issues which are central to the decision-making process.

1.7 The local authority

There are two issues that the local authority has to deal with. The first of these is to decide the nature of the relationship that it will form with the community during the upgrading process. The second is the view that it will take of the settlement in the longer term.

1.7.1 Creating a partnership between the local authority and the community

Successful upgrading, within the context of the ViSP methodology, requires that the local authority adopt a partnership approach with the community being upgrading. This is often difficult, given the line-functional nature of local government. The way in which the City of Belo Horizonte dealt with this problem was through the creation of a separate company, URBEL (the municipal planning and housing company of Belo Horizonte). This would be the equivalent of a Section 21 company in South Africa. This company was multi-disciplinary in its composition, and was the primary agent responsible for informal settlements within the city. This was made possible by designating these areas as zones of social interest, with their own planning requirements. This meant that URBEL did not have to gain approval of the final plan of the upgraded favela from the planning department of the city. Similarly it had sole responsibility for dealing with all utility companies supplying these settlements with services.

1.7.2 Managing ViSP in a local authority context

The use of GIS to manage informal settlements is still in its infancy as an area of technical expertise. As part of this project, a study was carried out of the international use of GIS in the context[1]. Several projects used some ideas that were similar to those in Belo Horizonte. In general, however, the study found that the use of GIS had been more conventional, and nowhere was there the same degree of innovation or such a detailed methodology. The main reason for this was that such a methodology could only succeed if it is carried out with the community. All of the GIS projects assessed were external interventions, with minimal community input. Hence they were limited by the amount of external information available and consequently tended to focus on the physical environment.

A second area of study that was addressed by this project was the capacity of local government to manage the GIS system. A detailed survey of the role of GIS within the Cape Town City Council was carried out as part of the project, which also included an analysis of local government use of GIS in other countries. There were a number of major conclusions that emerged form the study, summarised below.

- GIS within local authorities is poorly co-ordinated. This leads to duplication of information and a generally low-level of knowledge of GIS.
- There are two approaches to managing a GIS. The one is data driven and the other applications-driven. Cape Town was found to be largely data-driven. However, such an approach is totally unsuited to informal settlement upgrading, since data is generally scarce. Hence there needs to be a major shift to an applications-driven approach. This has started to happen more recently, with the introduction of powerful GIS systems that can be operated by individual users, who do tend to be applications-driven.

[1] A number of background studies have been carried out to support the work described in this report. These comprise the international review described here, a study of GIS operation in the City of Cape Town, a review of nine different upgrading projects I different parts of the world, and a review of the current literature on urban poverty. More information on these background studies may be obtained from the Department of Civil Engineering at the University of Cape Town.

- The problem identified above is particularly acute in the area of land surveying. The study found that the city-wide GIS is built around a detailed cadastre. But this information is not available for informal settlements. This is where the international study mentioned previously became particularly important, as it described alternatives to the cadastre-based approach.

What emerged from these studies is that there needs to be a significant shift within the local authority, if informal settlement upgrading is to work effectively. Local authorities need to set up appropriate management structures to deal with settlements that operate across line departments. And they also need to create within these units their own GIS base, which is designed around the needs of the settlement upgrading methodology.

1.8 The structure of the report

This first chapter has provided an overview of the issues that need to be addressed in developing a replicable methodology for informal settlement upgrading. It has touched upon on the issues of urbanisation and migration, and the complexity of these issues. It then moved on to show that, if upgrading is to become a component of national policy, three elements need to be addressed. These are the technical methodology, the role of the community, and the organisational structure of the local authority. The chapters that follow pick up on different facets of these issues, but also explore the nature of informal settlements in much greater detail.

Chapter 2 begins this analysis by exploring the international debate that compares sites and services with in-situ upgrading, and discusses the benefits and disadvantages of each. Here the clear benefits of in-situ upgrading, and the underlying problems of site-and-service schemes begin to emerge very clearly. Nonetheless, in spite of these recognised advantages, there still remains a strong general antithesis towards settlement upgrading in South Africa. It is therefore important to demonstrate the extent to which this process has become accepted at an international level, and to show how these concerns were played out in the international arena. This is reflected by the changing attitude of international agencies that is tracked in that chapter.

Chapter 3 moves the focus to informal settlements themselves. It clarifies definitions, and then explores the nature of settlement formation, before discussing economic process that impact informal settlement development. This chapter highlights some important issues that can inform government policy. It demonstrates the crucial role of informal settlements as the main shelter option for the urban poor. At the same time, it shows how commercialisation of these settlements begins almost from the time when they are first established. This makes them a crucial component of a city's informal sector, an important economic factor that is often overlooked when shelter or housing strategies are developed. This chapter also highlights the difference in the perception of informal settlements that exists between those who live there and those in authority.

Chapter 4 is the first of three chapters that deals with Brazil. This chapter covers the similarities that exist between Brazil and South Africa at a macro level, with the objective of demonstrating the relevance of using Brazilian experience in South Africa. This is followed in Chapter 5 by a description of the Belo Horizonte experience of settlement upgrading, which traces its history and the evolution of its current policy. Again this has important lessons for South Africa, since it represents the only international example of a macro policy that was driven by government. The third chapter on Brazil (Chapter 6) then deals with upgrading at the level of the favela, and describes the Alvorada programme in Belo Horizonte. This is done in two parts. The first part deals broadly with the upgrading methodology, while the second part deals specifically with the ViSP component.

Chapter 7 then draws some conclusions. It begins by developing an approach to informal settlement upgrading in South Africa generally, looking first at the core issues that emerge out of the study when viewed from this perspective. This leads to a number of constraints that affect different approaches to upgrading. It then shows how the ViSP approach would need to be modified for application in South Africa, and how it would need to be situated within a broader methodology. Its application within this broader methodology is then reviewed. The report ends with a discussion of the way forward, which in turn lays the foundation for the second report. The report is supported by a comprehensive bibliography.

2. THE INTERNATIONAL POLICY DEBATE ON INFORMAL SETTLEMENTS

2.1 Introduction

The issue of how to supply housing and services to the urban poor has occupied governments and multi-lateral agencies internationally for over two decades. When South Africa developed its housing policy, it did not explore this debate in any depth. However, if South Africa is now faced with a situation where it is unlikely to be able to re-locate informal settlements within its current housing policy, and where these settlements may even continue to grow in numbers, then it becomes important to revisit this debate. This is particularly important in the current policy environment. There the 'Peoples Housing Process' is the only officially sanctioned approach to upgrading at a national level. Yet it represents only one of a number of approaches to informal settlement upgrading. Furthermore, it may not necessarily be the most appropriate. In exploring these issues, the natural starting point is the international policy debate, and that provides the focus for this chapter.

In the 1950s and 1960s the dominant approach to informal settlements was one of demolition and replacement by public housing. This strongly interventionist role of the state, in taking responsibility for the delivery of permanent housing units was transplanted from developed countries, where it had proved successful in the immediate post-war period. The assumption was that this approach would eventually eliminate the perceived squalor and disorder of informal settlements (Pugh, 1995:63). The reality was, however, that urbanisation, informal settlement growth and overcrowding escalated. This then provoked a response on two fronts. The first was an academic response. Here, in the late 1960s, John Turner and other academics began to present a strong critique of the assumptions underlying public housing, by drawing attention to the mechanisms of housing production inherent in informal settlements. They called for a shift to greater autonomy or dweller control in the production of housing. The second response was from governments in developing countries, who exerted pressure on the World Bank to 'extend its range of development loans to urban infrastructure and housing' (Pugh, 1995:64). Responding to this pressure, the Bank entered the housing sphere. However, this was done only on condition that there would be a radical shift away from public housing. The alternative approach that it advocated to replace social housing was self-help, through the delivery of sites-and-services and in-situ slum upgrading (Pugh, 1995:64).

In setting out two options to replace public housing, the World Bank opened up a debate that continues in many countries through to the present time. It is important to understand the nature of this debate, since it is one of the pillars of opposition to informal settlement upgrading. Hence this chapter begins by exploring exactly what is meant by these two delivery options and follows this by an outline of the arguments used to support and oppose the two options. This exploration of the debate is then followed by a review of the evolution of the major international policy positions with respect to informal settlement upgrading, in the context of urban development policies. This in turn leads to an exposition of the current international position. The chapter focuses on the international situation and specifically excludes South Africa, since the country was not part of that evolutionary process. The implications of some of these issues for South Africa will be covered separately in the final chapter.

2.2 Sites-and-services schemes

2.2.1 Defining sites-and-services

There is little consensus about the precise meaning of the term sites-and-services, although most authors agree that the central concept is the provision of serviced sites of land on which the beneficiaries are able to build some form of superstructure. But issues such as plot size, form of title or levels of service are not included in the definition. Nor do most of the definitions include a target group (van der Linden, 1986:16).

What is known is that sites-and-services schemes can be implemented in two different ways in respect of the relationship to the beneficiaries. The first way is to provide services to sites that have been pegged out on unoccupied land, which beneficiaries could then occupy to build their houses. In this case there is

rarely a clearly defined beneficiary group that can be involved in a participatory process in respect of the scheme. The second way of implementing a sites-and-services scheme is through what is termed a 'roll over' scheme. This involves moving people from an existing informal settlement area, sub-dividing the area into plots, providing basic services to these plots, and then allocating these lots to the people to build houses upon, so that they may return to the area. In this case there is quite a strong link between the community being moved and the new sites-and-services scheme. In addition to these two basic options, some definitions of sites-and-services schemes include the provision of a partially finished house on a serviced site, but all definitions agree that the house is incomplete. Finally, sites-and-services schemes may be covered by a subsidy or they have a cost attached to them, which would be repaid through an amortised loan.

2.2.2 Aims of the sites-and-services approach

There is a wide variety of opinions on what the aims of the sites-and-services approach is precisely. However, some of the aims can be grouped as:

- Housing the poor
- Increasing the stock of permanent housing
- Limiting public expenses
- Restoring formal planning control and implied effects
- Developing a strong construction sector
- Providing opportunities for jobs and for starting small businesses
- Accelerating capital formation by low-income families, and
- Harnessing investments in an orderly fashion.

These aims often overlap and, in some cases, even contradict one another. For example, the aim of providing housing for the poor would require an increase in public expenses through subsidies, which is in contradiction with the aim to limit public expenses (Van der Linden, 1986:17).

2.2.3 Lessons from sites-and-services approach

There are a number of lessons that can be learnt from past experience of sites-and-services schemes. Firstly, most of the sites-and-services projects reviewed in the international literature were sponsored by the World Bank, and were isolated projects. Thus there is a problem with drawing lessons from the experiences. Secondly, there were often specially created agencies that were established to manage the schemes, and who were able to obtain exemptions from building regulations. Thirdly, as these were pilot projects and there was a willingness to demonstrate their viability and success, there may have been a bias in the selection of beneficiaries (ibid., 1986: 98). Fourth, one of the lessons learnt in the sites-and-services projects was that incomes are a poor indicator of what households can and are willing to invest in housing. Van der Linden argues that '... the amount which people are willing to invest in housing is not a fixed proportion of their income, but depends on... income, type of tenure and the need for investment...' (ibid., 1986: 101). Fifth, according to van der Linden, evaluation of World Bank sites-and-services projects showed a modest population turnover, although there were some examples where the dropout rate was high. These experiences imply that sites-and-services projects for the sake of relocation do not work, although such projects often score high regarding the efficiency of implementation (Martin, 1982:255, referenced in van der Linden, 1986:103).

Finally, in considering affordability in the World Bank projects, van der Linden states that the 'low turnover figures as well as the performance in house construction can be viewed as an indication that the projects are affordable to the majority of participants.' (Van der Linden, 1986:103). However, it should be noted that, in making this statement, the study also demonstrated that the target groups were more representative of the middle class than of the poorest urban households.

2.3 Informal settlement upgrading

2.3.1 Defining upgrading

Informal settlement upgrading may be defined as improvement of the settlement without the total relocation of the existing population, and in such a way that a part of the population stay on their existing sites. This means that there is no specific methodology, nor is the nature of the improvement defined. Thus it may comprise an improvement in the infrastructure or the housing, or it may comprise

the provision of security of tenure. Any one of these would be considered to be upgrading. In addition, there is no common agreement on whether part of the population should be moved and, if so, how much. Hence it is quite a vague concept, which is one reason why it evokes so much debate and such a lack of consensus.

2.3.2 The aims of upgrading

As stated above, there are no clear aims that are universally approved, as is the case with sites-and-services schemes. One reason for this is the dominance of the World Bank's economic paradigm, which views upgrading purely in terms of its financial cost. However, this paradigm is being increasingly challenged, and a wide range of benefits of upgrading is now being recognised and slowly quantified. At present, though, this has still not led to the clear definition of a set of aims or objectives. At this stage, the best way to view settlement upgrading is in terms of a benefit-cost analysis, which at least defines these benefits, even though they cannot be quantified.

2.3.3 The benefit-cost analysis of settlement upgrading

The financial cost of upgrading has been the overriding concern of the World Bank since its introduction of the twin approaches of upgrading and sites-and-services in 1972. However, there is still negligible data available on the real numbers. This is partly because of the wide variability of settlement conditions, and partly because of the wide array of options that comprise upgrading. Hence any discussion of costs that does arise tends to take place in the context of a comparison of upgrading against sites-and-services. This is an important practical aspect in the upgrading debate. As Ferguson states: 'A large part of the appeal of squatter upgrading rests on the hypothesis of lower cost - that upgrading is more economical than new solutions such as a serviced site' (Ferguson, 1996:173). However, perceptions of the cost comparison differ.

On the one hand, van der Linden argues that 'squatment (sic) upgrading is much cheaper than sites-and-services, especially in the majority of cases where squatting is on public land' (van der Linden, 1986:127). Ferguson, on the other hand, questions this. He recognises that 'the up front cash costs of upgrading are less than those of serviced sites' (Ferguson, 1996:190). However, based upon case studies in Jamaica, he argues that once the squatter's investment in terms of time and finance, and the environmental costs to the broader public are added into the calculation, the gap between upgrading and formal sector solutions closes considerably (Ferguson, 1996:188). The problem with this finding is that it cannot be generalised without a clear understanding of what is being compared. In this case Ferguson is comparing a 'government random squatter upgrading project', which does not deliver sanitation and electricity, but which incurs costs for partial relocation necessitated by the introduction of roads, against costs incurred by a 'government serviced sites project' and a 'private sector moderate income project' of high infrastructural standards (Ferguson, 1996:187). Ferguson's findings cannot, therefore, be applied to integrated upgrading that includes a full range of services. A conclusion might be that an exploration of cost variables would be more useful to the practical debate than the detailed comparison of specific cases.

As with the arguments on the implications of informal settlement upgrading above, cost arguments cannot be generalised outside of a clear definition of what comprises upgrading. Where cost recovery through beneficiaries' long-term payment for services, as well as maintenance, is considered part of the economic effectiveness of an approach, the willingness and ability to make these payments will impact on the cost to the state. Here Angel's review of the community as builder/controller applies, whereby: 'the more they feel that these facilities are really theirs to care for, the more careful and responsible they are likely to be' (Angel, 1983:14). Finally, where the approach includes the titling of informal sites, the complexity of the land registration system will impact on the project cost. Referring to the expense of titling, McAuslan states, 'an efficient land surveying and registration office is needed for title granting in connection with upgrading squatter settlements. But who bears the cost of the exercise? The taxpayers ... or the beneficiaries of the title?' (McAuslan, 1987:61).

Moving to the benefits of upgrading, Perlman presents a useful listing of cost advantageous components of upgrading that go beyond the aspects of infrastructure delivery. She reviews insights gained from research conducted in informal settlements in the 1960s and lists conclusions that were subsequently put forward in favour of in-situ upgrading. The economic arguments include the following:

1. Building on existing investment in informal housing.
2. Further investment unleashed through the granting of security of tenure.
3. Constructive use of the labour of unemployed and under-employed in the housing investment.
4. Commercialisation (and taxing) of unused labour and materials.
5. Favourable cost comparison between upgrading and formal public housing delivery.
6. Locational advantages to residents of well-located settlements.
7. Prevention of loss of employment that is commonly caused by relocation (Perlman, 1981: 170,171).

To this list, Obudho and Mhlanga add a further economic argument in favour of upgrading, namely the cost of sprawl caused by low-density high standard serviced site projects (Obudho and Mhlanga, 1981:339).

Of value in this context, is Mulwanda's discussion of informal settlement clearance and relocation in Zambia. This gives an indication of the importance of this cost factor to informal settlement residents. In reviewing popular resistance to relocation in Zambia, Mulwanda mentions that one of the squatters' main concerns was the improbability of successfully relocating a business, or livelihood, to a newly developed area some distance away. '...Commercial and industrial undertakings are pulled down. The undertakings which are razed to the ground are very rarely replaced in the resettlement areas since rarely does the clearance involve compensation' (Mulwanda, 1989:260). Squatter representatives are quoted to have said 'we don't have the money to build new structures such as houses and business shops' (Mulwanda, 1989:250).

Recognising these economic concerns and linking them to social processes, Martin lists the following socio-economic advantages of upgrading.

1. It preserves existing economic systems and opportunities for those most in need, the urban poor.
2. It preserves a low-cost housing system, usually at advantageous locations, thus enabling the inhabitants to retain the maximum disposable income.
3. It preserves a community that has many internal linkages to safeguard the interests of the individual family and the group.
4. The alternative to upgrading is relocation in one form or another: this is socially disruptive and by usually being to a much less favourable location, results in higher transport costs and less access to informal employment opportunities' (Martin, 1983:53).

Martin further expands on the relative disadvantage to those subject to the partial relocation required by in-situ upgrading, and refers to its implications for the decision-making process. '... Since most upgrading projects involve demolition and resettlement, those affected by it may object strongly to paying the economic and social penalties involved, while others are reaping only the rewards of the process' (Martin, 1983:56).

A further argument used in favour of upgrading is the expected increase in investment by residents, once ensured security of tenure. Martin refers to the '*sine qua non* of upgrading that land tenure would be essential if there was to be any improvement in housing conditions' (Martin, 1983:56). Martin discusses how this assumption created expectations of 'pent-up investment ... generating a substantial and rapid improvement in housing standards' (Martin, 1983: 57). While he recognises this to be the case where the degree of prior insecurity was severe, he refers to other factors more directly related to levels of investment, namely poverty, owner-occupation (versus landlordism) and perceived security. Angel cites two cases, where upgrading of infrastructure and associated security led only to negligible levels of investment in housing. A comparison of improved and unimproved Kampumgs in Jakarta, revealed little investment subsequent to upgrading, as did the Migrant Settlement Upgrading Programme in Port Moresby. In the latter case, Angel relates this to 'the level of poverty of the migrants, their lack of interest in spending their savings on housing improvements because of their cultural traditions, and their lack of commitment to stay in the urban area. In this case neither tenure nor infrastructure, loans, technical assistance and community organisation were sufficient conditions for generating indigenous shelter improvements' (Angel, 1983:8).

2.4 Comparing sites-and-services with informal settlement upgrading

The World Bank's rejection (upon its entry into the housing sector in the 1970s) of public housing in favour of upgrading and sites-and-services was based on arguments of cost and effective targeting. The twin approaches of sites-and-services and squatter upgrading, as encouraged by the World Bank since the 1970s, have been compared and critiqued against one another. This argument can be broken down into a number of parts.

2.4.1 Targeting

The effectiveness of targeting is a major aspect of comparison. Van der Linden argues that 'in most cases, sites-and-services schemes have by no means catered to the increase in low-income housing demand. In some cases, they have even failed to be of any use to the low-income population' (van der Linden, 1986:ix). Pugh argues that in-situ upgrading invariably reached the intended target market, whereas with sites-and-services projects plots 'were allocated to selected households that could repay costs' (Pugh, 1995:63).

2.4.2 The 'knock-on' effect of upgrading

A strong component of the comparative debate is the evaluation of end results of in-situ upgrading versus sites-and-services, rather than the processes through which the result is attained. What emerges, as a recurring concern, is the impact of informal settlement intervention on the formation of new informal settlements. There are two arguments here, both based on the belief that upgrading is directly linked to the formation of new informal settlements. The first argument relates to the clearance of informal settlements in the absence of appropriate relocation sites. Here it is sometimes argued that upgrading 'does not eliminate the phenomena [but that] in fact it acts as a catalyst to further development of illegal settlements' (Mulwanda, 1989:260). The second argument, put forward by Obudho and Mhlanga (1988:331), relates to the concern that 'legalising squatter settlements can either condone antisocial behaviour [squatting] or create a revolutionary force of the poor.' Similarly, Ferguson, reviewing the situation in Jamaica, is of the conviction that informal settlement upgrading 'fails to get ahead of demand and provokes land invasion' (Ferguson, 1996:174). In contrast to these two views, O'Connor states that 'ways have to be found to accept existing settlements as assets without encouraging further squatting' (O'Connor, 1983: 'The African City', Africana, New York, quoted in Obudho & Mhlanga, 1989:331,332).

In questioning the validity of these arguments that connect informal settlement intervention directly with the formation of new settlements, Thirkell argues that they do not take full account of the complex social, economic and political pressures and decision-making involved in the formation of informal settlements. These pressures are not only located in the low-income sector. Under high inflation, for example, it is the economic pressure on the middle class that causes this group to seek accommodation in the low-income sector as described by Thirkell (1996:71.85).

Also opposing this argument is the counter argument that sites-and-services schemes are also believed to have caused further informal settlements. Thus Obudho and Mhlanga note that 'despite the success of site and service schemes in several African countries, the scheme is not really popular in other African countries due to fears of creating new slum and squatter settlements' (Obudho & Mhlanga, 1988:336).

2.4.3 The complexity of upgrading

A common tendency is to engage with the complexity of upgrading, referring to an existing physical and social situation, with the added complication of needing to de-densify and relocate a percentage of households in order to introduce roads and services. However, where serviced sites are planned to replace informal settlements, no reference is made to the conflictual process of blanket relocation that is required. In reviewing the site and service approach, van der Linden (1986) discusses its lack of emphasis on participation. Referring to the World Banks promotion of this approach, van der Linden states that 'the Bank's pressure has been concentrated much more on lowering of standards and cost recovery than on public participation,' adding though that poor maintenance and cost recovery had recently led the World Bank to reassess the role of participation in sites-and-services (van der Linden, 1986:121).

2.4.4 The hidden cost of sites-and-services

The site and service approach is understood to commence on the new site. Little concern is given to the question of from where and how the participants relocate to the serviced site. Thus Ferguson, for example, ignores the political and social disruption and the cost (to the individual) of relocation to serviced sites, when presenting comparative data on upgrading and formal sector development. Focusing mainly on economic indicators, he makes the following statement about upgrading: 'large numbers of squatter houses - between 10 and 40 per cent of squatter communities - must be relocated and, often, reimbursed to make way for roads. Relocation is both costly and politically difficult' (Ferguson, 1996:180). His cost comparison thus includes the compensatory cost to the state of partial relocation for upgrading, yet no relocation expenses for serviced sites. Thus neither in terms of project expenses, nor in terms of the comparative debate, is the relocation to the serviced site considered a component of serviced sites.

2.4.5 The reactive nature of the upgrading response

Common practical arguments in favour of informal settlement upgrading are linked to the relative shortcomings of other approaches. The practical adoption of upgrading, therefore, has mostly been a reaction to the failure of other systems of delivery (Schlyter, 1981:7, Obudho and Mhlanga, 1988:330), rather than a mind shift and conviction of the fundamentals of the approach. Martin observes that 'it has not always been the intrinsic merits of upgrading which have led to its adoption, but the failure of conventional housing policies to result in the production of a sufficient number of units annually, and at a sufficiently low cost (Martin, 1983:53,54). Ferguson (1996:191) states that 'some governments have tried to correct high cost and poor targeting of the traditional approach through upgrading squatter settlements.'

Mulwanda reviews the Zambian Human Settlement secretary's official perception of informal settlement housing, through which support for upgrading is justified: 'Squatter settlements are an economic reality and a necessary evil and the only practical solution to disasters they face is upgrading and community work. The settlements are an alternative to official housing which is continuously becoming unavailable and when available is often out of reach of low-income groups' (Mulwanda, 1998:260).

2.4.6 Political fears of upgrading

McGee describes the link between conventional wisdom about informal settlements and government response. He reviews the 1960s perception that squatters undermine the structure of political order and retard economic development, a view that has justified removal programmes (McGee, 1979:2,3). McGee observes in the late 1970s, that despite a change in insight regarding informal settlements, 'housing problems are still dramatised in terms of an alarming housing deficit' based on a world standard (McGee, 1979:4). Acceptable housing standards are central to government attitudes to informal settlements. Obudho and Mhlanga argue that 'destroying existing slum and squatter settlements means a reduction in the housing stock as well as a loss to the poor families who had invested considerable sums of money in their dwellings' (Obudho and Mhlanga, 1988:330). Martin links the recognition of this fact to political support for in-situ upgrading of informal settlements. 'Why is upgrading practised? ... Undoubtedly one reason is that it 'solves' the housing problem by transforming 'illegal' dwellings into 'legal' ones, thus improving the housing statistics. In the same way it also helps to defuse political agitation for improved housing by slum and squatter dwellers. These are general concepts that might loom large in political decision-making' (Martin, 1983:55).

Angel expands on the notion that the state's acceptance of upgrading is linked to acceptance of lower infrastructure and housing standards, and the political threat posed by demands from informal settlement communities. He traces a gradual recognition of some advantages to the state of upgrading programmes. 'They are gradually beginning to see the value of supporting slum improvement programmes as effective mechanisms for gaining popular support in low-income areas. They can also see that the 'per family' (or 'per voter') expenditure on slum infrastructure is rather low, in comparison with earlier housing programmes. Politicians can also see the importance of infrastructure in general and roads in particular, in providing the authorities with access to the inner reaches of slums and squatter areas, thus increasing control of the security forces over potentially volatile situations which may develop there' (Angel, 1983:15). However, Angel argues that the land tenure question remains problematic to politicians, as it is feared that it will alienate landowners and encourage further squatting. Thus there

remains resistance to 'serious reorientation of government priorities for development and ... [to] substantial new legislation. ... Given the difficulty in handling the land issue, they prefer programmes that do not fundamentally change the status quo' (Angel, 1983:15,16).

2.4.7 Engineers' fears of upgrading

Added to the politician's resistance to fundamental change is the municipal engineers' resistance to lowering of infrastructural standards. In this regard, Angel argues that upgrading of one settlement might detract from and legitimise eviction of another settlement. Further, he refers to the large percentage of relocation required through high standards of upgrading, the displacement of the weakest by market forces subsequent to upgrading, the strain on household expenditure by service payments required by high infrastructure standards, and the potential exploitation in terms of controlling access to certain services. Despite potential benefits of 'improved health and comfort, economic gain, and improved land tenure security and community organisation,' Angel argues that at this stage 'the slum dwellers still remain at the receiving end of government charity, and fall short of becoming fully responsible participants in the process of resource allocation' (Angel, 1983:19,20).

2.4.8 The visual impact of informal settlements

In Tanzania, as early as 1972, the upgrading of informal settlements was adopted and had 'full support on the highest political level' (Schlyter, 1981:7). Schlyter quotes the Tanzanian president to have said, 'for most people the only effective choice is between an improved or an unimproved sub-standard house' (*ibid.*). However, ambiguity continued to rule over Tanzanian informal settlements. '...A resistance remained among local politicians and within the administration, in Tanzania as in many other countries' (Schlyter, 1981:7). Mulwanda cites how the visibility of informal settlements to 'visitors entering or leaving a city' is a 'continuous source of embarrassment to both central and local authorities and thus the frantic effort to tuck them out of sight' (Mulwanda, 1989:260).

2.4.9 Summary of the upgrading vs sites-and-services debate

The large majority of the arguments put forward opposing upgrading are spurious. The benefits highlighted by Perlman, Martin and others are extensive, and have to be taken into account. Overall, the arguments against settlement upgrading fall into three categories. The first is the fear of informal settlements. Because they are not planned and catalogued, they cannot be easily 'controlled' whether by politicians or by planners and engineers. Secondly, there is a lack of knowledge of how to upgrade. The construction of sites-and-services schemes is governed by codes, guidelines and standards. These do not exist for settlement upgrading. Finally, there is no knowledge of the cost of upgrading. Sites-and-services can be defined in terms of cost per site. At present there is negligible cost data available for upgrading projects. These last two points raise valid questions that need to be answered. However, they do not provide valid arguments for opposing upgrading.

2.5 International agency thinking on informal settlements

2.5.1 Introduction

The agendas of international funders have a major impact upon the acceptance or otherwise of informal settlement upgrading by national governments. These agendas are reviewed by a number of authors. Angel takes a sympathetic view. He summarises his discussion on this topic as follows: 'from the international funders' point of view, the provision of infrastructure in slums and squatter areas is a key component of the new international paradigm for low-cost human settlements development. ... Their involvement in this activity directs limited international financial resources towards the urban poor, without unnecessarily compromising their rural counterparts. It is economically justifiable as having positive effects on urban land values and it should be pursued on the economic principle of cost recovery from beneficiaries' (Angel, 1983:18). In reviewing Angel's analysis, however, Obudho and Mhlanga are more critical in their judgement over international agencies' agendas, specifically in Africa. They argue that: 'The efforts of the international aid agencies to improve conditions in squatter areas of Third World cities, especially Africa, have been solely to control the political impact of squatters and to assimilate them into the present neo-colonial and socio-political systems' (Obudho and Mhlanga, 1988:332).

In his review, McAuslan focuses on the tenure component of upgrading. He finds that a World Bank review of the advantages of providing secure tenure 'concludes that the payments for regularisation of land titles in squatter areas on public land in Cairo are expected to bring in a sizeable surplus to the

agency responsible in a relatively short time. This surplus may in turn be used to finance upgrading programmes in squatter areas elsewhere.' McAuslan adds 'had the squatters been told about the real purpose of their paying for their titles, they may well have declined to take up the titles' (McAuslan, 1987:62).

Finally, Martin draws the following conclusion which, though referring primarily to the involvement professionals, applies equally to international funders. 'The imposition of externally defined goals on an existing community, no matter how laudable those goals may be, is one of the root causes of problems in the upgrading process' (Martin, 1983:78).

2.5.2 Background

It is useful to the debate on informal settlement upgrading to review how the international interest evolved. Here it is important to recognise that there are two different, albeit interwoven perspectives that run throughout. These comprise the World Bank and the United Nations perspectives respectively. The World Bank perspective was spelt out earlier. This is predominantly economic in outlook, but within a very narrow interpretation of economics that links solely to financial cost. The basis of the United Nations perspective, on the other hand, is very different and derives from an attempt to create sustainable human settlements and narrow the gap that exists between the rich and the poor in the city.

2.6 The development of World Bank urban policy

It is important to recognise that the World Bank draws a distinction between infrastructure and housing. It tends to see infrastructure investment as distinct from the settlement *per se*. It is the role of the local authority or, more recently, the private sector, and is discussed in that context. Hence, when the Bank discusses settlements, its focus tends to revolve around housing. For this reason the informal settlement upgrading, discussed in the context of the Bank, will reflect this focus. Thus, as mentioned in the introduction, the Bank entered the housing sphere only on condition that there would be a radical shift away from public housing. The approach it advocated was self-help, through delivery of sites-and-services and in-situ slum upgrading (Pugh, 1995:64). In the first instance others provided infrastructure. In the second instance the provision of infrastructure was not really considered at all.

Initiating the debate in this context, Pugh (1995) stresses the strong influence the World Bank has had over housing theory and policy in the developing world, through its role as conditional financier. Jones and Ward (1994) point out that the World Bank provides two-thirds of global planning aid. The Bank is mainly associated with in-situ slum upgrading schemes and sites-and-services projects, of which it financed 116 across 55 countries between 1972 and 1990 (Pugh, 1995:63). However, most commentators, including Pugh, see this involvement as only part of a wider and evolutionary development of World Bank policy, from 'market favoured neo-liberalism' in the 1970s to 'more attention and sophistication for government roles' in the 1990s (Pugh, 1995: 63). Three phases in World Bank urban policy can be identified: firstly, a focus on self help projects in the form of slum upgrading and sites-and-services; secondly, housing seen as part of the economic framework; and thirdly, enablement of housing and housing markets.

The Bank's philosophy may usefully be contrasted with Turner's emerging philosophy of housing autonomy. While the latter emphasised the importance of people's own contribution and the integration of housing into the social fabric, the World Bank's approach to housing and infrastructure was based on rigid economic arguments of affordability, cost recovery and replicability through self-help. Jones and Ward (1994) point out the discrepancy between Turner's and the Word Bank's approaches: 'Instead of emphasis on dweller control, projects became larger and more bureaucratically rigid - dangerously resembling the previous generation of "heteronymously" produced housing that Turner and others had attacked' (Jones & Ward, 1994:36). They point out four key policy areas in the World Bank's *Urbanisation Sector Working Paper* of 1972. Firstly, low-cost solutions, so as to reach more beneficiaries. Secondly, rather than subsidising development, the Bank saw its role as 'pump-priming', so that revenue would be collected locally. Thirdly, technical assistance, intended to change urban planning consciousness. And fourthly, self-financing or replicability of programmes was a requirement.

The result of this World Bank paradigm, which dominated the 1970s and part of the 1980s was a series of pilot projects, comprising sites-and-services and in-situ slum upgrading. The aim of these projects was to demonstrate that public supply of land and infrastructure would trigger private investment through

self-help housing, thereby impacting on urban poverty and reducing the burden on government funds (Baken & van der Linden, 1993). There seems to be broad agreement in the literature on the limitations of the approach and its failure to achieve its aims (Menezes, 1995, Cohen & Leitman, 1994, Pugh, 1995). Menezes acknowledges that in terms of individual actions the projects were successful, however, they were generally not replicable at a large scale. The reasons he lists are problems with land assembly, the absence of trunk services, inappropriate building regulations and poor cost recovery (Menezes, 1995:2). Cohen and Leitman (1994) argue that the focus was on physical implementation rather than on policy change. 'Because many urban programmes did not achieve sustainable policy reform and institutional development, they were not replicable' (Cohen, & Leitman, 1994:119) and the private sector did not respond. Menezes describes how the Brazilian regulatory sphere treated sites-and-services projects as enclaves, that needed 'one-time exceptions to development and building regulations,' therefore every project required a new struggle over regulatory standards' (Menezes, 1995: 2).

In respect of the different pilot projects, Menezes maintains that in-situ upgrading was more successful than sites-and-services. The reason was that it did not aim 'to transform the housing sector, but merely to persuade the governments to stop the bulldozer, and to adopt a policy of tenure regularisation, and infrastructure provision especially basic sanitation' (Menezes, 1995:2). Pugh supports this position that in-situ upgrading was more successful. He argues that in-situ upgrading can be said to have addressed poverty in that it invariably reached the intended target group, while with sites-and-services projects, plots 'were allocated to selected households that could repay costs. The anti-poverty thrust of sites-and-services also depended upon the extent to which households traded their housing rights to higher-income groups' (Pugh, 1995:63).

Pugh's review of experience in Madras, India, highlights a further shortcoming that applies as much to sites-and-services as to in-situ upgrading projects. He points out that metropolitan-wide town planning and housing agencies were favoured over local authorities in the capital installations, while ongoing management and maintenance fell into the responsibility of local authorities, which lacked managerial, financial and technological capacity. 'In operation it became clear that local governments had to be involved in the programmes, and the effectiveness of their roles depended upon substantial reforms in finance, management and training. ... It was also necessary to reduce regulatory standards and to revise town planning regulations' (Pugh, 1995:73).

The World Bank began to shift slowly away from this approach in the early 1980s. Baken and van der Linden (1993:2) ascribe this, firstly, to the limited success of the World Bank Projects and, secondly, to the 'shift in economic policies in western countries from "welfare stateism (sic)" to a more market-oriented approach.' Pugh sees the main reason for the shift as being the 'appreciation of the fact that housing was closely connected to macro-economic conditions ... and the need to create and use housing credit institutions' (Pugh, 1995:66). In 1983 the World Bank adopted housing credit innovations already in operation by the US Agency for International Aid (USAID). With this the Bank also 'emphasised tighter fiscal and monetary policies, deregulation in financial markets, and anti-inflationary policies', which were connected to 'macroeconomic reform, including the Bank and IMF structural adjustment' (Pugh, 1995:66). In this new phase sites-and-services and slum upgrading were not replaced, but encompassed in a wider policy framework and set the context for the subsequent 'widening of the urban housing sector development' (Pugh, 1995:67).

A further shift was introduced in 1986 with a new focus on 'the growth and development of the entire housing sector in its urban and national context' (Pugh, 1995:67). Thus the development of the housing sector and the urban economy is seen 'as vehicles for promoting general economic growth and productivity,' central to which is the concept of 'enablement' (Pugh, 1995:67). This concept is based on a positive outlook on cities, in that they contribute to economic and social development. 'Enablement is defined as providing the legislative, institutional, and financial framework whereby entrepreneurship in the private sector, communities, and among individuals can effectively develop the urban housing sector' (Pugh, 1995:67,68). The neo-liberalism of the initial World Bank economic theory has developed into a New Political Economy, in which enablement (of markets) plays a key part. This saw a major role for the private sector in managing the city, although the policy was later adapted to a more positive perception of the role of government.

2.7 The United Nations view

2.7.1 Habitat II

The Habitat II Conference (June 1996) had the following two themes: 'Adequate shelter for all' and 'Sustainable human settlements development in an urbanising world'. The agenda was agreed upon and officially adopted by the governments of the 180 countries represented at the conference. It can therefore be seen as a current international position on urban development. However, it does not stand in isolation, but evolved from and has a strong overlap with other international resolutions. Several United Nations resolutions preceded the Habitat Agenda. While Habitat I, leading out of the 1976 conference in Vancouver, can be seen as being superseded by Habitat II, more recent declarations are still in force and continue to give direction to urban development. These are the 1988 *Global Strategy for Shelter to the Year 2000*, and the 1992 *Agenda 21* of the United Nations Conference on Environment and Development, of which Chapter 7 focuses on 'Sustainable Human Settlement Development'.

The evolution of the United Nations position paralleled the policy shifts of the World Bank, which had dominated informal settlement policy in developing countries since the 1970s. In 1986 the World Bank started collaborating with other multi-lateral agencies including the UNDP and the UNCHS (Habitat) through *the Urban Management Programme* (UMP), the largest technical assistance programme in urban development. Hence this group's position too needs to be reviewed.

2.8 Informal settlements and the Habitat Agenda

Informal settlements do not feature as an individual item on the agenda leading out of the Habitat II Conference (UNCHS (Habitat), 1996b). The preamble, which sets out the themes and context of the Habitat Agenda merely alludes to the growth of informal settlements as one of many serious problems confronting cities and towns and their inhabitants. Similarly, the Commitments and the Global Plan of Action only indirectly refer to concerns with informal settlements. Thus shelter delivery systems are expected to anticipate unplanned settlements, rather than responding directly to alarming figures of the scale and growth of informal settlements. For governments to seriously adopt this position will require a profound shift from reactive to pro-active policy. This shift in policy and strategy is implicit in the agenda. While some mention is made of intervention such as the adequate supply of basic services, facilities and amenities and the upgrading of existing housing stock, this is not limited to the upgrading of informal settlements. More reference is made to the enabling of upgrading, through the building of local authority capacity for governance and management. Associated to this are the reform of cadastral systems, the streamlining of land registration procedures, the improving and rationalising of urban planning, the enabling of tenure regularisation, the revision of land-use by-laws and building and planning standards. These aspects, once addressed, will equally ease the formal delivery of affordable housing.

The Habitat Agenda makes no specific reference to either sites-and-services or slum upgrading as a solution to the shelter challenge. What it does say, however, is that intervention is no longer product oriented, as in the concept of serviced land, but enabling. The emphasis is on the supply of serviceable land and on the integration of the formal and the informal city. The Recife Declaration (UNCHS (Habitat), 1996c:7), which was presented at the Habitat II Conference, includes the following statement: 'The centrepiece of urban policy as we enter the 21st Century must ... be the struggle against poverty, with goals such as the integration of the informal city, the recovery and democratic use of public space, and the reversal of the trend towards the concentration of wealth and opportunities, which so often ends in a spiral of violence.'

While the Habitat Agenda accepts that 'there are no universal solutions that can be fairly applied' (UNCHS (Habitat), 1996b:39), it emphasises the need for 'co-operation with and between countries, and effective partnerships at all levels' (1996b:3). Their purpose is the 'pooling of resources, sharing of knowledge, contribution of skills and capitalising on comparative advantages of collective actions' (1996b:9). A number of initiatives are intended to support this aim. One is the International Forum on Urban Poverty, 'a partnership among municipalities, United Nations organisations, private Foundations, NGOs and community-based organisations that are active in the struggle against poverty at the local level' (UNCHS (Habitat), 1996a:2). Other initiatives are the selection, documentation and dissemination of Best Practices, and the transfer of planning, design and construction techniques, which are

encouraged alongside the impartial monitoring of settlement processes and the dissemination of findings and ideas by academic and research institutions, particularly in developing countries.

2.9 Current policy positions of international agencies

2.9.1 The World Bank

By the 1990s the World Bank had accepted that liberalism and enablement require 'good governance, institutional reform, and sophisticated roles in government' (Pugh, 1995:68). On the one hand, this called for governments to reform property rights and land registration systems, and to ensure 'adequate supplies for expanding housing markets'; on the other hand it required 'partnerships and interdependence among state agencies, markets, NGOs, and individuals' (Pugh, 1995:68). In addition, the World Bank returned legitimacy to subsidies, provided they were effectively targeted at the poor. The favoured form of subsidy in the 1990s is the one-off capital grant (Pugh, 1995:70).

In 1991 the World Bank published a policy paper titled *Urban Policy and Economic Development: an Agenda for the 1990s.* Four key areas are addressed: urban productivity, urban poverty, urban environment and urban research. In a summary of this paper, Cohen and Leitman stress the distinction in this policy document between macroeconomic and urban policies and their interrelationships. 'Structural adjustment policies at the macro level are intended over the longer term to create an enabling policy environment for more productive urban economies. ... For many countries, however, these policy changes require a corresponding urban adjustment to support national economic adjustment goals' (Cohen and Leitman, 1994: 120). The productivity of the urban economy and its contribution to macroeconomic performance is constrained at the urban level by 'infrastructure deficiencies, the regulatory framework governing urban markets for land and housing, weak municipal institutions and inadequate financial services for urban development' (Cohen and Leitman, 1994:120). Thus the first aspect of the World Bank's urban policy is to increase urban productivity (World Bank, 1991:9).

The second aspect of the policy is to alleviate urban poverty, of which the physical manifestation is understood as being the vast informal settlements, outside of the legal framework of the city, lacking infrastructure and social services and subject to a deteriorating urban environment. It is recognised that structural adjustment has increased urban poverty, as lower-middle class groups have been pushed into the lower income category. As labour rather than property is the main asset of the poor, they have been most affected by contractions in urban labour markets, brought about by restrictive monetary and fiscal polices. Increases in prices of goods and services, as well as cuts in public expenditure affecting public health and education equally affect the poor (World bank, 1991). This condition prevails until such time as the 'resumption of growth leads to improved opportunities for employment, higher productivity and increased wages' (World Bank, 1991:9). Thus the World Bank sees 'the challenge of urban management in the economic environment of the 1990s ... to improve productivity while directly alleviating the growing incidence of urban poverty, thereby also improving equity' (Cohen & Leitman, 1994:123).

The third aspect of the urban policy addresses the impacts of urban environmental problems 'on the health and productivity of individuals, households and communities ... [and on the] sustainability of development' (World Bank, 1991:11). The link between poverty and environmental degradation is implicit. The policy calls for 'a major research and development effort to identify effective approaches' (World Bank, 1991:12).

The final aspect of the urban policy focuses on the need for urban research. 'The priority areas for research include the linkages between the urban economy and macroeconomic aggregates, the internal efficiencies of cities and urban productivity, the urban poor and the informal sector, the financing of urban investments, the role of government in the urban development process and the urban environment' (World Bank, 1991:12).

2.9.2 The Urban Management Programme (UMP)

The World Bank shift towards enablement coincided with the collaboration between the World Bank, the United Nations Centre for Human Settlements (UNCHS) (Habitat) and the United Nations Development Programme (UNDP) in the founding of the *Urban Management Programme* in 1986. It is 'the largest global multi-agency technical support programme in urban development' (UNCHS (Habitat), 1995:16). The 1991 World Bank urban policy paper reviewed above states that the reason for the UMP is 'to

develop a common approach to urban problems' (World Bank, 1991:83). Pugh describes the aim of this programme as follows: to improve 'performance in developing countries in land management, municipal finance, infrastructure services, the environment, and building up the capacity of urban management institutions' (Pugh, 1995:67). In his review of the evolution of World Bank policy, Pugh does not distinguish between the theory behind the Urban Management Programme (UMP) and what he refers to as the third phase of the World Bank policy. It can be assumed that he is implying a strong overlap in thinking behind the UMP and World Bank Policy. However, the point of departure that the UMP is equivalent to World Bank policy, when taken by Jones and Ward in a critiquing article, sparked considerable reaction and clarification of the distinction between the two initiatives. This debate is reviewed in more detail below.

2.9.3 Global Shelter Strategy for the Year 2000

Pugh more explicitly refers to paralleled thinking in the UNCHS (habitat), referring to *the Global Strategy for Shelter to the Year 2000,* endorsed by its General Assembly in 1988, which presents a refinement and elaboration of the concept of enablement (Pugh, 1995:67). The fundamental objectives and principles forming the basis of the strategy for improving the situation of the disadvantaged and poor are as follows. Firstly, promoting enabling policies, which utilise the full potential of actors in the field of human settlements. Secondly, fully recognising the role of women 'as contributors to the solutions of human settlements.' Thirdly, 'full recognition of the important links between shelter and economic development'. And lastly, reconciling shelter provision and urban development with sustainable management of the environment (UNCHS, 1991:4,5). The guidelines of the strategy are structured under (a) national shelter objectives, (b) reorganisation of the shelter sector (including reference to macro-economic strategies, new institutional arrangements required by the enabling approach, the legal and regulatory framework, and the role of data-bases), (c) mobilisation and allocation of financial resources and (d) shelter production and improvement (with specific reference to the regularisation of existing informal sector housing). Implementation of the Global Strategy for Shelter occurs at five different levels, through action by UNCHS (Habitat) (including involvement in the UMP), action by governments, action by the United Nations system (including initiatives of the World Bank and the UNDP, partly through the UMP), action by bilateral and multi-lateral agencies and intergovernmental organisations, and action by NGOs (UNCHS, 1991). The distinction between the World Bank and the UMP becomes clear in the relationship of these initiatives to the Global Strategy for Shelter.

2.9.4 Agenda 21

Recommendations from the 1992 United Nations Conference on Environment and Development (UNCED) are embodied in the *Agenda 21,* which lays out principles of sustainable development. These were later endorsed by the Habitat Agenda and Istanbul Declaration (Wakely, 1996). Chapter 7 of Agenda 21 is titled *Promoting Sustainable Human Settlement Development.* It ascribes to 'the "enabling approach" advocated for the human settlement sector' (UNCED, 1992:70). The overall objective is to improve the 'social, economic and environmental quality of human settlements' (UNCED, 1992:70). The Agenda recommends the following approaches:

- technical co-operation activities,
- partnerships among the public, private and community groups and special interest groups,
- participation in the decision-making process by community groups and special interest groups (UNCED, 1992:70).

The basis for action in the eight programme areas identified in Chapter 7 of Agenda 21 is, on the one hand, support for International declarations such as the *Universal Declaration of Human Rights,* the *International Covenant of Economic, Social and Cultural Rights,* the *Global Shelter Strategy to the Year 2000,* and the proclamation of the 1990s as the *International Decade for Natural Disaster Reduction,* and on the other hand, the recognition of shortfalls in human settlements development. Specific roles for initiatives such as the Urban Management Programme, the Sustainable Cities Programme and the WHO Healthy Cities Programme are highlighted.

Chapter 7 of Agenda 21 makes explicit reference to informal settlement upgrading, from the perspective that governments should support the shelter efforts of the poor. This requires the adaptation of 'existing codes and regulations to facilitate their access to land, finance and low-cost building materials' and the active promotion of 'regularisation and upgrading of informal settlements and urban slums as an expedient measure and pragmatic solution to the urban shelter deficit' (UNCED, 1992:72). Under

infrastructure provision, it further advises that 'developing countries should be assisted at national and local levels in adopting an integrated approach to the provision of water supply, energy, sanitation, drainage and solid waste management, and external funding agencies should ensure that this approach is applied in particular to environmental infrastructure improvement in informal settlements based on regulations and standards that take into account the living conditions and resources of the communities to be served' (UNCED, 1992:81). This requires 'strengthening the institutional capacity of local authorities and administrators in the integrated provision of adequate infrastructure services in partnership with local communities and the private sector (UNCED, 1992:83). The Agenda further refers to the need to establish 'city data management capabilities', and advises that 'United Nations organisations, such as Habitat, UNEP and UNDP, could provide technical advice and model data management systems' (UNCED, 1992:75). Specific mention is made of the role for advanced technology such as GIS and satellite imagery, as well as international exchange of information and experience (UNCED, 1992:80).

2.9.5 UNCHS (Habitat) Settlement Upgrading Programme (SUP)

It is these aspects of Agenda 21 and the similar orientation of the Global Strategy for Shelter to the Year 2000 upon which the founding of the UNCHS Settlement Upgrading Programme (SUP) in 1993 was based. Its objective in the longer term is to establish 'an international reference framework for settlement upgrading' which provides 'member country governments with specific policy instruments and planning and implementation tools, for the exchange of information and know-how' (UNCHS (Habitat), 1993:4). In its first two years the aim was to 'test and develop computer applications for the participatory planning of settlement upgrading interventions and for the establishment of cadastral databases, addressing the information management needs of settlement regularisation and upgrading interventions, in relation to the *problematique* of the legal status of informal settlements' (UNCHS (Habitat), 1993:4). This included 'the strengthening of the Information Bank and Network on Services for the Urban Poor of the Water Supply and Sanitation Collaborative Council (WASSANCO)' and 'initiating policy development and capacity building activities in SUP pilot cities' (UNCHS (Habitat), 1995:12). The ViSP approach was tested in Nakuru, Kenya and Belo Horizonte, Brazil. The SUP activities are 'carried out by participating universities, working closely with local authorities and local research counterparts' (UNCHS (Habitat), 1995:12). In the second phase the programme is intended to disseminate the Visual Settlement Planning (ViSP) approach, 'creating an enabling framework for its effective use' (UNCHS (Habitat), 1993:8), provide training, publish source material and provide technical assistance. The SUP co-ordinates with other initiatives such as the Urban Management Programme, the Sustainable Cities Programme, the Community Development Programme and the Settlement Infrastructure and Environment Programme.

2.9.6 The 1996 Recife Declaration

The Recife International Meeting on Urban Poverty held in March 1996 was organised in preparation for the Habitat II Conference. 35 countries and organisations including community-based, non-government, private, municipal and United Nations agencies were represented. The declaration leading out of the meeting is titled *Urban Poverty: a World Challenge* and provided recommendations to Habitat II as well as to the levels of organisation represented at the Recife meeting. Its areas of focus are (a) globalisation and the challenge of urban poverty, (b) understanding unity and diversity of poverty, (c) the need for new relationships with the poor, in order to transform public and private action, (d) enabling policies, requiring investment in the poor, (e) the articulation of public and private actors, with a central role given to local authorities, and (f) the common future of cities, which requires an integration of the informal city as well as international exchange (UNCHS (Habitat), 1996c). The Recife Declaration is a more accessible document than the Habitat Agenda, which arose out of a more complex process of negotiation and consensus seeking. Though encompassing the same principles as the Habitat Agenda, the Recife Declaration makes more explicit reference to the relationship between informal settlement integration and poverty reduction.

2.10 Conclusions

There is a strong distinction to be drawn between the position of the World Bank, on the one hand, and the United Nations Agencies, on the other. The Bank's position is dominated by a support for market enablement, which may lead to the interests of the poor being ignored by the implementing governments. (Baken & van der Linden, 1993:17). At the same time the Bank's narrow interpretation of cost effectiveness means that it cannot recognise the wider economic and social benefits of upgrading.

The position of the United Nations Agencies, on the other hand, is strongly supportive of upgrading, recognising that it can make a positive contribution to urban development. Finally, when in terms of the comparison between upgrading and sites-and-services, the position tends to support that emerging from the practical debate. This generally recognises that the one should replace the other. Rather, they are seen as complementing one another. Thus Nientied and van der Linden state that ideally sites-and-services and upgrading 'are executed simultaneously. 'Squatment upgrading intends to deal with existing, but poor and illegal housing; sites-and-services are intended to increase the housing stock and thereby remove the need of the poor to resort to squatting' (Nientied and van der Linden, 1988:138). Similarly, Obudho and Mhlanga argue that 'sites-and-services must be complementary to efforts of upgrading existing squatter areas' (Obudho & Mhlanga, 1988:135). In all cases, however, settlement upgrading should be seen as a crucial component of any policy to provide services and housing for the urban poor.

3. INFORMAL SETTLEMENT PROCESSES

3.1 Introduction

In contrast to pre-planned formally laid out and controlled residential settlements, informal settlements are dynamic environments, constantly adjusting to changing pressures and processes. Political, economic and social forces cause, shape and either maintain or threaten the existence of informal settlements. The articles reviewed here consider key elements of informal settlement formation and examine to a varying extent the underlying processes, as well as commonly held assumptions. The review is based upon literature covering informal settlements in Africa (excluding South Africa), Latin America and Asia. The literature reviewed is largely Eurocentric, and originates from English-speaking journals and publications. In many cases it only covers one particular aspect of a country or region, and is therefore not comprehensively comparative. However, it does allow an understanding of the diversity of processes influencing informal settlements, which is the aim of this review. This perspective is then balanced to some extent by the review of a number of case studies that were evaluated for this study.

The chapter commences with a number of definitions, which refer to specific aspects of informal settlements, before focusing on the processes of settlement formation and development. It then looks at the economic pressures that impact on settlements, and the main areas of deficiency in the informal settlement environment. This is followed by an analysis of government responses to informal settlement growth. The chapter ends by drawing out some conclusions from both this, and the previous chapter.

3.2 Definitions and terminology

Turan explains that the difference between 'slum' and 'squatter' settlement lies in the production. A squatter settlement is the initial stage of a built environment, which might develop further, whereas a slum is in the final and decaying stage of the built environment. The shared characteristic of the two settlement types is usually low incomes, poverty and precarious infrastructure (Turan, 1987:77). However, the term 'slum' is often used as synonymous with squatter settlement, as in the article by Volbeda (1989), which is reviewed below. Similarly, since the 1970s, with World Bank involvement in 'sites and services and slum upgrading', the latter is generally accepted to include the in situ upgrading of informal settlements. According to Amis, the conventional definition of squatting is 'the illegal occupation of land and self-construction of shelter' (Amis, 1984:87). However, he argues that 'there is no necessary connection between these two aspects' as is often assumed (Amis, 1984:87). Perlman argues that 'what ultimately distinguishes a squatter settlement ... from many, otherwise similar, lower class communities is its illegal status in terms of land use' (Perlman, 1981:169). In a typology of low income settlements, Leeds defines squatting as the possession of land without title. However, he warns that 'typological thinking is antagonistic to processual thinking,' therefore this simple definition obscures 'all sorts of subtleties of possession, partial recognition of tenure, indirect acceptance of possession or tenure by the government' (Leeds, 1981:22). It is these 'processual' aspects that form the focus of this review.

While there appears to be some universality in the definition of 'squatter settlement,' other terms are used, usually with reference to specific characteristics of the settlement. Thus 'irregular settlement' referring to the layout; 'informal settlement' referring to the informality of the layout and buildings; 'shanty town' referring to the informality of the buildings; 'spontaneous settlement' referring to an absence of planning; 'illegal', 'clandestine' or 'pirate settlement' referring to the defiance of law; and 'precarious settlement' referring to the inadequate infrastructure and services. These terms are developed and used usually by authorities, as is evident from the settlement aspects they describe. The terminology changes as political orientation towards the settlements by the authorities changes. Andrews, Christie and Martin refer to the term 'unauthorised settlement' which was used by Zambian authorities prior to independence, and is directly linked to that regime's system of urbanisation control (Andrews et al, 1973:17). Peattie describes how official terminology was changed in Peru after a military coup in 1968. What were previously referred to as 'marginal barrios' were now called 'young towns,' - 'the term was no longer pejorative and implied official recognition for their inhabitants' right to live there' (Peattie, 1990:21).

In contrast then are the terms that appear to originate from within the settlements. Thus the Brazilian term 'favela' is believed to have originated from the name of a flower that grew on the slopes where the first Brazilian informal settlement grew (Ivo Imparato, personal communication). The term has been adopted officially and endured due to its political neutrality. Similarly, the Turkish term 'gecekondu' literally means 'landed overnight', referring to the fact that these settlements are erected in one night. This term too is used officially (Turan, 1987:77). The same process of settlement formation is encapsulated in the Mexican term 'barrio paracaidista' meaning 'parachutist neighbourhood' (Main, 1992:12). While these less politically laden terms appear plentiful and common throughout Latin America, the literature reviewed gives no evidence of such terms used in Africa.

3.3 The nature of settlement formation

The occupation of land in order to obtain shelter is related directly to the nature of operation of the urban economy and reflects the high cost of land and its over-regulation. It does not necessarily reflect an absence of land on which to settle. Rather it reflects that fact that land, under the capitalist economic system, has been turned into a commodity and, as such, it is operated under conditions of controlled scarcity. This section explores some of the linkages between informal settlement processes and the economy, and then looks at the responses that this induces in families. This is followed by a brief analysis of how land is occupied and the role played by external actors in this process.

3.3.1 Informal settlement process and the economy

Volbeda (1989:158) makes mention of the effect of economic recession on informal settlements. The majority of the cities' growth is located in informal areas in the form of expansion as well as densification, as many households of the lower brackets of the middle-income are pushed out of the formal rental market into informal settlement housing. Densification in low income housing areas takes the following forms: young adults remain in the house, even after new families are formed; rooms are sublet; plot coverage is increased; construction is retarded; layout standards are lowered in the development of new areas; additional floors are added onto buildings (Volbeda, 1989:159). Volbeda draws a direct link between the formation and expansion of informal settlements, and the wider socio-economic and employment situation (Volbeda, 1989:158).

Thirkell refers to a universal trend of 'downward raiding' as 'increases in urban land prices coupled with the slow delivery of residential plots through formal channels has made titled property ... increasingly unattractive to middle-income groups' (Thirkell, 1996:71). This leads to the buying out of poorer families in informal settlements by middle-income households, and therefore a social diversification within the settlements. In reviewing the informal housing market in Cebu City in the Philippines, Thirkell further finds that economic crises among the poorest households will lead them to sell the land they occupy below the informal market value, a factor which is exploited by the incoming middle-income buyers (Thirkell, 1996:85).

As in the case of the Philippines, macro-economic policies such as the withdrawal of the state housing provision and restrictions in public expenditure in Kenya have led middle-income households to seek accommodation in the informal market. Commercialisation of the housing sector in Kenya, however, has led to a rental market, which increasingly caters for the middle-income group (Amis, 1996:274). The same forces have pushed the poorest households out of informal owner occupation, that is self-built or subsistence housing, and into informal rental accommodation. Other implications of increased poverty and decrease in wages are an increased reliance on rural land and resources, and an increase in female headed households, the latter being discussed in greater detail below (Amis, 1996:279).

Gilbert examines the impact of recession on urban protest in Latin America. Here democratisation went hand in hand with austerity programmes. The general welcoming of democracy has dampened the support for unionised protest against the adoption of austerity policies (Gilbert, 1994:150). However, protest has come from the grassroots, in many cases assisted from outside organisations as reviewed below. In response to this wave of protest, governments have, to varying degrees, responded by targeting programmes at the poorest, to compensate for the effects of austerity (Gilbert, 1994:151).

3.3.2 The settlement process

In the 1950s and 1960s, the dominant view of informal settlements was that they reflected a 'culture of poverty', which referred to assumed 'pathological cultural trends' (Alsayad, 1993:33). Alsayad disagrees with this and argues that it is invalid to generalise about informal settlement processes across the developing world. He sees the situation more in terms of a relationship between the state and the informal settlement, and emphasises the dominance of what he terms the cultural variable. For this purpose, he defines culture as 'a broad system of values and norms of behaviour that mediates relations among the urban poor and between the urban poor and the state' (Alsayad, 1993:33, 34). The value of Alsayad's work lies in his description of three sets of processes. The first of these is the squatting process, the second the settlement formation process, and the third a set of government response mechanisms. This last component is covered later in the chapter.

Within the framework of government-squatter interactions and relationships, there are essentially four types of squatting processes: gradual, communal, mobilising and generated, which may be described as follows:

- Gradual settlement. This describes 'spontaneous acts by individual settlers seeking shelter by gradual accretion on a publicly or privately owned site'
- Communal settlement. This is 'a collective act by settlers who have co-ordinated a specific act of invasion'
- Mobilisation. This is 'often instigated by political parties or agents with the intention of social mobilisation . . . [and] may be aimed at threatening political legitimacy of a government'
- Finally a generated invasion. This too is 'also organised, but by official urban authorities in return for electoral gain.' (Alsayad, 1993:35).

This list reflects Alsayad's own geographical area of expertise, as well as the political conditions that existed at the time. Thus, Alsayad's work is based upon a comparison of six case studies, three in Latin America and three in the Middle East. The three informal settlements in Latin America comprise:

- A mobilised invasion in Columbia, of which the development was 'based on a clientelist relationship between the leader of the settlement and the authorities'.
- A communal invasion in Venezuela, which developed through a 'struggle between the community and the authorities'
- A gradual invasion in Peru, which developed with 'the juxtaposition of different political trends through the establishment of linkages between the squatter community and both political opposition and the government authorities' (Alsayad, 1993:37).

The three in the Middle East are gradual invasions (two in Egypt and one in Saudi Arabia). These settlements developed 'under distinct socio-political conditions,' yet represent common processes which are based on the need to maintain a gradual and unobtrusive character,' thus avoiding 'confrontation or negotiation with the government or political parties (Alsayad, 1993:40). Alsayad concludes that in Latin America informal settlements are generally either mobilised or generated, involve collective action, engage in political affiliations and involve the state in their development. Informal settlements in the Middle East develop gradually, 'as if an unspoken agreement to ignore one another exists between the squatters and the state' (Alsayad, 1993:40).

This analysis is supported by a number of other authors, although it is clear that the first two mechanisms are far more widespread than the third and fourth. Thus Turan's (1987) description of informal settlement occupation in Turkey is similar to the trend of organised invasions of Latin America. On the other hand, Main contrasts this with more gradual processes in Africa, where individuals rent or buy land without obtaining papers, and construct structures without building permission. There, 'such unauthorised settlements are typically located around the urban periphery, where farmland has been subdivided without planning approval for residential plots' (Main, 1992:13).

Even here though, it is difficult to generalise. It is true that many authors, such as Amis, Main and Lee-Smith, refer only to non-confrontational informal settlement formation in Africa. However, Andrews et al describe confrontational land invasions in Zambia. Prior to independence, informal settlements had originated either through contractors' camps into which non-contractors had infiltrated or through shack

farming by landowners. These were largely ignored by the colonial government. After independence, however, the informal settlements mushroomed, and 'open defiance of landowners began. This was squatting in the conventional sense of taking over someone else's land' (Andrews et al, 1973:17). By 1973, half of Zambia's population was housed in these informal settlements (Andrews, et al, 1993:17).

The occupation of the land is just the first step in a process. According to Alsayad, there is a distinct pattern to settlement formation, which occurs across the different squatting patterns. Alsayad breaks this informal settlement formation process into four components:

- Land invasion.
- Social formation.
- Physical consolidation.
- Urban maturity. (Alsayad, 1993:35).

3.3.3 Family cycle and survival strategies

The above sections have reviewed the various formation processes of informal settlements and the role of community mobilisation, authorities, the economy and outside organisations in these processes. At a separate level, there are the processes that drive individual households into entering the processes of informal settlement formation and development. The economic processes that condition families to take the risk of joining a communal invasion or to infiltrate an established informal settlement have already been mentioned above, equally the processes of settlement stratification as middle-income families infiltrate. Volbeda (1989) reviews how the decision to join a land invasion or informal settlement is also related to a particular stage in the family cycle. He describes a pattern of how certain phases in the formation and development of an informal settlement in Brazil corresponds with stages in the family cycle. Within this pattern, he traces particularly the responsibilities of women, whose survival strategies form the focus of his paper.

Volbeda stresses the level of competition for living space at the bottom-end of the market. The weakest in this market are elderly women, female-headed households and young adults, these being squeezed out of the subletting sector as demand increases with economic recession. Volbeda found that it is newly formed or young families that will compete for land in invasions or illegal subdivisions. While the family is in the expansion stage the household demands on the women are strongest, and they are most likely to stand together in a struggle for living space. Thus a woman's survival network often goes back to the invasion period in her life. This is followed by a stage of consolidation of family size, housing and networks. Economic recession will affect the form and speed of physical consolidation, and will cause those unable to consolidate to be squeezed out of the sector of owner-occupied housing in informal settlements. The stage of settlement legalisation often coincides with the family stage when financial burdens are greatest, when children require education, and are not contributing substantially to the household income.

It is common for male heads to leave the household during such pressured times. Under these circumstances, female household heads firstly, seek new economic opportunities, often at the expense of living space (rooms are sublet or home enterprises initiated), and secondly, turn to neighbourhood networks for support. But then new pressures arise, as contributions to these networks are required in return for benefits. Competition is a continuing factor as adult children seek own accommodation and the fragile elderly finally join the weakest sector, requiring support from household members. However the secured dwelling does form a considerable asset, until such time as the elderly are no longer able to look after themselves (Volbeda, 1989:163,164).

Other articles in this review appear to agree on the proposition that it is predominantly young families that will join a land invasion process. Shakur found that in informal settlements surveyed in Dhakar, Bangladesh, the nuclear family dominated overwhelmingly (Shakur, 1991:69). Similarly, Hardoy et al note that 'as is usual in this type of ((informal)) settlement, a high proportion of the inhabitants are infants, children and adolescents and there are few elderly people' (Hardoy et al, 1991:106). From Kenyan studies reviewed by Amis (1996:280), it also appears to be a widespread phenomenon that economic pressures cause men to leave their families, and coupled to this, that female-headed households are among the poorest.

3.3.4 Outside intervention

One important difference, which may help to explain the different underlying reasons for the prevalence of communal invasions as opposed to gradual invasions, is the role of outside agencies. Thus the reviewed literature on informal settlements in Latin America makes reference to the role of such outside organisations in the development of informal settlements, whereas this process is not evident from the literature on Africa. In Latin America it is mainly the Catholic Church that has played the role of assisting informal settlements. Gilbert explains the origin of the church involvement as lying in the meeting of the Latin American Bishops in Medellin in 1968, after which Liberation Theology was adopted in many parts of the continent. In 1979, 'the Bishops had agreed to support a "preferential option for the poor"', the premise of which was to 'use the Bible to make the poor conscious of injustice and to help them to organise to change their lives' (Gilbert, 1994:143). A base community movement was particularly strong in Brazil, where it contributed to the undermining of the military regime, and this also assisted in creating an organised base among communities. (Gilbert, 1994:143).

Cuenya et al (1990) similarly refer to the important role of church-backed grassroots communities in a land invasion and its consolidation in Argentina in the late 1970s. As these church grassroots groups provided 'pockets of local political activity, people organised themselves, worked and discussed their problems and needs. There was no other place in which such organisation and discussion could take place. There developed an awareness based on Christian values that now seemed to acquire a new social significance. This awareness included a concept of social justice and human rights in the widest sense. ... Their Christian inspiration contributed to the "legitimation" (sic), within their individual consciences, of a set of attitudes which gradually turned into concrete demands and laid the foundations for collective action' (Cuenya, et al, 1990:66). Cuenya et al also report a political fragmentation in community organisations after the return to democracy in Argentina. However, the passing of a new land law in favour of informal occupiers of land had meant the fulfilment of one of the most pressing collective demands (Cuenya, et al, 1990:71, 72).

In contrast to the two cases presented above, Hardoy and Hardoy (1991) describe a paternalist relationship between private charities (including the church) and an informal settlement in Argentina, which led to considerable mistrust within the community of any outsiders and their proposals for intervention (Hardoy et al, 1991:117). Hardoy et al conclude that 'some good initiatives have been aborted because they were presented by a representative from an outside agency. ... Failures are almost inevitable, when outsiders try to impose their points of view' (Hardoy, et al, 1991:118).

3.4 Main areas of deficiency in the informal settlement environment

3.4.1 Risk and insecurity

There are both physical and social deficiencies in the living environment in informal settlements. There are also strong inter-relationships between them, whereby an increase in the one, and particularly the first, impacts upon the other. Dealing with physical risk first, this is related primarily to the hostility of the land that is occupied. Thus the land may be prone to landslides, for example, as documented for Venezuela by Jiminez (1992), or to flooding, as documented for the waterfront settlements in Port Harcourt, Nigeria, by Fadare and Mills-Tettey (1992). Other areas of physical risk stem from a high groundwater table, from subsidence, from settling on old landfill sites, and from fires sweeping through the settlements.

Jiminez explains that the frequency of natural disaster in cities is not only related to the fact that the city, in particular the informal city, has encroached onto sensitive and unsuitable land, but that urban development in general has caused the 'transformation of geomorphologic processes into community hazards' (Jiminez, 1992:81). Thus 'slope changes frequently occur in *barrios*, not only because of the already unstable natural conditions, but also as a result of changes to the slopes from human activity' (Jiminez, 1992:83). Residents might well be aware of the frequency of natural disasters, and therefore the risk with which they are living. However, this factor alone is not always sufficient to persuade them to move. Thus Fadare and Mills-Tettey found that a relatively high percentage (32%) of residents of Port Harcourt's waterfront settlement were not prepared to move, even if a better alternative were available (Fadare and Mills-Tettey, 1992: 78). Unfortunately, this analysis does not give insight into the trade-offs

(be they economic or social) that residents are making in opting to live with risk of natural disaster, nor the psychological stresses of living with risk.

The dominant social risks are those related to security. This relates both to insecurity about the permanence of the settlement, or parts thereof, and the subsequent risk of eviction. Thus Lee-Smith reports of the early stages of an informal settlement in Nairobi, where the households, many of them female-headed, 'would camouflage their dwellings or take them down in the morning and re-erect them at night.' She adds that after 'the number of very poor quality shelters grew dramatically ... they were cleared' (Lee-Smith, 1989:178). Reichenheim and Harpham list insecurity of tenure as one of the components at the environmental level that with other physical, social and cultural aspects of the environment and in 'adverse interaction ... with the different levels of the human nervous system' are thought to cause mental problems (Reichenheim & Harpham, 1991:683, 684). In this case not only was mass eviction of an entire settlement considered to be a factor, but also the individual eviction by a landlord for not paying rent. This risk factor increased with the commercialisation of informal settlement housing in Nairobi (Amis, 1984:94).

There are then a number of problems of physical risk that have significant social impact. Among the most important of these is the risk of epidemics in informal settlements, which is well documented. (Hardoy, Cairncross and Satterthwaite, 1990). The underlying causes of such risk are often the insobriety of infrastructure and services, the presence of rodents and other pests, as well as high occupancy ratios, enabling the rapid spread of diseases. Official intervention in informal settlements is often conditioned by the threat of the outbreak of epidemics. Lee-Smith describes how payment for water supply in a resettlement area in Nairobi was dropped, following a cholera scare (Lee-Smith, 1989:179). While the threat of disease spreading beyond the boundaries of an informal settlement draws attention, the permanent health conditions of residents rarely has the same impact. Thus examples such as mental disorders among mothers, found by Reichenheim and Harpham (1991:686) to be as high as 36% in a Rio de Janeiro informal settlement, remain largely ignored. Finally there is the direct relationship to impermanent building structures (Yapi-Diahou, 1995:27), which is discussed more fully under section 3.5.3 below. Hardoy et al link the poor quality of buildings to health problems, with particular reference to the connection between respiratory diseases and dampness in the houses, caused by the poor quality of housing in the case of an informal settlement in Buenos Aires (Hardoy et al, 1991:108).

3.4.2 Compromised spatial and structural standards

The literature did not discuss the adverse effects of compromised space. Plot sizes that are mentioned average around 100m^2. Alasyad mentions the staking out of 90m^2 (6m x 15m) plots during an invasion in Columbia (Alsayad, 1993:35). Hardoy et al state for an informal settlement in Buenos Aires that 'the average lot measures 100m^2, but many are smaller' (Hardoy et al, 1991:108). Yapi-Diahou describes plot sizes in the informal housing market of Abidjan, Ivory Coast, as 'very small: 78 per cent of plots are no more than 100 square meters in size and only 13 per cent are over 200 square meters' (Yapi-Diahou, 1995:25).

While space is compromised at the individual level, informal settlement patterns in most instances equally imply a compromise of public space. While the predominantly pedestrian environment can be of social benefit, this is to the detriment of access by emergency and service vehicles. While the spatial aspect of access is not addressed in the literature reviewed, Hardoy et al describe how the lack of paved surfaces and the resulting mud and standing water on the streets of an informal settlement in Buenos Aires prevent services vehicles such as sanitation trucks from entering the settlement, besides causing discomfort to the residents (Hardoy, 1991:107). In addition, Hardoy and Satterthwaite have pointed to the connection between contaminated standing water and the spread of disease in informal settlements (Hardoy, Cairncross, Satterthwaite, 1990). The economic environment in informal settlements is discussed under *Economic process in informal settlement development* (see 3.5). Various links between economic pressures and health are reviewed here. Hardoy et al mention that poverty in the informal settlement they researched in Argentina is evident in the quality of the housing and in the diets. They refer to different government intervention to alleviate the nutrition problem. These ranged from distributing food boxes, issuing food bonds, to setting up popular kitchens. However, they conclude that 'adequate nutrition remains the most serious problem for most neighbourhoods' (Hardoy et al, 1991:108). Amis has pointed to the compromise poor households have to make between housing expenditure and nutrition, in order not to be squeezed out of the market. With the commercialisation of informal housing in Nairobi, Amis fears that 'it seems that the urban poor are being forced into a

capitalist rent relationship they cannot afford without risk to their health. The danger here is of a relatively well housed but malnourished population' (Amis, 1984:95). Amis demonstrates how child malnutrition 'as judged by ratios of weight and height to age' indicates whether the payment of rent represents a major financial difficulty to the household (Amis, 1984:93). Amis adds that in these terms the advantage of conventional squatting (owner occupied subsistence housing) was that the poor could 'eat all their money' (Amis, 1984:95).

Reichenheim and Harpham allude to the link between economic pressures and maternal mental health in informal settlements. When mothers are 'forced to take on work for cash outside the home ... in a context of uneven gender-labour distribution inside the household' they become 'wage-labourers and domestic workers at the same time.' Where children have to be left alone with inadequate supervision, and 'where there is a weak social structure, as often happens in many squatter settlements, mothers' mental stability may be impaired and their ability at child rearing diminished' (Reichenheim and Harpham, 1991:684). Volbeda reviews Moser and Levy's theoretical basis for gender analysis, which includes not only the double task of production and reproduction referred to by Riechenheim and Harpham, but also 'a further substantial task in community management' (Volbeda, 1989:160). This addresses the common assumption that 'women in particular, in their role of household manager or reproductive task, have plenty of spare time for community participation' (Volbeda, 1989:160).

3.5 Economic process in informal settlement development

Whilst it is within the physical and social arenas that risk and insecurity primarily manifest themselves, it is the economic processes that tend to shape the way in which informal settlements form and develop. It is these processes that authors such as Amis and Lee-Smith have researched in Kenya. The slow infiltration or spillage onto peripheral land, which is common to African cities, has associated with it an economic transaction in unauthorised subdivision and renting. In contrast, the invasions in Latin America and Turkey discussed by Alsayad and Turan provide, at least in the initial stages, free of charge access to land (although mention of bribes to organisers of planned invasions are made - Turan, 1989:89). According to Amis, this means that a major advantage of communal squatting, at least in Latin America, is that the resources of the poor are freed for needs other than housing (such as nutrition). Even there, however, they argue that this subsistence shelter is only a transitional phenomenon, as commercialisation and political integration seem inevitable and that these forces will remove that benefit (Amis, 1984:95). It is these economic forces that are explored in this section.

3.5.1 Commercialisation of the shelter process

Amis (1984) differentiates between subsistence shelter and commercialisation of the shelter process. The former 'can only exist in the absence of capital, since the involvement in capital will result in the establishment of commercial relations' (Amis, 1984;88). Amis parallels the process of shelter commercialisation with that of agriculture, where it refers to a transformation from subsistence agriculture to a cash crop economy. He addresses two broadly held assumptions, firstly, that housing in informal settlements is self-built, therefore subsistence shelter, as 'provision or production of shelter and its consumption are contained within the same household unit' (Amis, 1984:87). And secondly, that the main reason for lack of investment is the illegality of the settlement. Amis argues that 'the notion that illegality and self-construction are essential elements of squatting refers to a special case that has been popularised by much work in Latin America' (Amis, 1984:88). Amis holds that security of investment can be obtained in the absence of formal legality. He substantiates this with evidence from Latin America, where illegal subdivision, sale of plots by original land invaders, and small scale landlordism are signs of commercialisation, as well as in Kenya, where a large scale unauthorised rental sector has emerged. Amis concludes that 'while it seems that pressure towards the commercialisation of unauthorised settlements may be universal throughout the periphery the specific form it takes is a function of the prevailing political economy' (Amis, 1984:88).

Amis further examines the mechanisms of commercialisation and their implications for the poor. He describes how residual subsistence housing in informal settlements in Nairobi is being replaced in situ by rental units, the profitability of such activities lying in the high demand. This reflects a simultaneous 'capitalistic' process in Kenya from communal to private rights to land, albeit in the absence of legal title deeds (Amis, 1984:89). Profit maximisation has changed the building from the socially conditioned U-shaped house, to economic structures that allow the average landlord to let out more than 12 rooms (Amis, 1984:91). Commercialisation too has increased mobility and has overridden ethnic loyalties and

prejudices (Amis, 1984:94). The pressure to pay regular rentals in many cases requires a compromise in nutrition, which is reflected in child malnutrition among the poorer households (Amis, 1984:95). The poorest are pushed out of the market and in turn seek subsistence shelter on the city's periphery (Amis, 1984:94).

3.5.2 Commercialisation in land transactions

Yapi-Diahou addresses 'the myth of free land' in the urban informal housing sector in the Ivory Coast (Yapi-Diahou, 1995:25). He describes how 'the practice of tipping is ... a way of camouflaging commercial practices, even though these prices may seem very low to some beneficiaries' (Yapi-Diahou, 1995:26). In the Philippines land in informal areas is bought up by affluent buyers and held for speculation purposes, a process that impedes the supply of informal land (Thirkell, 1996:83). Thirkell explains how low-income families occupy their land upon purchasing and do not regard it as a commodity. However, in times of economic crisis, they will exchange the land resource for cash. However, this occurs at below market prices. Thirkell found a connection between the perception of land value and household income, irrespective of location of the land (Thirkell, 1996:87). This he assigns to 'the lack of knowledge and also of confidence in the market, provoking both extremely low estimations and inconsistent pricing' by low-income sellers (Thirkell, 1996:87). A further reason he cites is that higher income residents in informal settlements tend to have connections or make pay-offs to the formal sector, thus gaining a level of security. They therefore attach higher value to the land (Thirkell, 1996:88,89). While the land value perceptions in the Philippines appear not to take into account locational advantages (Thirkell, 1996), Amis found that in Kenya there is a direct correlation between rent levels and location, the inner-city informal settlements, and those close to industrial areas being more expensive (Amis, 1996:275).

3.5.3 Commercialisation in the building process

Commercialisation in the building process is widespread, even where impermanent building technology is used. Yapi-Diahou describes how in the Ivory Coast a permanent structure would cost less to construct than one of wood and sheet metal. However, in the absence of legal security, residents choose to invest in portable building materials. The building process is commercialised, firstly, through the purchase of building materials and prefabricated sections, and secondly, through the division of labour, in transport of the material and construction. Yapi-Diahou's study in the Ivory Coast found that more than half of the owner-occupiers financed their construction through personal savings, mostly originating from rent. Others supplemented savings through kinship networks or loans from employers. The construction therefore takes place without reliance on government or outside agencies (Yapi-Diahou, 1995:28).

Thirkell notes a lack in the Philippines of credit and mortgage facilities for families without regular employment (Thirkell, 1996:74). Asiama argues for Ghana and other West African cities that the major difference between the poor and the not so poor is not the level of income but their access to opportunities to obtain land and finance. While residents of informal settlements in many West African cities have considerably varying incomes, the informality, irregularity and multiple nature of the incomes excludes even those with high incomes from obtaining loans (Asiama, 1985). Igel and Srinivas identify the same gap between credit demand and formal credit supply in India. They examine the informal credit markets which fill this gap, and identify their characteristics as follows: 'absence of regulations and subsidies; proximity and easy accessibility; availability of very small loans for short periods; low information and administrative costs; a requirement for little or no collateral; flexible and variable interest rates (from very high interest to none); highly flexible transactions and repayments tailored to individual needs' (Igel & Srinivas, 1996:289). They further reveal that 'contrary to popular belief, the number of operators in the market is high, and competition is tough' (Igel and Srinivas, 1996:290). Though not documented universally, it appears that informal credit markets play a substantial part in the commercialisation of informal housing construction.

3.5.4 The rental sector

As mentioned in the section on commercialisation of housing, Amis describes a process in Kenya whereby the poor, who previously were able to build their own dwelling, must now rent accommodation (Amis, B, 1996:274). In his earlier paper, he argues that 'yesterday's squatter is today's tenant' (Amis, 1984:90). Tipple and Willis state that, while very little data are available on rental markets in Africa, it is the most common form of tenure in many African countries (Tipple, Willis, 1991:28). The literature reviewed appears consistent on the finding that the weakest in the informal housing sector have no

choice but to rent. Volbeda states that sublet rooms in informal settlements rank lowest in the housing hierarchy in Brazil. When analysed in terms of gender, it is found that female-headed households are among the weakest, therefore often renting accommodation (Volbeda, 1989:162). Yapi-Diahou found that in Abidjan, Ivory Coast, more female-headed households were informal renters than owners. However, informal sector renters are in many cases of a very varied income. Tipple (referring to Gilbert) mentions this to be the case in Bogota and Mexico City (Tipple, Willis, 1991:27), while Amis mentions middle-income informal renters in Nairobi (Amis, 1984:93).

Amis examines not only the tenants' but also the landlord's side of the informal rental sector. He finds that landlords too are of varied income (Amis, 1984:93). Landlord relations with tenants are said 'to range from sympathy to total insensitivity.' In explanation Amis suggests that 'it may well be that it is the smaller-scale landlords who are socially nearest to their tenants who are the hardest landlords, the reason being that for these landlords, their tenants' rent is their sole source of livelihood' (Amis, 1984:93).

3.6 Relationship with authorities

There are two sides to this relationship, that of the community and that of the authorities. In his work in this area, Gilbert (1994) has examined the actions of the low income (mainly informal settlement) community and the urban authorities and identified a clear relationship between the two. The mass mobilisation of informal settlement communities in the 1970s and 1980s is now an internationally recognised phenomenon. And yet Gilbert's work reveals that most 'ordinary Latin Americans ... regard street protests in a disapproving light as something that less respectable members of society engage in. It follows that only quite extraordinary circumstances lead to mass mobilisation and protest' (Gilbert, 1994:129).

Abbott (1996) has identified two mechanisms by which people come together for collective action. The first is through small groups, where there is a common sustaining interest. This illustrates the formation of pockets of homogeneity within a heterogeneous population and is the basis for community development programmes. The second is where large numbers of people unite over a specific issue. Land occupation in Latin America is the most well-known example of that mechanism, while a second example is the South African rent boycott of the 1980s. The weakness of this mechanism is that it is a single-issue phenomenon, which does not address the underlying heterogeneity of the group and hence is not sustainable.

This has been clearly demonstrated by Gilbert, who has shown that participation in community politics are usually high during the initial stages of settlement formation, or when there is a threat to the settlement. Over time, however, the domestic responsibilities of daily life 'tend to reduce urban militancy' (Gilbert, 1994:131). In addition, as the process of social stratification occurs, through the infiltration of temporary (tenant) households with short term interests, or through party political competition, solidarity or common interest is weakened (Gilbert, 1994:131-132). Abbott argues that such mobilisation around single issues is by definition linked to the achievement of the specific objective associated with that issue. Once this is done there is insufficient underlying cohesion to sustain collective action on a broader front (Abbott, 1996:95).

The recognition of this reality was a major determinant of government strategy in Latin America, and led to a number of government responses. The first is clientelism, which is referred to as 'one of the most effective ways in which Latin American governments have managed to dampen political protest' (Gilbert, 1994:132). Neighbourhood associations are set up and channels of communication and negotiation are initiated. However, misuse of these channels for the gain of votes, by making empty promises, leads to apathy and low levels of participation in such initiatives (Gilbert, 1994:132). Alsayad describes a clientist relationship between a Colombian informal settlement and an opposition party leader. He concludes, that 'the authorities and politicians, wherever possible, have taken advantage of the urgency of the needs of the urban poor to advance their own political careers' (Alsayad, 1993:36).

Second, Gilbert discusses competition between leaders of different communities in securing limited public resources for their communities, and within this context the co-optation of leadership by authorities (Gilbert, 1994:134). A community that has lost out in the competition for resources will be co-opted into peaceful acceptance of the situation through promises of personal favours or political gain to the leaders.

Gilbert, however, refers to social science literature that argues that co-optation does not exclude the possibility that a community might gain through the deal (Gilbert, 1994:134).

Thirdly, repression of protest from informal settlement communities was widespread in Latin America in the 1970s, when governments were undemocratic, and both military and non-military governments carried out imprisonment, torture and political assassinations. With repression effectively dampening popular protest by informal settlement communities (some of which had been founded by opposition parties), Gilbert notes 'that by the 1970s, most observers had become extremely pessimistic about the role of grassroots pressure in helping to change the Latin American political system' (Gilbert, 1994:135). This ties back to the earlier discussion on the improbability of continued mobilisation and deep politicisation of informal settlement communities in light of day-to-day concerns and constraints. Governments' powers to free resources for repression and co-option proved stronger than the urban protest, which, according to Castells' 1970s theory, would lead to 'the radical restructuring of society' (Gilbert, 1994:136).

The review of relationships with authorities has focused, up to this point, primarily on Latin America. No directly comparable literature was found on Africa, outside of South Africa. However, a number of articles do touch on the relationship between authorities and informal settlement communities. A hard-handed control approach by authorities is evident in a number of countries. In Abidjan, Ivory Coast, eviction is cited as one of the most common causes of residential mobility. 'Public authorities, who are responsible for the evictions justify their actions as a means of defending and imposing town planning principles which could be invalidated by unplanned housing, whether makeshift or not' (Yapi-Diahou, 1995:19). Yapi-Diahou concludes that eviction 'is a permanent feature of state urban policy.' Amis makes a connection between urban-rural migration control and the 'colonial legacy of housing and planning standards that cannot possibly be implemented given the economic conditions facing the majority' (Amis, 1984:89). Amis compares 'Zambia, Tanzania, Uganda and much of West Africa and the Middle East,' where urbanisation control was never attempted, with Kenya and Zimbabwe, where pass laws were once in force, with the result that invasions and squatting were in direct confrontation to the State (Amis, 1984:89). In Zimbabwe, the government has been successful in constraining the growth of informal housing, though at the cost of increasing rents and overcrowding (Amis, 1996:282) and through the enforcement of a strict policy of demolition of informal settlements. On the other hand, the easing of urbanisation control in Kenya has led to a degree of legitimacy of informal settlement, which in turn appears to have led to a growth in commercialisation in these settlements (Amis, 1984:89).

3.7 Conclusions

Chapters 2 and 3 present a detailed overview of the literature on informal settlements as it exists at the present time. Chapter 2 began with a comparative review of sites and services schemes and informal settlement upgrading. This highlighted the immense social benefit of settlement upgrading. It also demonstrated an increasing awareness internationally of the importance of upgrading and the advantages that it holds over sites and services development. The World Bank, which views housing primarily as a means of production, has slowly moved from a position of dominant support for sites and services to a position that recognises the importance of both options. The United Nations, on the other hand, has a much greater interest in shelter and in poverty alleviation. And there the support for informal settlement upgrading is far more explicit.

Moving to the literature on informal settlements themselves (Chapter 3), it is clear that these settlements are vibrant, dynamic centres. This is not to romanticise them. There is immense poverty and insecurity. However, it is saying that they provide an environment where people can develop themselves. This is in stark contrast to the often-sterile living environment of sites and services schemes. The case studies demonstrate that upgrading can be successful when it is able to tap into and utilise this indigenous capacity for growth and development.

There are a number of important conclusions that can be drawn from this literature review, which feed into the development of an informal settlement upgrading strategy. Of these three are considered particularly relevant. The first conclusion derives from a study of community actions in settlement formation. Squatting is not necessarily the preferred choice of migrants seeking shelter; it is the only option available. However, once it is recognised that this is the only option, people will take it and fight to retain it. This phenomenon cannot be stopped except through the provision of alternative accommodation ahead of the land occupation. Attempts to "catch up" a housing backlog favour those

who are already in the urban areas, and therefore do not have any significant impact of new settlement formation or existing settlement replenishment.

The second conclusion derives from an analysis of threats and deficiencies. It is clear that any upgrading programme must address these deficiencies, but from a community perspective. This issue of perspective is extremely important. There is an interesting and relevant analysis of this subject by Goulet, a sociologist at the University of Notre Dame in Paris. Goulet argues that development decisions are made by three different categories of actors: technical specialists, politicians (or their bureaucratic agents) and persons pressing some special or general concern (Goulet, 1986:301). Excluding self-interest (a sub-section of the third category), he argues that the first two categories of decision makers apply distinct rationality systems, the technological and the political. Those who plead for moral values pursue ethical rationality (the third category). (Goulet, 1986:301-302, quoted in Abbott, 1993:77-8). He then goes on to say that "when they converge in common decision making arenas, the three rationalities impinge upon one another, not in the mode of horizontal mutuality, but at cross purposes and in a vertical pattern. Each brand of thinking tends to approach the others in triumphal, reductionist fashion, and leads either to unfruitful conflict or abdication, both of which generate poor decision making" (Goulet, 1986:304-305, quoted in Abbott, 1993:78). This is extremely relevant here. For it means that the technical professionals, the politicians and the community will all have different interpretations of the settlements deficiencies, based upon their own rationalities. This in turn will lead to three different views of the solution. Under these conditions, it is crucial that, while the other perceptions are taken into account, it is the community's 'rationality' that is most important, and which provides the basis for the solution.

The third conclusion that can be drawn relates to the actions of government. It is clear that informal settlements are extremely threatening for governments at all levels. They exist outside of the bureaucratic legislative framework, and are difficult to control. It is important to recognise governments' legitimate concerns in this regard. While the legislative framework is often over-rigid, and rarely designed to support the urban poor, it is at the same time the agreed and chosen framework for collective human interaction. What is needed therefore is a clear methodology of upgrading that demonstrates how informal settlements can be transformed into structured environments, albeit using what are at present non-conventional methods.

4. THE RELEVANCE OF BRAZIL TO SOUTH AFRICA

4.1 Introduction

Chapters 2 and 3 have explored the need for a national policy on informal settlements based upon their upgrading in-situ, and the type of strategy that should be followed in carrying out this policy. The conclusion to be drawn is that in-situ upgrading is now widely accepted and viable, and that it often provides the most appropriate solution from a development perspective. Once this issue is accepted, then the discussion moves on to the approach. As part of this research, nine case studies were evaluated[2] from different parts of the world. These can be divided into three types of project, which demonstrate three different types of control, namely control by government (either local or national), control by the community (often in conjunction with non-governmental organisations) or a partnership between government and community. The first type was able to demonstrate little, if any, long-term success, while both the second and third could show examples of successful projects. At present it is the last of these that tends to dominate the South African debate. Experiences of community driven projects are to be found most commonly (but not exclusively) in India, Pakistan and Sri Lanka, and it is from those sources that the South African position derives. This approach is reflected in the structure and the framework of the Peoples Housing Process, and so it is well documented. Less is known about partnerships. This is primarily because these are to be found most commonly in Latin American countries, where the language barrier, and the absence of traditional links, hinders the transfer of experience. This is particularly relevant to Brazil, because of its strong similarities to South Africa. This chapter will argue that the experience of settlement upgrading gained in Brazil over the past ten years, and particularly the experience of Belo Horizonte, has important lessons for South Africa, which are at least on a par with the experiences of the Indian sub-continent. It could go further and argue that, in a number of areas, the former experiences represent a more appropriate model for South Africa. The present chapter provides the initial motivation for this argument by looking at the relevance of Brazil to South Africa.

South Africa and Brazil have major similarities that have been highlighted by a number of researchers (see for example Friedman and de Villiers, 1996), and which will be discussed briefly later. These similarities are much greater than those between South Africa and India. There are also some differences but, of these, three that relate specifically to informal settlements serve to further reinforce the relevance of the Brazilian upgrading experience to South Africa. The first difference lies in the maturity of the housing and informal settlement debate in Brazil when compared to South Africa. The second difference lies in the scale and progression of the urban problem in Brazil. And the third difference relates to the advancement of the socio-political process in Brazil, and the lessons that have been gained in terms of effective working partnerships between local government and communities.

This chapter focuses on three issues. The first addresses the current position and debate in Brazil with respect to informal settlements. The second provides a socio-demographic comparison between Brazil and South Africa. And the third outlines the socio-political process in Brazil since the 1950s, which has contributed to the switch from a situation where government policy was aimed at controlling and removing informal settlements, to a policy directed towards legalisation and upgrading of informal settlements.

4.2 The current position and debate in Brazil

The intense debate in Brazil in preparation of the UNCHS (Habitat) conference in Istanbul in 1996 indicates the extent to which this country is immersed in the current thinking on urban issues such as shelter, urban poverty and informal settlement intervention. The 1996 United Nations conference in Istanbul (Habitat II) was seen in Brazil as 'an unique opportunity for uniting sectors of the Brazilian society around the urban and housing issues' (Maricato, 1996:10). Progressive groups strongly criticised the Brazilian government's preparation for the Habitat II conference, not agreeing with its diagnosis of the urban situation, as it did not reflect the richness of the country's debate. It was argued that Government was not making use of 'a historical opportunity to contribute to the construction of a democratic proposal for the future of the Brazilian city,' and was instead 'reducing the Action Plan to a

[2] See footnote 1 on page 8 for further reference to these case studies.

sum of sectoral policies' (Federacao Nacional dos Arquitetos e Urbanistas, 1996: 22,24). Seeing as government had sidelined the debate of civil society in its elaboration of an Action Plan, civil society had no option but to develop its own proposals and to negotiate these with the government. Thus the National Forum for Urban Reform united religious, popular, class and non-governmental organisations in preparation for a Brazilian Conference on Habitat. Mobilisation took place through the four largest urban movements. The Brazilian Conference, which focused on the democratic management of cities, was the largest Brazilian meeting thus far regarding urban reform. Internal disputes within the urban movement were overcome by a common understanding of the political importance of the event. The conference became the main topic of the local press, while international meetings brought the Brazilian discussion closer to the international debate and 'reaffirmed the maturity of the Brazilian position' (ibid.:29).

The national selection of Best Practices, which paralleled the elaboration of a national plan for action in preparation of the Habitat II Conference in Istanbul, was undertaken with much rigour throughout Brazil. The initiative has impacted on the public debate through the factual documentation, publication and local dissemination of the Brazilian register of Best Practices. This publication (Bonduki, 1996) presents a rich variety of experience from various tiers of government as well as non-governmental organisations in tackling the severe urban challenges that Brazil is facing. It places this in relation to the international and Brazilian debate on the urban question.

In preparation for the Istanbul Conference, Brazil and in particular Belo Horizonte, was the venue of an International Seminar on the Challenge of the Informal Town. Funded by the Italian Government and the UNCHS (Habitat), the event was organised by the Italian NGO AVSI (*Associazione Voluntari per il Servizio Internazionale*), the Municipality of Belo Horizonte, the Catholic University of Minas Gerais (PUC), the Institute of Social Co-operation and Development (CODESC). This seminar brought together mainly Brazilian practitioners of NGOs, government and consultancies and academics, immersed in the questions of informal settlement intervention. The seminar led to propositions and recommendations on various challenges associated to informal settlements. The resulting publication (UNCHS (Habitat), 1995) reflects the Brazilian experience in this field and illustrates close association to the international thinking.

This research will concentrate on the informal settlement upgrading experience in Belo Horizonte, which, among many others is covered both in the Best Practice publication (Bonduki, 1996) and in the proceedings of the International Seminar on the Challenge of the Informal City (UNCHS (Habitat), 1995). However, it is important to understand the intervention experience out of which the Belo Horizonte approach developed, and the debate in which it is immersed. This is considered of particular relevance, due to the relative lack of progressive and critical discourse in the field in South Africa. In order to understand the maturity of the Brazilian situation in relation to South Africa, two reviews follow: firstly, a broad socio-demographic comparison of the two countries; and secondly, the socio-political process in Brazil over the last decades. These emphasise the relevance to South Africa of the Brazilian experience in informal settlement intervention.

4.3 A socio-demographic comparison between Brazil and South Africa

Brazil, with a surface area of 846 million km^2 is approximately eight times the size of South Africa. The population density of Brazil is considerably lower than that of South Africa, the figures for 1992 being 182 and 318 people per hectare for Brazil and South Africa respectively (UNCHS (Habitat), 1996a). What further distinguishes Brazil is the concentration of its population in the cities. In 1995, 78.3% of the population lived in cities (with a figure of 74% applying to the Latin American region) while in South Africa only 50.8% of the population lived in cities (with a figure of 30.8% applying to the Sub-Saharan region). With the concentration of population in urban areas, Brazil is characterised by large urban areas, with 7 cities having a population greater than 4 million people, and a further 35 cities ranging between one and four million people. In 1995 Sao Paulo had a metropolitan population of 16 million people followed by Rio de Janeiro with close on 10 million people, and Belo Horizonte with over three million people.

Linked to high levels of urbanisation (or percentage of population living in cities) and the large size of cities is an important factor that further differentiates between Brazil and South Africa. In Brazil urban population growth rates have declined since the 1960s, whereas in South Africa they are increasing and only expected to drop beyond 2005 (UNCHS (Habitat), 1996b). Table 4.1 below illustrates that despite the projected decline in the rate of urban population growth in South Africa beyond 2005, the numbers of people moving to the cities will continue to increase, whereas this figure is dropping for Brazil.

Table 4.1: Average annual urban population growth for Brazil and South Africa (1965-2025)

	1965-1975	1975-1985	1985-1995	1995-2005	2005-2015	2015-2025
Brazil	4.52%	3.74%	2.88%	2.15% (+3 004 000 people)	1.56% (+2 617 000 people)	1.14% (+2 198 000 people)
South Africa	2.77%	2.63%	2.82%	3.15% (+765 000 people)	3.00% (+ 987 000 people)	2.35% (+1 008 000 people)

Source: UNCHS (Habitat), 1996b.

The level of urbanisation (the percentage of population living in urban as opposed to rural areas) is projected to continue increasing for both Brazil and South Africa. From 1995 to 2025 the level of urbanisation in Brazil is expected to increase from 78.3% to 88.9%. In South Africa it is projected to increase from 50.8% to 68.6%, that is from approximately half to well beyond two thirds of the population living in cities (UNCHS (Habitat), 1996b). The current level of urbanisation in Brazil would imply that poverty is already spatially concentrated in urban areas, although it is generally understood that the worst living conditions still prevail in rural areas. In South Africa poverty is still concentrated in rural areas. A 1995 analysis of poverty in South Africa (Ministry of the Office of the President: RDP, 1995:9) shows that 75% of the poor live in rural areas, with 74% of the rural population, 41% of the urban population and 20% of the metropolitan population being poor. However, the projected demographic shift discussed above will redirect the spatial concentration of poverty from rural to urban areas, though it can be expected that the ultra poor will continue to be concentrated in the rural areas.

The statistics discussed thus far indicate that South Africa can be expected, to a large extent, to follow the demographic trend of Brazil, with an increase in the concentration of both population and poverty in large urban centres. Further, there are parallels between the socio-economic conditions and levels of inequality in Brazil and South Africa. South Africa and Brazil are ranked with Thailand, Poland, Chile, Malaysia and Venezuela as middle-income countries according to their GNP (Ministry in the Office of the President: RDP, 1995:6). South Africa ranks slightly lower than Brazil in GNP (2.77 for Brazil and 2,67 for South Africa) as well as in social indicators such as life expectancy and access to safe water. Equally, South Africa ranks higher than Brazil in illiteracy and fertility and infant mortality rates. Of all middle income countries compared in the study, South Africa displays the poorest social conditions. The study ascribes this to the high level of inequality that was created and maintained through the legacy of *apartheid*. However, according to the Gini-coefficient, which measures the degree of inequality, Brazil displays the highest inequality among the middle-income countries, followed by South Africa (Ministry in the Office of the President: RDP, 1994). Thus a significant similarity between Brazil and South Africa is the concentration of wealth in a small percentage of the population, and the deprivation of the majority. Guedes and Devecchi, (1994 quoted in UNCHS (Habitat), 1996b:50) state that for Brazil 'Recent figures show that the top tenth of the population controls nearly half of the nation's wealth, and the bottom 10 per cent owns less than 1 per cent.' Similar findings are made for South Africa, with the following statement by Kruger and Davies (1994 quoted in UNCHS (Habitat), 1996b:61): 'In 1988 the top 10 per cent received 48 per cent of income while the lower 50 per cent received only 11 per cent of the income.'

The high levels of inequality in Brazil and South Africa result in similar housing situations, where it is unlikely that newly formed households will access formal housing. Although Brazil has a lower fertility rate and a lower urban population growth rate than South Africa, there is a separate factor that amplifies housing demand in Brazil. The average household size in Brazil is exceptionally small at 3.5, as opposed to 5.4 for South Africa, which is expected to increase to 5.6 by 2025. Therefore, when population figures are translated into housing demand, which is represented by numbers of households, figures for Brazil are relatively high (UNCHS (Habitat), 1996b:54, 64). Both countries have experienced a decline in economic growth, particularly in the 1980s, which has decreased access by the poor to formal housing [it is still too early to read the impact of Brazil's stabilisation and reform programme (*Plano Real*) introduced in 1994, which has reduced inflation and changed consumption patterns (Flynn, 1996)]. The 1994 Housing White Paper of the South African Government gives an alarming figure that 13.5% of all households (1.06 million households) are living in squatter settlements mainly in and around urban centres, with an addition of 150 000 new households added annually (Department of Housing, 1994:

9, 10). For Brazil the figure of 1980 was 21% of the population living in squatter settlements or favelas. However, this figure is believed to have increased with the economic recession of the 1980s (Pasternak Taschner, 1995:186).

4.4 The Brazilian socio-political process since the 1950s

The comparison of population and socio-economic indicators of the two countries illustrates that Brazil is deeply immersed in situation that South Africa is heading for and in some aspects is already sharing with Brazil. However, it is the socio-political processes, which Brazil has undergone, and with which the socio-demographic conditions are inter-linked, which give the Brazilian experience particular relevance for South Africa. The following review of the political process in Brazil in the latter half of this century will explain to some extent the relative sophistication of the informal settlement intervention experience and debate in Brazil.

During the populist period in Brazil from 1945 to 1964, policies towards informal settlements were ambiguous. Central government attempted to construct popular housing, while local governments reacted to the growth of informal settlements with laws and regulations to suppress them. In the mid-1950s, when the scale of informal settlements in Brazil's cities became evident, Federal government created a law that enabled municipalities to fund improvements in favela conditions. This led to in-situ upgrading of basic services, as well as relocations to new housing areas according to modernist concepts of rationalism and mass production of housing. Towards 1960 an increased focus on modernisation, exemplified by the construction of Brazilia, diverted attention away from popular housing. This coincided with an intense rural exodus and population growth in the main urban centres, which were undergoing industrialisation (notably the automotive industry in Sao Paulo). The result was a deepening of the housing crisis (Pasternak Taschner, 1995:203, 204).

The threat of socialist mobilisation and uprising of the under-housed urban masses arose with the Cuban revolution in 1959. The United States of America reacted by committing large sums of USAID (United States Agency for International Development) funding for the eradication of squatter settlements in Latin America through relocation to housing estates. The strategy behind this housing intervention was largely to protect Western democracy (Pasternak Taschner, 1995:205).

As early as 1966 the social problems associated with the relocation of squatters to peripheral housing schemes were pointed out and debated in Brazil (Pasternak Taschner, 1995:205). However, the military regime that took control through a coup in 1964 perpetuated the relocation of squatters, carrying these out in an authoritarian manner with the aid of security forces (Pasternak Taschner, 1995:205), while at the same time restricting political activity. Thus critics of such practices were confined to academic circles (Maricato, 1996:9). The new regime devised an institutional and financial housing and urban planning scheme, in which the National Housing Bank (BNH) provided mortgage funding for housing. The bank was financed through the workers' unemployment fund, which deducted 8% off all Brazilian employees' salaries (Bolaffi, 1992:100). The housing finance system, which promoted home-ownership, had the purpose of strengthening the construction industry, in order to provide employment (Pasternak Taschner, 1995:205). While close on 5 million housing units were constructed in the two decades that the system operated, this was far below its target. In addition, only a quarter of the units, representing no more than 8% of the Bank's investment, reaching the low income bracket. The remaining 92% was invested in housing for the wealthy (Bolaffi, 1992:102).

Towards the end of the first decade of military rule two changes in central government to some extent affected the situation of workers and informal settlement residents. Firstly, new housing programmes were initiated by the Housing Finance System of central government, one for the financing of serviced sites (PROFILURB) on newly developed land, and the other for the replacement of informal settlements by $75m^2$ plots with $25m^2$ core units (PROMORAR) - in South Africa this would be termed roll-over upgrading. However, the programme had little impact as it was ended in 1984. (Pasternak Taschner, 1995:206)

Secondly, new space was created for social movements. While the first decade of the military dictatorship (1964 to 1974) allowed no participation of society in the matters of the state, this was followed by a gradual opening of politics, which allowed space for the development of urban social movements (Maia, 1995:177, 178). A new labour union movement orchestrated massive workers' strikes. This was not supported by the mainstream opposition party. Therefore, when the formation of

new political parties was legalised in 1979, union leaders were convinced of the need for an autonomous workers' party. In 1980 the *Partido dos Trabalhadores* (PT- Workers' Party) was formed 'in an alliance with a number of other radical groups, including the "progressive" Catholic church, urban social movements, peasants' unions, leftist revolutionary groups of a variety of tendencies, human and civil rights activists, and radical intellectuals and politicians' (Abers, 1996:36). While the party imposes no particular formula, its key concepts are autonomous grassroots control and direct participation (ibid.:37).

By 1984 the economic crisis lead to a crisis in the National Housing Bank, reducing its effectiveness and, resulting in a further diversification of the housing system as alternatives had to be sought. In order to maintain an involvement in housing the Housing Finance System of the Central Government created a finance programme for self-help and mutual help (*mutirao*). From this period on, state and municipal governments started developing their own approaches to the housing and informal settlement situation, these including in-situ upgrading and mutual help.

Economic pressures in the early 1980s, with the foreign debt crisis in 1982, as well as pressure from the international community condemning military rule and from the increasingly mobilised citizenry, caused the transition into democracy, with the military rule ending in 1984 (Lawrence, 1991:53). As opposed to the earlier authoritarian and later differentiated programmes of the military regime, the federal government of the New Republic initiated clientelistic programmes through the Special Community Action Secretary (SEAC), in parallel to the National Housing Bank, which was increasingly running into debt and was disbanded in 1986 (Pasternak Taschner, 1995:206).

Federal government's role in housing intervention diminished as the political transition from the military dictatorship to democracy brought new powers to federated state and the municipal level. A programme of decentralisation was launched with the 1988 constitution, which gave significant autonomy and power to local governments - Brazil is widely recognised to be among the leaders in urban governance in the southern hemisphere. Municipal responsibilities are the provision of services, some in conjunction with state and central government and partly without intervention from the other tiers. Municipal funding is generated within the municipality, as well as through transfers from other tiers of government. (UNCHS (Habitat), 1996a:167).

Pasternak Taschner (1995:207) is critical of the lack of position of the Federal Government concerning informal settlement intervention, arguing that the new 1988 constitution 'made the federal government lose resources to unstructured states and municipalities, configurating an unsystematic way to transmit responsibilities.' However, Fernandes sees the particular relevance of the 1988 constitution to the informal settlement situation in its legal provisions for land regularisation and in the allocation of responsibilities. Fernandes (1993:220) summarises this as follows:

> 'There is no specific mention of the issue of favelas. However, the provision of housing was considered to be a matter of the common competence of the Federal Union, federated states and municipalities, which should all 'promote housing construction programmes and the improvements of the existing conditions of housing and basic sanitation'; it is also their constitutional duty 'to combat the causes of poverty and the factors of marginalisation, promoting the social integration of the less favoured sectors' (1988 Federal Constitution, art. 23, IX and X). Another important development was the approval, in the new Constitution, of the right of urban *usucapiao* [adverse possession] for those who occupy private (and never public) areas less then 250m^2 for five consecutive years.'

The municipal elections based on the 1988 constitution put a large number of left-oriented parties into power, with the PT (Workers' Party) winning over 40 municipalities, including important urban centres such as Sao Paulo and Porto Alegre (Bolaffi, 1992:110). In 1993 the PT won the municipal elections in Belo Horizonte where they introduced concepts of participatory governance, and in 1996 were superseded by a PT-aligned party committed to a continuity of policy. In the absence of clear federal government policy, the 1990s have seen an experimentation in the housing and informal settlement intervention field by the different tiers of government and by many municipalities, much of which is captured in the documentation of the Brazilian Best Practices for the Habitat II Conference (Bonduki, 1996).

A decade after the last federal government funding of informal settlement upgrading through the *PROMORAR* programme which was dissolved in 1984, federal government in 1995 resumed its responsibility in funding in-situ upgrading of favelas. The new programme, *Brazil Nosse Teto* (Brazil Our Home), consists of two project types, *Habitar Brazil* funded through the treasury of the Federal Union and PROMORADIA (Housing Programme) and PROSANEAMENTO (Sanitation Programme) funded through the *Caixa Economica Federal* (CEF - Federal Economic Fund) replacing the National Housing Bank, which was closed in 1986 - the CEF is also resourced through employees contributions to the unemployment fund. For the PROMORADIA programme the CEF funding from the federal government has to be matched by a minimum of 10% state funding (Teixeira Carvalho, pers. comm.).

In contrast to the National Housing Bank, which mainly financed loans to the wealthy sector, the CEF serves the poorer sector with incomes up to 12 minimum salaries (one minimum salary in 1997 being 120 Real/US$), whereas the richer sector is served by the Federal Government's Housing Finance System. While 95% of Brazil's housing deficit is in the income sector of up to 12 minimum salaries, 50% is in the poorest category of up to three minimum salaries. It is recognised that this sector is not able to make regular loan repayments, and can therefore not be served by the housing mortgage system of the CEF, which provides finance only for contractor production. A recent shift has been to address this sector of the housing demand through end-user credit (*Carta de Credito*), a concept that in 1997 was being negotiated by the trustee council of the national unemployment fund with particular interest from the Federation of Trade Unions (CUT - *Central Unica dos Trabalhadores*) (Olivio Miranda Oliviera, pers. comm.).

The CEF transfers funding to the federated states, where it is administered through state housing companies (created in 1991) charged with financing housing developments and since 1995 also upgrading of informal settlements. CEF funding is also transferred from states to municipalities, as in the case of the upgrading of the favela *Vila Senhor dos Pasos* through the Alvorada Programme of the Municipality of Belo Horizonte (Olivio Miranda Oliviera, Novara, pers. comm.). Two problems reduce the effectiveness of this system in impacting on the informal settlement situation. Firstly, the state housing companies are geared towards the financing of new housing estates and have no experience in the complex task of upgrading informal settlements (Teixeira Carvalho, pers. comm.). Secondly, the political differences between state and municipal governments often lead to the boycotting of municipalities by states. Thus municipal governments with programmes for upgrading, and in many instances experience in the field, are paralysed by delays in state funding (Olivio Miranda Oliviera, pers. com). Responses in Salvador have been that Universities work closely with the State Housing Company to evaluate the upgrading interventions and improve the approach (Teixeira Carvalho, pers. com). On the other hand, the Italian NGO AVSI, drawing on its upgrading experience in Belo Horizonte and more recently in Salvador, is developing a capacity building programme for officials of the state housing company (Michelini, pers. comm.). With the delay of state funding to municipalities, the response has been to secure funding from other sources. While the municipality of Salvador has no financial capacity to undertake informal settlement upgrading, the municipality of Belo Horizonte relies on 50% Italian funding for its upgrading programme 'Alvorada,' which is supported technically by the Italian NGO AVSI.

4.5 Conclusions

The Brazilian government's attitude to informal settlements has shifted considerably over the decades. In the 1960s and 1970s the belief was that informal settlements could be eradicated. In the mid-70s, government started working with informal settlements. However, its has only been since the mid-1990s that federal government has recognised informal settlements as permanent elements of the city and have started addressing this reality by financing upgrading programmes. For the first time, federal policy recognises that upgrading makes a major contribution to the low income housing stock, thus recognising the efforts of the poor in housing themselves (Michelini, pers. comm.). This progression in government attitude is of relevance to South Africa, where national government appears to be following this trend. In addition to this important fact, however, is a more important lesson for the longer term. For the result of the changes described above mean that Brazil now has a wealth of experience in developing approaches to informal settlement upgrading at the state and local authority level, that is most relevant to the informal settlement situation in South Africa. This report now moves to what is considered to be the most important and most relevant of these experiences, namely the upgrading methodology developed in the municipality of Belo Horizonte.

5. THE BELO HORIZONTE EXPERIENCE OF FAVELA UPGRADING

5.1 The development of favela intervention in Belo Horizonte

A review of the history of favela intervention in Belo Horizonte gives some indication of the various factors and relationships on which the development and successful adoption of an informal settlement upgrading approach depend. In a society with very high levels of inequality, the demands of squatters are situated in an arena of intense conflict in class interests. The Belo Horizonte case illustrates that organised demand of those excluded from legal housing can place a major threat to the status quo. However, the elite in Belo Horizonte has managed to remain largely unchallenged, as various strategies have ensured slow progress in both the development of solutions and in their implementation. It is in this context that the role of international co-operation in the advancing of approaches or methodologies, and in the funding of implementation, must be understood, as it too is limited by the dynamics of the local class struggle reflected in the relationship between government and organised disenfranchised society.

Belo Horizonte is a metropolitan region of 3.5 million inhabitants, which was founded in 1897 as a political capital for the State of Minas Gerais, and as an economic centre. The urban growth of the city reflected the broader situation in Brazil, with:

> 'intense migration; restricted conditions of access to land and housing; high costs of housing production and of urban services, aggravated even further by inflation; unequal (and unfair patterns of income distribution; real property treated as exchange value; extensive hoarding of idle land; and an intense speculation process' (Fernandes, 1992:213).

Belo Horizonte's first favelas date back to the city's initial construction. As workers' housing was not provided for, the builders of the city housed themselves in the proximity of the building sites. Public authorities' response was the eradication of favelas and the expulsion of the inhabitants to the city's periphery. Within the first decade of the city's existence, the people of the periphery had organised in protest to their expulsion. This mobilisation intensified in the 1930s. However, after extensive expansion of the city's favelas with the industrialisation of the city and associated rural-urban migration, the favela movement was repressed in 1945. In the early 1960s the favela movement again became active in resisting expulsion, with its protest actions including the planned overnight invasion of land. However, as from 1964 the military dictatorship strongly repressed popular movements. The Municipality continued its policy of relocation, first through its Department of Housing and Popular Neighbourhoods (DBP - *Departemento Municipal de Habitacao e Bairros Populares*), and as from 1971 through the Co-ordination of Housing of Social Interest (CHISBEL - *Coordenacao de Habitacao de Interesse Social de Belo Horizonte*) (Afonzo, de Azevedo, 1987).

In 1974 the Catholic Church in Belo Horizonte created the Pastoral de Favelas, extending its network of Ecclesiastic Base Communities into favelas and providing structured space for debate on the situation in the favelas (Father Bernareggi, pers. comm.). This new initiative attracted favela leaders, giving them a secure and socially legitimate space, thus pulling the favela movement out of isolation. The Pastoral de Favelas worked closely with the Union of Workers of the Periphery (UTP - *Uniao de Trabalhadores da Periferia*). However, a division gradually developed, with the Pastoral de Favelas focusing on the question of the right to ownership of land in Favelas, while the UTP responded to more immediate demands associated with removals, such as the struggle for better compensation. Within the Pastoral de Favelas the debate was over its dual role of, firstly, unifying the struggle, and secondly, providing moral and religious formation, particularly of leaders, through the structured reflection of the problems (Afonzo, de Azevedo, 1987).

The late 1970s saw a strong growth in resident associations. This is ascribed to both the worsening conditions in favelas as well as the political opening allowing a new relationship between government and citizens. The security of living conditions in favelas were affected by the continued threat of removals by the municipality (CHSIBEL) and by physical risk associated to damages caused by heavy flooding. The political opening resulted in support for community associations, both from politicians, for

whom they presented a vehicle for making themselves known and to lobby for support, and from state programmes that laid increasing emphasis on participatory approaches (Afonzo, de Azevedo, 1987).

In 1979 the first favela upgrading programme for Belo Horizonte was initiated with the state of Minas Gerais creating a Community Development Programme (PRODECOM - *Programa de Desenvolvimento de Comunidades*). The programme, which involved the municipality, encompassed progressive principles such as support to small local initiatives, harnessing the labour of beneficiaries and giving a central role to community associations. However, various limitations led to a minimal effectiveness of the programme. Firstly, it avoided the question of land regularisation, prioritising on physical improvements; secondly, the infrastructure that was installed was of a low quality; thirdly, implementation was limited to a few show-case projects, and fourthly, ambiguity in policy remained as the municipality continued with removals through CHISBEL (Afonzo, de Azevedo, 1987). Fernandes (1993:217) summarises that

> 'Despite having secured some concrete gains for the favela population in terms of urbanisation (upgrading) works, PRODECOM was turned into the object of a very complex political struggle involving diverging progressive political forces, and was eventually abandoned after almost four years, when a newly elected democratic government took office in Minas Gerais.'

One criticism of the programme by left wing and intellectual circles and the influential Pastoral de Favelas was that it distracted attention from the fundamental demand that property rights be recognised where land was illegally occupied (Fernandes, 1993:218). The Pastoral de Favelas and resident associations together asserted pressure around the issue of land ownership (Afonzo, de Azevedo, 1987).

5.1.1 Introduction of the PROFAVELA Law

In 1983 the pressure from civil society, in association with unique personal and political circumstances led to the passing of the Municipal Law for the Regularisation of Favelas (PROFAVELA - *Programa Municipal de Regularisacao de Favelas*), the first law in Brazil that recognised favela residents' rights to ownership of the land they occupied. The favela movement's victory on the issue of legal rights to land seems surprising in the political climate of the military dictatorship, albeit towards the end of its rule. However, it was the transitory climate, in combination with favourable personal circumstances that allowed for the passing of the law. In 1982 the mayor of Belo Horizonte was moved to the Federal Chamber, and his nominated substitute confided in a highly acclaimed architect, experienced in popular housing, who was a friend and relative of the new mayor, as well as being technical assessor to the Pastoral de Favelas, thus participating in their congresses and meetings where the debate on upgrading and legalisation of favelas was being advanced (Father Bernareggi, pers. comm.). With the support of the Pastoral de Favelas and the sympathy of the mayor, the architect succeeded in presenting to the mayor the proposal for the PROFAVELA Law. As the military dictatorship was coming to an end, with elections in sight, the governing party did not want to loose popular support to opposition parties. As there was significant popular support for the proposed law, it was passed with practically no resistance (Afonzo, de Azevedo, 1987). The contents of the PROFAVELA Law are summarised in the box on the following page.

The passing of the PROFAVELA Law reflected 'internal contradictions in the complex state apparatus' (Fernandes, 1993:218). Father Bernareggi, co-ordinator of the Pastoral de Favelas in the fastest growing Region of Belo Horizonte, summarises the irony of the situation: 'And so, in dictatorship style, through the mechanisms of the dictatorship, the movement of favelados obtained a law that is democratic' (Father Bernareggi, pers. comm.). Afonzo and de Azevedo argue that it can be assumed that the legislature did not have a clear understanding of the power of such a legal instrument. They considered it at the most to be a law of a social nature, which, as was common in Brazil, would not be carried out (Afonzo, de Azevedo, 1987:127). While the law was passed without debate, Michelini (Pers. comm.) recalls some discussion around the law with opposition voiced both from the Left and the Right. The political Right, representing wealthy landowners, feared that the law would encourage new invasions, while the Left feared that individual land ownership would encourage middle class values and would reduce the likelihood of political mobilisation of the favela population. However, the favela movement's demand for individual ownership of occupied plots was practical, resulting from the societal aspiration of inheriting property from one generation to the next (Michelini, pers. comm.). Another interpretation is that the demand for property rights is a demand for the integration 'into "normal" life and ... into the heart of the rest of the population' (Bonnefoy, 1989:74 quoted in Fernandes, 1993:229,230), also

implying an integration 'into the market society' (Afonso and de Azevedo, 1987:136, quoted in Fernandes, 1993:229).

The PROFAVELA Law

The PROFAVELA Law applies to 'densely occupied favelas with economically needy populations that existed up until the date of the aerial photography survey of 10 September 1981' [updated in 1996 (Bede, pers. comm.)]. These areas are assigned Special Sector 4 zoning [now referred to as ZEIS (*Zonas Especiais de Interesse Especial - Special Zones of Social Interest*) 1 and 3 (Bede, pers. comm.)], which recognises, where possible, the characteristics of spontaneous occupation. They are therefore excluded from the general norms applying throughout the municipality. Instead, they are subject to specific norms issued by decree, together with the approved spatial plan. The areas are exempted from taxes and contributions for upgrading for a period of 5 years. Ownership of the regularised plots may be directly transferred to the occupants.

Summary of the measures included in the law:

- Topographical survey of the perimeter of all areas to be included in the Special Sector 4 Zoning and inclusion in the zoning by decree.
- Demarcation of the road system in all areas in the Special Sector 4, as a base for the layout plan, ensuring that this takes cognisance of the local characteristics.
- Approval of the layout plan with norms for land use and occupation directing future development in the area - these norms are defined, taking into consideration the needs expressed through representatives of the local residents (in order to avoid speculation, changes in land use from the existing pattern are only permitted within the parameters of the approved land use of the area).
- Land regularisation, with the objective of issuing titles to the occupants of the plots, as per the approved layout plan.
- Initiation and co-ordination of means of improving the living conditions of the residents and their integration into the life and benefits of the city.

Plot layout

- The standard plot of the area is the plot size most frequently occurring in the area and is calculated for each favela.
- For the sake of equity, the largest plot to be titled will have twice the size of the standard plot, with a maximum of $360m^2$ [currently being reduced to $250m^2$, due to increasing pressure for land within the municipality (Bede, pers. comm.)].

Official survey of the residents

- The survey of residents serves as a reference in the titling of the plots, ensuring that the beneficiaries are economically needy - this is defined in proportion to the average income of the local population.
- Each occupant is issued no more than one plot with residential or mixed land use. A second plot is permitted only where this has a non-residential function and economically sustains the family.

Methodology for the layout planning

In order to be approved, the layout plan must include all technical data to ensure that the boundaries of the plots can be easily established on the ground. In addition, the plan must indicate all spatial references required for the planning of the service layout and implementation.

Source: Prefeitura Municipal de Belo Horizonte, 1985

As government had passed the law out of political opportunism rather than a belief in its inherent principles, its implementation depended on continued pressure from the favela movement. The Pastoral de Favelas developed a ten-year target through which approximately ten favela legalisations a year would reach the then 120 favelas in the municipality. Gradually, with continued pressure from the Pastoral de Favelas and the UTP, which now converged in their priorities around regularisation, the Municipal Secretary of Social Action (SMAC - *Secretaria Municipal de Acao Comunitaria*) started implementing the PROFAVELA Law as its main programme. However, implementation was slow, the municipality placing blame on complicated bureaucratic procedures and problems of co-ordination between municipal departments (Afonzo, de Azevedo, 1987).

Further problems with the implementation of the first upgrading projects were associated to a lack of experience in favela intervention. This expressed itself in a poor approach, whereby land regularisation or the titling of land was isolated from spatial re-planning and provision of infrastructure. Thus a settlement was surveyed, and titles were issued to those plots qualifying according to minimum standards of safety specified in the PROFAVELA Law. Plots displaying high levels of risk, such as slopes greater than 40 degrees, were left unregularised (Bede, pers. comm.). The lack of spatial re-planning therefore had the result that, firstly, some resident's in favelas remained in illegal occupation of their land, and secondly, unsuitable land subdivisions were frozen in the new cadastre. In an extreme case, title was granted to a $7m^2$ plot adjacent to one more than 50 times its size (Bede, 1995:247). The formalising of inappropriate layouts had the further consequence that in some cases roads and open spaces were invaded subsequent to regularisation. Even where this had not occurred, official boundaries had to be readjusted when service lines were installed (Bede, pers. comm.)

5.1.2 AVSI-URBEL partnership

The favela movement continued to address the challenges of implementing the PROFAVELA Law. Two practical responses were significant in overcoming the implementation obstacles. Firstly, identifying a lack of technical capacity, the Catholic Church, through the Pastoral de Favelas, invited the Voluntary Association for International Service (AVSI - *Associazione Voluntari per il Servizio Internazionale*) to give technical support to the upgrading in Belo Horizonte (Father Bernareggi, pers. comm.). Initially, this comprised the introduction to Brazil of computerised surveying techniques (with the computerised theodolite 'Total Station'), and later the advancement of the intervention approach. Secondly, by the mid 1980s UTP, with the support of the Pastoral de Favelas and the new and broader Federation of Resident Associations of Neighbourhoods Suburbs and Favelas of Belo Horizonte (FAMOBH), responded to the municipality's problem with bureaucratic procedures by proposing the creation of a separate public body specifically charged with the implementation of the PROFAVELA Law (Afonzo, de Azevedo, 1987:134). This proposal was implemented through the creation of the Upgrading Company of Belo Horizonte (URBEL - *Companhia Urbanizadora de Belo Horizonte*) in 1985 out of the municipal mining and housing company FEROBEL, which was founded in 1961 (Valdares and Procopio de Alvarenga, pers. comm.). Father Bernareggi Coordinator of the Pastoral de Favelas recalls:

> 'So URBEL was created, and to give support to URBEL we called AVSI from Italy, which had all the technical conditions and a certain liberty, being an NGO. ... So the scheme was such, that one would work together, AVSI as NGO linked to the popular movement, so that AVSI would be the technical expression of the popular movement of the favelados. And with URBEL, which is the necessary government support, we would produce ten legalisations a year' (Father Bernareggi, pers. comm.).

Implementation of the PROFAVELA Law now depended on the functioning of the triangle: *Government - organised civil society - NGO*. However, the favela movement received a severe blow in 1986 with an order, by the auxiliary Bishop of Belo Horizonte, for the disbanding of the Pastoral de Favelas (Father Bernareggi, pers. comm.). As the city was being divided into regions, the request from the Bishop was that the city-wide Pastoral de Favelas be dismantled and recreated in each region. As it was evident that none of the regions had the capacity to maintain the structure of the Pastoral de Favelas, the order was interpreted as purposefully destroying what had become a significant threat to the land speculating class from which the bishop originated. The result of the order was that in most parishes the ecclesiastic base communities were no longer sustained by the church, and instead were invaded by political parties (Father Bernareggi, pers. comm.). The coordinator of the Pastoral de Favelas, who has since struggled, unsuccessfully, for the reinstatement of the Pastoral de Favelas, described the consequences of the order of the Bishop as follows:

> 'A favela community was abandoned by the church and the leaders were co-opted by political parties. They all became party members. A few of them, the more important leaders, were invited by the government to participate in the government, creating URBEL for example. ... Those people that were no longer being sustained by the Pastoral de Favelas, then in URBEL as managers ... were earning good money, and as a result, the movement of the favelas practically was obliged to die and has already died. ... And we no longer have access to these communities. Who has access there are the governors with money, or the political parties of the extreme Left. ... that ideology with not a single Christian perspective. And that does not sustain. That does not give support for a big popular complement .... the great popular movement of the Favelas of Belo Horizonte today is dead' (Father Bernareggi, pers. comm.).

Thus the struggle for regularisation and upgrading in Belo Horizonte has been subject to societal contradictions. The state on the one hand passed the PROFAVELA Law, yet on the other hand lacks political will for its implementation. The Catholic church, also serving conflicting class interests, further impedes the implementation of the law by weakening the popular movement. Fernandes argues that under these conditions the PROFAVELA Law itself has a contradicting outcome:

> '... in view of the political unwillingness of the state to implement the legislation, and the lack of strength of the most interested social groups to enforce its implementation, the law can very easily become a powerful ideological instrument. Thus, it contributes contradictorily, but dialectically, to both the neutralising of social pressures and the legitimation of state action' (Fernandes, 1993:229).

The weakening of the favela movement after the establishment of the municipal Upgrading Company URBEL meant a turning point in favela upgrading, which was no longer controlled by popular demand. AVSI's role shifted from one of giving technical support to the favela movement to giving technical support to the public authorities. New developments in the upgrading intervention were in the advancement of technology. While the German aid organisation GTZ developed more appropriate infrastructure standards, thus focusing on physical upgrading, the NGO AVSI, searched for more effective means for implementing land regularisation. Michelini (pers. comm.) explained that Brazil, at the time, did not allow the import of computer software. However, as the law was more lenient on import of software for academic purposes, an agreement was made with the Catholic University in Belo Horizonte. The university would use the software in a postgraduate course that was addressing favela upgrading, and through extension work included in the course, the students would apply the software in actual upgrading projects. Thus the GEODAT system (a computerised theodolite working on a CAD platform) was introduced to Brazil, significantly increasing capacity for implementing the PROFAVELA Law.

AVSI's role of technical support developed a new arm through a research initiative towards improving the upgrading approach. For this purpose, AVSI was able to tap into resources and experience in Italy. Realising that the structure of favelas had more in common with historic Italian towns than with urban environments created in the 20th century, AVSI saw relevance in the way these historical towns were upgraded to accommodate 20th century services. Thus research links were established with the Italian University of Bologna, which had developed GIS (Geographical Information Systems) applications in the upgrading of historical centres in Italy (Michelini, pers. comm.).

The exploration of GIS for favela upgrading at the University of Bologna coincided in with the development of the ViSP (Visual Settlement Planning) approach by UNCHS (Habitat), through a team of technicians from Italy and Finland. While AVSI and the University of Bologna were adhering to a traditional methodology with a field survey to capture physical data, Habitat were developing a methodology for low resolution data capturing through low altitude aerial photography with very basic camera equipment. Application of this rapid data capturing or surveying approach was in emergency situations such as landslides, to facilitate immediate intervention. The Finish technician presented the ViSP approach at the University of Bologna in 1991, and Bologna University proceeded to combine the ViSP and GIS technologies. While data captured through the ViSP approach (aerial photographs geo-referenced through ground control points) was not accurate enough for the legalisation process in favelas, its contribution was that it enabled the understanding of the settlement structure at a low cost and in a relatively short time. This allowed for broad decision-making on the intervention (termed '*plano global*' and for the purposes of this report 'general planning') thus enabling planning, prioritising and budgeting of the intervention (Muzzarelli, pers. comm.).

During this period land regularisation and physical intervention continued to be carried out in isolation of one another. Due to URBEL's low operating budget, AVSI's main partner in upgrading was the state of Minas Gerais. Emphasis of the state-funded intervention was on physical upgrading of infrastructure, therefore, with a strong engineering bias (Novara, pers. comm.). However, AVSI maintained a close relationship with URBEL, assisting with the implementation of the PROFAVELA Law. Between 1989 and 1992 a total of 5 147 titles were issued in 20 favelas (Bede, pers. comm.). However, this occurred in isolation from infrastructure upgrading.

5.1.3 The role of the PT in favela intervention in Belo Horizonte

A new turning point in the scope for upgrading resulted from the municipal elections in 1993, which brought the progressive Workers' Party (PT - *Partido dos Trabalhadores*) into power. Three aspects of

the Workers' Party governance gave new direction to favela intervention in Belo Horizonte. Firstly, the Workers' Party had experience in favela upgrading in other municipalities it had governed, such as Sao Paulo, from 1990 to 1992, and Santo Andre (also in the metropolitan region of Sao Paulo). The favela intervention approach that had been developed under Workers' Party governance, with assistance from the development consultancy Diagonal, integrated the socio-organisational, legal and physical/environmental components of the intervention into an interdisciplinary approach. This methodology, which brings together the legal, sociological, urbanist/architectural and engineering professions, as well as relying heavily on the involvement of social workers (*'acomanhamento social* - social attendance), was transferred to Belo Horizonte and further developed through GIS support from AVSI (Bede, pers. comm.).

Secondly, the Workers' Party gave greater priority to the implementation of the PROFAVELA Law. Therefore, URBEL received more resources than in the previous years and was now in a position to articulate an upgrading programme. This enabled AVSI to work in a closer relationship with URBEL. The AVSI-URBEL partnership led to the elaboration of the Alvorada Programme (see Chapter 6), a pilot project implementing the integrated upgrading methodology, and funded in part by the Italian government through AVSI and in part through municipal and state funding (Novara, pers. comm.).

Thirdly, the concept of participatory governance of the Workers' Party gave a new role to organised civil society. Themes that the party ascribes to are 'decentralisation of power, government accountability to autonomous social movements, and a reversal of priorities away from elite groups toward the poor and disadvantaged' (Abers, 1996:37,38). While the emphasis in the execution of local programmes, such as the integrated upgrading of favelas, is on citizen involvement and control, the Workers' Party also encourages citizen participation

> '... in *decision-making* about how government spending should be allocated and the kind of programs that should be implemented. ... the PT has made the transformation of budget policy one of its central local government objectives because the manipulation of city spending has historically been the backbone of local clientelistic structures' (Abers, 1996: 36,39).

The new relationship between URBEL and AVSI enabled the elaboration of a programme for favela upgrading, with 50% Italian funding through AVSI, matched by an equal amount from the municipality through URBEL. Named the *Programma Alvorada* ('Dawn' Programme), this initiative was targeted at 6 favelas as a pilot intervention, pioneering the GIS supported approach and encompassing a significant shift from an engineering focus to recognising the favela as an issue of urbanism (Novara, pers. comm.).

Though recognised as a successful approach, implementation of the Alvorada Programme has been extremely slow. A discussion of the methodology, as well as its evaluation by role players, follows in greater detail in the next section. At this stage, and in conclusion to the historical development of upgrading intervention in Belo Horizonte, it is relevant to point out that the triangular relationship between a) civil society, in this case represented by the favela movement, b) the municipality, represented by URBEL, and c) the NGO AVSI, has shifted since the mid 1980s when AVSI first arrived. At that stage the favela movement was in a position of control, with AVSI, as well as URBEL, serving its demands. Currently, in the absence of a strong and unified favela movement, control is placed in the hands of URBEL, with AVSI, though providing support to URBEL, independently pushing for certain directions and asserting pressure for implementation. The NGO is able to do so due to its access to international donor funding and conditions that donors can attach to these, as well as its close relationship to the UNCHS and its resulting presence in international debates.

The future of the "AVSI-URBEL-civil society" relationship depends on the one hand on the political continuity at the municipal level, and on the other hand on the favela movement. A new dynamic in the mobilisation of favela residents occurred in January of 1997, when the Movement of the Landless (*Movimento do Sem Terra*), which has orchestrated extensive invasions of rural land, extended its activities into urban areas, as the Movement of the Homeless (*Movimento do Sem Teto*) (Bernareggi, pers. comm.). Favela mobilisation has also increased in response to municipal policies, discussed in the following section, which require the active participation of organised residents in decision-making. It remains to be seen whether these initiatives, as well as the continuing endeavours to have the Pastoral de Favelas reinstated, will lead to a unified movement with sufficient power to take effective control over the favela intervention process.

5.2 Current informal settlement situation and conditions

The metropolitan region of Belo Horizonte, which comprises 582 400 ha, is made up of 20 municipalities. The central municipality of Belo Horizonte, which is made up of 9 regions, comprises 33 500 ha, with a population of approximately 2,1M people at a gross density of 60.3 people per hectare. Municipal data further indicate that the municipality's 139 favelas with total of 337 000 inhabitants house 17% of the municipality's population, though only occupying 2.7% of the total area. Compared to the gross density of 60.3 people per hectare for the municipality, the favelas have an average density of over 400 people per hectare. Most housing studies group favelas together with 'housing groups' (*conjuntos habitacionais*) which, though created by the public authorities, display similar characteristics as favelas, also requiring intervention in the form of land regularisation and upgrading of infrastructure and basic services. With the 21 housing groups added to the favelas, the combined population comprises 21% of the city's inhabitants (Prefeitura Municipal, 1995:103,105).

The favelas of Belo Horizonte are spread evenly across the urban fabric. Maps indicating the location of favelas at different stages of the growth of the city illustrate that the production of favelas has always occurred simultaneously to the development of the formal city, resulting in the relatively even distribution of favelas (Capanni, 1989). However, favela sizes vary considerably, with the seven largest favelas accommodating 60% of the favela population (Fernandes, 1993:223). With regards to the legal property of the occupied areas, approximately 50% of the favela dwellers occupy privately owned land (*ibid.*:219). While much of the privately owned invaded land allegedly belongs to a single company, there is uncertainty over the ownership situation of much of the land (*ibid.*:226).

The municipality's population growth rate between 1980 and 1991 was 1.2%, with a growth rate in dwellings of 2.5%. The higher growth rate in dwellings is ascribed to the drop in household size from 4.6 in 1980 to 4.0 in 1991, a trend which is common throughout Brazil, as mentioned in Chapter 4. The population growth rate is not uniform throughout the city. The region Venda Nova has the highest population growth rate, namely 3.6%, between 1980 and 1991. With the lowest land prices, this region functions as reception area of new migrants. However, most in-migration to the city is accommodated in the surrounding peripheral municipalities, where the equivalent growth rates have been as high as 7.9% (Santa Luzia and Ibirité) (Prefeitura Municipal, 1995:70). These are referred to as dormitory municipalities (Valdares and Procopio de Alvarenga, pers. comm.).

Favelas have mainly occupied land that was avoided by formal development due to unsuitable conditions. Primarily these consist of steep slopes, which are often associated with the risk of land slides after heavy rain - the occupation of such land, resulting in the removal of vegetation, construction at the foot and top of steep slopes, and disposal of refuse on slopes exacerbates the slope instability. In the occupation and consolidation process, natural drainage channels have taken on the function of open sewers and drains.

Living conditions within a settlement are differentiated according to the geomorphology and associated suitability for occupation. Invasion commences in the more accessible areas, on less steep slopes and away from open drainage channels. These areas usually display better living conditions, with larger plot sizes and due to the longer duration of occupation, a higher degree of consolidation of buildings. Due to relative accessibility to surrounding service networks dwellings have often benefited from ad hoc extension of services by public authorities. The longer occupation of these residents in the city also results in the households having secured higher incomes. In contrast, poorer living conditions are concentrated in the low-lying areas close to drainage channels, which are invaded only as pressure increases. Densities are higher, with narrow access routes and minimal plots, often only comprising the footprint of the dwelling. Poor lighting and ventilation is exacerbated by vertical consolidation with up to three storeys. Due to obstructions such as drainage channels and almost vertical slopes, access is restricted to cul de sacs. Proximity to the open sewers and drainage channels which mostly double up as pathways, results in health risks, as well as risk of flooding.

Socio-economic conditions in favelas are distributed according to the differentiation described above, with economically weaker households living in areas of higher densities and associated poor conditions. According to a recent survey of the favela Vila Senhor dos Passos, 63% of poor households were concentrated in the low lying area. These households were earning up to 3 minimum salaries (one minimum salary = 120 reals). The following data from the recent survey of the settlement Vila Senhor

dos Passos reflect socio-economic conditions in Belo Horizonte's favelas. The income of 21.3% of households lies between 0 and 1 minimum salary; 38.6% of households have an income between 1-3 minimum salaries; 18.6% households have an income of 3-5 minimum salaries and only 21.5% have an income above 5 minimum salaries. About 47% of household heads are regularly employed, 2% are employers, 14% autonomous, 15% on pension and 22% working in their own households (of these 9.8% indicated that they were unemployed). Household sizes varied from 1 to more than 10 people with an average household size of 3.9. Common household sizes are between 2 and 5, with 57% of households headed by women (URBEL, 1995).

Favela dwellings in Belo Horizonte are mainly constructed of masonry. This is assigned to the relative strength of the favela movement, particularly in the late 1970s and early 1980s, when it procured significant security for the favela population (Bede, pers. comm.). Light-weight brick with reinforced concrete beams is a popularised building technology. However, construction is often poor, resulting in precarious structures, particularly where densities are high.

Access to basic services is generally individual rather than communal. Water lines are informally extended into the settlements, allowing for individual water-borne sanitation. However, sewerage is disposed of into natural drainage courses that function as open sewers. As the plumbing is installed informally at minimum cost and consumption is not charged for, leakage and wastage is high (in some cases water runs continuously, as no taps are installed). This comprises a considerable cost to the official water suppliers, who for this reason have been motivated, at times, to officially extend their networks into favelas. The same situation applies for the provision of electricity (Michelini, pers. comm.). However, levels of official infrastructure and basic services vary considerably across favelas. The two cases described below illustrate the range of processes settlements have undergone in procuring infrastructure and basic services.

Two case studies depicting processes of infrastructure upgrading

1. Vila Sao Tomas:
28 hectare, 2 000 households
71 families/ha, 254 people/ha
The favela Vila Sao Tomas has been gradually settled since the 1950s. Some families were expelled with continuing threats for removals. Ad hoc service provision started in 1975 with electricity lines installed along the official streets bordering the settlement. With renewed threats for removal in 1980, the local population organised into a resident's association. The settlement successfully resisted removal and gradually procured further upgrading intervention. In 1983 water was installed along some streets, followed by a pre-school and electric lighting in alleys. In 1986 URBEL installed sewerage and drainage and commenced with the paving of alleys. A bus line was introduced to serve the area and communal shed or hall constructed. In 1991 URBEL undertook further drainage works, and in 1993 the community organisation procured upgrading finance from the municipality's participatory budget. This was assigned to the improvement of living conditions in the low-lying area where densities are highest - 90 households occupy an average of $50m^2$ each.
Source: URBEL, 1994

2. Vila Senhor dos Passos:
12.6 hectare, 980 households
78 families/ha, 302 people/ha
The favela Vila Senhor dos Passos, located near the city centre, was occupied as early as 1914. 20% of the settlement occupied privately owned land. The official landowners never undertook to remove the invaders, thus the occupation has been relatively peaceful. In 1980 the settlement was subject to upgrading intervention through PRODECOM. This comprised the supply of water, laying of sewers, paving of streets and alleys, construction of stairways and installation of some lamp posts. However, no maintenance programme was in place, therefore the infrastructure, which was of a low standard, deteriorated rapidly. Negative experience with the PRODECOM intervention led to suspicion among the residents of public authorities. This was compounded by the lack of a unified community organisation, the two rival organisations having little support from residents. Only in 1994 a new community movement was initiated in order to partake in the participatory budget allocation of the municipality. In the same year, the settlement was chosen for integrated intervention (land regularisation, physical upgrading and organisational capacity-building) through URBEL's pilot project 'Alvorada'. In 1996 the spatial layout and land sub-division of the first phase (276 plots) was approved by municipal decree and by mid 1997 titles had been issued to 92 plots. The spatial plan for the first phase required the relocation of 20 households (7.2%), these being housed in temporary $14m^2$ units in a nearby cul de sac, awaiting the completion of flats within the settlement. Comprehensive infrastructure upgrading was underway in the first phase.
Source: URBEL, 1995

Fernandes (1993:223) argues that, despite delays in government intervention, living conditions in the favelas of Belo Horizonte have been improved to a far greater extent than those of the peripheral poor, living in 'irregular' or 'clandestine' land subdivisions. The favela improvements are ascribed to a significant extent to 'technical and financial co-operation of foreign agencies and governments, particularly from Italy and Germany.'

5.3 Local government and housing intervention

The Municipality of Belo Horizonte is divided into 9 regions, so as to form a decentralised structure for the provision of services. Each region is under the responsibility of a regional administrator, appointed by the municipal authority (Paixao Bretas, 1996:213).

5.3.1 Housing responsibilities in the municipal government

The responsibilities for housing in the Municipality of Belo Horizonte are spread across three entities, the Municipal Council for Housing (CMH - *Conselho Municipal de Habitacao*), the Municipal Fund for Popular Housing (FMHP - *Fundo Municipal de Habitacao Popular*), and the Upgrading Company of Belo Horizonte (URBEL).

- The council (CMH), on which are represented popular movements, syndicates, business representatives, tertiary education institutions, representatives of the legislative and executive authorities of the municipality and the Municipal Secretary of Planning, makes decisions on housing policies, plans and projects, as well as inspecting and approving funding applications.
- The fund (FMHP) finances the implementation of programmes and projects directed at households with an income of up to 5 minimum salaries. These comprise the upgrading of favelas, the construction of housing units and the purchase of land for low cost housing programmes. The source of municipal housing finance is from federal and state and municipal government, as well as other sources.
- The housing company (URBEL) executes the municipal housing policy and manages the Municipal Housing Fund, as well as proposing policies, plans, programmes and norms to the Municipal Housing Council [URBEL is a mixed economy enterprise with 98% municipal and 2% private shares (Valdares and Procopio de Alvarenga, pers. comm.)].

The municipal housing policy defines two areas of intervention. Firstly, intervention in existing settlements, including favelas. This intervention is either comprehensive and integrated, or selective, addressing a particular problem. Secondly, production of new housing. This comprises either the purchase and servicing of land, the purchase of serviced sites, or the construction of housing units (Prefeitura Popular de Belo Horizonte, 1993, Rodrigues Medeiros, 1996).

5.3.2 Principles embodied in the municipal housing policy

The Municipal housing policy is based on a process of urban reform, central to which are the concepts of 'dignified housing' and 'right to the city'. This is embodied in a democratic process, which gives priority to collective demand, while also enabling the generation of income. In terms of intervention methodology, emphasis is placed on popular participation and integrated activities (URBEL, 1996b:8,9).

The priority given to collective demand translates into two significant aspects of the municipal housing policy. Firstly the participatory budget allocation process (*Orcamento Participativo*) and, secondly, the management options for the implementation of housing intervention. These will be briefly discussed.

5.3.3 Participatory budget allocation process

The participatory budget allocation process, which takes place in each of the municipality's nine regions, requires the participation of citizens in the decision-making over resource allocation. This occurs yearly through a series of meetings between local government and organised civil society, in which resource claims are voiced, and decisions made over intervention priorities. Thus the housing demand is channelled into a collective process where popular organisations compete in defining priorities.

The purpose of a decentralised budget allocation process, which has been implemented by many PT governed municipal administrations across Brazil, is to encourage citizens to participate in local government decision making, thus establishing people's control over state resources. Through the process, which entails considerable publicity through the media, as well as seminars and meetings,

dialogue is enabled between government and civil society, while also ensuring a transparent administration (Paixao Bretas, 1996). By assigning responsibility to organised civil society, the process contributes to the development of the popular movement (URBEL, 1995). The relationship between civil society and government is no longer confrontational, as was required by previous systems. Instead it takes the form of a partnership.

The participatory budget of the Municipality of Belo Horizonte has two components, public works (streets, paving, drainage, schools, health, refuse) and housing. The budget is distributed to the municipality's nine regions, according to the size of the population and the average income. The experience has been that participation from poor communities is higher than from the wealthy (Valdares and Procopio de Alvarenga, pers. comm.).

5.3.4 Choice in management structures for housing intervention

URBEL operates on three forms of implementation management, varying in degree of beneficiary involvement. By making available these options in management structures, UBREL, in accordance with its political philosophy, enables the decentralisation of housing production where this is desired (URBEL, 1995). Entry into housing is through housing associations or movements, which participate in the budgetary allocation process and, once they have secured funding, are involved in the decision-making over the choice of management approach for the housing production (Valdares and Procopio de Alvarenga, pers. comm.). The three forms of management are as follows:

- Public management, whereby the beneficiary takes possession of a completed housing product.
- Co-management, whereby URBEL supplies construction material and technical assessment and the organised beneficiaries construct the housing.
- Self-management, whereby the organisers of the popular movement (the organised beneficiary group) manage the entire production process. (URBEL, 1995).

While bureaucratic procedures for co- and self-management have been defined (and are operating) for the production of new housing, favela intervention (upgrading) at this stage operates only through public management. URBEL is currently considering co- and self-management in the upgrading of favelas, as one way of reducing implementation costs (Ferreira Jacinto, pers. comm.). It would also appear that decentralised management structures for favela intervention would be in line with the current policy direction that increasingly relies on organised initiative of the favela residents for resource allocation through the participatory budget process.

5.4 Informal settlement intervention

Since the passing of the PROVAFELA Law (Legislation for the Favela Regularisation Programme) in 1984, policy towards favelas in Belo Horizonte has unambiguously departed from removals and relocations. The single policy applying is that of transforming favelas into adequate housing areas, integrating them into the formal fabric of the city. While the city's land use zoning previously did not recognise the existence of favelas, classifying them mainly as areas of conservation of vegetation (Fernandes, 1993:220), the PROFAVELA Law included them into the zoning by introducing a special zone. Cut-off date for the inclusion in this zone was the 1981 aerial photography. However, the zoning was updated in 1996 with new favelas and recent extensions to existing favelas being incorporated into the special zoning (Bede, pers. com).

URBEL's intervention in favelas is structured into two programmes. Firstly, the Structural Programme for Areas of Risk focuses on eliminating geological or geotechnical risk and is directed at all favelas in the municipality. Secondly, the Alvorada Programme is focused on integrated comprehensive intervention and is directed at three favelas in the city in the form of a pilot project. In addition to these two programmes, URBEL carries out land regularisation in favelas across the city. The Alvorada Programme, which is limited to a selected group of favelas, is thus situated within a municipal structure that intervenes in all favelas. While the methodology of the Alvorada Programme is covered in detail in the following section, a brief review of the three areas of intervention follows.

5.4.1 The structural programme for areas of risk

The structural programme directed at eliminating risk has three components, firstly, the attendance to emergency situations, mainly landslides in periods of heavy rain. This comprises the monitoring of

rainfall and identifying of areas of risk, organising temporary evacuation of high-risk areas and emergency intervention such as drainage and stabilisation. Where minimum standards of safety cannot be reached, residents are prohibited from returning and instead are re-housed in through housing projects within the urban fabric. Secondly, plans for the elimination of risk in those favelas that display the worst conditions are carried out according to the priorities of the participatory budgeting process. Thirdly, favela residents are mobilised around the issues of risk through education programmes and the creation of 'civil defence groups' comprising residents trained to recognise emergency situations and act as intermediaries between the local residents and URBEL (URBEL, 1996b:25-27).

5.4.2 The Alvorada Programme

The Alvorada pilot programme, which is directed at three informal settlements in the municipality of Belo Horizonte and two in neighbouring municipalities, is based on an international agreement of technical and financial co-operation. For the settlements within the municipality of Belo Horizonte, the agreement is between the State of Minas Gerais, the Municipality of Belo Horizonte, the Cultural Society of Minas Gerais, the Pontifical Catholic University of Minas Gerais, the Italian NGO AVSI and the Institute of Co-operation and Social Development (CODESC) (URBEL, 1996a:60). The approach applied in the Alvorada Programme seeks to integrate the favela with the surrounding formal city through a comprehensive physical, legal and social intervention. Initially the intervention in the three settlements was intended to be completed within the period of the agreement from 1994 to 1997. However, progress has been slower than expected and the agreement has been extended (Ferreira Jacinto, pers. comm.). The programme methodology, its funding, as well as its evaluation by the role players, is discussed in greater detail in the following section.

5.4.3 Land regularisation

Land regularisation within the three favelas of the Alvorada Programme is carried out in co-ordination with spatial re-planning and the installation of infrastructure and basic services. However, titling of plots has been carried out in other favelas in the absence of physical upgrading. In most cases this intervention was restricted to those favelas occupying municipal land, where legal procedures for land regularisation were least complicated. Thus the more complex cases on privately owned land were avoided. Further problems were that, in the absence of physical upgrading, the intervention did not impact on the living conditions of the residents. In addition, the land regularisation did not take into consideration any alterations to the layout, which would be required for the physical upgrading (adjustments to the street network to allow for improved access and installation of services). Recognising the limitations of this approach, URBEL introduced a general level of planning for each favela, which identifies the main problems and potentials of the existing layout and establishes guidelines for intervention. This planning instrument, termed 'plano global' guides ad hoc or localised intervention. As favela residents increasingly access small amounts of funding through the participatory budget allocation process, the plano global has an important function of enabling the organised local population in prioritising intervention. In response to the avoidance of regularisation in areas of private ownership, the Municipality of Belo Horizonte has entered into an agreement with the Catholic University of Minas Gerais, in order to develop procedures of adverse possession (*usucapiao*), making accessible the legal instrument created by the 1988 constitution, whereby ownership can be transferred to the occupier of privately owned land after an undisputed five year period of occupation (URBEL, 1996b:32).

6. THE ALVORADA PROGRAMME IN BELO HORIZONTE

6.1 Introduction

Belo Horizonte has provided a new dimension to the international understanding of informal settlement upgrading. At both a national and a local level, the PROFAVELA law is a benchmark, in terms of the way in which it provides both recognition and protection to the favelas. Organisationally, the creation of URBEL as a municipal non-profit company, and the partnership formed with the NGO AVSI, when linked to the methodology of the Alvorada programme, provide a new framework for in-situ upgrading. The PROFAVELA law was covered in some detail in the previous section. This chapter will concern itself with the URBEL-AVSI relationship, and specifically the role played by AVSI. The chapter is divided into two parts. The first part deals with the upgrading methodology of the Alvorada programme in broad detail, while the second part concerns itself with the technical detail associated with the Visual Settlement Planning (ViSP) approach.

The city of Belo Horizonte (as opposed to the metropolitan region) has a total population of 2.1 million. Of these, more than 337 000 people live in 139 squatter settlements ("favelas") (AVSI, 1997). These areas are characterised by a high risk of flooding and landslides. The programme has been designed for the social, urban and environmental recovery of degraded urban areas in the metropolitan region of the city of Belo Horizonte[1]. It has been implemented in several favelas. Amongst these are the Vila Nossa Senhora Aparecida, Vila Apolonia, Lixao, Vila Marcola, Vila Senhor dos Passos and Vila Ventosa. In the Vila Nossa Senhora Aparecida, which contains 1300 families, 15% of the area has a slope above 47%. In addition to difficult access, the Vila is faced with precarious sewerage, drainage and garbage collection. The Vila Marcola faces similar problems. In this case though, 50% of the area has a slope of above 47%. The Vila Apolonia (1100 families) is characterised by a low level of consolidation. The Vila is disconnected both internally and with the surroundings, and is also faced with an absence of infrastructure and services. The Lixao settlement (411 families) is situated on a garbage dump and, as such, represents a settlement in a critical risk area. Gas emissions from the decaying garbage dump are a serious fire hazard. The Vila Senhor dos Passos is well connected to the surroundings but has a disconnected internal passageway. There is also a considerable demand for land regulation facing this favela. The Vila Ventosa has no accessibility to urban services and is also characterised by a precarious sewerage system.

As the Alvorada Programme methodology was developed in order to more effectively implement the PROFAVELA law, it is based on the principles set out in that law. The key principle embodied there is that the settlement structure of the favela be maintained. It should be noted, however, that the Guide Plan for Belo Horizonte, approved in 1996 allows also for vertical development as a form of intervention in the favela zones (Special Sector 4, now ZEIS 1 - Special Zone of Social Interest), that is the replacement of the favela layout structure and dwellings with multi-storey residential blocks (Prefeitura Municipal de Belo Horizonte, 1996a:7). URBEL describes the Alvorada approach as one that accepts the favela as part of the housing stock. It is thus recognised that these settlements do not only represent risk and need, but also a potential for transformation. Raising the standard of living is understood to apply to all basic aspects of living - accessibility, security, comfort, health, recreation and the ability to socialise and to access urban services. Thus the approach is one whereby the process of spatial restructuring is based on a detailed evaluation of the problems and potentials of each favela (URBEL, 1996b:20).

URBEL defines the operational principles of the Alvorada Programme as follows:

- Participation of the community in all stages of the process, including planning, implementation, evaluation and maintenance (the latter is referred to as 'post-occupation');

[1] The following quotation from AVSI (1996) best summarises all of the facets of the programme:
'The programme acts through technical and methodological presuppositions of structural intervention including urbanization, construction of social equipment, land regulation, support to housing improvements, promotion of social-economic and cultural developments with support to community-based organisations, programmes to generate employment and income and strengthen local institutions by building institutional capacity and improving management skills'. (AVSI, 1996).

- Integrating the activities of public and private institutions in the areas of education, health, urban cleansing/refuse removal, culture, human rights, nutrition, employment and income generation;
- Interdisciplinary work, with a technical team comprising the social, legal and urban professions (Ferreira Jacinto, pers, com.).

A close interdependence exists between the three components of the programme methodology, namely, land regularisation, urban-environmental regeneration and social organisation (URBEL, 1996b:21). URBEL describes these components as follows:

- Land regularisation - two aspects pertain to the security of the residents, a) legalising the land use by municipal decree, b) transferring ownership of the plots to the residents.
- Urban-environmental regeneration. This means improving living conditions through the provision of infrastructure and urban services, the parcelling (division) of land, and integration with the surrounding areas and the city as a whole. This is based on a comprehensive evaluation of the problems and potential of the settlement. The residents participate in evaluating their settlement with the technical team and in identifying the possibilities for alterations.
- Organisational and participatory development - the programme invests in the participation of the residents in all aspects of the work. This requires a process of education, which develops critical attitudes necessary for collective work (URBEL, 1996a:59).

This chapter describes in detail that approach to upgrading, termed a methodology, which is practised in Belo Horizonte, and which incorporates Visual Settlement Planning (ViSP). The chapter is divided into two parts. The first part (A) comprising sections 6.2 to 6.4, deals with the methodology itself, and is descriptive. The second part (B) comprising sections 6.5 to 6.14, deals more specifically with the structure of the GIS system used to implement the methodology. Strictly speaking, this is the ViSP component, but it cannot be separated from the broader methodology described in part (A).

A. THE UPGRADING METHODOLOGY OF THE ALVORADA PROGRAMME

6.2 The nature of the external intervention procedure

As with conventional comprehensive planning approaches, the intervention procedure of the Alvorada Programme has the three phases of analysis, decision-making and implementation. The only difference is that in the Alvorada programme, it is necessary to precede this process by a phase of preliminary activity in the community. These are discussed in greater detail in section 6.6. Within these stages there are then a number of specific interventions, which are described in greater detail below.

6.2.1 Social work

Throughout the programme, from analysis to post-occupation, the approach incorporates interaction with the local residents at varying levels. A site office ensures the permanent access of the residents to project staff, in particular a resident social worker. This social work component, carried out by a team comprising the social worker and local community development workers, is termed *'acompanhamento social das obras'* (social accompanying/attendance of the works). Novara (pers. comm.) explains:

> 'The role of the social work is neither to convince the people about the benefits of the project, nor to carry out exactly what each individual wants. Much rather, it has the role of discussing and developing a solution with the residents. The activity of developing the community, so that it is able to eliminate its problems, is complemented by activities directed at assisting in crises. This involves alleviating problems of malnutrition and abuse among young children, the development of crèches and the integration of adolescents into the job market. This aspect of social work is considered fundamental in the context of the severe poverty'.

The social work, which combines community development, resident participation and social upliftment, draws on a range of community interaction techniques. In order to gain entry into the community for the social work, key informants are identified among the residents. These may be formal leaders of community associations or experienced and respected individuals whom residents would approach with problems. Together they form the reference group for the project. (Novara, pers. comm.)

Contact between residents and the project staff throughout the duration of the project ranges from interaction with individuals to interaction with the entire local population. URBEL (1996a:59) uses the following techniques: home visits, individual consultation in the project office inside the settlement, meetings with specific groups according to demand, sectoral meetings with a group of streets, meetings specifically for capacity building and decision-making with the reference group (key informants), larger meetings and seminars with all residents, and meetings of the interdisciplinary team and involved organisations to plan activities.

6.2.2 The questionnaire survey

While at the community development and decision-making level the methodology interacts with groups or representatives of the local population, there is also the need to interact with each individual household in the settlement. This applies comprehensively for the question of land regularisation and the extension and connection of basic services, and selectively in areas where dwellings are relocated to eliminate risk or improve access. Selective interaction with individual households is also required for the social upliftment component, targeted at the most needy. Interaction with individual households is primarily through a census survey. A comprehensive questionnaire covers all necessary data related to land regularisation, basic service extension and connection, elimination of risk and social upliftment. The survey, which combines observations of the field worker and questions answered by household members, covers the following data categories:

- The plot: land use, tenure, length of occupation, plot size.
- The dwelling - legal: use, tenure of the dwelling, duration of occupation (and proof of these), other fixed assets, characteristics of access, degree of completion of the building condition.
- The dwelling - physical characteristics: size, level of risk, wall material, roof material, flooring, stairs.
- The dwelling - service level: type of sanitation, sewer connection, water supply, electricity supply, refuse disposal, holding of animals and other observations.
- Household - level of community organisation: involvement in /knowledge of /trust in residents association, local politicians, religious institutions, public authorities; awareness of settlement needs.
- Household - monthly expenditure: rent, transport, groceries, water, light, electricity, gas, health, other.
- Household members - characteristics: name, sex, level of education, citizenship, position in the household, marital status, occupation, location of occupation, sources of income, identity document.

Combined with geo-referenced aerial photography, and at a later stage refined through a ground survey, the questionnaire survey data is entered into a GIS. This has three functions, a) the management of the complex individual data, allowing it to be accessed for the various intervention components, b) spatial queries to identify the need for selective intervention such as elimination of risk and social upliftment, c) thematic mapping, displaying the spatial distribution of settlement characteristics. The thematic mapping in turn has two functions. Firstly, it enables an understanding of the socio-economic diversity in the community, indicating levels of community representation and political awareness, and enables the project to identify priorities such as mobilisation and capacity building of representatives. It also enables the identification of priority areas for social intervention such as job creation. Secondly, it provides the basic data required for the spatial planning, which has to take into account diverse factors ranging from plot sizes, access to dwellings, the need for service provision and the location of geo-technical risk (Muzzarelli, pers. comm.).

The comprehensive questionnaire survey is tested through a 5% sample. This data is used for the preliminary diagnosis, identifying key problems and potentials in the settlement. Through a decision-making process involving the local residents, this is developed into the general plan or *plano global* of the settlement, as is required for all favelas in the municipality. Within the Alvorada Programme the preliminary phase has three functions, firstly, to allow an understanding of the settlement in its urban context and in respect to its internal characteristic, which enables a broad level of decision-making. Secondly, to establish initial contact with the residents. Thirdly, the exercise, which enables both the project planners/architects and the residents to understand the settlement structure and social characteristics of the area, establishes a good basis for discussion between project staff and residents (Capitanio. pers. comm.).

6.2.3 Housing intervention

Adjustment to dwellings is required either where access routes need to be widened or extended, or where geo-technical or geological risks exist, this being primarily on steep slopes. Three principles apply in the relocation of the affected dwellings. Firstly, the relocation area is located within the settlement, or as close to the settlement as possible, in order to keep the social disruption at a minimum. Secondly, the residents affected by the relocation partake in the decision on the area of relocation and the form of the building (this can range from houses on individual plots to units in an apartment block). Thirdly, the reconstructed dwelling is based on the size of the original house that was demolished. However, minimum standards apply, such as the provision of a bathroom. While construction to date has been through a conventional tendering system, with building contractors undertaking the construction, a new direction has been to develop co-operatives and systems of self-management, as applied by URBEL in the production of new housing areas (Capitanio, pers. comm.).

6.2.4 Provision of infrastructure and basic services

Engineering works are carried out through conventional tendering procedures, with engineering contractors carrying out the laying of pipes, construction of roads, pavements and steps, etc. The contracts do not require the hiring of local labour. However, due to the intricate and often intimate structure of the favelas, most contractors employ local residents in order to allow for easier access. At this stage, AVSI and URBEL are looking into means of making more use of local labour in the construction. At this stage the employment creation programme (one component of the social work that accompanies the intervention) is not integrated with the employment generated through the construction work in the community (Capitanio, pers. comm.).

6.2.5 Land regularisation

Land regularisation is a slow and complex process. While the establishing of new boundaries is a predictable procedure, with a ground survey undertaken with the computerised theodolite 'totalstation', it is the assimilation of the occupied land that is complex and can be unpredictable. Few problems are encountered where the entire occupied land is publicly owned. However, where private land is occupied, and in many cases this comprises several separate properties, delays are common. As procedures for adverse possession ('*usucapiad*') of privately owned land through the application of the 1988 constitution are only now being established for Belo Horizonte, privately owned land has to be expropriated. Where landowners do not agree with the compensation, a legal procedure is entered into, which can lead to significant delays. A particular restriction is that such expropriation has to be undertaken for roads and other collectively used space, before construction can take place. With the land regularisation of the residential plots, the least complex cases are generally handled first. These are plots occupied only by one household. Where plots are occupied by more than one family or plots exceed the maximum permitted size, negotiation has to take place between affected households in order to establish legal boundaries (Capitanio, pers. comm., Coeiho Mota Pinheiro and de Andrade, pers. comm.).

6.2.6 Social upliftment

Besides crèches and nutritional centres that AVSI has initiated and supported in a number of favelas over the last decade, the social upliftment programme operating in the favelas of the Alvorada Programme is directed at integrating youths into the employment market. The census survey enables the identification of the most vulnerable households, the criteria being size of the dwelling, room occupancy, gender of the household head (female headed households being weaker than those headed by males), household income, number of household members older than 12 years, and whether an adolescent has to contribute to the household income. Once identified, the most vulnerable households are visited, further information is gathered and the household enters into the project. According to their qualifications, the youths are prepared for the job market through supplementary courses to complete schooling, professional training or one month practical work experience in a company. While supported through a programme running in four Brazilian cities, the project is working towards being self-sustaining. Cost recovery is through the payment of a fee by the company that takes on employees through the project (Martos, pers. comm.).

Case study of the Alvorada Programme methodology
Vila Senhor dos Passos
12,6 hectare; 980 households; 3 800 people
78 families/ha; 302 people/ha

Mobilisation and participation
At the commencement of the intervention, the local residents had little belief in the possibilities of transforming living conditions through collective action. The socio-economic survey indicated that 62% of the residents were neither collectively organised for improvements in the settlement, nor did they have knowledge of any form of localised mobilisation. Of 79% of the households none of the members participated in local movements of any sort. Only 10 % of households were participating in religious institutions. There was also a high level of distrust of public institutions and NGOs (URBEL, 1996a). The low level of mobilisation needed to be considered in the definition of the strategy for participation and community development. URBEL proposed the formation of a forum with representatives of the various groups and organisations in the settlement, such as the resident associations, church groups and health groups. Through this forum residents started participating in the programme (Ferreira Jacinto, pers. comm.). With the development of the programme in Vila Senhor dos Passos, the level of mobilisation has increased significantly. As a result participation in the programme, as well as credibility of the public bodies and NGOs has improved (URBEL, 1996a).

Land Regularisation
A municipal decree of September 1996 approves of the spatial plan and land parcelling of 276 plots, comprising the first phase of the intervention, and sets out the regulations for land use, future densification and building alterations (Prefeitura Municipal de Belo Horizonte, 1996b). Titling of plots has been undertaken for those plots that pose no complications. These are mainly plots occupied only by one family and on publicly owned land. By the end of 1996, 52 titles had been issued and a further 40 were issued in the first half of 1997. 20% of the occupied land was privately owned and would need to be expropriated from the official owners before titles can be issued to the occupants (Coelho Mota Pinheiro, de Andrade, pers. comm.). While this creates delay, the continuing titling of publicly owned land ensures continuity of the intervention. This was of particular importance when engineering works were delayed for several months due to funding problems - the continuity of the regularisation, as well as the social components, maintained patience among the residents. One reason for this is the high value residents attach to the procurement of ownership of the occupied plot (Ferreira Jacinto, pers. comm.). The standard plot size for the settlement is $120m^2$. Therefore, according to the PROFAVELA Law, the maximum plot size permitted in the land regularisation is $240m^2$. A number of plots are smaller than $40m^2$. One particular plot comprised $9m^2$. This resident will be re-housed through the relocation process.

Re-housing
The first phase of the intervention, where engineering works and land regularisation are currently underway, comprises the densest section of the settlement. According to the analysis, 20 of the 276 dwellings needed to be removed in order to allow access and the installation of infrastructure or due to the precariousness of the structures. As vacant land within the settlement is limited, the residents suggested the construction of flats within the settlement, a process termed 'verticalisation'. A few of the affected households chose relocation outside of the settlement, in one of URBEL's new housing areas. For those that chose relocation within the settlement, a range of flats is under construction (bachelor to two-bedroom), in accordance to the size of the original dwelling. (Coelho Mota Pinheiro and de Andrade, pers. comm.). The programme provides temporary housing in order to bridge the period between demolition of the original dwelling and completion of the new dwelling. While some residents chose to reside with friends or relatives, most of the households are accommodated in one-roomed $14m^2$ corrugated iron units with kitchen corners. Five units share a communal bathroom. The temporary structure is located in a cul de sac adjacent to the favela. The period of temporary housing was intended to be 8 months. However, construction delays were caused by funding and by complicated land regularisation procedures, extending this period beyond 18 months (Coelho Mota Pinheiro and de Andrade, pers. comm.).

6.3 Division of responsibilities

Responsibility for the collection of the data rests with URBEL. Local favela residents are involved as field workers for the census survey, while specialists undertake the physical and legal surveys (Novara, pers. comm.). AVSI, with whom the GIS workstations are located, are responsible for entering of the data into the GIS. They subsequently generate base maps from the aerial survey, and thematic maps by relating the socio-economic data to the physical data. URBEL employs planning and engineering consultants for the design and quantification of the infrastructure and service upgrading and the housing intervention. Execution of this work is allocated by tender to engineering and building contractors, who generally employ some local residents. URBEL's legal staff undertakes the land regularisation, in conjunction with AVSI. Social communication throughout the process is undertaken by URBEL and the State of Minas Gerais, while popular education is undertaken by URBEL, AVSI, the Pontifical Catholic University of Minas Gerais and the State of Minas Gerais. The social component of the intervention is supplemented by income and employment generation programmes of the State of Minas Gerais. In addition, the professional specialisation course in support of the Alvorada Programme is being developed by URBEL, AVSI and the Pontifical University of Minas Gerais, resulting in institutional capacity building (Ferreira Jacinto, pers. comm.).

URBEL has an interdisciplinary team of 17 people committed only to the Alvorada Programme. These comprise one co-ordinator, four architects/urbanists, two social workers, two lawyers, two engineers, a number of trainees and support staff (Ferreira Jacinto, pers. comm.). AVSI in turn has a staff of approximately 13 people, comprising one co-ordinator, two architects, three computer specialists, two social workers, two accountants and support staff.

6.4 Critical evaluation by the role players

In discussions on the effectiveness of the Alvorada Programme, both successes and concerns were raised. Aspects that are being evaluated by URBEL and AVSI, in relation to the practical results of the programme, are funding and capacity. A positive practical result has been the high quality of the output and satisfaction by all parties involved, including the funding agencies and the local residents, with the participation methodology (Ferreira Jacinto, pers. comm.). However, a serious concern that was raised by both URBEL and AVSI was the delay in implementation. The programme had been designed to complete upgrading in three favelas in the Municipality of Belo Horizonte over a three year period (1994-1997). However, implementation was still in the early stages after more than three years. A number of causes have been identified for the delay and are leading to some re-orientation in the programme (Ferreira Jacinto, pers. comm.).

6.4.1 Funding

The main cause for the delay in implementation is associated to funding. Firstly, the actual cost of the implementation was not anticipated. The cost of relocating a percentage of households was not included in the original budget that was provided in equal shares by the Italian government and the Municipality of Belo Horizonte. This budget was based on US$600 per household, based on previous experience in infrastructure upgrading. However the actual costs amounted to US$4 500, with relocation of 10-15% of residents (Novara, pers. comm.). As a result, the percentage of funding provided by the Municipality had to be increased from 50% to 80% (Ferreira Jacinto, pers. com). While the reason for the underestimation of costs is attributed to lack of precedent, as might be expected with a pilot project, the recognition of the real costs of comprehensive favela intervention in the light of the scale of the favela problem is leading to re-thinking in terms of intervention approach.

Secondly, it is recognised that the Alvorada Programme, in piloting a methodology, was over-ambitious in attempting to intervene simultaneously in three large favelas (with a total of 4 400 households) within the Municipality. With ambiguous cost factors such as the relocation of a percentage of households, which could not be quantified at the time of budgeting, it is recognised that the scale of the financial backlog would have been more manageable, had the pilot been limited to intervention in no more than one favela (Valdares and Procopio de Alvarenga, pers. comm.).

Thirdly, a part of the municipal funding is transferred from federal to municipal government via the State of Minas Gerais. This allows for interference by state level politics in the transfer of funds. As a result,

the municipality is now attempting to access federal funding directly (Valdares and Procopio de Alvarenga, pers. comm.).

Fourthly, it is recognised that, in the quest for broad political support, there is a tendency within administrations to spread resources thinly over a large number of favelas rather than concentrating allocation to a limited number. This political reality is being taken into consideration in the discussions over future intervention approaches (Novara, pers. comm.).

New avenues of funding have been opened, on the one hand, with organised favela residents partaking in the participatory budget allocation process and, on the other hand, with World Bank interest through exposure of the programme at the 1996 United Nations Conference in Istanbul (Habitat II). However, resources for the completion of the integrated intervention in the three favelas of the Alvorada Programme are not secure and will depend on political priorities (Ferreira Jacinto, pers. comm.).

6.4.2 Capacity

A further limitation associated to the slow implementation of the programme is the lack of capacity. As the Alvorada Programme implied pioneering work in the area of integrated and interdisciplinary intervention, the professionals involved could not draw on previous experience. Thus it took URBEL two years to develop an appropriate team of professionals for the Programme (Ferreira Jacinto, pers. comm.). The replicability of the methodology from a pilot project to broader implementation across Belo Horizonte's favelas depends, to some extent, on available professional capacity. As the skills required for this form of intervention, and the issues associated with informal settlements in general, are not included in conventional professional training, the Pontifical Catholic University of Minas Gerais is currently developing a mid-career course, while AVSI is developing training directed specifically at technical professionals in municipalities (Novara, pers. comm.).

A further question of capacity is related to the lack of procedural norms within URBEL, which, through the Alvorada Programme, is faced with the particular challenge of co-ordinating activities of the various service providers in the implementation (Ferreira Jacinto, pers. comm.). With regards to the lack of legal procedures for the Land regularisation, the Pontifical University of Belo Horizonte is developing procedures for the transfer of ownership to the occupants of privately owned invaded land (URBEL, 1996b:32).

Concern was also raised over the nature of the partnership on which the Alvorada Programme is based. Due to limited experience, the roles of the various partners were not clearly defined. It has been recognised that legal mechanisms are required to bind the various parties to their responsibilities (Ferreira Jacinto, pers. comm.).

6.4.3 New directions

While many of the identified problems, such as lack of capacity in terms of staff and procedure and the procurement of funds, are being addressed in order to enable the continuity of the Alvorada Programme, some modifications to its intervention approach are being considered. These are linked to an endeavour to reduce implementation costs per unit. In this respect, self-management of the physical aspects of the intervention by the organised communities, as operated by choice in URBEL's new housing developments, is being considered. However, there are fears that the complexity of the upgrading process will limit the applicability of this approach (Ferreira Jacinto, pers. comm.).

It is also recognised that the Alvorada Programme methodology is based on conventional infrastructure delivery approaches, where implementation is phased into spatial areas. However, with the slow issuing of funding, it is now considered more appropriate to identify small individual projects within the settlement. One has also realised that the comprehensive transformation within two years (as originally anticipated by the Alvorada Programme) of a favela that developed over 40 to 70 years is a strong impact on the social and physical environment, and requires considerable intervention (social work) after the physical upgrading in order to forestall the degradation of the transformed environment. It is, therefore, considered more appropriate to allow the transformation to take place gradually and according to the priorities of the residents (Novara, pers. com).

Thus the experience with the pilot programme has triggered a reassessment of favela intervention in general. New thinking, both within AVSI and URBEL, addresses the question of how to extend

intervention into all favelas within the municipality. At the cost of US$4 500 per household, the extension of the Alvorada Programme methodology to the 61 000 households living in favelas is financially unrealistic (Novara, pers. comm.). Rethinking is occurring around two key instruments, the *plano global* or general plan, and the participatory budget allocation process.

The 1996 guide plan for Belo Horizonte institutionalised the general plan or *plano global* for favelas, requiring that it be applied to each favela within the municipality. To date, 6 favelas have a completed general plan, while a further 14 are underway (Bede, pers. comm.). As the general plan comprises the first step in the Alvorada Programme methodology, procedures for the development of these plans have been developed, with AVSI providing the GIS support.

For favela residents, the participatory budget is directly linked to the general plan or *plano global*, as it enables organised resident groups to identify projects in their favela and then seek funding from the budget. However, it is recognised that the municipal resources distributed through the participatory budget are not sufficient to resolve the favela problem; therefore there will be ongoing need for external funding.

B. THE VISUAL SETTLEMENT PLANNING (VISP) APPROACH ADOPTED ON THE ALVORADA PROGRAMME

6.5 Background

Much of the information on the computer methodology, the hardware and the software requirements for ViSP was gathered during a visit to Belo Horizonte by a member of the research team. While in Belo Horizonte, from April to May 1996, she spent time working with AVSI, an Italian NGO that has been supporting informal settlement upgrading in the city since 1984. The main aim of the visit was to gather information to enable assessment of the technology base and technical capacity of the ViSP GIS system in Belo Horizonte. Thus the main purpose of Part A of this chapter was to describe the methodology from a planning and social perspective, the section deals with the same subject from the perspective of technical support.

AVSI works at a micro-scale interacting with communities in informal settlement areas to upgrade services. Through AVSI's current partnership with the municipality, the Municipal Housing Company of Belo Horizonte (URBEL), they are playing a technical and social support role primarily through the management of a settlement GIS for a municipal upgrading programme, the Alvorada Programme. Their focus is on urban planning requirements. The establishment of acceptable urban structure living conditions is the motivation that drives the data capturing and processing activities. Their approach is urbanistic/planning and not engineering.

The Alvorada Project Manager, Enrico Novara, views the GIS ViSP approach as having three levels:

- Information gathering including archiving information and capturing topographic data.
- Information processing including project diagnostics and topographic model generation.
- Micro-urbanism (town planning) is incorporated at this level. The diagnostics identified are used for the project planning. GHEO software is used in conjunction with GIS (INFO data), TOP (topographic data), and AutoCAD (Project data) software.
- Combining the information and topographic model to enable urban management applications. The low-level data capturing and processing, and higher level data spatial data analysis networks are linked.

According to the Alvorada Project Manager, up to ten favela regions had been entered into the system by the time of the visit, while the data processing component of the ViSP approach had been running since 1995 mid-year.

6.6 Research methodology

During the visit, some time was spent becoming acquainted with the Alvorada Project. A number of sessions were held with the URBEL personnel on the socio-economic data types (28 groups of variables are monitored), applied legislation, infrastructural services provided and AutoCAD based thematic mapping activities. A case study of a favela called Villa of Nossa Senhora dos Passos, which is

characterised by variable topography, was visited. The remaining period was spent becoming further acquainted with the application of the following software packages AutoCAD, GHEO, GHEORASTER, TNTMIPS, MapInfo and other customised software.

The following issues were to be addressed by the visit to Belo Horizonte:

- The primary aim of the survey of the Visual Settlement Planning Approach (ViSP) adopted in Belo Horizonte (Brazil) was to document the current GIS-based ViSP applications in the fields of urban management, planning, squatter-settlement upgrading and natural hazard alleviation in Belo Horizonte. This would include the following.
  - An overview of the monitoring, fast response and mapping capabilities of the approach. Areas of particular interest in the general approach included: GIS map base generation, visualisation and statistical analysis.
  - An overview of the technical and analytical capabilities of the software applied in the ViSP approach. This included: TNTMIPS, AutoCAD, GHEORASTER, MapInfo, Arc/Info, Atlas GIS, and to a lesser extent database management system software. Of particular interest were applications utilising the buffering, multiple overlay, point in polygon, statistical and surface analysis capabilities of the software.
  - A brief overview of the community interaction and participation processes and the role that GIS plays in facilitating these processes.
- Other system issues that were to be addressed included: the data types collected and map-oriented analytical tasks associated with the infrastructural services provided to the squatter areas, data load capacity, spatial data structures employed. Flood related applications were of particular interest in terms of the stormwater management problems in the area.

Various forms of information were requested from AVSI / URBEL in order to document the GIS component of the ViSP approach in Belo Horizonte. These included a sample set of data and example plot reports.

A sample set of data was requested from AVSI for several reasons. The material would serve as an invaluable teaching tool to Urban Management MSc students at the University of Cape Town and as a proto-type model for future informal settlement micro-scale work in South Africa. A series of detailed socio-economic reports, infrastructural plans and maps, levels of infrastructural service data, and geotechnical and geological intervention data for the Villa Nossa Senhor dos Passos was also requested from URBEL. Any infrastructural and geological data that had not been captured already into the GIS, would be captured from the printouts provided by URBEL. This would provide a very detailed real informal settlement area dataset, much more detailed than one could ever hope to get in S.A., with which to experiment potential analytical applications in an ARC-INFO or INTERGRAPH environment. Detailed, coupled cadastral-topographic and socio-economic datasets for informal settlements of this nature are difficult to obtain and should be employed as fruitfully as possible. The Ventosa Villa favela was of interest from the point of view of its flat topography, which is also a characteristic of Ikapa, and could also be characterised by floods. If infrastructural problems similar to those facing Ikapa could be identified, then similar solutions could possibly be applied.

Other requests were made for

- Example output plots showing superposition of vectorial and raster data.
- Example output maps showing thematic zones useful for planning and upgrading. For example, in thematic maps.
  - Various types of risk zones identified.
  - Various types of habitations identified and others if available.
  - Planning/urbanistic project proposal.
- A hard copy of the 354 professions monitored in Villa Nossa Senhora dos Passos, listed in the CLIPPER socio-economic database.
- Access to negatives of GHEORASTER screen displays from which slide negatives are made.
- Contact details of GIS using organisations in Belo Horizonte and the rest of Brazil.

In response to these requests, a number of data sets and a series of plot reports were provided. General information requests were made for information about the AVSI ViSP programme with regards to the number of favelas mapped in the system and the location of information on the favelas.

Exposure to various software packages and their applications was also requested. The following details some of the packages and the nature of the requests relating to the packages.

- GHEORASTER: Application for Mosaicing and any other possible applications.
- MapInfo: Production of thematic maps, procedures for registering raster images and superimposing vectorial data and MapBasic programming capabilities.
- TNTMIPS: Capabilities of the software and what it was used for.
- ATLAS GIS: Use of the software.
- AutoCAD versions 12 and 13: Use of tracer for vectorising raster images and application of tracer programme to other operations.
- CLIPPER: Capturing of socio-economic data and linkage with MapInfo.
- TRANSCAD, Arc/Info, Arc/View, MICROSTATION Intergraph: General comments on applications.

The responses to the requests for gaining experience in the use of the above packages and the applications that were being used in Belo Horizonte, provided the information for the discussion in the rest of this chapter.

6.7 The Role of GIS in the Alvorada Programme

As mentioned in section 6.2, the approach taken in a typical Alvorada Programme project has similarities to the conventional planning approach. However, it tends to be more complex because it consists of several phases and of a multitude of collaborative planning, surveying, social interactions and other processes, all of which take place simultaneously. Taking as an example the project for the Sr. Dos Passos favela upgrading this can best be described, when broken down into four key phases, as follows:

- Preliminary research.
- Preliminary surveys, formulation of guidelines and urban plan.
- Planning processes.
- Implementation processes involving the provision of infrastructure.

The components of each of these phases are summarised in Table 6.1, shown overleaf. The first phase consists of a series of surveys and preliminary research projects. The second phase leads to the development of a preliminary urban plan. In the planning phase project diagnosis and urban plan are further developed. The definition of the parcel boundaries and the land registration processes are also included in this phase. The fourth phase involves the development of detailed construction plans and the implementation of these plans. Throughout all of the phases the social action group is intensively involved in negotiations with the affected communities. The GIS database developed for the ViSP approach is initiated subsequent to or during the second phase. The database is developed throughout the duration of the project and several application maps are extracted from the system to aid activities in the third and fourth phases.

The GIS system has three registers (AVSI, 1997). These registers are designed for the analysis of the area and for its subsequent management and are as follows:

- A register for town planning-environmental ties.
- A register of the occupants.
- A land register.

The register for town planning-environmental ties gathers information on provisions and land tenure characteristics, as well as hydro-morphological and environmental risk characteristics. The register of the occupants consists of socio-economic census or sample data of the area population. It contains data on family units including the following data types: name, sex, age, education, employment, housing conditions and degree of community organisation. The land register consists of data relevant to the use and ownership of the land. This includes information such as location, area, type of use, tenure and period of occupation.

Table 6.1: The components of a four phase upgrading project in the Alvorada Programme

1. Preliminary research
- Preliminary social action group meeting.
- Identification of permanent residents.
- Preliminary topographic and research tasks.
- Conclusion of preliminary research.

2. Preliminary surveys, formulation of guidelines and urban plan
- Topographic land survey and cadastral research.
- Social economic and environmental research.
- Preliminary geotechnical and geological surveys.
- Surveys of levels of service, problems and potentials.
- Survey of guidelines and of other projects and organisations in the area.
- Integrated diagnostics and programme of necessities.
- Formulation of action guidelines.
- Social action group presents integrated diagnostics and action guidelines.
- Integrated studies of alternative solutions and viability.
- Definition of project breakdown and preliminary urban plan.
- Social action group presents project breakdown and preliminary urban plan.

3. Planning processes
- Final evaluation of urban plan.
- Identification of public spaces.
- Cadastre of new sites, relocations, renovations.
- Land surveys for roadways and drainage.
- Geotechnical consolidation.
- Water and sanitation networks.
- Recognition of solid residuals (rubble).
- General urbanisation plan.
- Preliminary construction plan.
- Social action group presents general urban plan.
- Planning of access and roadways.
- Delimitation of public areas.
- Land dis-appropriation process for opening of public spaces and resettlement areas.
- Studies and projects for land parcelling.
- Approval of parcelling and registration procedures.
- Elaboration of contracts, writings and registration.

4. Implementation processes involving the provision of infrastructure
- Pavement project.
- Drainage and canalisation project.
- Urban architecture project for reassessment areas.
- Sanitation network project.
- Water supply network.
- Geotechnical consolidation.
- Manual of technical specifications.
- Construction plan.
- Plan of quantities and prices.
- Time plan.
- Social action preceding commencement of construction.
- Construction.
- Social action accompanying construction.

In Belo Horizonte, the GIS component of the ViSP approach focuses on the development of numerous local level databases. A separate database is developed for each informal settlement being upgraded. Thus the areas covered by the local level databases can typically range from 3.6 ha (Lixao) to about

24 ha (Vila Marcola). These databases are designed for detailed micro-scale work. The principle functionality of the database changes throughout the duration of the project. Initially it serves as a tool for drawing up the settlement diagnostics and preliminary urban plan. As the project develops and more detailed geotechnical, infrastructural services, socio-economic, land ownership and topographical surveying data are entered into the database, other planning related applications become possible. The database is then used: in the land parcelling process, to identify specific resettlement areas etc. In the final stages of the project, the database is used to guide the implementation process.

In summary, the development and implementation of the ViSP approach in Belo Horizonte and Italy, has involved the use of GIS in the following manner:

- to gather and archive information
- to generate a topographic model
- for project diagnosis work and
- for other urban management applications.
-

A number of differences exist in the techniques employed in these two areas. In Belo Horizonte, the first three applications have been implemented at a local level.

Other urban management applications have been developed in Italy by the University of Bologna and CAR-TECH. These applications involve more complex analyses of the data acquired in the ViSP project, and have been developed on additional software systems not used in Belo Horizonte (namely, Intergraph and Arc-Info software). In Belo Horizonte, a planning approach has been followed, involving substantial community interaction, and the focus has been on implementation. In contrast, in Italy the focus has been on research and analysis.

6.8 Organisations involved in the development of the database

The GIS tools incorporated in the ViSP approach used in the Alvorada Programme have been critical to the development and implementation of upgrading projects in these areas. The collaborative agreement incorporated within the Alvorada Programme is intended to develop, utilise and maintain databases on the poor peri-urban areas of Belo Horizonte. The ViSP approach provides a low-cost solution to the mapping requirements facing these areas. The development of the basic low accuracy cadastral database which results from the ViSP approach is complemented by data inputs from other organisations. Thus in the same manner that the Alvorada Programme represents a holistic approach to informal settlement upgrading, the ViSP approach in Belo Horizonte represents an integrated and collaborative database building process. The main reason for adopting this collaborative approach is to prevent overlapping or duplication of efforts on the part of the departments responsible for urban intervention and policy (AVSI, 1996). The key organisations which have contributed to the development of the Alvorada Programme GIS databases include the following:

- **URBEL** (Companhia Urbanizadora de Belo Horizonte / Belo Horizonte Urbanization Company).
- **AVSI** (Associazione Volontari per il Servizio Internazionale / Voluntary Association for International Service).
- **PRODABEL** (Companhia de Processamento de Dados do Municipio de Belo Horizonte / Belo Horizonte Data Processing Company).
- **PMMG** (Policia Militar do Estado de Minas Gerais / State of Minas Gerais Military Police).
- **CEMIG** Companhia Energetica de Minas Gerais / Minas Gerais Power Company).
- **COPASA** (Companhia de Saneamento de Minas Gerais / Minas Gerais Sanitation Company).
- **CODESC** (Instituto de Cooperacao e Desenvolvimento Social / Social Development Cooperation Institute).

In addition, two other consultancies have contributed significantly to the development and maintenance of these databases. These are:

- **CAD 126** (Cartografia e Servicos Informatizados para o Planejamento Urbano / Cartography and Computerized Systems for Urban Planning).
- **DIAGONAL** (Diagonal Consultores Associados / Diagonal Associated Consultants).

Other organisations which contributed less directly to the development of the database, but which are involved in the Alvorada programme in Belo Horizonte comprise:

- **PUC** (Pontificial Universidade Catolica / Pontifical Catholic University)
- **SETAS** (Secretaria de Estado do Trabalho e Acao Social / State Department of Labour and Social Welfare)
- **SMC** (Sociedade Mineira de Cultura / Society of the State of Minas Gerais for Culture)

Finally, a large number of small favela dweller's associations also play a very important role in the upgrading process. These associations are critical to the community participation aspect of the programme. In Salvador (Bahia) for example, these organisations include groups such as: Jose Silveira Foundation, 1° de Maio Company, COMONAL (Co-operative of Novos Alagados inhabitants), Dom Avelar Brandao Vila Foundation.

6.9 Hardware configuration

The hardware configuration employed in the ViSP approach in Belo Horizonte is essentially the same as the hardware configuration listed by Nieminen (1995) the ViSP system in Kenya, and included in the list detailed below. This is summarised from Nieminen (1996). The list is divided into three parts, the computer system, output devices and input devices.

6.9.1 The computer system

- PC/AT compatible microcomputer with ISA/VL-bus (VLB); Power supply: 200W, 110-240 V automatic switching; CPU: 486DX2/66Mhz (clock doubling); Cache 128 KB; Memory 16 MB RAM; Hard disk: 1 GB IDE disk; Floppy disk: 1.44 MB 3.5" and 1.2 MB 5.25"; Microsoft mouse; System software: MS-DOS 6.2 and Windows 3.1.
- GRAPHICS: Windows accelerator, VLB with 2 MB VRAM (eg. ATI Graphics Ultra Pro VLB/w 2 MB VRAM).
- DISPLAY: 17" MULTISYNCH, NON-INTERLACED, REFRESH RATE 72 Hz, colour display, tritron or flat-square tube, dot pitch 0.28 mm or less.
- CD-ROM: double speed, multisession XA, PhotoCD drive.
- TAPE DRIVE: 250 MB compressed, ¼", QIC (eg. Colorado Jumbo).
- UPS: 600 VA capacity.

6.9.2 Input devices

- Slide Scanner: 35 mm 24-bits colour scanner, resolution 2700 dpi, such as Nikon CoolScan, and supported by chosen software, such as TNTMIPS.
- Photographic camera: single lens reflex 35 mm automatic camera, w/ automatic film winding and good quality 35-50 mm lens.
- Flatbed scanner: A4-size 24-bits/pixel colour scanner, resolution, 300 dpi minimum and supported by chosen software such as TNTMIPS.
- Digitising table: A0-size, high resolution digitising table with 16-button cursor, stand and supported by chosen software such as AutoCAD, TNTMIPS, ATLAS*GIS and MapInfo.

6.9.3 Output devices

- Printer: A4-size, inkjet colour printer, 300 dpi resolution, eg. HP Paint Jet XL 300 or DeskJet 1200C / w 6.MB RAM, and supported by chosen software, such as Auto CAD, TNTMIPS, Atlas*GIS and MapInfo
- Plotter: A0-size, multipen plotter, supported by chosen software.

6.10 Software implemented

The following key software products are used in the Belo Horizonte ViSP GIS system:

- the Gheo software suite.
- AutoCAD 12/13 and tracer for AutoCAD.
- MapInfo Version 4.0.
- a relational Data Base Management System.

The technical features of the Gheo software suite are discussed in detail by CAR-TECH (1996)[2]. The software is integrated in a seamless manner with AutoCAD, which serves as the vector data-capturing interface. The system requires a soft-engine graphics accelerator[3] and a relational database (Oracle, SQL or Quadbase).

6.10.1 The gheo software suite

The Gheo software suite represents a GIS system comprised of a fully integrated dual database. The dual database is composed of a graphic database, which contains all the geometric and topological information related to the entities represented on the map, and a descriptive database, which contains all the quantitative and descriptive data associated with the geographic data. The Gheo software suite consists of the following modules: Gheomake, Gheocheck, Gheobuild, Gheoload, Gheoraster and Gheo. The purpose of each of these modules is discussed below.

The Gheomake module is used to create the configuration files for the GIS database. The Gheocheck module is used to verify that the geometry of the graphical elements is correct. It assists line work processing operations such as deleting duplicated lines, verifying lines that end on a vertex, deleting overshoots, undershoots, and zero length lines. As with most other line work processing macros, a tolerance level must be set to ensure suitable results upon programme execution. The Gheobuild module is used to construct the topology of digitised files and to create features for the graphical database. The topology building process defines the relative spatial positions of adjacent elements in the graphical database. This process is required before geographically defined spatial queries can be defined. The Gheoload module represents a batch module for drawing data pre-processed by Gheobuild. It is essentially used to load compressed vector data.

The Gheoraster module is an image processing module which is used to load and unload raster images, geo-reference images, create mosaics, set dithering, resize images and insert calibration points. In conjunction with AutoCAD, the Gheoraster module can be used independently of the Gheo module (discussed below), for heads-up digitising. The geo-referencing functionality enables an image (eg. a scanned aerial photo or base map) to be reproduced in real co-ordinates, through a geometric transformation. Within the Gheoraster environment it is possible to create raster backdrops to vector data. Such representations place the vector data into context and are useful for serving as a communication tool.

The Gheo module has been designed as a simplified GIS user interface. It enables interactive editing, drawing, database management and consulting, by the site server and client users. Unlike the other modules listed above, it can be used as a standalone low-end platform GIS system linked to an SQL RDBMS. It is generally far simpler to use than the Gheo suite, and more specifically, it enables thematic maps to be produced far more easily. However, compared to the Gheo suite, it has far fewer spatial analysis capabilities and no image processing capabilities.

In ViSP GIS laboratory in Belo Horizonte, the Gheo suite is employed and the key module used for the majority of the data capturing tasks is Gheoraster. The remaining modules of the suite are indispensable, but are used for far shorter and fewer data processing tasks.

6.10.2 AutoCad

The AutoCAD software suite constitutes the principle digitising and design tool used in the methodology. Tracer for AutoCAD12 is used to digitise raster images of contour maps or building plans. It is a semi-automatic data conversion tool used to convert map raster images to vector drawings. It is particularly useful for dealing with maps shown on tracing paper. The AutoLISP software is used to automate procedures carried out in Gheoraster. The MapInfo software is good for presentation purposes. It is used

[2] Gheo is a software suite distributed in a client server environment, which is provided with the AutoCAD version12 driver software and, also with the MS-DOS version of the relational database QUADBASE-SQL. The applications are written in C and the system function at 32 bits. The alphanumeric database and the cartographic database are accessible from within AutoCAD, without having to exit the programme. The Gheo software has been extensively developed for creating GIS applications for the management of the infrastructural networks (water and gas) in Italy (Catasto).

[3] A soft-engine is a view accelerator. It enables one to zoom into and out of images rapidly.

for data visualisation, elementary data analyses (thematic mapping) and presentation, rather than for data capture. The RDBMS SQL software is used in Belo Horizonte, although other software can be linked.

6.10.3 Database structure issues

The database is composed of graphic and alphanumeric data. The graphic database is organised in terms of geotypes. A geotype represents a determined category of graphic objects, such as a road or highway. An infinite number of sub-levels may be generated per geotype category. For each geotype, the graphic element representation (polyline, polygon, point, text), the type of line, thickness, colour etc., is usually specified. Attached to each geotype is an alphanumeric attribute table. Relational linkages are created between the different geotype attribute tables when the need arises for creating queries that depend on the attribute data associated with two or more geotypes.

The structure of the database is determined by the contents of the configuration files. In these files, the settings of parameters, which are fundamental to the execution of the GHEO programmes, are listed. The configuration files are used to define the relations between the graphic database and the alphanumeric attributes. It is possible to state the directories of the graphic and alphanumeric databases and the customised characteristics per object, outside the database, and to visualise the recalls in AutoCAD. The associated configuration files may be created by almost any editor or through the GEOMAKE module. Configuration files may also be used to customise the execution and accelerate the run-time of the application GHEO programmes.

6.11 Data capture

6.11.1 Vector data

The vector database is comprised of area-based, polyline-based, text-based and line-based layers. Attribute data are linked to area centroids in the case of the area-based layers, and attached to placed points in the case of the possible layer types. The vector data is organised into 95 levels approximately, and may be grouped into categories relating to planning, the physical environment, annotation, boundaries, complementary elements, physical elements, single point elements etc. Each geotype is placed on its own layer and is characterised by a unique set of display attributes. Associated with each geotype are fields of attribute data, which may be represented in one or more alphanumeric data tables (eg the edificio level has links to the edificio and domi-sec attribute tables).

6.11.2 Raster data

The methodology employed to capture the imagery data for mapping in Belo Horizonte involves the use of helicopter photography. A normal hand held 35 mm camera is used to obtain the photographs as the helicopter hovers over the point of interest. The key advantage of this approach is that a much lower flying height (and consequently a much higher resolution) can be obtained than if an aircraft is used to take the photography. The negatives of the photos are subsequently scanned and geo-referenced using the image processing software. The accuracy of the pictures taken in this way is variable, and for that reason this approach has received some criticism.

However, the low altitudes obtainable by using a helicopter enable maps at a scale of 1:250 to be created on a regular basis. The method has been specifically designed to enable individual plot boundaries to be defined. Often, because of the high density of housing structures in the informal settlement areas, different plots will fall under one roof. In other words a single roof may cover one or more domiciles. The 1:250 resolution then enables very subtle differences in roof texture to be distinguished.

6.11.3 Attribute data

The socio-economic data captured is entered into an attribute table extracted from the cadastral and infrastructure attribute data tables (see complete set of original tables below). The socio-economic data types lie in the following categories: identification, planning, construction materials, infrastructure, domestic animals, gender by age, interview data and other survey related data. Table 6.2 provides a full listing of the data types translated from a DBF table definition file and from the socio-economic, physical-environmental research questionnaire constructed by the Companhia Urbanizadora de Belo Horizonte (URBEL). A number of the fields are repeated for further details. These complementary columns have been created for the following fields: equivalent use of lot, management of occupation of benefactor,

interviewee details: family position, civil status, occupational status, other sources of rent, alternative proof of length of time of occupation, other permanent residents, building material, sewerage, type of water provision, water treatment, garbage disposal, other animals bred and quantity, and other indicators/ institutes/ councillors.

A field is allocated to each type of building material constituting the walls- irrespective of whether there is one type of material (brick) which represents 100 % of the walls in nearly all cases. The same is true for the roof materials and the numbers of different animals present. In addition, for each roof material a field is dedicated for the state of conservation of that material - again irrespective of whether that material is present or not. Similarly, 12 default fields are created for the age/gender data - irrespective of the age and gender distribution characteristics of the favela. The result of this type of data population strategy is a large number of empty fields, which inhibits reading the files. The various options available for classifying the infrastructural data are discussed in the thematic section below. The interviewee details category is repeated as many times as the number of interviewees addressed. The tables, which were inspected, revealed an average of three repetitions of this set of data fields. A number of indexing fields are also repeated for each table. These include: region, module, nucleus code, number of cadastral stamp.

Table 6.2: Types of attribute data captured for the ViSP approach

CATEGORY	ATTRIBUTE DATA FIELDS
IDENTIFICATION	Region, modality, code of nucleus.
PLANNING	Sector, block, lot, number of domicile, cadastral stamp, ideal fraction, provisional address, definitive address, use of lot, area occupied, occupation of benefactor, property holder, time of occupation: years, months, proof of length of time of occupation, property of other permanent residents, total number of witnesses, name of witness number 1, address of witness number 1, number of other permanent residents, address of other permanent resident, number of rooms, number of persons in domicile.
CONSTRUCTION MATERIALS	Percentages of material constituting walls (bricks, mud bricks, wood / canvas / tin, other), state of conservation of material constituting walls (bricks, mud bricks, wood / canvas / tin, other), percentage of material constituting roof (ceramic tiles, masonry, fibreglass, metallic tiles, other), state of conservation of roof material, observations on construction materials.
INFRASTRUCTURE	Sewerage, light, type of water provision, garbage disposal.
ANIMALS	Quantity of animals (pigs, goats, horses, chickens, domestic, other).
GENDER & AGE	Number of males and number of females in the following age groups: 0-6, 7-12, 13-18, 19-30, 31-50, > 50 years old.
INTERVIEWEE	Interviewee: name, gender, age, nationality, family position, civil status, civil situation, profession, observation of profession, occupational status, rent, sources of other rents, value of other rent, schooling, capable of signing, document number, institutions participated by interviewee.
SURVEY / COMMUNITY PARTICIPATION	Validation of improvements requested by residents, institutions. Assisting community, councillors.
OTHER	Current minimum salary, researcher, date, field officer, reviser, date of revision, observations of researcher, observations of technician.

6.12 Data capturing techniques employed

6.12.1 Vector data

Two types of vector data are captured, namely topographic and cadastral data. The topographic data is captured in the field using land-surveying equipment. This equipment consists of an electronic theodolite, a distance meter and a data collection instrument. The topographic map represents the base map and is produced in an AutoCAD environment. The developers of the ViSP GIS system in Belo Horizonte confirmed that Microstation provides data capturing tools and other functionality superior to AutoCAD; however, they selected the latter software for two reasons. Firstly, there is a greater availability of skilled AutoCAD users in Belo Horizonte and secondly, the suppliers of the AutoCAD software offered a better software support deal.

The architecture of the database has been designed to meet the needs of both cartographic and GIS thematic mapping applications. In order to meet the cartographic requirements the vector outputs on a map must appear as simplified and realistic as possible. For example, adjacent houses utilising the same wall must appear to do so in the output. On the other hand, the thematic mapping requirements necessitate that each house be represented by a closed polygon. For this reason adjacent houses are individual digitised as separate polylines and subsequently closed to form polygons. The line work matching is carried out using the "zoom-in" and "stretch" facilities of the software.

Image files, which are digitised, using AutoCAD version 13, may be imported into AutoCAD version 12 for vectorisation. The vectorisation procedure commences by loading two overlapping geo-referenced image files (eg. 16-339 and 17-339, where the first no. refers to the photo number and the second to the flight number). The colours of both images are subsequently normalised /smoothed to range over 250 colour types. This is because AutoCAD can only recognise 250 colours. Each type of element has a predefined level. Once the digitising environment has been set up, the vector level to be edited or created is subsequently activated and the vector data capturing process can begin.

6.12.2 Raster data

The image processing techniques employed in the ViSP approach can be grouped into the following set of steps: 1) initial geo-referencing, 2) image calibration, 3) mosaicing and 4) clipping. Prior to the initial geo-referencing process, the raster data is converted from TGA format to TIF format, and subsequently to the Gheo GDE format. The Gheoraster software suite is used to geo-reference scanned aerial photographs on the computer screen. Subsequent to this, several points which have had x and y co-ordinates measured in the field are individually selected on the GDE image. The Universal Transverse Mercator co-ordinate system (UTM) is generally used in this process. Once the co-ordinate data has been edited, it is used to generate a surface of vector-based triangles by which the image may be geo-referenced. These are triangles that have vertices that extend beyond the boundary of the original image, and which will be used to link the image to an adjacent image. The software corrects the point by interpolating its new position on the image using the least squares method. During the geo-referencing process, the photo may or may not be corrected for elevation. This depends on whether elevation data is available or not. For the case where elevation data is not available, an elevation based triangular irregular network cannot be created. The number of control points selected for each image depends on the quality of the image, the area covered by the image, the flying height, and on the heterogeneity of the ground at that location. For an area of 800 meters squared, 11 points are indicated on the 35mm colour photo print, and is the basis for geo-referencing the image on the basis of location co-ordinates. It should be noted that triangular network generated during the geo-referencing procedure is based only on location and not elevation data. This triangular irregular network (TIN) model is referred to as a locational TIN model. The geo-referencing procedure enables the exact locations of points which have not been measured in the field, but which constitute the image, to be located via the triangular network model.

The first step in the image calibration procedure involves the production of a list of calculated co-ordinates in order to identify error points characterised by poor correlation values. Two methods can subsequently be applied to correct any error points. Firstly, an incorrect point can be shifted by trial and error in the four N / S / E / W directions and the changes in the error sizes observed. This can be

repeated with more defined correction orientations. Alternatively, measured points on an adjacent photo can be selected as the vertices of the triangles near the error point.

The mosiacing process essentially involves a collation of all the geo-referenced images for an area. Unlike the TNTMIPS (5.0) software, the mosaicing capabilities of Gheoraster enable multiple geo-referenced images to be viewed simultaneously and to be easily plotted. The mosaicing process requires that consecutive images display an average overlap of about 30 %. Without this overlap, the construction of the mosaic is impeded by edge distortions on the imagery. Once a mosaic has been created, the overlapping imagery is clipped. This procedure enables the file size to be reduced significantly. It also improves the continuity of adjacent images. The clipping process is carried out by constructing a polyline around the selected portion of the photography which is to be retained.

Locational TIN models have been constructed for the northern, eastern, and southern-most extreme parts of the Ventosa favela. Currently there is no on-line mechanism for monitoring the various data capturing projects that are on the go simultaneously. Several areas of interest have simply been "coloured-in" on an out of date base map.

6.12.3 Attribute data

The attribute data entered onto the system is initially collected using a well-structured field questionnaire. This questionnaire has been developed by URBEL and captures urban planning, infrastructure, legislation and socio-economic data. A CLIPPER software programme was written by Galvao (1995) to aid the conversion of the hardcopy information into a computer format. This programme covers only the socio-economic data. Otherwise the attribute data component of the ViSP GIS database is composed predominantly of only domicile related attribute data. A limited amount of infrastructure data indicating the level of services provided also appears. This is to be supplemented by detailed infrastructure and geological intervention data. These data capturing components of the CLIPPER programme discussed above have yet to be written.

6.12.4 Linkage of the vector and attribute databases

The linkage of the vector and attribute databases is a complex process involving the use of several customised routines. In the first instance, a programme is run to label the polygons. This programme is firstly used to construct linkages ("ligacoes") between the polylines/polygons on the base map and an ID table. Each block of the vectorised file is coded by three basic indices: 1) favela, 2) villa and 3) lot. Each polyline/ polygon has a label associated with it. Once polygon linkages have been constructed several Gheo line work cleaning and topology building routines must be run. The GEOCHECK routine[4] is run to check for polygons that are not closed. The GEOBUILD and GEOCLEAN commands are subsequently used to close these polygons and to create topology. An ASCII file is then created which can be read by Gheo. The GHEOLOAD command can subsequently be used to read this file. The ASCII file is then imported into the MapInfo programme, and a relational link or join is subsequently constructed between the ASCII file and the attribute code table.

6.13 Structure of the database

The complete database is essentially comprised of three types of data entities: 1) the cadastral and infrastructural vector data levels, 2) the cadastral and infrastructural alphanumeric data tables and 3) the socio-economic alphanumeric data tables. The cadastral and infrastructural database forms the set of base maps to which the results of the physical and socio-economic researches are attached. An examination of the following configuration files, associated with the data provided by AVSI (1996): GBUILD.CFG, GLOAD.CFG and GHEO.CFG, has been used to identify the structure of the current database.

The alphanumeric database follows a dBase III file format and an ORACLE database is used for relational database management. Previously, lots were used for the organisation of the attribute data. Currently, the domicile geotype is the feature which largely controls the data organisation. The attribute tables that are used on a regular basis are typically comprised of 121 (Senhor dos Passos) to 164 (Ventosa) fields of data. The number of fields is largely dependent on the comprehensiveness of the socio-economic and physical survey, and often appears to be too many in most cases. A group of 15 fields relates to each

[4] This is analogous to ARC/INFO's routines which checks for node errors such as pseudo-nodes, overshoots, undershoots etc.

person interviewed within a domicile. This group of fields is repeated within the database as many times as the number of people interviewed. Another source of data redundancy lies in the repetition of a large number of identification fields (municipal area, municipal code, favela, favela code, nucleus, nucleus code. etc), which is repeated for each table. Most of these fields are never used in the final thematic map production phase - so why waste processing time dragging these data through each stage of the process? In fact, the only fields of interest are the mapid/link field(s) and the fields, which contain the relevant attribute data. New tables are created by constructing spatial queries and relational joins between tables as the need arises. These techniques are often applied to consider relationships such as between the fields of domicile and infrastructural data. For example, in the case of evaluating water provision, the following tables (field/field..) are constructed through spatial queries: (water network / building).

An inspection of the GLOAD.CFG configuration file illustrates that the alphanumeric database is comprised [of] 21 original tables. New tables are derived from these data by the construction of spatial queries and through the application of relational joins (see above). Table 6.3 shows a listing of the attribute data types, with the abbreviations in brackets being derived from the original .cfg file listing. In cases where the original text could not be translated, the original terminology has been retained.

Table 6.3: Listing of the attribute data types derived from the GBUILD.CFG configuration file of 07 March 1995

nucleus (nu)	Municipal (mn)	region (re)	name (na), (ap)
municipal code (cm)	Regional code (cr)	nucleus code (cn)	nucleus type (tn)
area (su)	Perimeter (pe)	population (po)	average density /ha (dm)
average lot size (m^2)	gross medium lot (lb)	block code (cq)	public telephone (tp)
lot code (cl)	use of lot (ul)	interviewee (ne)	number of levels (ed)
number of domiciles (nd)	no. of occupants (no)	occupation type (ro)	declivity level/band (fd)
equipment type (te)	name (no)	road way code (cv)	segment code (tv)
road type (tv)	road name (nv)	urban hierarchy (hu)	favela hierarchy (hf)
pavement (pv)	Conservation state(ec)	type of domain(tf)	service domain (ex)
type of course (tc)	no. of civil buildings (ne)	building type (te)	number of levels (na)
reformed (rf)	risk (ri)	element type (te)	hole type (tp)
pole type (po)	dead-end type (bo)	waste type (tl)	
contour level (cot)			
water network code (wc)	Cadastral stamp (cs)	arrimo type (ta)	arrimo extension (ae)
tallus situation (ts)	cod_rede_agua (cra)	raster (r)	Infrastructure type (ti)
date emplaced (dp)	make (m)	type (t)	material (mat)
diameter (dia)	prof_posa (pro)	poz (pozzetto)	slide (s)
allocation date (da)	Lunghezza (l)	num_sdopp (num)	note (n)
fitter (posa)	Pressure (press)	stato_man (sta)	consumption (con)

6.14 Application of the database

6.14.1 Global plans

The initial aim of adopting the concept of "Global Plans" was to enable these plans to determine a set of urban guidelines and lines of intervention necessary for the consolidation of settlements (AVSI, 1996). By 1994 Global Plans had been drawn up in the Alvorada Programme for several regions involving about 5600 families. These regions included: Vila Sumare, Vila Tiradentes, Vila Sao Tomas, Conjunto Jardim Felicidade, Vista do Sol and Vila Marmiteiros.

The definition of the concept of a "Global Plan" as used in the Alvorada Programme documentation is not clearly defined in terms of the cartographic elements, which are typically included on such a plan. Two quotations from the AVSI (1996) documentation which best describes the purpose of the Global Plan are as follows:

> 'They are included as a base for reference within the context of a policy for progressive investment that proposes replacing a practice of timed intervention or unarticulated emergencies.'

and

> 'The Global Plan may be regarded as a stage in the development of a planned process that will guide the evolution of the settlement that comes from knowledge of the site and of its peculiarities as a preliminary step and as inspiration for future transformations.'

A further description of the concept of a Global Plan, developed later, can be quoted from AVSI (1998).

> 'The global area plan is the defining instrument for town-planning and social alternatives, necessary to the integration of informal settlements in the urban context.'

An attempt was made to more clearly define the components of a typical global area plan by inspecting several area plans produced by the Belo Horizonte ViSP GIS system. The global plans are generally plotted out at a scale of 1:2000 and illustrate features such as natural drainage, convergence points, primary, secondary and local alleys etc. The types of information illustrated in the global area planning maps generated in the ViSP approach are shown in Table 6.4. Essentially these maps show features that are of relevance to planning projects. These include features such as staircases and houses, cadastral stamp numbers, lot boundaries etc.

Table 6.4: Geotypes appearing in the global plans produced in the ViSP approach

STRUCTURES & URBAN EQUIPMENT	PATHWAYS & BOUNDARIES	POINTS OF INTEREST & PROPOSALS	OTHER AREAS OF INTEREST
Commerce	Limit of Vila	Convergence points	Renovation area due to risk
Service	Houses in risk area	Potential interest points	Probable renovation area
Leisure	Avenue	Relocation area	Maintenance area
Church	Vehicle roads	Proposed roads	
Final bus stop	Natural drainage	Ways linked to vehicle roads	
Public telephone	Access ways	Pavement	
Garbage depot	Contours	Renovated pavement	
Health centre	Principle ways	Removable way	
	Secondary ways	Proposed drainage	
	Local ways		
	Stairs		

6.14.2 Types of thematic maps

The cartographic outputs which are currently produced for the Alvorada project may be loosely classified into maps for urban analysis, area planning, and integrated programme maps. The urban analysis maps illustrates features such as the areas of lots and health services used at scales ranging from 1:500 to 1:1000. The concept of "global plans", which illustrate the diagnostics and upgrading proposals for a single informal settlement, also falls into the area-planning category (see section 5.8.2). The integrated programme category contains maps integrating various data types for planning purposes. For example, cadastral stamp numbers and other text layers are superimposed on the cadastral vector map, which in turn may be superimposed on the colour raster image used for digitising. Other maps produced include:

1. Detailed CAD-type plans at scale of 1:75. Contours are typically superimposed on the cadastral and detailed planning maps, and is of particular relevance to the favelas in B.H. as a result of the rough terrain.
2. Thematic maps represent single variables related the prevalent housing types in terms of the location and the nature of the habitation (ie. situated in: resettlement, insalubrious or risk areas, or areas with a slope exceeding 47%), and other variables such as the distribution of the population distribution classes.

3. Thematic maps which synthesise multiple variables related to the infrastructural services into categories such as: good, medium, bad, medium-good, medium-bad, other etc. (The ranking schemes applied are further discussed below.)
4. Thematic maps that synthesise multiple variables related to the housing materials and state of conservation into categories such as: good, medium, bad, medium-good, medium-bad, other etc.

6.14.3 Standard guidelines adopted for the production of thematic maps

A series of standard data category representation guidelines have been developed for the production of the thematic maps. The following section outlines exactly what features have been selected for thematisation and what data range categories have been selected to represent the data visually. Table 6.5, which lists the standard guidelines adopted for the production of thematic maps in the ViSP approach, has been drawn up by investigating the socio-economic and physical environment research questionnaire and a large number of thematic maps produced in Belo Horizonte.

LAND OWNERSHIP

The land ownership data consists of lot area information and data relating to the domicile. The lot areas are subdivided into classes according to the regularisation strategy adopted. The minimum sized lots received the greatest attention. For reference the value of the lots defined for the nucleus was also represented even though the strategy does not imply the regulation of this judicial figure. Finally, the legal values were also considered to regularise the maximum area. The values selected for the area range limits (ie. 80 and 125 m^2) are linked to the number of inhabitants in the area. The main area type categories and the ranges considered for the area and domicile data are shown in Table 6.5.

INFRASTRUCTURE

The infrastructural and sanitary conditions data is represented firstly on a per service basis and secondly as a map which synthesises all the infrastructural services information for a location. Each level of service option has been graded on a point scale. The values associated with each level of service are listed in Table 6.5. The ratings listed in brackets are often interchanged with 3=good, 2=medium, 1=medium/bad, 0=bad.

SOCIO-ECONOMIC

The socio-economic data consists of data specific to the inhabitants of each domicile within the settlement, and of data relating community participation issues. With respect to the community participation data, categories exist for indicating the communication channels through which the dwellers specifically vindicate improvements in the community (eg. Dwellers' association) and categories for other community groups dwellers may simply interact with.

CONSTRUCTION MATERIALS

Each type of wall building material is allocated a certain point value on a scale. The state of the buildings is subsequently evaluated by multiplying the material value of the wall by the percentage of which that value constitutes of the total dwelling.

Table 6.5: Standard guidelines adopted for the production of thematic maps in the ViSP approach in Belo Horizonte

Planning

- Management of property: documented owner (1), undocumented owner (2), rented (3), shared (4), other (5).
- Land use of lot (single- or multi-family residential/ commercial/services/collective services / industrial / mixed / open or vacant lot / others).
- Type of occupation (own with documents/own without documents/shared/rented).
- Acquisition time (up to 5 years/from 5 to 10 years/from 10 to 20 years/more than 20 years).
- Number of levels comprising the dwelling (1/2/3/>3).
- Risk (none/risk present).
- Number of domiciles on the lot (0/1/2-3/4-5/>5).
- Ideal fraction (present or yes = 1 / absent or no = 2).

Interviewee details

- Family position: head of family (1), husband/wife/companion/ (2), son/daughter (3), parent (4), lives alone (5), aggregated (6), others (7).

Land ownership

- 3.1 Area of lots (m^2): (0-40, 40-80, 80-125, 125-300, >300).
- 3.2 Ownership of lots: PROFAVELA municipal areas / private areas / State land.

Health services

- State hospital / polyclininc / convention clinic / other.

Domicile

- Time of occupation (up to 5 years, 5-10 years, 10 - 20 years, > 20 years).
- Number of rooms in total (1 - 3, 4 - 6, 7 - 10, > 10).

Infrastructure

- Sewerage: linked to the official COPASA network (3), linked to the non-official network (2), linked to the pluvial gallery (2), ditch or pit (2), mixed / others (1), lacking-open air (0).
- Sanitation: individual internal (1), individual external (2), collective (3), lacking (4).
- Light: CEMIG network (2), clandestine (1), lacking (0) Water: COPASA network / hydrometer (3), clandestine (2), others / mixed (1), lacking (0).
- Water treatment: water box with lid (3), uncovered water box (2), direct from network and not stored (1), drum (0), others/mixed (0).
- Garbage disposal: treated for collection (2), garbage deposit container, litter bin, incinerated (1), discarded onto: kerbs of public roads, waterways, dumps, others/mixed (0).

Socio-economic data

Occupants of domicile

- Number of occupants in the domicile (0-1, 2-5, 6-9, ≥ 10).
- Income per capita: (Minimum salary per person where the income per person = [total domicile income]/[number of people in the domicile]): (0 - 0.3, 0.3 - 0.6, 0.6 -1, 1 -2, >2).
- Density: Number of habitations per m^2 (0-29.6, 21.6-43.2, 43.2-69.5, 69.5-135, >135).

Community organisation

- Community associations used to vindicate improvements, eg. dwellers' association, known politicians, public power, religious institutions, do not vindicate, do not know, others/mixed.
- Other community participation groups, eg. dweller's association, religious institutes/youth groups /councillors, others/mixed, do not participate/frequent.

Construction materials and state of dwelling

- Construction material: brick (4), earth (3), wood/canvas/tin (2), other (1).
- The state of conservation of the construction material: (good=1/regular=0.5/bad=0.1).
- Cover: ceramic tiles: = 5, mud =4, amianto tiles = 3, metallic tiles = 2, other = 1.
- The state of the cover: bad (0-3), medium (3-4), good (4-5).

6.14.4 Other outputs

Other outputs produced by the GIS system implemented in the ViSP approach include combined raster-vector outputs, detailed planning maps and final diagnosis reports. The cadastral and topographic vector data layers are often plotted against the corresponding colour ortho-photos for illustrative purposes. For the final stages of planning projects, the street affected is mapped in detail, with all the cadastral and topographic data captured at a high resolution (plot and dwelling dimensions and so forth). All the hazard areas and the URBEL/AVSI upgrading proposals are illustrated. This appears as a pull-out map at the beginning of the report. The remainder of the report consists of a photograph, an architectural planning map, all the socio-economic data, and the characterisation / upgrading proposal for each dwelling along the street.

7. APPLYING VISP IN A SOUTH AFRICAN CONTEXT

7.1 Introduction

This research project took as its starting point a specific approach to informal settlement upgrading that was practised in Belo Horizonte in Brazil, and the practicality of applying that methodology in a South African context. As the research progressed, however, and different parties were drawn into the process, it became apparent that that there were wider issues that needed to be addressed by the project. The research had been based upon two key assumptions. The first was that the need for settlement upgrading through in-situ development was the most appropriate mechanism for the development of these settlements. The second was that the methodology used in Belo Horizonte was the most appropriate one for South African cities to adopt. Both of these assumptions were questioned by some members of the steering committee, who expressed concern as to whether this was a valid point of departure for the research. The feeling was that these assumptions were themselves substantive issues for debate, and that both should be explored further as part of this research project.

The social framework within which informal settlement takes place had always been considered an important facet of the research project. The previous chapter indicated that ViSP, although itself a 'methodology' in the narrow sense of the word, actually situates itself within a wider methodological framework, which integrates the social and technical facets of upgrading into a single programme. It was, therefore, an understandable view that this wider framework should be explored more fully. In the light of the concerns, and the points raised in the introduction to Chapter 1, this aspect was expanded quite extensively as the research progressed. In doing so, it incorporated a more detailed analysis of the basis of informal settlement upgrading, taking cognisance of the extensive work that has been done in this area internationally. This has resulted in a much deeper exploration of the context within which informal settlements grow and develop.

There are two distinct sets of issues involved in the contextual debate about informal settlements, and both are relevant to South Africa. The first is the debate about whether informal settlement upgrading should take place at all, and the second relates to how, if it does take place, it should be implemented. When this research began at the beginning of 1995, the only urban area to support settlement upgrading to any degree was Durban. In all the other major centres it was still the belief that the solution to the housing crisis in South Africa could be found through the provision of new housing. Over the period of this research, this view has been modified. Both Gauteng and Durban Metropolitan Area have adopted a limited informal settlement upgrading policy. But this is not universally accepted, and informal settlement upgrading constitutes only a very minor component of the National Housing Act. The need to strengthen this component significantly in the future will be discussed later in this chapter.

Whilst the principle of in-situ informal settlement upgrading is slowly being recognised, there is no single view on how such upgrading should take place. As a result, there are at least three different approaches being used in different areas. The one, practised by Gauteng and Durban, is constructed around security of tenure. The second, being explored by the National Department of Water Affairs and Forestry, focuses on water and sanitation, seeking to address the environmental health needs of the settlement. The third, suggested by the Peoples' Housing Process of the National Department of Housing, seeks to encourage communities to take charge of the process. This places the emphasis on human development processes rather than on the quantifying, externally, of specific 'deliverables'.

This research related to the application of ViSP cannot ignore these core issues, or the debates that underpin them. If they are not addressed, then the methodology that forms the basis for this research has no contextual basis in South Africa, and this then limits its potential for widespread adoption in this country. The only way in which the applied component of the research can deal with this issue effectively is to demonstrate the application of the methodology through a real application. This has been possible, and the methodology is currently being tested on a large scale pilot project in Cape Town.

As a result of these fundamental changes to the research programme, it was considered that the most appropriate way to deal with the research would be to present the findings in two separate reports. The first report, which is this one, deals with the wider policy debate on informal settlements, and concludes by demonstrating the importance of the ViSP approach, and the wider methodology pioneered in Belo

Horizonte, to South Africa. The second report then describes how this methodology works in practice, and set out a structured and systematic way, which will provide a guideline for its implementation in South Africa.

7.2 Developing an approach to informal settlement upgrading in South Africa: the core issues

As outlined in the introduction to this chapter, there are two distinct areas of policy debate with respect to informal settlements, the need for upgrading and the nature of upgrading. This section will deal with both of these in turn.

7.2.1 The need for informal settlement upgrading

This report has dealt extensively with the international debate on informal settlement upgrading, and has shown that it is now accepted as a viable means of dealing with informal settlements. It is also slowly being recognised as the most appropriate means. When South Africa began to develop its own housing policy after the first democratic election in 1994, it did explore this international policy debate to a limited extent. However, its primary concern was with formal housing delivery, and it tended to focus on some of the failings of formal housing delivery that have contributed to support for informal settlement upgrading, on the assumption that, if these could be overcome, settlement upgrading would not be necessary. The most important of these failings identified was the poor targeting of subsidies. In the majority of cases, while these may have been intended for the very poor, they were actually taken by those higher up the economic ladder. The evidence emerging from the implementation of South Africa's capital subsidy scheme is that it has addressed this issue well, and the capital subsidy is reaching its target market among the very poor. However, poor targeting of formal housing subsidies is not the sole reason for supporting informal settlement upgrading, and other factors, which are equally important, have failed to receive the same attention.

The reasons for this are to be found in South Africa's history. In terms of the broader policy debate, South Africa has tended to see itself as a special case. Firstly, the informal settlements have strong negative connotations, with echoes of apartheid. This is not necessarily linked to the informal settlements themselves, as the Apartheid State had a policy of clearing informal settlements as soon as they appeared. Rather it reflects the psychological importance of new housing as a reflection of the new government's commitment to a better life for those who suffered as the victims of apartheid.

Five years after the election however, as South Africa begins its second term as a parliamentary democracy, this policy needs to be reviewed. The original housing policy was designed around the elimination of the housing backlog over a period of time. This is not going to happen. Urbanisation in South Africa is now entering its most rapid growth phase, which will last for the next fifteen years at least. The delivery rate for new housing in South Africa cannot remove the backlog in housing and deal with the growth of informal settlements at the same time, no matter how impressive the figures for delivery might be. And this is not a regional situation. It applies to all the major metropolitan areas in the country.

As a result, informal settlements will continue to exist in South Africa into the foreseeable future. Hence the policy debate needs to be widened to take this into account. And this means drawing upon international experience. Once the subject is revisited in this light, the debate has to deal with all the factors related to informal settlement growth and development. This means addressing the following issues:

- *The need for a change to South Africa's current housing policy.* This need for change has two components. The first is recognition of the inability of the current housing policy to "solve" the housing crisis in South Africa, no matter how well intentioned this policy, nor how successful the delivery against production targets. Associated with this is the need, at all levels of government, to recognise that informal settlements will continue to grow faster than the government's capacity to provide new housing. The second component is that which takes much greater cognisance of international experience of informal settlement upgrading, and the lessons to be learnt from this. These have been described in the research, and are summarised in the bullet points that follow.

- A re-evaluation of the informal settlement upgrading versus sites and services debate, as outlined in Chapter 2. In particular, the underlying reasons why professionals and local authorities oppose informal settlement upgrading need to be taken into account.
- The changes that have taken place in the thinking of international agencies, and the reasons for this shift.
- The nature of informal settlements and their relationship with both the formal and the informal economy.
- The importance of social capital.
- The importance of social networks as mechanisms for survival and, later, for growth and development.
- The fact that shelter exists, no matter how poor it may be, has to be incorporated into an economic analysis of benefit.
- The disjunctive between the policy support for densification, compared with the de-densifying impact of new low-cost housing.
- The relationship between housing and transport. Many informal settlements are well located geographically. Land for low-cost housing is often on the periphery. As a result, moving people to new low-cost housing developments results in an ongoing transport subsidy. At the very least there has to be a national debate that incorporates all of these issues.

If all of these factors are taken into account, then international experience indicates that informal settlement upgrading will become a primary vehicle for the improvement of shelter conditions for this sector of society, leaving new housing provision as a vehicle for addressing other forms of overcrowding.

7.2.2 The approach to informal settlement upgrading

As mentioned in the introductory section, there are a number of different approaches to upgrading. Internationally the number of detailed case studies of informal settlement upgrading remains limited. However the are a number of them, and they provide important lessons and experiences. A total of nine case studies were identified that had relevance to this debate, and they were divided into groupings that reflected the prime mover in the process. This revealed that such projects have their origins in one of four groups: international agencies, governments (whether national, regional or local), NGOs and communities themselves (see Table 7.1). Belo Horizonte is not included, although this is a major case study, as this project is described separately in the body of the report.

Table 7.1: Settlement upgrading case study projects

Section	Project	Primary agent driving project
A3.1	Slum Improvement Programme, Madras, India	World Bank
A3.2	Lusaka Settlement Upgrading, Zambia	National government (partly World Bank funded);
A3.3	Integrated Slum Improvement, Visakhapatnam, India	Government developed approach (partly World Bank funded);
A3.4	Kampung Improvement Programme, Surabaya, Indonesia	Government initiated
A3.5	One Million Houses Programme: Community Contracts, Colombo, Sri Lanka	Government initiated, community-based implementation
A3.6	Community Action Planning: Community Land Regularisation and Blocking-Out, Sri Lanka	Community-based approach
A3.7	Orangi Pilot Project, Karachi, Pakistan	Community/NGO-developed approach
A3.8	Communidades Programme, Fortaleza, Brazil	NGO-developed approach
A3.9	Casa Melhor; A Community Fund for People's Housing, Fortaleza, Brazil	NGO-developed approach

The projects exhibit a diverse range of objectives. Lusaka provided one of the first attempts, internationally, at large scale upgrading. The primary objective was infrastructure provision, and external professionals took the major decisions. The project resulted in a large number of relocations, due primarily to the high standards of the services. Many of these problems were avoided in the Asian

experiences, although it is important to note the different circumstances. In all cases plot sizes are very much smaller, footpaths take the place of roads in many places, and people are prepared to live under much more crowded conditions. Even so the results of these case studies was mixed in terms of their long-term success. The Indian experiences show the inappropriateness of a prescriptive approach. Where government attempts to dictate the process the success is limited. However, it is important not to draw the wrong conclusions from this. Both the Indonesian and Sri Lankan case studies have strong government involvement. Of the two the latter is the most interesting. The Sri Lankan One Million Houses Programme is considered to be a major international showcase for community-based decision-making. Certainly community decision-making at the level of detailed planning and implementation is one of the highest recorded. Government, however, laid down the basic framework within which the decision-making would operate. What made it successful was that the planning framework was in line with the reality of the settlements. A strong community-based network was established, with a social support system funded by government, to agree this framework at a community level, following which community-based decision-making took over.

The case studies that are driven by communities themselves, or by NGOs working with communities, tend to follow a different approach. There is generally little holistic planning. Instead, specific activities are highlighted, often one at a time, which reflect the perceived priority needs of the community. Once the first of these has been addressed, or is underway, then the group moves on the next, and so on.

In addition to the case studies outlined above, there have also been other developments in the area of settlement upgrading. As mentioned earlier, both the Gauteng Provincial Administration and the Durban Metropolitan Council have introduced settlement upgrading policies, while the South African national Department of Water Affairs and Forestry is exploring the water quality conditions of informal settlements. When these are combined with the international case study experiences, a picture begins to emerge of different approaches to informal settlement upgrading, which can be quantified in terms of a key determinant that underpins the primary intervention. In total six of these 'determinants' have been identified, and these are discussed briefly below.

7.2.3 Formal tenure as a basis for upgrading

This is rapidly becoming the most popular determinant for upgrading in South Africa. In 1996, the Gauteng Provincial Administration produced a document, which identified the upgrading of tenure as the key element of an upgrading policy (Gauteng Provincial Administration, 1996:2). The overall objectives of the programme were:

- The extension of security of tenure to the occupants of informal settlements in Gauteng.
- The transformation of de facto existing relationships to land into formal land rights.
- Enabling beneficiaries to hold and enjoy benefits in land, without fear of arbitrary action by the state, private landowners or other institutions.
- The provision of land rights in informal settlements on a non-discriminatory basis (ibid.:4-5).

Following from this, 26994 sites in 11 informal settlements were identified to pilot the tenure upgrading project (Gauteng Provincial Administration, 1997). This move is now being followed by a policy shift in the Durban Metropolitan area in 1998, which is intended to make security of tenure, and tenure formalisation, the keystone of that city's informal settlement upgrading policy (Smit, pers.comm., 1999).

The tenure upgrading approach has some international support. An international conference of Professional Surveyors, held in Durban in 1997, argued strongly in favour of this approach. It has also been tried elsewhere, and was the pre-cursor of the ViSP-related methodology developed in Belo Horizonte. However, it ran into serious difficulties there and was abandoned in favour of the ViSP approach (see pp. 53-4).

The major problem with the tenure approach is its inflexibility. In order to provide formal tenure (ie. a title deed) to each property, the land must first be consolidated, and then sub-divided. Once it has been sub-divided and the individual title deeds registered, then the layout is fixed. If any changes have to be made subsequently, be it for public roads or for servitudes (rights of way), then negotiations have to take place with a large number of individual landowners, and a long and extremely complex process of negotiation follows, with no guarantee of success. It was this factor that led to its abandonment in Belo Horizonte.

7.2.4 Housing as a basis for upgrading

Housing improvement is often seen as the most important facet of settlement improvement. This is shown by the slant given to much of the literature that has been covered in this report. The South African Peoples' Housing Process also sees this as the primary issue. However, in the context of informal settlements this is misleading. There are a number of international studies that explore this focus. The Communidades programme in Fortaleza in Brazil is one of these. The FUNDASAL programme in El Salvador in the 1980s is another (Stein, 1990, Abbott, 1994). However, all of these are based upon a premise that infrastructure is provided in one form or another. There are no obvious examples of situations where the focus of upgrading has been on housing without any consideration being given to infrastructure provision. Hence housing per se does not constitute a dominant determinant of upgrading, although it will often be the key element in conjunction with one of the dominant determinants outlined above.

7.2.5 Water quality/public health improvement as a basis for upgrading

Informal settlements are generally characterised by over-crowding and unhygienic conditions caused by a lack of basic water and sanitation facilities. Hence it is reasonable to assume that provision of water and sanitation is a natural base from which to begin a process of incremental upgrading. However, when all the factors that determine the final layout of an informal settlement are considered, water and sanitation are the least important physical determinants of layout. All that is required is that sewerage can flow under gravity, and that only arises if there is water-borne sewerage.

This means that, in planning an upgrading logically, water and sanitation should be the last services to be installed[1]. This is not always the case, but it is important to understand the circumstances under which this condition no longer applies. Essentially, this is linked to two issues, physical risk and levels of service. For the installation of water and sanitation as the first upgrading step, then position of the shacks will need to be fixed (i.e. no internal shack movement or relocation is planned).

7.2.6 Infrastructure provision as the basis for upgrading

This is the approach adopted in the Lusaka and Madras case studies. Like the tenure option, its primary objective is the formalisation of the settlement. In this case, however, the reasoning is that of development professionals, and seeks to follow the housing development process followed by new developments in Greenfield sites. It is probably the least successful of all the different approaches. The reason for this is that it imposes a large financial burden on the occupants without necessarily addressing their own needs. The result is generally a poor recovery of the investment (which is the primary measure of success in this approach) and a subsequent deterioration of services.

7.2.7 Community choice as a basis for upgrading

The term 'community choice' means that the residents of the settlement have total control over the upgrading actions, which comprise not only what actions will be taken but also when and how. In other words, the sector targetted for improvement will not always be the same for each project, but will be determined by the community. The first development of this approach was in Sri Lanka, grew out of the Million Houses Project, and led, in turn, to the development of what became known later as 'Action Planning'. This later developed into a methodology for professional planners[2], which enables them to support communities in the formulation of a community driven planning process for their areas. However, there are two issues that are often overlooked by people who support this approach. The first is that government plays a key role in establishing a policy framework for the programme. The second is that there are a number of factors associated with this approach relating to issues such as complexity, relocation and the level of physical risk.

A more valid example of how community planning evolved in an informal settlement environment is the Orangi project in Pakistan. This began as a low-cost sanitation project, where the residents laid sewers themselves as the first step in the upgrading. This has now been used as an international case study supporting a community-driven approach to settlement upgrading in which communities take full responsibility for all aspects of upgrading. As mentioned earlier, the process is considered paramount in this approach. Where external support is required this is provided by NGOs, while local authorities and built-environment professionals are considered to be secondary actors. This approach is extremely relevant to South Africa at the present time, as it is the approach recommended by the Peoples' Housing

[1] A distinction should be made between emergency services and final services. This discussion refers to the latter.
[2] See Hamdi and Goethert, 1996 for a detailed description of this planning approach.

Process within the National Department of Housing. The only difference in South Africa is that residents are encouraged (by means of government grant allocations) to place their primary focus on housing.

7.2.8 The integrated approach to upgrading (The 'Plano Global' of Belo Horizonte)

This is the approach followed by Belo Horizonte. At the same time, however, there are also key aspects of this same philosophy underpinning the Sri Lankan Million Houses Programme, as well as the Indonesian Kampung Improvement Programme in Surabaya. This approach takes as its basis the inter-related of all human activities operating at the level of the individual settlement. Development is then based upon all of those being addressed. Where the Belo Horizonte experience differs from the Sri Lanka experience is in the ensuing methodology. In Sri Lanka, once the basic, and very simple, development guidelines had been set out (National Housing Development Authority, 1988), then the detailed planning and implementation took place through the community choice methodology. In Belo Horizonte, and similarly in Surabaya, the different components were all carried forward simultaneously. Thus in Sri Lanka the primary intervention was via a community development type support system. In Belo Horizonte, it was through both a social support network and a sophisticated local government/NGO professional team. The integrated approach therefore seeks to map and progress all facets of the upgrading process together, and this is what makes it different from other approaches. It also requires a more complex methodology.

7.2.9 The constraints affecting different approaches to upgrading

The approaches outlined above can all be applied, with varying degrees of success, to the upgrading of informal settlements. However, nowhere is there an analysis of the conditions that make a particular approach successful. This section will outline some of the conditions that affect the success or failure of the different approaches.

There are three major factors that determine whether a particular approach can work. And here the term 'factor' relates to externalities. It is taken as a pre-requisite that all have full community involvement. The three factors are the physical nature of the settlement, the physical risk attached to the land on which the settlement is constructed, and the levels of service provided, which, in turn, is linked to user expectations.

a. The nature of the settlement

By the 'nature of the settlement' is meant the spatial relationship that one dwelling has to another. It is useful in the first instance to begin this discussion in South Africa, before widening it to the international arena. Informal settlements in South Africa can be divided into three broad categories. The first is low-density peri-urban. The Winterveld area, to the north-west of Pretoria is a good example of this type of settlement pattern. This is particularly South African, and a product of apartheid. People were forcibly relocated from urban area and literally "dumped" in the nearest "homeland", which in the case of the Winterveld was Bophuthatswana. Because there was a large amount of land available, densities were relatively low, and certainly less than the gross densities used for conventional formal low-cost housing developments (30-35 dwellings per gross hectare). Under these conditions, virtually any upgrading approach can be used successfully.

The second is typified by those settlements to be found on the outskirts of Durban, often outside the Metropolitan boundary. Here people from the rural areas moved onto tribal land on the outskirts of the city, where they were unaffected by apartheid laws. Yet they were close enough to the city to make the area attractive for settlement. The difference to the first is that the area is better located, and people move there of their own accord (which is not to say that it is their preferred choice). As a result densities tend to become much higher than in the previous case. However, expectations are low in respect of service levels so that basic levels of service are often appropriate and acceptable. This minimises the disruption and allows more scope for a range of approaches to be applied.

The third type of settlement is that of land invasion on pockets of land that lie within the municipal boundaries. Often these pieces of land are strategically located, but they are also physically marginal (the majority of the cases), or kept as public open space. In a minority of cases the land will be privately owned and planned for higher income residential or commercial development.

Comparing this to the international situation, there are similarities with the last two settlement types. The growth and development of informal settlements is different in the cities of Latin America, East and

Southern Africa, and the Indian sub-continent. In Latin American cities the dominant settlement condition is that of invaded land within an urban boundary (type 3). The difference with South Africa is that of housing patterns. Thus, whereas South African settlements have single storey detached shacks, the buildings in Latin America tend to be much more integrated, both in terms of common walls and differing levels.

In African cities, the majority of informal settlements formed on the periphery of the urban area take the form of a doughnut around the city. Over time, the municipal boundary was extended to incorporate this new growth. As a result they tend to be far more extensive in area. Otherwise the dominant dwelling form is similar to that of South Africa, namely single detached dwellings.

The settlements in the cities of the Indian sub-continent fall somewhere between the two. They are generally within the municipal boundary, but can be extensive in area. They are sometimes individual single storey dwellings and sometimes two-storey dwellings with common walls. In the first instance also, their proximity to one another reduces spacing to a minimum. The major difference here is one of housing density, with the area allocated to a dwelling being far smaller, on average, than in the other two cases. The Sri Lankan project, for example, has an average plot size for the single dwelling option of $50M^2$. As a result, both the Latin American settlements and those of the Indian sub-continent tend to have population densities that are far higher than in South Africa. As mentioned earlier (see page 47), the settlements in Belo Horizonte average 400 persons per hectare, but can go as high as 1000 persons per hectare.

b. The physical risk

Because informal settlements are unplanned, they will always suffer a larger degree of physical risk than do formal settlements. The major issue with respect to upgrading is whether the degree of risk is sufficient to warrant a degree of re-location, whether this be internal relocation or away from the site altogether. In this respect, settlement formation by land invasion carries the greatest degree of physical risk. African urbanisation rates are relatively low, at around 30%. Hence there is often space to grow. Under these circumstances, the major concern is the loss of good arable land. With land invasions, strategically located land is scarce. If there is any land available it is because it is protected open space, or because it was difficult land to develop. As a result, the land is likely to have a higher physical risk attached to it. This in turn increases the likelihood of partial relocation. The nature of settlement growth in Latin America, with its infill development on physically marginal land, means that physical risk is a major issue. This appears to be much less of a problem in the Indian and Sri Lankan cases, although it was again a major factor in the Indonesian case study.

c. Levels of service

The chosen levels of service are a crucial element of informal settlement upgrading, and this is where the difference between informal settlements in Latin American cities and in the cities of the Indian sub-continent becomes most apparent. Foremost among these services is access. Informal settlements in both regions are characterised by a network of paths, but these will generally be wider in Latin American cities. In addition, the latter will also have a larger network of roads. This is made possible by the spatial relationships described earlier. The informal settlements of the Indian sub-continent couple very small plot sizes with an acceptance of more basic services, not only in roads but also in water supply and sanitation. The greater use of bicycles is also an important factor. Finally, there is the issue of poverty. The level of poverty in informal settlements in the Indian sub-continent is far greater than is the case either in Brazil or South Africa, and this impacts upon the levels of expectation in the different areas.

7.2.10 Comparing the different approaches to upgrading

The issues raised above demonstrate the importance of looking at informal settlements in their totality. The approaches that are sector specific cannot do this. This is not to say that they will always fail. What it does say is that, under conditions where a variety of site-related factors need to be taken into account, then sector specific approaches will be inappropriate. Translating this into the South African context, the broad settlement classification described earlier can be used as a basis for determining the appropriateness of different approaches. Thus, for example, it is likely that all of the approaches described above can probably be applied with reasonable success to settlements with the following characteristics:

- Relatively low densities.
- Land where there is no significant physical risk.
- Where there are no conflicting demands upon land use.
- Land that can be serviced at a basic level of service.

These characteristics can, therefore, be interpreted as pre-conditions for the use of sector specific upgrading strategies (approaches). These characteristics will be a feature of virtually all South Africa's peri-urban settlements (such as the Winterveld) as well as to many peripheral developments such as exist outside the Durban Metropolitan boundary. And even where one characteristic is absent (e.g. densities are relatively high) sector-based approaches may still be appropriate if all the other characteristics are there.

However the situation changes substantially when it comes to dense infill settlements. Here, the nature of the settlement is generally such that at most one of the characteristics is applicable. Under these conditions, sector-based approaches are inappropriate. Under these circumstances, there are only two approaches that are suited to dense urban settlement upgrading. These are community choice and the fully integrated approach. However, the use of the first needs to be clarified. The approach adopted in the Orangi project is unlikely to be successful in South Africa, because it does not address the issues outlined above. Specifically, it fails to deal with the issues of risk and access. The latter, in particular, is of major importance in South Africa, where road networks rather than footpaths constitute the dominant access form. Furthermore, physical risk is a major factor in South Africa's urban informal settlements, just as it is in Brazil. Hence the need to accommodate these two factors can result in the need for substantial relocation among residents. This may take place within the settlement or from inside to outside, but it has to be dealt with. Thus the community choice approach can only work if it deals adequately with this issue. Furthermore, in prioritising activities, it has to take into account the full range of development options, even though it may choose to develop these one at a time. What all of this means is that there has to be a modification to the community choice approach that recognises the importance of all the factors likely to influence movement within the settlement.

7.3 Applying ViSP in the Cape Town upgrading approach

7.3.1 Reasons for modifying the Belo Horizonte approach

The purpose of the research was to verify whether the Belo Horizonte approach to upgrading was relevant to South Africa. The answer to that question is mixed. The underlying elements of the approach are valid. However, it is the conclusion of the research programme that the way in which the complete methodology is applied cannot be moved from Brazil to another country as it stands. There are a number of reasons for reaching this conclusion. The first is the influence of other international experiences of upgrading. In this regard, the Sri Lankan Million Houses Programme is probably the most important. This has valuable lessons for South Africa, which need to be recognised and integrated.

Secondly, there are a number of important differences between South Africa and Brazil that need to be taken into account when developing an informal settlement upgrading strategy for South Africa. The first difference relates to the specific relationship that exists in many peoples' minds between apartheid and informal settlements. A large majority of informal settlement inhabitants are African people, who constitute the majority of South Africa's population. Hence upgrading has to be wary not to be perceived as something that is only applicable to African people, thereby indicating that upgrading is a continuation of apartheid under another name. Allied to this, some decision-makers view the informal settlements themselves as a legacy of apartheid. These people would measure the success of delivery by, among other issues, the decline of informal settlements in urban areas. Whilst both of these perceptions are understandable, it is important to recognise that informal settlement growth is be expected in a country of South Africa's socio-economic profile and rate of urbanisation. This needs to be recognised but it should always be sensitive to the devastating effect of the country's political legacy.

The second difference is at the level of policy. The upgrading of informal settlements in Belo Horizonte is based upon satisfying the needs of the PROFAVELA Law. The driving force behind settlement planning in South Africa is the housing subsidy. The two are very different. The first favours informal settlement upgrading, the second new housing delivery. Brazil moved away from the latter more than ten years ago. However, in South Africa, this means that there is still a major hurdle to be overcome in having the

policy of upgrading accepted. The third difference relates to the nature of housing. This issue is discussed in more detail later in the chapter.

The fourth difference relates to service delivery and service levels. This covers a different aspect to that described in sections 7.2.4 and 7.2.5. In Brazil there is an extensive network of utility companies responsible for providing water, sewerage and electricity. The policy of these utilities is to provide services as part of the upgrading process, and these will be provided to every house. The municipality will then supply roads and stormwater drainage. Roads will be constructed for two-way traffic, but the road reserve will be much less than is the case in South Africa. In terms of the level of service classification, these services lie between intermediate and full. The situation in South Africa is significantly different. In its development of a municipal infrastructure investment framework for South Africa, the national government recognised the need to provide different levels of service, and accepted the three-tier system, whereby service levels are described as being either basic, intermediate or full. Depending upon the level of service chosen, and the settlement type, this may reduce the need in some cases for a fully integrated approach of the Belo Horizonte kind.

Finally, there is the recent experience of Belo Horizonte itself. This is not a difference per se, but it constitutes an important reason for modifying the approach. The comprehensive integrated approach described in Chapter 6 is extremely resource intensive (the cost is approximately US$4 500 per site), which is not sustainable when applied to all the informal settlements in South Africa's major metropolitan areas. Hence there needs to be some way of modifying the approach that reduces the demand on financial resources without changing the principles underlying the approach.

7.3.2 Applying ViSP in a South African context

It was stated earlier that ViSP provides the technical GIS base for a wider methodology, which has been termed the Belo Horizonte approach. The validity of ViSP remains, even if the broader methodology is changed. In fact it will be argued here that, with advances in geo-spatial information, ViSP should become the common basis for all informal settlement upgrading. Computer technology was not used in the Sri Lankan programme, yet that programme was very effective. However, this chapter has tried to show that the Sri Lankan approach may not be applicable in areas where there are greater physical uncertainties and greater access requirements.

The use of ViSP in Belo Horizonte is based upon the need to understand, and then to change, spatial relationships between dwellings. Again, such changes took place in Sri Lanka and in Indonesia without GIS. There GIS would probably have made the process easier to implement, but it was not essential. But again there is the issue of complexity and change. The situation in Sri Lanka, with respect to mobility among the informal settlement population, was different. Currently in South Africa this level of mobility is high. Hence a primary reason for using a GIS-based spatial system is to relate the people (and their dwellings) to the physical site that they occupy under conditions of spatial change.

Finally there is the development process itself. New (greenfield) housing development ends with a township layout, but it begins with an analysis of topology and ground conditions. The importance of these remains with informal settlements, and is probably even greater, simply because people are already occupying the site. Under these circumstances, a spatially referenced map, which shows all the dwellings, provides a linkage between the dwellings themselves and the physical factors that are likely to influence whether or not the occupants can stay in their dwelling. This is arguing that, as Gauteng and Durban have realised, security of tenure (which does not necessarily imply title) is the basis for further development. The ViSP system provides the basis for identifying who might have to relocate. If those who have to relocate are guaranteed a new site, either within or outside of the settlement, then this provides a foundation for sustainable upgrading of the settlement. There are a number of factors that might require dwellings to be relocated. These are as follows:

- Bad ground (this could be an unstable slope, a flood prone area or a fault in the underlying ground).
- Existing servitudes or rights of way.
- Competing claims for ownership.
- The need for public or social services.
- The provision of access routes.
- Changes in the house clustering pattern.

Much of the data needed to define these factors may be obtained from records or site surveys. However, these alone will be inadequate. They also need to be linked to socio-economic data relevant to the residents of the settlement. A new development area rarely has an identifiable community. Hence planning is done by defining the area in broad socio-economic terms, through a combination of selling prices and the provision of residential amenities and services that are linked to affordability (via broad-band socio-economic grouping).

Informal settlements have a defined target community. Hence it is not only possible, but necessary, to match the development to that specific community. This means community decision-making. However, communities need information if they are to make decisions. Hence a socio-economic survey becomes the second core component of ViSP. This in turn is linked to the GIS though a database management system (DBMS). Yet if such a survey is to be both comprehensive and accurate, it can only be obtained by the community themselves. Hence an integral component of ViSP is the full involvement of the community in the process of upgrading the settlement. If it does not, it is likely to fail. At the same time, it is important to recognise that ViSP is based upon information technology, and that this is powerful. This technology, if applied improperly, can be used to further exclude and marginalise communities.

Once the different surveys (aerial, technical, socio-economic) have been carried out, then physical, social and economic information is either attached to, or overlaid on, the plan showing the layout of the existing dwellings. From there any number of thematic maps can be produced which provide the basis for future decision-making. It is argued here that this phase of the work, leading up to the generation of a spatially referenced map complete with all attribute and non-attribute information, should provide the basis for all informal settlement upgrading. It is then possible to move forward in a number of ways, all of which lie on a continuum that reflects the possible development areas for the settlement. The next section looks at these areas and sets out some basic parameters that highlight the issues that need to be addressed within each of them.

7.4 Applying ViSP within a broader methodology

ViSP provides the foundation from which upgrading takes place. The Cape Town methodology takes this foundation, and then identifies all of the different developmental elements. To date, 16 key elements have been identified, which can be classified or grouped within three broad categories. The first category covers elements 1-5, and deals with policy. The second category covers elements 6-11, and deals, broadly, with land allocation. The third category covers areas 12-16, and deals with more specific issues of detail that provide benefits primarily to the individual families.

i. Principles guiding the relationship between different actors.
ii. The role of the community.
iii. The nature of external intervention.
iv. Gender.
v. Relocation policy.
vi. Tenure.
vii. Identification of physical risk and areas of contested land use.
viii. Access
ix. Levels of service.
x. Plot definition.
xi. Public open space.
xii. Economic development opportunities.
xiii. Physical infrastructure provision.
xiv. Housing.
xv. Social services.
xvi. Health and physical environment.

These different aspects are discussed briefly below.

7.4.1 Principles guiding the relationship between different actors

The current approach to housing and infrastructure provision in South Africa is based upon greenfield site development. This follows a set of planning and engineering norms and practices, and which

operates within a well-defined regulatory framework. Whilst this approach may be criticised, with some justification, as being top-down, it does nevertheless provide a workable methodology that has been proven over many years.

In-situ upgrading, on the other hand, deals with something that already exists. If work is to begin in this area, then the project must begin with an analysis and an understanding of what it is that exists. This means understanding the settlement; understanding the social dynamic of the settlement; and understanding what it is that makes the settlement a vibrant human experience. It is important to know how people live and work; how these and other issues are linked to the way in which the settlement is structured; what are the problems that people face in their daily lives, and how these can be improved.

In addition, the experience from Brazil indicates that settlement upgrading, in-situ, only succeeds if it is based upon strong, articulated, community demand. One problem in South African cities is that many residents do not even know that the option of in-situ upgrading exists, or what it entails. This was the case in Cape Town, where, until now, residents have been forced to accept removal to a peripheral site and service scheme with core housing as the only option available. Now that an alternative of in-situ upgrading is becoming known, this is receiving increasing support among communities in the city.

These are important issues when it comes to defining the roles of different actors and the relationship between them. As mentioned earlier, there are a number of different settlement typologies within South Africa. The settlements that are covered by this methodology are dense urban settlements, ranging from 60 to 200 dwellings per gross hectare (ie. including the paths, roads and other interstices). At the same time, the settlements themselves are generally situated on land that is considered marginal in terms of its development potential. The nature of this physical marginality will differ from place to place, depending upon the prevailing geological and hydrological characteristics of the area. Whatever the nature of this physical marginality, however, there will generally be a high degree of physical risk attached to staying in the area permanently. This means that the upgrading will involve some relocation and perhaps even some re-grading of the land. This calls for partnerships to be established. The Belo Horizonte experience indicated that, when left alone, the local authority and the community tended to polarise and take up different positions on these issues. The role of the NGO, AVSI, was that of broker and independent analyst. This in turn led to a three-way partnership. This format has been adopted on this project, with the three groups involved in the pilot study being the communities of Kanana and New Rest, the City of Cape Town, and the University of Cape Town.

7.4.2 The role of the community

Based upon what has been said above, the community is a full partner in the development process. However, this raises a number of issues, which are well known in the community participation debate. For example, who is the community and how are they to be represented? This process addresses those issues in a particular way. It is also recognised that capacity building and community empowerment are central facets of the process. But the existing deficiencies in these areas cannot be instantly rectified. This will take some time. The role of the independent agent is crucial during this period. The important issue, though, is to establish the principle of partnership at the beginning. Hence this type of upgrading is not a process controlled by the community in isolation, nor is it a project controlled by the local authority, however well-meaning that authority is. Instead, it needs to be a full and equal partnership between the two.

7.4.3 The nature of external intervention

The methodological framework is a tightly structured one, based upon a formalised social interaction between the project team and the whole community. This operates on two levels. The one level is that which deals with the involvement of community representatives, while the other deals with the involvement of the whole community. In any community project, the greatest challenge is gaining the active involvement of a large proportion of the community. Inevitably certain people come to the fore who have a specific interest, and these people then become the representatives in whatever process is taking place. With in-situ upgrading it is crucial that every single family becomes involved. To achieve this we have taken an approach that involves the use of full-time community workers, accountable to the wider community. These community workers operate, in turn, under the auspices of professional social workers specialised in community development. One community worker is allocated to each 300 shacks (in the ideal situation).

There are a number of reasons for this approach, some of which are described later. Essentially, however, it is a mechanism for involving all members of the community in the process, both in terms of information sharing, and in terms of decision-making. This is a system, which recognises that every person in the community has two sets of interests, one individual and one collective. With this system both are addressed. This aspect of the methodology is similar to that in Belo Horizonte. At the same time, however, it confirms South African experience gained over a long period of time on community-based projects in a number of different areas of South Africa. These include the Winterveld (Abbott, 1989) and KwaZulu-Natal (Abbott, 1993; 1996).

In order to ensure the growth and development of the type of meaningful partnership described earlier, it is necessary to provide an initial budget for committee training and development. This is geared towards the establishment of a management structure controlled by the community, which will take full financial and operational responsibility for the project.

7.4.4 Gender

The role of women in the project is crucial to project success, to equity in accessing project benefits, and to counter the historical imbalance that currently favours men. It is a central tenet of the methodology that women be given full recognition and the maximum opportunities. Thus their involvement has to be seen holistically and incorporated into every facet of the project. This means addressing the issue in a number of different ways, which encapsulate the full extent of the decision-making opportunities opened up by the project. Four specific areas are highlighted here.

- *Access and integration*

In poor urban societies, it is most often the women and the elderly who are marginalised. The use of community workers, described above, to access each and every household and involve them in the basic level of decision-making is intended to ensure that those who would normally be excluded are involved. One thinks specifically here of single parent families, whose time pressures and level of poverty preclude their involvement.

- *Addressing the needs of women*

Decision-making processes in South Africa tend to be dominated by men, who bring their own agenda. Yet women will often see development from a very different perspective, which is generally grounded much more in pragmatism rather than power and opportunity. The survey should have a specific section devoted to quantifying these needs. What are the priorities expressed by women? How do they perceive that their needs can be met? What are the particular economic activities that they are involved in? By acquiring this information and ensuring that women input into the decision-making process, the project is likely to be more balanced and have a greater likelihood of succeeding.

- *Spatial planning*

The third area links to planning and infrastructure provision. A central facet of the project is community choice of site boundaries and of infrastructure. The needs of women should be central to these decisions. A good example here is access. Currently access is designed for those with motor vehicles. Yet the largest number of trips to and from an area involves women and children. A second example is that of space. In conventional developments there is little or no thought given to the use of space. The result is that women are not only marginalised but also spatially isolated. The needs of women will be paramount when decisions are taken around the issue of space.

- *Community management structures*

This is a community project. The capacity of those practising external intervention is limited, and rightly. In this case, the external group can draw the attention of the community to the above issues, and include appropriate sections in the survey. But ultimately the decisions will be those of the community. If women's needs are to be met, then women must be fully represented on the decision-making committees. The training programmes for the committees should pay special attention to the needs of women, to ensure that they are not excluded by default. Their involvement at this level should be actively encouraged and supported.

7.4.5 Relocation

This is the first item of detail in the methodology. In-situ upgrading at this density cannot take place without some relocation. This provides an immediate test for the partnership policy, since any relocation

can only be successful if there is full co-operation from the community. The way in which the basis is laid for this to occur is the prior establishment of a minimum relocation policy. This policy states that no person will be relocated except through consent and on the basis of a need driven by either risk, access, or another community defined need. Allied to this is agreement that any relocation will, in the first instance, take place within the boundary of the settlement. Any relocation outside the area must be as close as is physically possible, geographically, to the settlement. This means the simultaneous development of all components of the project.

Such a policy then raises two other critical issues. The first of these relates to occupancy of the site. This policy can only work if there is a degree of stability within the settlement. It cannot, for example, work in settlements that are still in a rapid growth phase. So while the technical component of the methodology can tolerate a small amount of additional growth during the upgrading, this is limited. The second issue relates to plot size. There are no formally agreed plot sizes. Instead, plot size is determined by the boundaries that can be defined between existing dwellings. On the other hand this needs to be limited. Experience from Brazil indicates that this is best done by defining a maximum to minimum plot size ratio. However, this should also accommodate those within the settlement who are being moved from their existing site.

7.4.6 Tenure

The starting point for the upgrading process is that the shacks are already owned or occupied. Given that an objective of the upgrading is security of tenure, this immediately raises questions about the nature of ownership (e.g. how to deal with multiple plot ownership; what policy to adopt towards tenants). This is particularly relevant given that the upgrading will be operating within the context of the capital subsidy scheme. This is less of a problem with respect to income levels than it used to be, given the recent changes in the income eligibility rules. But the issues mentioned above are problematic, as is the presence of non-South African citizens. Hence, if upgrading is to become an integral part of national housing policy, it is going to necessitate changes to the subsidy process.

7.4.7 Identification of areas of physical risk and/or conflicting land use

This is a major reason for relocation, whether this is internal or totally away from the site. However, with this methodology it is no longer acceptable to dismiss entire settlements as being unsuitable areas for development. Having said this, it also needs to be recognised that, as mentioned earlier, the majority of informal settlements are located on marginal land of one type or another. Furthermore, this marginality represents a physical risk to members of the community. This requires that there be a much more detailed physical analysis of the site than is the case with a greenfields area, and the community must be fully convinced by the technical arguments. There should also be alternatives described wherever possible. This approach requires a much greater level of involvement on the part of professionals than is normally the case in new developments. Risk analysis and risk management become key components of the management plan, and often require new strategies to be developed to deal with the problems encountered. They also demand a more flexible approach on the part of the local authority.

7.4.8 Access

A second major reason for (primarily internal) relocation is that of access. Dense informal settlements tend to minimise the space allocated to access, often to as low as 5% of the site. This compares to a figure of over 30% allocated to road reserves in a low-income greenfield site. Clearly this represents a major difference of perception of the use of access between different parties, while use of the latter figure would result in the relocation of a substantial proportion of the population. Agreeing equitable access, which provides a compromise between need and availability, is therefore a major component of the methodology. Under these circumstances, different levels of access have to be used, and recognition needs to be given to the low level of car ownership. This means that access needs to be planned for people rather than for cars.

7.4.9 Other determinants of relocation

These additional determinants of relocation fall into two categories. In the first instance, there may be some problems around land use that do not fall into the category of risk, yet still impact upon where people can live. Two examples of this are servitudes (rights of way) associated with existing

underground services and areas of land that have already been allocated for social services (eg. schools, clinics). These types of situation can only be dealt with through negotiation.

A second important aspect that falls into this category is that of space. Greenfield development is driven by land use planning determinants. Yet this has not featured here. The reality of upgrading is that land use planning plays a much smaller part in informal settlement upgrading. In addition, many informal settlements are in-fill developments, which means that the residents can use facilities in adjoining area. In some cases, planning norms may indicate the need for such space. These norms will need to be placed before the community for discussion and debate, particularly if they will result in substantial relocation. If they do not receive approval then they do not happen. At the same time, the definition of site boundaries can still involve discussions on the use of communal space, which may then result in some repositioning of shacks. But this would be a decision that is taken by the residents involved.

This is not to say that space, and the use of space, is unimportant; it is not. The effective use of space is a central feature of the methodology. The main point that is being made here is that the approach must be dictated by what already exists, and fit within the minimum relocation strategy. Debate on the use of space needs to be linked to the debate on local level access, and integrated with the planning of local access. It should not be determined by the perceived needs of external professionals or local authorities.

7.4.10 Public open space

This is an area where the western perception of public open space needs to be completely rethought. In a Brazilian Favela, as in South Africa, public open space that exists simply in order to meet a zoning requirement represents space for more shacks. This is demonstrated clearly by the growth of informal settlements in Khayelitsha in Cape Town. In Brazil, if it is necessary to retain a piece of land free of housing, then it is often landscaped and turned into a football field. This will then be kept free of housing by the people themselves. The point here is that the space is satisfying a need determined by the people. This has to become the practice in South Africa.

7.4.11 Plot identification

The identification of plots is clearly central to the success of the upgrading. The project team has to make decisions on access and areas of risk. This defines the number of families who need to be relocated. Space must then be found for them. At the same time, there needs to be an agreement between neighbours on the boundary lines between properties. It was mentioned earlier that this form of upgrading does not use regular plot sizes. Therefore the definition of site boundaries is something that occurs through a process of negotiation between shack owners. The community workers play a crucial role in this process.

The approach to plot identification follows a specific procedure. Firstly, the principle on which the definition of plots is determined is agreed at a settlement level by all shack dwellers. Then the area is broken up into small sections or neighbourhoods, and the community workers work with the groups in these areas to establish area committees. This defines the level of detailed discussion and negotiation. Finally, different boundaries are tested and then confirmed.

7.4.12 Economic development opportunities

This begins the third component of the methodology, which deals with those aspects that benefit individual families. Prior to this the focus has been on collective activities.

There are three important components to the delivery process. Two of these, namely housing and physical infrastructure, are well recognised. The third is rarely recognised. And yet it is in many ways the most crucial. This is economic development. Failure to address this issue adequately is a weakness of virtually all previous upgrading schemes, although in the case of Belo Horizonte the extensive social survey and analysis did allow this to be taken into account. There, however, the focus was on access to formal employment.

A characteristic of informal settlements is the large number of people working in the informal economy. If the upgrading is to contribute towards the creation of a sustainable settlement, then it is crucial that support for all forms of economic activity becomes the cornerstone of the process. This begins with the

survey, which places a major emphasis on identifying economic activities. This then provides the basis for an economic baseline study, which takes the form of a SWOT analysis covering both formal and informal sector activities and opportunities.

This analysis then informs the other stages of the project. Thus in respect of housing, the use of property for any type of home-based enterprise is taken into account in the development of a housing plan for that dwelling. Similarly with infrastructure the needs of individual enterprises are considered. Following from that, the training and development programme that forms part of the upgrading process is developed on the basis of the economic baseline study.

7.4.13 Physical infrastructure provision

The provision of physical infrastructure in a South African context is strongly influenced by the housing subsidy, which provides for the capital cost. This will not be the same in other countries. Physical infrastructure for informal settlements needs to be divided into tow parts, with water and sanitation provision being separated from roads and stormwater. The reason for this stems from the cross-linkages that exist in these settlements due to the pre-existence of the shacks.

All physical services can be provided in a number of different ways, which provide a trade-off between cost and convenience (to the user), with a basic minimum being defined for reasons of health or basic accessibility. With water and sanitation options, this definition of different levels of service is limited to a specific set of options. With roads and stormwater, the situation is rather more complex. Here there are two variables, one related to the nature of access and the other related to the construction of that access. The first is linked to the planning methodology, and was covered earlier. Hence much of the decision-making around roads is taken away from the purely technical arena, and placed in the context of the policy debate, leaving only the issue of road and path construction to be dealt with as a technical issue.

7.4.14 Housing

Housing presents one of the greatest challenges for settlement upgrading. Informal settlements demonstrate very clear and specific shack characteristics. These characteristics relate both to the relationship between shacks as well as the composition and structure of the individual shacks themselves. These are demonstrated quite clearly in Figure 7.1, which shows the shack layout in the informal settlement of New Rest in Gugulethu. It can be seen that each shack is a detached, self-contained unit of one floor. This is a dominant characteristic that is replicated throughout South Africa. Furthermore, these are shack characteristics, which are deeply ingrained.

A study of informal settlement growth in Cape Town over the period 1993 to 1998 (Abbott and Douglas, 1999) indicates that, under pressure of increasing migration, the more popular settlements continue to densify until they reach a point where there is literally no more space to put additional shacks. This can be seen in Figure 7.2, which is a photograph of one of the densest settlements in Cape Town, namely Phola Park. Here the density now exceeds 200 dwellings per hectare, and it can be seen that there is very little room to add further shacks. Yet the nature of the development continues to demonstrate that, whatever the density, people will retain these core shack characteristics of detachment and a single floor.

It is useful at this point to compare this situation with that which exists in Brazil where one sees a very different characteristic of shack formation. Figure 7.3 shows this quite clearly. This is a photo of a shack settlement in Salvador, Bahia in Brazil. Here once can see that the people themselves have no problem with building informal dwellings that are sharing common walls and also extending beyond one storey.

Figure 7.1: Shack layout in New Rest, Gugulethu

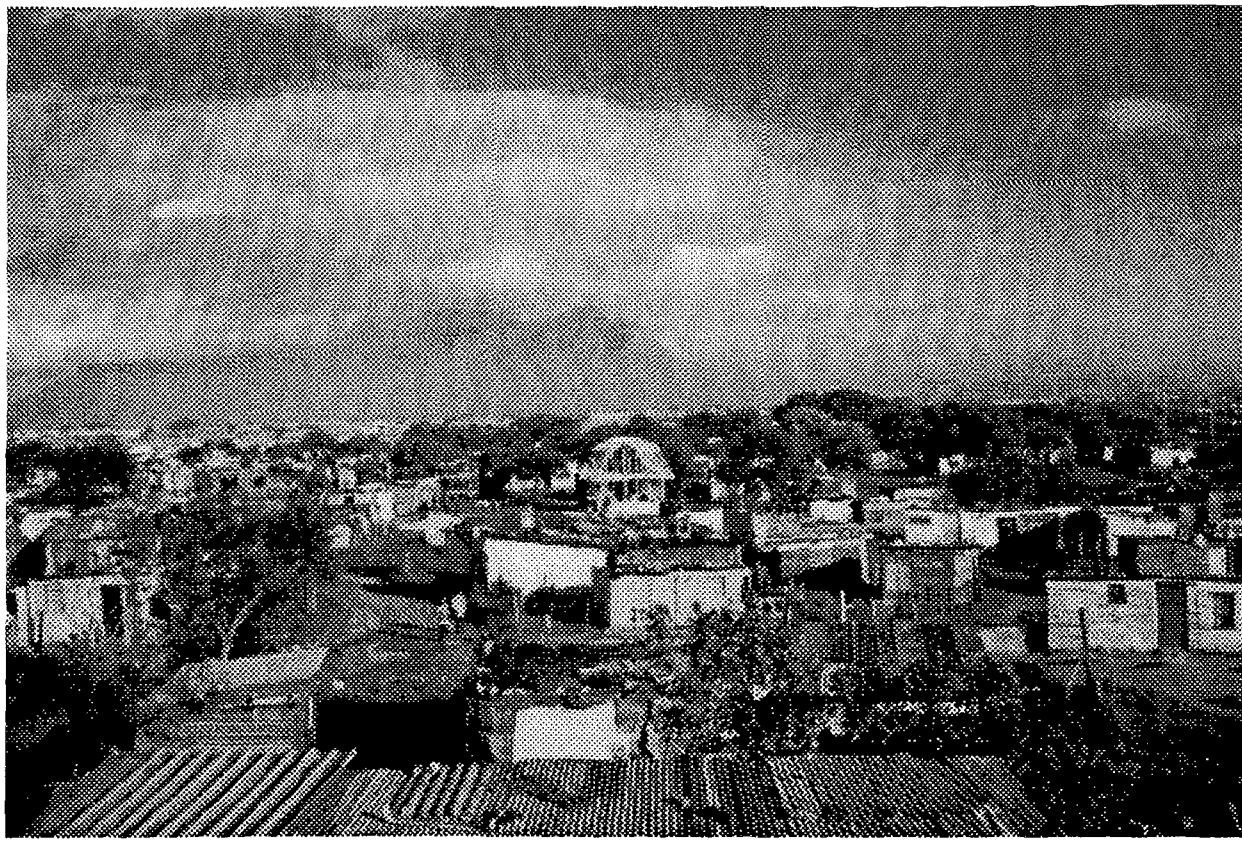


Figure 7.2: Shack layout in Phola Park, Gugulethu

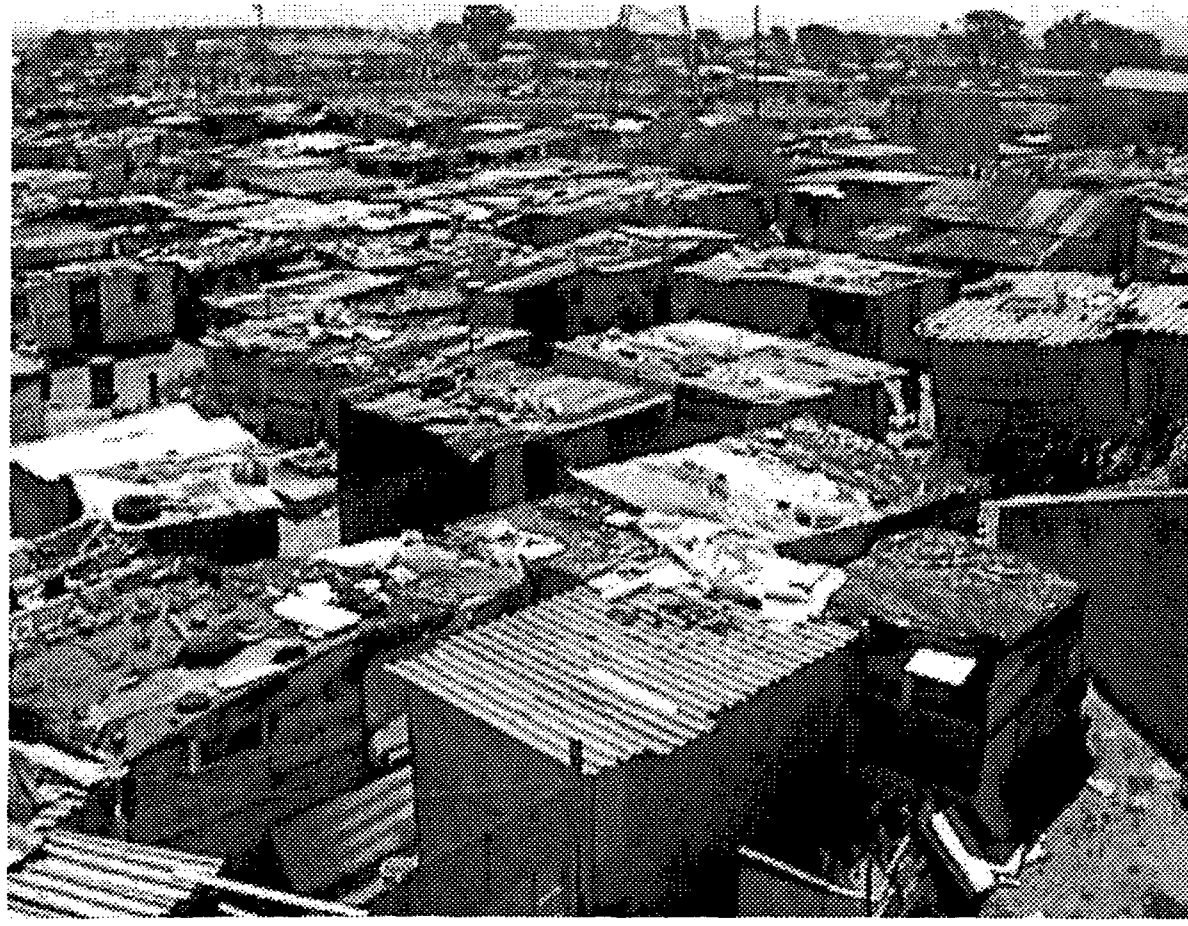
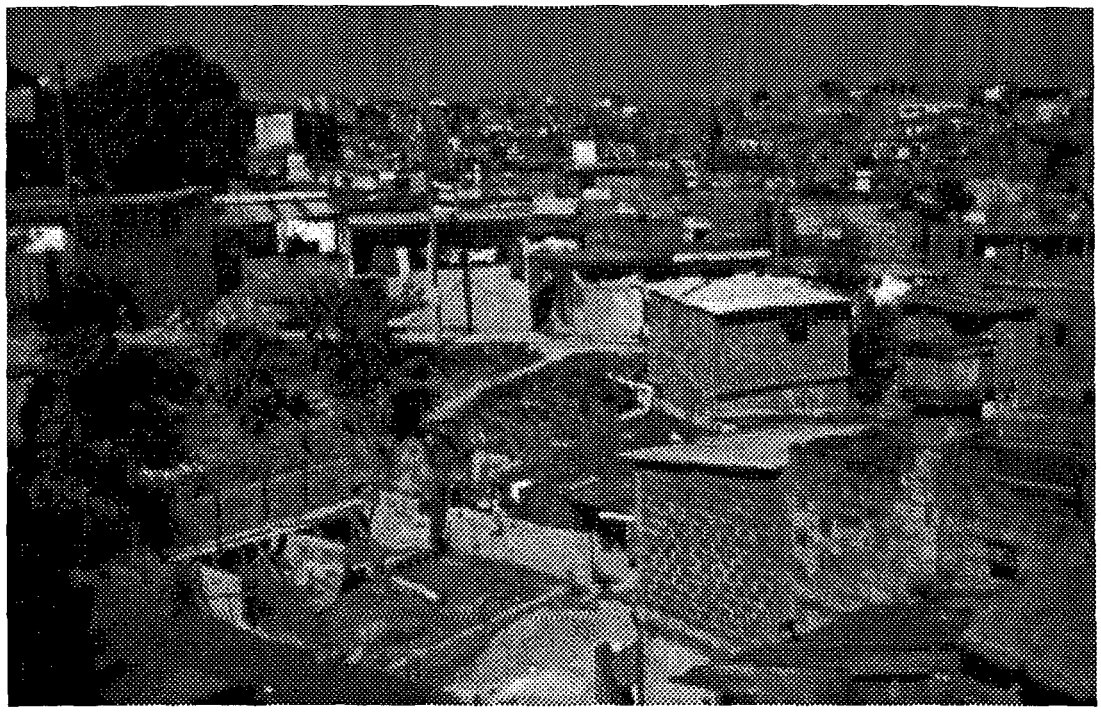


Figure 7.3: Shack layout in Salvador, Bahia, Brazil



This difference in construction method has implications for the housing typology. Residents of informal settlements in both countries begin with the same basic, cheap materials, eg. cardboard, corrugated iron. In South Africa, this typology does not change significantly over time. In Brazil, on the other hand, the typology changes quite rapidly, as residents adopt a new construction methodology and begin to upgrade their dwellings.

The question then needs to be asked as to why this difference exists. It would appear that there are two sets of issues that emerge when comparing informal settlement shack construction in South Africa and Brazil. The first relates to the shack characteristics discussed earlier, and this needs to be explored in a historical and cultural context. The second relates to attitude of construction industry towards the physical properties of the dwelling (in particular brick or block construction), and the bias that this engenders. Both of these are currently being addressed in the development of the New Rest case study.

7.4.15 Social services

The majority of dense informal settlements for which this methodology is appropriate tend to be infill developments. This means that they can often utilise the social services from surrounding areas. This is important since these areas require significant amounts of land. Where it is necessary to provide social services within the settlement itself, this can only be achieved through relocation. This requires three pre-requisites. Firstly, no other option is available on adjacent land. Second, space should be kept to an absolute minimum. This generally means the abandonment of existing norms, which tend to be based upon greenfield site conditions. And thirdly, that such facilities are multi-functional, so that the maximum utilisation can be obtained. All of these require significant changes of attitude, and regulatory frameworks, by the line departments concerned.

7.4.16 Environmental aspects and health aspects

The environmental health concerns relating to informal settlements are enormous. In a review of environmental health impacts in developing country cities, Bradley et al (1992) highlight the immense disadvantages of those living in "slums", a term which embraces informal settlements. There is a lower life expectancy at birth, with higher infant mortality from communicable diseases, often linked to inadequate water and sanitation. The general nutritional status is low, and female children are further disadvantaged in terms of differential nutrition, health care and mortality. Hence the concern of the National Department of Water Affairs and Forestry, and their desire to address this issue specifically. In this regard, the report by Bradley et al makes two important points. In the first, the authors state that, in spite of all the problems, while "Typically in cities, and particularly in the poorer parts of a city, the

ratio of people to space is very high . . . Nevertheless, we would deprecate attempts to decide on social and planning improvements partly on planning grounds" (Bradley et al, 1992:34).

The second important point that the authors make refers to infrastructure provision, and particularly water and sanitation. They caution that "Simplistic views on any infrastructural improvement are likely to be mistaken" (ibid.:34). They then state that "most [specialists in the field] would agree that the crucial step in water supply access improvements occurs when the tap is brought into the compound or household" (ibid.:34). This links environmental health improvements directly to the integrated upgrading process.

7.5 A policy for informal settlement upgrading in South Africa

A number of different issues have been covered in this report, each of which makes its own contributions to the policy debate. The chapters that deal with these issues are self-contained and provide their own conclusions. This final chapter leads out of that work, and its purpose is twofold. The first (which is covered in this section) is to develop a policy position for South Africa. The second (which is covered by the second report) is to lay the groundwork for an upgrading project that can be used to demonstrate the viability of in-situ upgrading in South Africa.

South Africa urgently needs a policy on informal settlement upgrading. Within this policy, the differences that exist between different types of settlements need to be recognised, and this should inform the methodology. The upgrading of peri-urban settlements, such as those currently outside the Durban Metropolitan Boundary and the Winterveld area north of Pretoria, can be approached in a number of different ways, using sector-based interventions. However, as the settlements become denser, and more entwined with the wider urban fabric that surrounds them, these approaches become inappropriate. And this is true whether it is the government, NGOs, or the communities themselves that drive these sector-based interventions. These methodologies may be forced upon poor countries out of necessity, where the meeting of basic needs is the primary objective. However, South Africa is not one of these countries.

This essentially leaves two approaches to upgrading. The first of these is fully community-driven upgrading. This may sound a worthy ideal. Experience from Brazil, however, coupled with an analysis of what it is that makes such projects successful, would indicate that it is unlikely to cope with the complexity of upgrading in a South African context. The alternative is to embark upon an integrated methodology, such as that developed in Belo Horizonte. Like community-based upgrading, this approach has been shown to be viable in specific areas. However, it too has serious problems, related in the main to the availability of adequate finance. This is a limiting factor in South Africa, where the housing subsidy is already over-extended and likely to be reduced over time. Furthermore, the South African situation tends to demand a greater level of community involvement, at the point of implementation, than is the case in Belo Horizonte. Nonetheless, there is much that can be learnt from this experience and applied in South Africa, both in terms of technical experience and organisational relationships (particularly those between local government and community).

In general terms, however, it would appear that the most appropriate approach to in-situ upgrading in South Africa is one which combines the best features of both of these approaches. Thus the specific approach that was pioneered in Belo Horizonte in Brazil can be applied in South Africa, provided that it is modified to suit local conditions and to integrate the important elements of the community-driven process. This modified methodology is now being implemented in Cape Town, in a pilot project involving three thousand shacks. Experience thus far confirms the validity of the approach.

There will be a prioritising of needs during the project, and some elements will be seen as more important than others. Common to them all, however, and underpinning the whole project, are four key elements. These are as follows:

- The primary determinant for the project was that the community wanted it and was prepared to take it forward. The choice of upgrading area, when made by outsiders, whether in government or the private/NGO sectors, and based upon perceived external needs, will have a very low chance of success.
- There is a social support system in the form of social workers, whose work complements that of the community committee.

- The aerial survey, which has every shack spatially referenced. For this there has to an absolute minimum ongoing movement in terms of new shack construction. In other words the settlement is stable and can be "frozen" for a period of time.
- The social and economic survey, which defines needs and priorities and ensures the involvement of every shack owner in the upgrading process.

Finally, there has to be a change to the national housing policy, to take into account the in-situ upgrading of informal settlements. This is not the case with the current policy. Upgrading requires a completely different approach to subsidy provision that does greenfield site development. It is about improving what people already have, and recognising the value and importance of what already exists, both in social and in economic terms. Finally it has to recognise the crucial importance of the social support mechanism, and make available finance to ensure that this element is in place.

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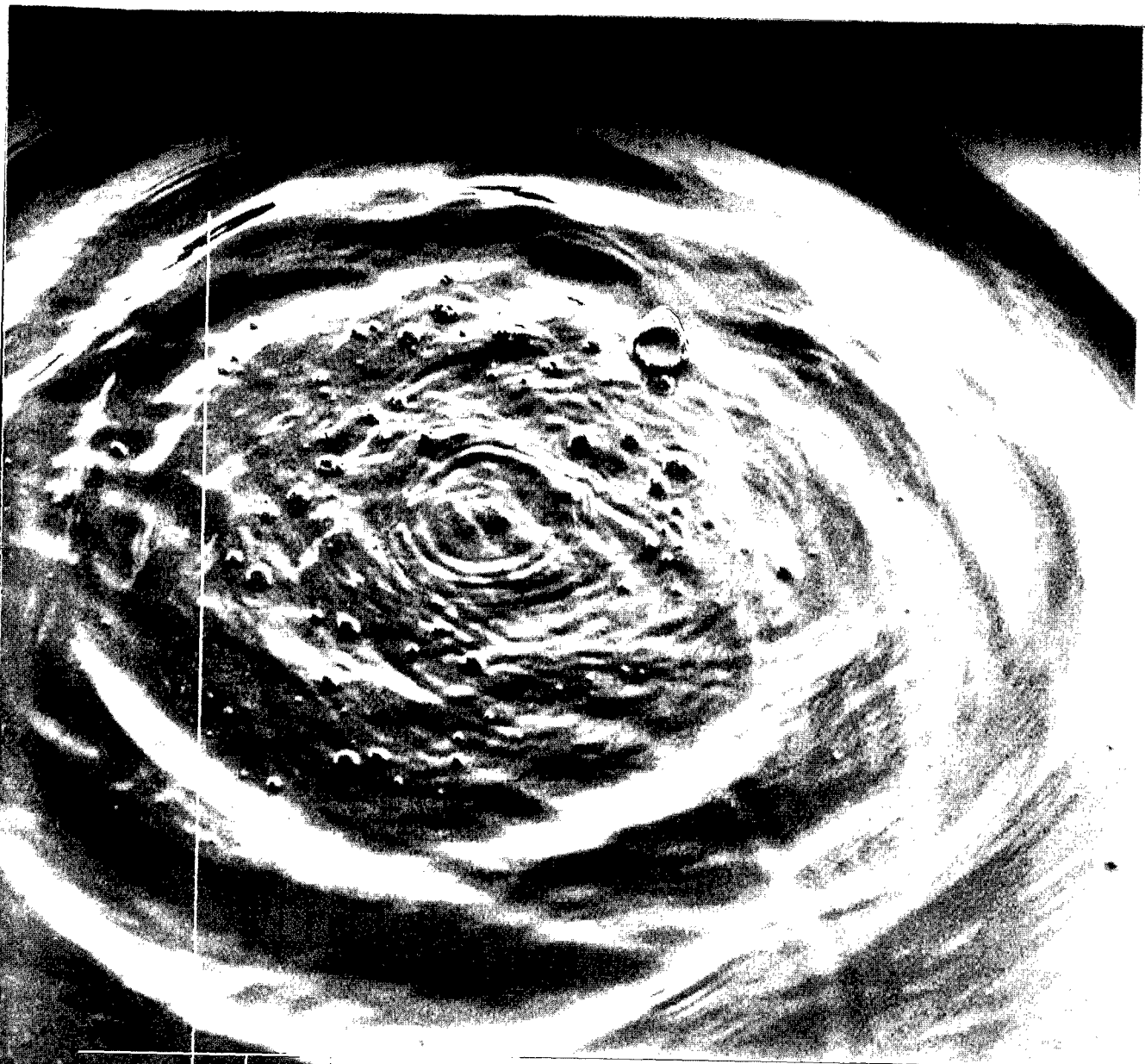

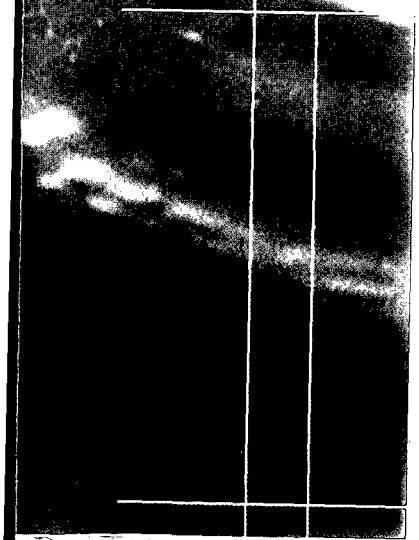

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