LEAD PROGRAMME IN TECHNOLOGIES FOR ENHANCED ENVIRONMENTAL MANAGEMENT

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List of Acronyms

CAP  Community Action Planning
CPM  Capability Poverty Measure
CSIR  Council for Scientific and Industrial Research
DCD  Department of Constitutional Development
EA  Enumerator Area
FCR  Foundation for Contemporary Research
HDI  Human Development Index
hh  household
HPI  Human Poverty Index
HSRC  Human Sciences Research Council
ICTs  Information Communication Technologies
IDP  Integrated Development Plan
LANDSAT  Land Satellite
MRC  Medical Research Council
NGO  Non-Governmental Organisation
OECD-DAC  Development Assistance Committee of the Organisation for Economic Co-Operation and Development
PPA  Participatory Poverty Assessment
PRA  Participatory Rural Appraisal
SEI  Stockholm Environment Institute
SIDA  Swedish International Development Cooperation Agency
SSA  Statistics South Africa
TB  Tuberculosis
TSSL  Technology Strategy for Sustainable Livelihoods
UN  United Nations
UNCHS  United Nations Conference on Human Settlement
UNDP  United Nations Development Programme
EXECUTIVE SUMMARY

South African society is still characterised by large, and increasing, gaps between rich and poor. The experience of the majority of South African households remains one of either outright poverty or of continued vulnerability to becoming poor. Adverse environmental conditions can disproportionately impact on poor communities resulting in a diminished quality of life for these communities (May, 1998).

This document is the preliminary social input to the Lead Programme in Technologies for Enhanced Environmental Management with a focus on water, sanitation and solid waste technologies. This initial review focuses on methodologies for identifying and describing poor urban communities in South Africa and methods for transfer of technology with these communities. This document is seen to be a discussion document, which is used to clarify the project focus. Thus some concepts indicated here, such as the target audience and technology transfer, could change as the project focus is defined.

The proposed four phase framework would operate within the IDP process. A combination of South African census, geological and land cover data could be employed with available IDP information to identify poor urban communities in South Africa. Description of these communities needs to come from available identification data and through applying systems and consensus-based methods and tools with individual communities. Through this process a list of priorities is identified and linked to a programme of action for all stakeholders. This can be monitored and changed by using indicators which are derived through objective and subjective data gathering. It is also imperative that any information gained through application of the proposed framework be fed back to the IDP process. The strong link with the IDP process acts to ensure that the programme of action operates within a legislated process, which supports local government to uphold its commitment to sustainable development. The proposed framework can also operate outside an IDP process and without the minimum baseline information available from a census.

In terms of indicators for monitoring poor urban communities, disparities can be measured in terms health, housing, transport, financial capital, wealth, education and employment, as well as energy, sanitation and water. A minimum of criterion need to be employed in the identification and measurement of poverty which stay static across communities assessed, so as to provide comparison and strengthen our understanding of the transfer of technology in the context of poverty. In understanding these disparities as imbalances between social, human, productive and natural capital we can identify source and priority for action within these communities in a holistic and systemic way.

The proposed framework needs further testing with relevant authorities, technology developers and communities before it can be used with any certainty towards the identification of appropriate technologies for enhanced environmental management.
1. INTRODUCTION

1.1 Background

South African society is still characterised by large, and increasing, gaps between rich and poor. The experience of the majority of South African households remains one of either outright poverty or of continued vulnerability to becoming poor. Adverse environmental conditions can disproportionately impact on poor communities resulting in a diminished quality of life for these communities. The relationship between poverty and environmental degradation is complex. The poor are often negatively affected by environmental degradation caused by others in society. At the same time, the poor often engage in processes that result in environmental degradation because their poverty leaves them no other choice (May, 1998; UNDP, 1998a).

The Lead Programme in Technologies for Enhanced Environmental Management has a focus on water, sanitation and solid waste technologies. This document is an initial review of methodologies for identifying and describing poor urban communities in South Africa and methods for transfer of technology with these communities.

1.2 Goals and objectives

The overall aim of the Lead Programme is to develop appropriate environmental assessment and management technologies to empower South Africa’s poor urban communities to improve their environmental condition and consequently their quality of life. In line with achieving this aim, this preliminary review of methodologies aims to:

- Identify and discuss the factors which define and describe poor urban communities in South Africa;
- Identify and explore the methodologies employed for the identification and description of poor urban communities in South Africa and internationally;
- Identify and explore the methodologies for technology transfer with poor urban communities; and
- Propose a framework for the identification and description of poor urban communities and the transfer of technology with these communities in South Africa.

This document is seen to be a discussion document, which is used to clarify the project focus. Thus some concepts indicated here, such as the target audience and technology transfer, could change as the project focus is defined.

1.3 Structure

The review of methodologies will be undertaken in five parts. Section 1 provides the background to this study and explores definitions of poverty, the legislative context within which a framework for identifying appropriate environmental technologies could operate and a review of decision-making processes for sustainable development.
Section 2 outlines the factors which impact on the description and identification of poor urban communities in South Africa and identifies relevant baseline information. Section 3 reviews four methodologies for identifying and describing poor urban communities and three methodologies for transferring technology with these communities in South Africa. Section 4 proposes a framework for the identification and description of poor urban communities and the transfer of technology with these communities both in and outside South Africa. Section 5 concludes with a look at the way forward.

1.4 Methodology

This preliminary review of methodologies employed interviews with relevant people by telephone and electronic mail and a desktop review of available literature to gather data for the identification and description of poor urban communities and transfer of technology. A full list of those who participated is provided in Appendix 1.

An exploration of ways to identify and describe poor urban communities looked at four studies. Three approaches were reviewed in the transfer of technology. These seven approaches informed the proposed framework for the identification, description and transfer of technology with poor urban communities in South Africa. It is envisaged that this proposed framework would operate within an Integrated Development Plan (IDP) process.

1.5 Decision-making for sustainable development

Sustainable development can be understood as achieving integration across the three systems of development: the economic, social, including the institutional and the biophysical systems. Optimizing goal achievements across these three systems calls for and creates processes of negotiation, trade-off, monitoring, feedback and adaptation represented by the overarching principle of sustainability. Sustainable development can therefore be described as the process of continuously striving for balance between:

- Protecting and using the physical and natural environment and its resources;
- Creating equitable and viable economic systems; and
- Acknowledging and guiding social and cultural systems and values towards greater equitability, responsibility and human well-being (Du Plessis, 1999).

Using these principles as a guide for decision-making, specific criteria, indicators and decisions can be identified. Research shows that indicators need to be developed in a participative manner to be effective as this improves the performance of technology interventions. More specifically the joint evaluation of urban conditions by experts, decision makers and stakeholders affected by problems within a city yield more comprehensive and more acceptable results than a purely expert-driven approach (Isham et al., 1994; Leitman, 1993; UNCHS, 1997).

The decision-making process as outlined below is different from the way decisions have traditionally been made. Sustainable development calls for integrated, consensus-based decision-making, and a shift from mechanistic problem solving. Parameters for decision-
making must take cognizance of all the systems impacted by the development and transfer of technology. **Figure 1** below shows how information collected from objective sources, like statistics, and subjective sources, like community perception studies, can be incorporated into a decision-making process for sustainable development, such as in the development of indicators.

**Figure 1  Decision-Making Process for Sustainable Development**

Poverty indicators describe the circumstances of the poor, serving as indirect measures of poverty where direct measures are not available and for measuring the performance of systems, policies and projects.

Indicators are used:

- To monitor the unfolding of possible futures as caused by the behaviour of the various systems and their interaction;
- To monitor the impact of decisions made against the principles of sustainable development; and
- To inform future evaluation and subsequent decisions (Du Plessis, 1999).

1.6  **Legislative context for decision-making for sustainable development**

The Integrated Development Planning (IDP) process may provide a legislated framework for the identification of appropriate technology while supporting local government’s commitment to sustainable development. The proposed framework needs to make best available use of data from the IDP process and needs to feedback any information gathered to the IDP process so as to build local government’s resources with regards to poor communities.

In South Africa, the IDP process is seen by government as the way forward for sustainable planning. Understanding the dynamics and extent of poverty is important within the IDP process as these are considered an important tool for poverty alleviation through the redirection of municipal resources (Malan, 1999). The IDP process is a statutory requirement which asks five questions:
Phase 1: Where do we want to go? – vision;
Phase 2: What benefits so we want to deliver? – development framework;
Phase 3: How do we get there? – development strategies;
Phase 4: What do we need to do to make it happen? – operational planning; and

The Integrated Development Planning (IDP) process and requirements

Local government faces a complex set of legislated planning requirements. Legislation makes a range of demands on local government to comply with various requirements which change as legislation changes. Appendix 2 outlines the core municipal planning requirements operating within the IDP process.

IDPs promote developmental government in the following ways:

- They enable municipalities to align and direct their financial and institutional resources towards agreed policy objectives and programmes.
- They are vital tools to ensure the integration of local government activities with other spheres of development planning at provincial, national and international levels.
- They serve as a basis for engagement between local government and stakeholders at local level.
- They enable municipalities to weigh up their obligations and systematically prioritise programmes and resource allocations. In a context of great inequalities, IDPs serve as a framework for municipalities to prioritise their actions around meeting urgent needs, while maintaining the overall economic, municipal and social infrastructure already in place.
- They assist local governments to focus on the environmental sustainability of their delivery and development strategies.
- Integrated development planning assists local government to develop a holistic strategy for poverty alleviation.
- IDPs empower municipalities to prioritise and strategically focus their activities and resources. A strategic process focuses on key or essential issues and/or geographic areas.

IDP process: review of practice

The IDP process promises democratisation of the planning process, integration of strategic, operational, sectoral and spatial planning, sustainability, cooperative governance, cyclical and incremental planning and flexibility. In practice, current IDPs tend to focus on strategic planning based on priorities identified early on in the public participation process, instead of first understanding the make-up of the urban system and then prioritising action according to the dynamics of the system. The result is that critical parts of the system are left out leading to unexpected problems in the planning process (Du Plessis, 1999).

The fault lies not with the concept of integrated development planning but rather in the way it is applied and in the choice of decision-making tools used. The complex set of
interdependent and interconnected issues that determine sustainable development requires a systems approach to problem solving (Du Plessis, 1999). The proposed framework for the identification of technologies for enhanced environmental management will both make use of data generated by the IDP process and inform it.

1.7 Definitions

Environment

Environment in the context of this review is understood to mean the biophysical, economic and social, including the institutional, spheres as defined in the National Environmental Management Act (1998). The focus of this review is on the social, economic and institutional elements in poor urban communities in South Africa as other specialist studies are examining the biophysical aspects.

Poverty

The proposed framework focuses on poor urban communities in identifying appropriate technologies.

Poverty is not just the result of material deprivation, but also the result of a set of interrelated factors, including vulnerability, isolation, physical weakness and powerlessness. Material poverty means a lack of assets and an inadequate and unreliable stock and flow of food and cash, and low returns to labour, despite high rates of participation. Vulnerability refers to external exposure to shocks, stress and risk, and the lack of means to cope without suffering damaging loss. Isolation is caused by illiteracy, lack of access to information, and physical distance from economic opportunities. Physical weakness is not just a result of a lack of food, but of a lack of productive adults due to migration, illness, disability or death. Powerlessness weakens the bargaining power of the poor with respect to access to services and the law, political rights, and their economic opportunities (Chambers, 1989; Rakodi, 1995; UNDP, 1997a).

Despite the many structural similarities of urban and rural poverty and the difficulties encountered with treating urban and rural poverty as separate categories, there are attributes of poverty which are more commonly found in urban areas (UNDP, 1997b).

Quality of life and poverty

Standardized measures of quality of life have been developed to assess the extent to which individuals are satisfied or dissatisfied with different areas of their own lives (Frisch, 1997). Poverty measurements address an individual's or household's capacity to meet their basic needs for subsistence. Elements of both poverty and quality of life overlap. In South Africa, absolute poverty remains pervasive and may be measured more easily at an objective level than quality of life. The proposed framework in section 4 sees poverty as the focus in the initial identification and description of poor urban communities in South Africa, and quality of life being explored subjectively in the further description of communities and transfer of technology.
Objective, subjective, quantitative and qualitative data

A combination of objective and subjective data as well as qualitative and quantitative data is required to identify and describe communities for the purpose of developing appropriate technology. Objective data measure poverty and quality of life without the self-assessment present in subjective data which cannot be aggregated up or across for comparison.

Quantitative and qualitative data are complimentary. Researchers can use quantitative surveys to discover which communities they should study in greater depth and they can use qualitative surveys to determine base questions for quantitative surveys and in the transfer of technology.

Appropriate technology

For the purposes of this study, appropriate technology comprises know-how and skills, goods and services, equipment, organisational and managerial procedures, institutions and social support structures. To be appropriate, a technology must be compatible with available natural, human and financial resources and correspond to the cultural practices of the user (UNDP, 1999).

Appropriate technology transfer

While appropriate technology can provide some solutions to the challenges facing urban sustainability, it is becoming increasingly clear that the greatest innovation needs to come in the way we develop, transfer and monitor that technology. This innovation requires a move from hierarchical and sectoral decision-making to a more holistic and participative model which addresses particular community needs through the gathering of objective and subjective data.

1.8 Assumptions

Sustainable development

Various definitions of sustainable development are based on concepts such as meeting human needs, providing quality of life for all and equitable distribution of resources, while living within the carrying capacity of the earth. In practice the fulfillment of these goals can often be contradictory, or mutually exclusive (Du Plessis, 1999).

Context and end-user of proposed framework for identifying appropriate technology

The end-user is presumed to be a local authority and the proposed framework aims to inform local planning processes. The context assumes that a minimum of baseline information would be available through the IDP process as a common point for data collection across local authorities. The proposed framework has been designed to function on a minimum of data which is relatively quick and cheap to gather and analyse towards the identification of appropriate technology.
It should be noted that the identification of technologies as explored here could be undertaken outside the IDP process as is discussed in Section 4.

**IDP process**

This review makes the assumption that local government is the institutional structure best positioned to deal with urban poverty. While the mandate exists for them to identify critical areas of need within the IDP process, this does not diminish the importance of provincial and national government in addressing poverty.

**Community**

An overriding assumption through this review is that there is such a thing as community and that it can be both objectively and subjectively identified and described. Many will dispute this and for the purpose of this review, community is simply a group of households which share common issues related to poverty, quality of life and environmental degradation.

**Poverty and environmental degradation**

The link between poverty and environmental degradation may not be directly causal. While improvement in poverty may precipitate improvement in environmental management, issues such as access to authority structures and the formal economy, often remain outside the scope of the poverty/environmental degradation relationship.

**1.9 Review**

External review of this document was undertaken by Dr. Liezl Malan, an independent social evaluation expert. Jeremy Evans, Mark Napier and Graham von Maltitz undertook the internal review.

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2. FACTORS WHICH IMPACT ON THE IDENTIFICATION AND DESCRIPTION OF COMMUNITIES

Factors which impact on the identification and description of communities can be local and remote. Local factors include population growth and migration as well as access to basic services. More remote factors include the effects of globalisation, the information revolution and climate change.

The main challenge facing urban sustainability is to include the ethos of sustainable development in all levels of decision-making in an integrative and iterative process. Urban areas should follow patterns that encourage social equity, effective resource use and economic development. The need to minimize environmental damage with the spread of suburbs and informal settlements, and their greater demands on the resource base, increases that challenge.

One of the problems within urban areas is the uneven distribution of wealth and of opportunities to create wealth. This leaves a percentage of people without the resources to lead satisfying lives or access opportunities to provide a better quality of life. Welfare is not the answer to poverty as it only exacerbates the social exclusion of the poor.

In addition, there is the problem of empowering the citizenry within decision-making structures without compromising the process. Current methods of public participation are increasingly coming under attack as being inefficient and costly in delays as well as being subject to the manipulations of minority interest groups. The decentralization of power to local government means that appropriate resources need to be made available to this sector to achieve its mandate.

An outline of the current situation for the factors which impact on poor urban communities in South Africa is followed by a review of their impacts. This review of impacts is not a definitive discussion of their extent but simply presents and describes the factors important to an understanding of poor urban communities in South Africa. These factors are discussed below in terms of the social, including institutional, economic and biophysical spheres of the environment.

2.1 Social factors which impact on communities

2.1.1 Current situation in South Africa

Population

South Africa’s population is growing at a rate of 2.06% per annum, and was expected to double by 2035. However, factors such as the spread of AIDS, the improving status of women, and better quality of life are likely to impact on this predicted growth trend. An 8% reduction in the population is expected by 2010 as a result of AIDS (South African Institute of Race Relations, 1998).
Age

The South African population is getting younger, with 44% under the age of 20. This would mean an increased need for youth-related services such as educational and recreational facilities, and job opportunities (Statistics South Africa, 1996).

Household

The traditional nuclear family is not the norm in South Africa. Many children do not live in the same household as their parents and 42% of children under the age of seven live only with their mother. Although this might have been a product of apartheid policies, the number of single female-headed households is not likely to change (CSIR, 1999a).

Gender

Women account for the majority of students at universities, and the percentage of employed women who are professionals is higher than the percentage for men. However, women make up only 22% of managers and 39% of professionals, with their salaries averaging about 71% of those of men (Budlender, 1998).

Migration

While there still is a degree of rural-urban migration to some metropolitan areas, it is small compared to the current rural-rural migration taking place. Cape Town and Gauteng are still experiencing in-migration from rural areas, while this has slowed considerably in Durban. In fact, there is evidence of movement to the rural areas on the edges of Durban due to lower service costs and opportunities for livelihoods derived from the natural resource base, as well as from the city (Mattes et al., 1998).

There is a national decline in migrant labour resulting in part from a shift by employers away from employing migrant labour, as well as the decline of the mining sector that was a major employer of migrant labour. This may also affect circular migration patterns and there is evidence that, in some areas at least, the links between urban populations and rural social networks are becoming weaker (Hindson, 1987).

Urbanisation

In South Africa 55% of the population are city dwellers. Gauteng is the most urbanised province with 96.4% of its population living in an urban area (Statistics South Africa, 1996). The growth of informal settlements in and around the metropolitan areas continues largely due to the decompression of township populations (Centre for Development and Enterprise, 1995). South African metropolitan areas in the 1990’s are increasingly sprawling, with the poor continuing to locate on the periphery. Current thinking is to emphasise integration, accepting the reality of sprawl, and to concentrate on mitigating its negative aspects by upgrading informal and low-income settlements to improve quality of life (CSIR, 1999a).
Poverty and inequality

South Africa has the second highest inequality coefficient in the world. While the inequality of income distribution between races is considerable, inequality within race groups is substantial. With the growth of the black middle class and a black elite, this inequality is not likely to disappear, but will be more evenly distributed between racial groups (May et al., 1998).

The greatest inequality can be found between male- and female-headed households. While South Africa has a relatively high per capita income, an effective unemployment rate of 37.6% and the fact that a quarter of the employed population earns less than R500 per month means that poverty remains an obstacle to sustainable development. Job shedding in the private and public sector, the closure of gold mines and a steady decrease in employment opportunities for unskilled labour, coupled with a young, growing population and a decline in economic growth, mean that poverty remains an important issue (May et al., 1998).

Access to basic services

The national average of households connected to electricity is 59%. Gauteng and the Western Cape have higher connection levels at 90% and 80% respectively (CSIR, 1999a).

More than half of South African households (51%) have access to water by a tap in their dwellings, and another 20% have taps on their sites. When public stand-pipes are included, almost all urban residents have access to potable water (Mvula Trust, 1995). However the majority of people still remain without access to warm water and the bad quality of water in many areas impacts on the spread of disease (Malan, 1999b).

In terms of sanitation, 58% of South Africans have a flush toilet either in the dwelling (44%) or on their site (14%). Another 9% have their own ventilated improved pit (VIP) or direct access to a VIP or chemical system. There remains a significant proportion of people who use less effective systems, such as informal pit systems (19%), bucket systems (5%) or have no access to sanitation (8%) (Mvula Trust, 1995).

Refuse removal by municipalities in urban areas stands at about 91% of houses. For township and informal settlement areas the coverage is not as great, with only about 85% of households enjoying refuse removal near their sites (CSIR, 1999a). While the national situation is promising, urban communities in Khayelitsha continue to experience refuse removal which is highly unsatisfactory and insufficient (Malan, 1999b).

The national average for the proportion of households with telephones is about 30%. In the Western Cape about 50% of households have telephone lines in their dwellings, compared with 13% in the Northern Province (CSIR, 1999a).
**Education**

In August 1997 a survey of some 32 000 educational institutions found many schools were affected by poor access to water, telephones and electricity and the poor condition of many school buildings. A countrywide shortage of more than 64 000 classrooms was identified (CSIR, 1999a).

**Housing**

The production of informal housing remains an important form of shelter supply for many people. Recent figures indicate that in 1998, freestanding informal settlement now constitutes 4.7% of dwellings, and backyard shacks, 2.4%. Traditional dwellings now represent 15.5% of housing stock. Formal housing types now constitute 72% of the total (Department of Housing, 1994).

**Health**

According to the Department of Health there were 2 604 clinics and 420 hospitals in the public sector in 1997. Together these hospitals provided more than 111,000 beds. Including the private sector, which provides 20% of the number of hospital beds, South Africa offers about three beds per one thousand of the population (South African Institute of Race Relations, 1998). In 1995, the social sectors accounted for 39% of the budget but only 12% was spent on basic education and health services. Expenditure remains biased toward nonbasic health service, with acute-care hospitals receiving 76% of the recurrent expenditure. Non-hospital primary care, by contrast, accounts for only 1% of current expenses (UNDP, 1998a).

The single most important health trend is the rapid increase in HIV infection. Ante-natal clinic surveys conducted in April 1999 conservatively estimated that 22% of the population is infected, with 1 500 new infections per day (Kirby, 1999). At this rate it is estimated that the average life expectancy will reduce from 62 to 40 years by 2010 (Kirby, 1999). The rate of infection is highest among young adults between 20 and 35 years of age, affecting the bulk of the working population, and there is an increase of infection among the 5 to 14 age group (Kirby, 1999).

**Crime**

Despite a decrease or stabilization in most serious crimes, the crime rates remain high (Crime Information Analysis Center – South African Police Services, 1998). Perceptions that the criminal justice system and the police are failing in their protective duty is resulting in an increased use of armed response security guards by the wealthy, and the formation of vigilante groups by the poor (CSIR, 1999a).

High levels of crime are bringing major changes to the built environment, the spatial form of cities and in public spaces. Increasingly the higher income groups are taking refuge in fortified suburbs, office complexes and shopping centres, effectively widening gaps between rich and poor, and creating literal social exclusion (CSIR, 1999a).
Decentralisation of power to Local Government

Under the Constitution, local government is a separate and distinct, yet inter-related sphere of government with its own executive and legislative authority and an important developmental role. One of the key tools for developmental local government is the IDP process, which has particular relevance to the alleviation of poverty through the focussing of local government spending (DCD, 1999).

Growth in civil society

Through provisions in the Development Facilitation Act No 67 of 1995 and the IDP process, community-based organizations are becoming more involved in development. Urban development agencies and neighbourhood pressure groups are movements now explicitly provided for in legal processes. Communities, especially in informal settlements, are becoming increasingly involved in providing their own housing and service needs (CSIR, 1999a).

One of the areas where civic involvement is strong and showing positive results is that of crime prevention. Groups like Business Against Crime, Traders Against Crime and initiatives such as Business Improvement Districts and Community Policing Forums are increasingly taking responsibility for crime prevention initiatives in co-operation with the South African Police Service (CSIR, 1999a).

2.1.2 Impact of the social environment

Population

Population density is not the greatest cause of environmental degradation and there is often a decrease in the extent of degradation with increasing population densities. Statistics indicate that poverty in a population is a source of population pressure and acts as an important indicator of the extent of environmental degradation (Schwabe, 1996).

State provision of basic needs

Research in Worcester indicates that there tends to be a greater reliance on formal, state provision of basic needs in urban areas than is the case in rural areas. However there appears to be a gap between poor communities and local councils who can help meet their needs by redirecting municipal spending. The results of this gap can be seen in the inadequate type of services received by poor communities in terms of the number of shared taps, lack of sanitation facilities and prevalence of informal housing. The consequence of inadequate service provision is an increase in disease, crime, floods and fire. Community relationships in urban areas may be more impersonal, and contacts with extended families generally less frequent (Malan, 1999a).
Crime

Crime tends to be greater in cities where poverty and wealth can be found side by side. Fear for personal safety in poorer neighbourhoods restricts mobility and affects business activities as well as family life. Crime costs in terms of its direct effects on victims and because scarce public and private resources often need to be spent on measures to improve security rather than on overall improvement in welfare (UNDP, 1997b).

Social and economic factors are leading to growth in gang activity and organised crime. The formal job market is unable to provide for the number of young people entering the work place, leading to dissatisfaction, tension and low self-esteem. The situation is complicated by changes in the traditional family structure (Budlender, 1998; CSIR, 1999a).

Female-headed households

Female-headed households make up a high proportion of the poor in urban areas. Many women rely on informal jobs like street vending and their relative lack of assets such as land and capital, as well as various forms of social and gender discrimination contribute to their poverty. Different pressures may bring them to urban areas, including the departure of a partner, to migrant jobs, death or through divorce, and/or legal and social restrictions to setting up their own economic activities in rural areas. Household fragmentation, resulting in female-headed households, can be both a cause and a consequence of urban poverty (UNDP, 1997b).

Gender

The increasing equalisation of the genders and the improved status of women affect population growth and have several impacts on communities. With more women able to access finance to buy their houses, women tend to have more power in communities and within their personal relationships (Budlender, 1998; CSIR, 1999a).

Education

Research in Worcester indicates that people in poor communities tend to have very low levels of formal schooling. One reason for this may be that poverty re-prioritises the use of time towards meeting immediate household needs. Education is often not perceived as meeting the immediate needs of a household. Consequently, women in poor communities are more likely to find a sustainable livelihood through a husband than by having an education (Malan, 1999a).

Health

Results indicate that the more an individual is prone to illness, the more precarious their source of income. Apart from serious economic repercussions in terms of increased medical care and pension costs, low productivity and loss of productive and experienced employees, the welfare and health care burden on the State will
dramatically increase from the effect of Aids. At the same time the tax base is likely to be eroded due to loss of economically active adults. Aids will also impact on issues such as housing and infrastructure needs, as well as the provision of special health care facilities, orphanages and cemeteries (CSIR, 1999a, Malan, 1999a;).

Aids, however, is not the only significant cause of death in South Africa. The diseases connected with poverty remain the primary causes of death. In 1990, 20.8% of deaths in children under 5 were due to diarrhoea and 9.4% to upper respiratory infection, both indicators of a low quality environment and low quality of life. People living in shacks are also prone to tuberculosis (TB) and diabetes which impacts on their capacity to generate income (South African Health Review, 1998).

**Energy**

Energy supply is one of the yardsticks of quality of life. Electricity facilitates development by making possible the emergence of home-based enterprises. It also improves the environmental quality within the household, as less coal and wood are burnt for energy purposes (CSIR, 1999a).

**Sanitation**

Sanitation is a basic service. Adequate and environmentally sustainable sanitation and sewerage systems can contribute to the reduction of disease (CSIR, 1999a).

**Telephones**

Telephones are important for the well-being of a household. They facilitate quick information sharing, support the development of home-based enterprises, can be useful in emergencies and can be a deterrent to crime (CSIR, 1999a).

### 2.2 Economic factors which impact on communities

#### 2.2.1 Current situation in South Africa

**Unemployment**

The South African labour market has been characterised by an increase in relative and absolute unemployment as the economy fails to create enough jobs to fulfil the need of its young and economically active population. The expanded unemployment rate increased from 32.7% in 1994 to 37.6% in 1999 (Department of Finance, 1999a).

The private sector has opted for more capital-intensive production methods whilst reducing their work force, with a resultant decline in total employment. The move by government to improve the efficiency of its public service also has a negative effect on employment creation. Declining international commodity prices, especially of gold, and the expansion of subcontracting and outworking in a number of economic sectors, further reduce formal employment opportunities (CSIR, 1999a). The occupational
change from labour-based occupations to knowledge-based occupations also plays a role in the increase of unemployment. While a large percentage of South Africans remain relatively uneducated, those areas where they could traditionally find unskilled and semi-skilled work are shedding employment opportunities (Statistics South Africa, 1996).

**Growth of the informal sector**

The informal sector contributes 6.9% to the GDP. This is more than agriculture (3.9%) and almost as much as mining (7%). In light of increased unemployment, a growing number of the South Africans have to gear themselves to the informal sector in which they either supplement their formal sector wages or are totally dependent on self-employment or casual wage employment. The growing urban informal sector is dominated by trading activity and there is an expansion into the service industry. The informal sector can also provide the key to the integration of the city by stimulating the development of commercial nodes in the townships (Statistics South Africa, 1999).

**Expansion of the tourism industry**

South Africa’s economy is shifting away from the production of raw materials towards a service industry, of which tourism is part. Tourism is already a key source of South Africa’s foreign exchange earnings. Attempts are being made in South Africa to ensure that the benefits of tourism initiatives reach local communities. The sectors that can be expected to derive the most benefit from tourism are agriculture, construction, service and manufacturing (Futter and Wood, 1997).

**Globalisation and the growth of information technology**

The rise of the global economy is associated with the growing integration of the production and markets of different countries. This was largely made possible by technological improvements that have enabled economic activities to be connected without having to be in close proximity, and to operate across time zones 24 hours a day (CSIR, 1999a). The impact on poor communities who are not part of the information age, is a widening gap between the informed and the uninformed.

**De-industrialisation**

The worldwide shift from manufacturing to service, and further to information industries and technologies has meant that de-industrialisation has become the norm in developed cities and manufacturing and goods-handling jobs have moved to the developing world. In the developing world these imported industries require high-tech knowledge and creates a skills gap between the skilled and unskilled (CSIR, 1999a).
2.2.2 **Impact of the economic environment**

*Commercial exchange*

The urban market place exposes people to commercialisation. Commercial exchange is more frequent in urban areas where households require money to fulfil basic needs. In rural areas these needs could be satisfied through sharing, exchange or subsistence farming. There is commercialisation of many items in the urban context, which would be free goods in the rural areas, such as water and shelter. This increases the pressure to earn money where formal jobs are scarce. For the majority of unskilled urban labourers, the result is dependence on casual wage labour and other irregular and low-paid informal sector work (UNDP, 1997b).

*Formal employment*

Research in Worcester indicates that poor people often have difficulty in accessing the formal economy. Formal employment is usually located outside the community and family or friendship networks, which are dominant factors in determining access to the formal employment available (Malan, 1999a).

*Transport and shelter and dependency rates*

For individuals to secure employment they require access to transport and shelter. Transport costs can account for up to 10% of a household’s disposable income. The erection of informal shelter is in response to user charges of municipally serviced units. People’s sense of responsibility towards extended family can result in higher dependency rates as shelter is provided to job seekers (Malan, 1999a).

*Financing*

Start-up capital is a prime reason why poor people are precluded from participating in the market economy. Few people in poor communities are able to save even part of their monthly income and the majority access credit through family networks rather than formal financial institutions (Malan, 1999a).

2.3 **Biophysical factors which impact on communities**

2.3.1 **Current situation in South Africa**

*Water*

South Africa is fast approaching water-scarcity as it is estimated at current water consumption levels that the country could run out of water by 2015. With increased development and urbanisation in South Africa, the country’s water resources are becoming increasingly polluted. The bulk of the major agricultural, as well as coal and gold mining areas are situated in the upper reaches of the country’s major rivers.
Informal settlement and badly-maintained sanitation and storm water infrastructure also contribute to pollution of both surface and ground water (Rand Water Board, 1999).

**Climate change**

The average global temperature has risen by 0.5% over the past century. It is predicted that climate change will affect rainfall, food production, spread of biological disease agents, survival of biodiversity, and sea levels, and cause an increase in extreme weather events. South Africa ranks as one of the top twenty emitters of greenhouse gases in the world, climate models predict that the mean air temperature will rise by about 2°C over the next century (Schwela, 1998). With the danger that the country will exhaust its ground and surface water within the next century, reduced rainfall and increased evaporation may have disastrous consequences (CSIR, 1999a).

**Loss of agricultural land**

The main causes of land degradation are overgrazing, immoderate clearing of vegetation, droughts, toxification through pollution and agricultural chemicals, and urbanisation. Loss of agricultural land, coupled with rapid population growth is increasing deficits in food production and security. In South Africa only 10% of the country is arable land, most of it in the grain basket of the Highveld plateau (Reader’s Digest, 1994). With the increasing urbanisation of Gauteng and open-cast mining activity in Mpumalanga, as well as the acidification of the soil due to air pollution in both provinces, the percentage of arable land is slowly decreasing. Erosion is further contributing to the annual loss of 500 million tons of topsoil (CSIR, 1999a).

**Biodiversity loss**

South Africa ranks as the third most biologically diverse country in the world, and as such is of major global importance for biodiversity conservation. Many important ecosystems have been degraded and ecological processes impaired because of agricultural and industrial development and increased urbanisation. The domestication of land is identified as one of the major causes of biodiversity loss on a global scale (CSIR, 1999a).

In addition to habitat loss and degradation, the over-exploitation of certain species, the introduction of exotic species, and the pollution and toxification of the soil, water and atmosphere have had major effects on South Africa’s biodiversity. Trends indicate that this situation is not improving, and that growing human populations and unsustainable rates of resource consumption will result in increasingly negative impacts on biodiversity (CSIR, 1999a).

**Environmental refugees**

In South Africa, a major cause of displacement from rural areas is the fact that people can no longer cover their basic needs from natural resources in their home areas. Population growth, climate change and land degradation are likely to contribute to a
steady increase in environmental refugees, not only within South Africa, but also from
neighbouring countries (CSIR, 1999a).

Air pollution

Apart from contributing to climate change, air pollution also has an impact on human
health, agriculture and the conservation of biodiversity. Between 18 and 50 million
incidences worldwide per year of respiratory disease are due to ambient air pollution
(Schwela, 1998).

Urban areas are particularly affected by nitric oxide and volatile organic carbon from the
transport sector, exacerbated by urban sprawl and lack of public transport (CSIR,
1999b). In South Africa the highest levels of air pollution at ground level are found in
townships due to the use of coal stoves for cooking and space heating. Some of the
highest levels of pollution can be found inside houses, a situation which is exacerbated
by poor ventilation (CSIR, 1999a).

Solid waste

Solid waste generation, both municipal and industrial, continues to increase worldwide.
With increased wealth the composition of waste changes from biodegradable organic
materials to glass, metals, plastics and other synthetic materials that can be reused and
recycled. While there are many disadvantages to an increase in non-degradable waste,
the job creation potential of waste management is estimated at 6 million jobs over the
next fifteen years, of which 83% will be for unskilled workers (Department of Finance,
1999b).

2.3.2 Impact of the biophysical environment

Poverty, the environment and health

As a result of overcrowding and high residential densities, competition for land, poor
segregation of residential and industrial functions, air pollution, and the failure of
investments in solid waste disposal, sanitation and water supply to keep up with rapid
urban growth, the poor are likely to suffer most from environmental degradation in cities.
There is a clear relationship between poverty, the environment and health. Children are
particularly vulnerable (UNDP, 1997b).

2.4 Conclusion

As indicated above, cross-cutting issues such as technology and biophysical trends as
well as crime often compound to impact negatively on poor communities. The spread
of the information technology can impact on poor communities by increasing the
knowledge gap between these and wealthier groups. Biophysical trends are felt acutely
in poor communities as levels of poverty expose people to air and water pollution. This
can be linked to issues of availability and affordability of services such as tapped water
and electricity, as well as inadequate access to knowledge on health, safety and
hygiene. Crime affects communities differently with poorer communities suffering most from violent crime.

In addition, trends to do with population growth and family structure, Aids, poverty and inequality, migration patterns, the growth of the informal sector, gender inequality, unemployment, inadequate access to services and the perpetuation of apartheid spatial patterns particularly affect those living in townships and informal settlements within urban centers.

3. METHODOLOGIES FOR IDENTIFYING AND DESCRIBING COMMUNITIES AND TRANSFERRING TECHNOLOGIES TOWARDS IDENTIFYING APPROPRIATE TECHNOLOGIES FOR ENHANCED ENVIRONMENTAL MANAGEMENT

3.1 Methodology for the identification and description of poor urban communities

Poverty is a complex condition which is measured differently depending on the elements used to define it. Consequently the indicators for the identification, description and monitoring of poor communities differ according to the elements used to define poverty. Definitions of poverty usually center on two sets of distinctions, absolute and relative poverty and narrow definitions such as ‘income poverty’ or broad conceptions such as human capital. The tools chosen to measure poverty will define how poor communities are identified, determine the context within which that poor community operates and predict the impact of the introduction of technologies with that poor community.

The following is a review of methods used to identify and describe poor urban communities in the international and South African context. UN and South African census data are quantitative and objective. Application of UN indicators in studies in Lebanon and Botswana and methodologies employing composites of indicators on a global scale are reviewed. Application of South African census data is explored in the context of a study in the Enseneli District of KwaZulu-Natal, and a methodology for lifestyle segmentation in South Africa is reviewed. The Port Elizabeth Household Environment and Health Study and the Worcester Poverty Audit employ both quantitative and qualitative methodology, which include objective and subjective data. Criterion and indicators employed in the studies reviewed are summarized in Table 1 at the end of the section.

Examples of using qualitative and quantitative data together remain rare. Multilateral agencies such as the United Nations (UN) and World Bank tend to employ both methods together when gathering information but tend to ignore the qualitative data when making policy recommendations. The challenge for community monitoring is to develop more integrated approaches, drawing on the strengths of each type of survey or method. The main issue in the integration of methods is linking the gathering of information with a programme of action (UNDP, 1998a).
3.1.1 The United Nations and Human Development

The UN measures and monitors poverty at a macrolevel. The United Nations Development Programme’s (UNDP’s) 1997 *Human Development Report* sees poverty as ‘the denial of opportunities and choices most basic to human development, to lead a long, healthy, creative life and to enjoy a decent standard of living, freedom, dignity, self-esteem and the respect of others’. This understanding of poverty sees it not as a condition but a process which views people as leading actors against impoverishment. The following is a brief review of some of the ways in which the UN measures poverty on a global scale (UNDP, 1998b).

**Indicators for monitoring poverty alleviation**

A series of goals and targets for the alleviation of poverty have recently been established at UN conferences where the Development Assistance Committee of the Organisation for Economic Co-operation and Development (OECD-DAC), the World Bank and the UN have joined forces to agree on the indicators that will be used in monitoring progress towards these targets. These four indicators which are compiled on a yearly basis are described below:

- **Income Poverty**
  Income poverty is defined as the lack of minimally adequate income or expenditure. The global target is that between 1993 and 2015 the proportion of people living in extreme poverty will be halved. The indicator for this will be the poverty headcount ratio, the proportion of the population whose income or consumption falls below US$1 per day. On this basis, the required reduction is from 30% to 15%. Built into this target is the requirement that the depth of poverty (the average income of those below the poverty line) should not get worse. It is understood that individual countries would replace their US$1 per day with an appropriate local threshold.

- **Relative Poverty**
  Relative poverty is defined as not meeting one’s needs relative to others. One may be relatively poor without being absolutely poor which is defined as not meeting one’s basic needs for subsistence. However if one is absolutely poor it is assumed that relative poverty is also present. The target is to increase the national consumption of the poorest fifth of the population.

- **Malnutrition**
  The global target is that between 1995 and 2005 the proportion of malnourished children should halve, and halve again between 2005 and 2015. The indicator for this will be the proportion of children under five who are underweight. This indicator combines the effects of both current and past malnourishment.
• **Literacy**

  The general target for adult literacy (age 15-24) is that between 1990 and 2015 it be reduced globally by three quarters, and that it be the same for men as for women. This means reducing global male and female literacy rates by 8% by 2015.

**Human Poverty Index**

The Human Poverty Index (HPI) corresponds with the Human Development Index (HDI) to produce the Human Development Report. The HDI combines indicators of national income, life expectancy, and educational attainment to give a composite measure of human progress.

The HPI includes the adult literacy rate, the percentage of the population not expected to reach forty and a composite of three indicators termed ‘overall economic provisioning’. This includes the percentage of people without access to safe water, the percentage of people without access to health services and the percentage of children under five years of age who are under weight. Since the HPI does not include an income component, it offers the opportunity to measure human poverty without making comparisons with income poverty.

**Unsatisfied Needs Method**

This method is being used in Lebanon where household income and expenditure data are not yet available. Households are not classified as poor or non-poor but according to the extent to which they meet four basic needs: housing, education, water and sewerage as well as needs related to income. Each is measured with several indicators, which for housing included rooms per-person, built area per-person and principal means of heating.

This methodology establishes a standardized measurement scale between zero and two for each indicator, and defines thresholds for each indicator in light of prevailing economic, social and cultural conditions. It then calculates a composite index to measure the basic needs satisfaction for each household. This methodology can be used by policy makers in formulating policies to target adequate infrastructure, services and assistance to those most in need.

**Capability Poverty Measure**

The Capability Poverty Measure (CPM) combines three indicators, the female literacy rate, the percentage of children under five years of age who are under weight and the percentage of births not attended by a trained health professional. Such a measure allows distinctions to be made between ‘income poverty’ and ‘capability poverty’. Highlighted by this method in Botswana, was the number of basic services and public health goods to reach remote districts.
3.1.2 South African Census

Every person present in South Africa on Census Night 9-10 October 1996, should have been enumerated in Census ’96. Respondents were given the choice of being interviewed or of completing the questionnaire themselves. In South Africa the smallest spatial unit of information available from a census is the Enumerator Area (EA) (approximately 120 to 150 households). Households are asked to respond to a number of criterion issues which include questions about geographic area, EA type, household size, household characteristics, services, household income and head of household characteristics. The EA type classifies human settlement according to geographic location and the kind of dwellings that are most common within the EA (Statistics South Africa, 1996).

South African census: review of practice

In October 1998, the Interim Statistics Council set up a task team to review the 1996 census as a result of widespread suspicion of the preliminary results (SSA, 1997; Statistics Council, 1998). The report identified the following areas in need of further research:

- The size of the undercount of men (particularly working ages);
- The size of the undercount of the 0-4 age group;
- The extent of age misstatement in terms of self assessment of women over 60 years old and men over 65 years old;
- The extent of international migration to and from South Africa;
- The size of the White population;
- The reasonableness of the provincial estimates in light of the above (Statistical Council, 1998).

The 1996 post enumeration survey adjusted count could possibly underestimate the population by between one and two million. Thus it is advisable for planners who make use of detailed estimates of the population numbers, to re-estimate the population in the light of possible deficiencies (Dorrington, 1999).

People and environmental degradation: application of census data

A study of the Enseleni district of KwaZulu-Natal looked at the characteristics of the population in the area using 1991 census information and correlating it to the extent of environmental degradation during the same period. This was determined by analyzing Land Satellite (LANDSAT) Thematic Mapper imagery captured in 1991. The following review is based on work by Schwabe (Schwabe, 1996).

The extent of environmental degradation was determined using image classification procedures. The extent of degradation was taken as a percentage of the total area defined within each boundary used for enumerating the population characteristics of the region within the 1991 census. These boundaries or EAs, together with the socio-
economic characteristics of each EA and the associated percentage of land degradation, were then statistically analysed to determine any possible correlations, variations and statistical relationships.

Results of the study indicate that population density is not the greatest cause of environmental degradation. Although there must be a critical threshold regarding population density and its effects on the environment, results of this study indicate that population pressure has a much greater bearing on the extent of degradation. Socio-economic parameters indicate that the poverty rather than the density of the population is an important indicator of the extent of degradation. Per capita income is not taken purely as an indication of poverty but also includes the level of access people have to resources and services.

Demographic processes influence land degradation. As the population grows, land and services become scarcer relative to population and is therefore used more intensively (Billsborrow and Okoth Ogenado, 1992). It is the interaction between the overall human pressure on the environment and the resource and ecological potential of the natural landscape that determines the ecological situation. This implies that a critical mass or threshold can be defined for any particular ecological situation. The traditional land use type can be used to express the essence of human pressure on the environment and only use population density as a secondary element in the analysis. The results of the research show that the joint analysis of land use type and population density compiled spatially can outline the boundaries of concrete areas experiencing various levels of human pressure (Antipova and Zherebtsova, 1991).

Lifestyle Segmentation

The ability to clearly delineate the categories of people living in South Africa has proved extremely difficult in the past when using census variables. More than 150 census variables are available for each EA from the 1991 census, and when combined with the large number of EAs, the resulting data matrix has proved to be too complex to assimilate. In addition, existing lifestyle segmentation systems available in South Africa have provided information at a suburb level which means that the categorization of the population into similar socio-economic groups could only be done in metropolitan areas.

<table>
<thead>
<tr>
<th>Lifestyle segmentation methodology</th>
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<tr>
<td>The Human Sciences Research Council (HSRC) decided to classify the South African population into a number of homogeneous socio-economic parameters that could easily be used by demographers and planners. A number of lifestyle category schemes from the United States were examined and ClusterPlus 2000 was identified as the most appropriate. This system as applied in South Africa uses 20 categories to demarcate the population according to lifestyle. The data is available at R5 000 per province (1999) (Stanton, 1998).</td>
</tr>
<tr>
<td>Boundaries of the 1991 EAs by the Statistics South Africa (SSA) were used as the basis for capturing the 1996 census information. Each EA had household information relating to geographic area, population, gender, household, work status, income, age and education attributed to it.</td>
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</table>
Preliminary discussion with the HSRC, has indicated that they would be interested in participating in a study which could combine census data according to lifestyle segmentation, land cover data and geological information to determine areas of potential environmental degradation (Schwabe, 1999).

3.1.3 *The Port Elizabeth Household Environment and Health Study*

The Port Elizabeth Household Environment and Health Study was undertaken as a joint study between the Medical Research Council South Africa (MRC), the University of Port Elizabeth (UPE) and the Stockholm Environment Institute (SEI). The Port Elizabeth (PE) study is part of a four city comparative study of household environment and health involving Jakarta, Sao Paulo and Accra (SEI, MRC, SIDA, 1999).

**Study aims and objectives**

This study did not measure poverty directly but examined criteria related to poverty. The objectives of the study were:

- To describe a range of interconnected household environmental problems in PE;
- To compare the severity of these problems in different socio-economic groupings;
- To evaluate their health impacts;
- To assess people’s (and especially women’s) priorities regarding improvements;
- To examine the financial, technological, educational and institutional obstacles to improvement; and
- To draw out some policy implications of these findings.

**PE study methodology**

**1000 household survey**

The 1000 household broad-spectrum survey formed the core of the study. A randomly selected series of enumerator areas for the 1996 census was drawn and ten households were sampled from each of these. The survey instrument was based on the questionnaires used in the other cities with adaptations to the local context. The issues covered in the questionnaire included the demographic profile of the household; access to and use of basic services such as sanitation, water and energy; wealth (measured by commodity ownership); land tenure and housing-related questions; as well as health indicators.
Household water and fuel survey
A sub-sample of 201 of the 1000 households was asked for more details of water and fuel usage. The sample was stratified between households having running water inside their homes, those with yard taps and those making use of communal stand pipes. A questionnaire was used and Environmental Health Officers made observations in and around the home environment. The water study was undertaken so as to ascertain the differences in access to water supplies and in particular deterioration in water quality associated with local practices such as water collection and storage methods, for those households which did not have running water in their homes. Samples were taken and analysed for microbiological quality.

Focus groups
A series of focus groups was held once the results of the 1000 household survey had been collated. Since the more serious environmental problems were concentrated in the poorer areas, participants were selected to reflect this. The issues discussed in the focus groups were selected using the results of the survey plus the experience of the research and steering committees.

Children’s environmental health
An initiative was launched in order to explore how children could be involved in identifying environmental issues and incorporated into environmental education efforts. A series of specialist reports on education and communication and a video showing the environmental health issues facing children living in poorer communities in PE were commissioned.

Specialist Reports
In addition to the above field-based research activities, there were a number of specialist desktop studies commissioned which looked at environmental health service provision, local government dynamics and civil society involvement, housing and health impacts of paraffin

Wealth, water and fuel analysis
Five quintiles or categories of wealth were devised based on a points system derived from the value of the consumer durables owned by the household. Using this classification, the PE population fell into approximately five equal groups. These quintiles could be allocated to the estimated household income. When used in the report, the 1000 household results are usually stratified by wealth quintile. The fuel and water survey results are usually broken down by access to water as this was the manner in which the samples were defined.

Integration
Those who were responsible for managing and recording the focus groups were not involved in the initial surveys nor in the quantitative data analysis. The focus groups and child-based video material however confirmed issues which were identified in the qualitative surveys.
3.1.4 The Worcester Poverty Audit

Recent attempts at poverty alleviation by the state have focused on the role of Local Government in addressing local needs and inequalities. The developmental mandate of Local Government, which focuses attention on pro-poor initiatives and programmes, needs an understanding of poverty within the local context to ensure that these programmes are appropriate and effective. The following review is based on work by Malan (Malan, 1999a).

Conceptual framework

Research in Worcester argues that in order to understand poverty, local institutions need to look beyond the obvious economic indicators of wealth and deprivation, and recognize poverty as a complex social phenomenon. This understanding is based on an analysis of the type of relationships that poor individuals have with their immediate environment and the extent to which these relationships help or prevent the achievement of a sustainable livelihood.

Sustainable livelihood includes both the economic and social aspects of well being and consists of dimensions such as inclusion, self-respect, health, income stability and the ability to exert social power (Chambers, 1993).

The Asset Vulnerability Framework provides the conceptual framework used to link the basic needs with the outcome of sustainable livelihoods. The Worcester study adapted this framework to describe the elements required to meet these basic needs (Moser, 1998):

- **Human capital**
  Human capital is defined by the ability to work to generate income. Human capital assets include factors such as health, education and the availability of employment opportunities. Human capital provides the means to satisfy the need for subsistence for a sustainable livelihood.

- **Social capital**
  Social capital is defined by the strength of an individual’s social network. Where social networks are strong, there are improved rates of development, governance and institutional performance. Social capital assets include relationships with family, friends, formal and informal support services such as access to child care and spiritual fulfilment. Social capital provides protection, affection, understanding, participation and identity towards a sustainable livelihood.

- **Productive capital**
  Productive capital is defined by the ability to command the physical elements needed to produce goods and services for subsistence. Productive capital serves two functions through enabling employment and assisting in the creation of goods and services for sale. Productive capital assets include productive space, finance, equipment and access to transport. Productive capital provides the physical means to produce a sustainable livelihood.
All three of the above elements function inter-dependently in order to provide the basic conditions for obtaining a sustainable livelihood. Dysfunction in any of these elements results in a decreased ability to obtain a sustainable livelihood, which results in poverty. Communities who have greater control over the relationships they have with the external environment, have fewer difficulties in satisfying the basic needs required for achieving a sustainable livelihood.

Worcester study methodology

Phase 1
Phase 1 aimed at identifying the poorest areas in Worcester and used a spatially based questionnaire that was applied to key individuals in the municipality and the Non-Government Organization (NGO) sector. Respondents were asked to rank all neighbourhoods in the area on a scale of 1 to 4 in relation to their perception of how poor the areas was. Respondents were also asked to define what they meant by poverty in order to determine on what basis they made the division between rich and poor areas.

Phase 2
For Phase 2, the sample for the quantitative research area was drawn on a random basis within demarcated areas in each neighbourhood. The reasoning for the subdivision was to ensure that there was an adequate geographic spread of responses for each neighbourhood. Within each area, a structured questionnaire was used. The questionnaire consisted of a series of closed-ended questions examining multiple facets of poverty.

Phase 3
The survey research was followed by a third phase, which consisted of a series of 10 in-depth interviews with residents of different areas. The interviews were recorded and transcribed in detail by a team of researchers. Interviews were subsequently analysed using discourse analysis as a primary methodology.

This study combined the results of the three research phases into a holistic and detailed understanding of the different dimensions of the experience of poverty. This entailed interpreting the results of all three phases of the research within the conceptual understanding of poverty as outlined above.

3.2 Methodology for Technology Transfer

The following section reviews three methodologies employed in the transfer of technology. The UN Technology Strategy for Sustainable Livelihoods (TSSL) takes a systems approach, which focuses on the interactions between all actors in a system. The UN Participatory Poverty Assessment (PPA) and the Community Action Planning (CAP) are more consensus-based participatory decision-making approaches, which focus on the community’s relationship to other actors within a system.
3.2.1 **Systems Approach**

A system is a structure which operates through the interaction of its parts. Structures maybe as infinite as the universe and as finite as an atom. If the boundaries are too narrowly defined, important interactions may be missed. Boundaries that are defined too broadly risk masking important interactions. (Bellinger, 1998).

One of the major changes in perspective brought about by systems dynamics is that it provides an internal locus of responsibility. The system itself is the cause of its behaviours, rather than a set of external forces. Solving problems within the system requires an adaptation of the behaviour of the system, and not necessarily an external solution such as that offered by technology alone.

To understand the system within which a particular community functions and the behaviours which this system gives rise to, the following reviews the UN Technology Strategy for Sustainable Livelihoods.

3.2.2 **Technology Strategy for Sustainable Livelihoods (TSSL)**

The Technology Strategy for Sustainable Livelihoods (TSSL) is a UNDP initiative for the adaption of technology in the context of the sustainable livelihoods approach. This approach requires technology development to emphasise the importance of establishing links between indigenous knowledge and external scientific knowledge. This is to ensure that local problem identification and insights remain the starting point for inquiry; and secondly to accelerate innovation by focusing efforts that build on indigenous scientific methods as well as examples from outside the community. This process involves building networks using information communication technologies (ICT’s), to facilitate the exchange of knowledge and best practice. The systems approach reflects the holistic process of transferring technology where traditional relationships between science, technology and communities has been characterized by strong sectoral lines (UNDP, 1999).

**Study objectives**

The key characteristics of the systems approach to technology transfer are:

- To present a portfolio of interconnected technologies;
- To understand that technologies must change over time to meet new conditions in the system;
- To identify technologies which are suitable to local conditions;
- To provide a technology mix which aims to improve all components in the system at hand;
- To develop technologies which aim for improved productivity of materials by using waste by-products and energy and by eliminating waste where possible;
- To undertake multi-disciplinary research in order to address the complex needs of the system.
The TSSL approach requires action at all three levels of government working together. Good links between stakeholders is imperative for TSSL to be effective. Major stakeholders include local community, non-governmental organizations, provincial, national and international research institutes and government organizations.

The TSSL must be focused on the assets, strengths and livelihoods of the community. To realize this it is necessary that community play a central role in the technology development strategy. Effective community participation in the technology development strategy will ensure that outside technology and know-how do not dominate in the development process. In achieving this, the following points need to be considered in designing a process.

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<th>TSSL methodology</th>
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### Politics
A technology development strategy must acknowledge the political nature of participatory development. For a number of reasons a community may be marginalized from the political institutional sectors which impact on them. Thus action is needed to ensure community empowerment within these institutions. Specific action may include the linking of community to the local, provincial and national governments within which they operate.

### Responsibilities
Stakeholders need to understand that the primary responsibility for the direction of the technology strategy lies with the local community.

### Team composition
Teams should be relatively small and be comprised of researchers of the same cultural identity as the community and should include people with experience of working with NGOs. This team should have expertise in technology issues related to community livelihoods and should be trained in participatory research methods and group facilitation.

### Representation
The development of a technology strategy should involve stakeholder meetings at local, provincial and national level. Feedback from these meetings must be fed back to communities and may be done so through community representatives at these meetings.

### Information
Community’s need up to date information on all aspects of the technology strategy. Viable local communication methods need to be identified to pass on such information and may be done so through songs, plays, newsletters and the internet.
3.2.3 Consensus–based participatory decision-making

The overall goals of participatory decision-making is to move away from extractive research initiatives where information generated in local areas is processed, analysed and disseminated outside the areas in which the research was originally conducted. Participatory decision-making enables communities to do their own research and analysis. It should be based on consensus, and not on compromise or a majority vote, to avoid the formation of power blocks and disregard of minority concerns. Consensus-based decisions also tend to have a more holistic scope, often leading to a win-win situation (May, 1998; Du Plessis 1999). The following two methodologies employ consensus-based participatory decision-making processes and are based on the work of May and Goethert and Hamdi (May, 1998; Goethert and Hamdi, 1988; Goethert and Hamdi, 1998).

3.2.4 Participatory Poverty Assessment

Participatory Poverty Assessments (PPAs) are often included in UNDP and World Bank programmes for local assessments of poverty. PPAs often rely on methods and tools based on Participatory Rural Appraisal (PRA) which draw on anthropology, Participatory Action Research, Rapid Rural Appraisal and agro-ecosystems analysis. Although the origins of the methodology are predominantly rural, and generally related to participatory planning of natural resource management, they are increasingly used in a wide variety of contexts, including urban and poverty research. Much of the early development of these approaches took place within a context of participatory community development rather than policy research and was carried out by NGOs in Africa and South Asia. The methodology places emphasis on:

- Local people as analysts rather than informants;
- Outsiders acting as facilitators;
- Group contexts for research;
- Visual sharing of information; and
- Empowering weaker, marginal members of communities to participate.

Study objectives

A PPA was conducted in South Africa in 1997 which aimed at clarifying the picture of poverty provided by other sources by focusing on the following objectives (May, 1998):

- To explore local conceptions of poverty, vulnerability and relative well-being in poor urban and rural communities, which included a local understanding of causes or determinants of those conditions. This included the view of poor people as well as the view of those who are delivery agents, policy makers and researchers.

- To explore what the poor themselves see as the most significant constraints that they face, how their understanding of these constraints determines their use of resources and services; and their perceptions of the most effective actions for poverty reduction which can be taken by i) individuals or families, ii) communities,
iii) government agencies, iv) other institutions. This included the view of delivery agents, policy makers and researchers;

- To provide information on the intra-household component of poverty including gender and generational aspects;

- To provide information on dynamic dimensions of poverty and vulnerability which are of critical importance to the poor, and which are particularly suited to investigation through qualitative and participatory research methods. Examples of these include: intra-household aspects of poverty, risk/vulnerability including seasonal stress and various kinds of shocks; and time-depth analysis through life-historical constructions.

South African PPA methodology

The following methods and tools were employed by the South African PPA:

The proper household
This is a visualization exercise that asks participants to draw a ‘proper’ household. Participants are asked to identify who would live in this household, what the household looks like, what the relations between household members are, and what members of the household do to survive and thrive. The intention is to create an open-ended process using a simple set of questions that allow participants to define what they believe is proper or ideal according to their worldview. This tool allows the householder themselves to define what is meant by a household and may be understood differently by different people in the same community. This technique avoids the academic debate around a standard definition for household and brings it into the subjective realm to add meaning and provides a basis of comparison between what is real and what is ideal.

Venn diagrams
These allow participants to represent their responses to a question on different sized or coloured sheets of paper and show the relationships between the issues visualized.

Time trends and time lines
These reflect changes in locally-defined issues over long periods (often decades) of time and allow for respondents to represent significant events in the history of individuals and communities.

Seasonality charts
These reflect changes in locally-defined issues over a short period of time.

Story with a gap
Participants are given two drawings, one depicting the beginning of a certain situation and one that depicts the end of that situation. Participants are asked to fill in the gap between the beginning of the situation and the end so that the dynamics at play are better understood.
Maps
Participants are asked to illustrate locations of households combined with basic information on those households, local infrastructure, locations in the country where people originated from or places where they go in search of work.

Daily Calendars
These depict how participants allocate their time during a day.

Matrices
These allow participants to compare and rank one set of variables with the same or another set of variables.

Carts and rocks
Participants are asked to identify opportunities that can help a household or community move from a particular problem to a solution and the constraints that are encountered that can undermine efforts to resolve this particular challenge.

Problem trees
These help to illustrate the various opportunities and constraints faced by participants in relation to a particular development challenge.

Focus Group Session
Groups of people with common characteristics meet to discuss a particular issue. These issues could be the causes of malnutrition or other health issues, agricultural issues or local political dynamics. Focus group sessions are designed to generate discussion between participants and usually begin with a core set of questions that are explored. Focus group sessions are not considered part of the conventional PRA toolkit, but were an important component of the South African PPA.

PRA methods and tools in practice

PRA methodology is often seen as being soft and unscientific. Despite growing popularity of PRA, qualitative studies do not generally command the same respect or have the same influence in the policy making process as quantitative studies. PPA studies are thus often included as a later addition to larger quantitative poverty surveys and policy is rarely shaped by the outcomes of the qualitative analysis.

More recently concerns about the limitations of PRA have emerged from those who have employed and are trying to refine and strengthen the methodology. The following are some of the more significant challenges facing PRA:

- The lack of clarity about the nature and dynamics of participation. Local level power issues which shape the outcome of PRA sessions are not accounted for. People present at a session are often confused with people actively engaged in a PRA session.
There is a misconception that facilitators can and must act as neutral observers in the process. This disguises the influence which outsiders have on the PRA process.

PRA tools can easily be manipulated to confirm the agendas, positions and/or programmes of the researcher, policy-maker or development institution. This undermines the value of the methodology for critical policy analysis;

Much of what is labeled PRA remains in practice extractive with data analysis and planning often occurring away from the field;

There is a tendency of analysis to be anecdotal or to give great significance to the insight generated by a relatively small number of unspecified participants in formulating policy. This can lead to incorrect results and incorrect policy formulation;

PRA is increasingly being applied in a ‘blueprint’ fashion, with emphasis on the application of the ‘tools’ to find out predetermined issues rather than engaging in an open-ended process where future questions and outcomes flow from the preceding local level analysis. The experimentation, creativity and flexibility which are the strengths of the methodology run the risk of being lost in the process.

### 3.2.5 Community Action Planning

Community Action Planning (CAP) or Microplanning aims to empower communities to design, implement and manage their own settlement programmes. Its methods are participatory, community-based, problem-driven, fast and designed to inform policy from the grassroots. This approach has been developed by Goethert and Hamdi during their work on housing programmes in developing countries. The process can easily be geared to operate in urban low-income settlements.

In Bangladesh a version was prepared that linked training of local technical officers, participatory community upgrading, and the on-going strategic planning effort in Dhaka and Chittagong. In South Africa the method is being used as part of the township upgrading, and a pilot project was undertaken in Schweizer-Reneke, North-West Province, with subsequent workshops in the planning stages. Recently it has been adapted as a tool for risk mitigation by communities in India. The method is not prescriptive and provides a structure for making decisions and relating decision-makers (Goethert and Hamdi, 1998a; Goethert and Hamdi, 1988b).

**Study objectives**

Implicit is an approach which is largely problem-driven and where each action in turn identifies subsequent actions, building the programme as one proceeds, rather than as pre-emptive or pre-packaged.
METHODOLOGY

Local participants are involved in determining both the content and to the structure of the programme. Only the broadest of intentions (or policies) are brought to the site from the top, and subsequently crafted into workable programmes from the bottom. Microplanning is a process which seeks to build linkages between local programmes and national policies to reach consensus among participants on priorities, as well as appropriate courses of action and governmental intervention.

Participants
Participants at the workshop include a cross-section of community representatives, technical officers from the various departments (sanitation, housing, education, dependent on the nature of the municipality organization). The facilitator plays a key role as moderator and must have the confidence of all participants.

Workshop
The key element of CAP is an active, intense community-based workshop, carried out over a period of 2 to 5 days, depending on the specific goals of the workshop. The output of the workshops is a development plan which includes a list of prioritized problems, strategies and options for dealing with the problems, and a rudimentary work programme describing who, when and what is to be done. Integral to the method is the equal relation between the professional technical inputs and the community.

Process
The process is flexible and variations of the approach have been undertaken to address specific circumstances. In all cases where community action planning was used the fundamentals were retained: rapid, intense field-based workshops, a problem-driven agenda, equal community-technical participation and documentation. The process adopts four general stages of work:

<table>
<thead>
<tr>
<th>Stage 1:</th>
<th>Problem identification and Prioritizing: what are the problems?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 2:</td>
<td>Strategies, Options and Tradeoffs: what approaches and actions are most suitable to deal with problems?</td>
</tr>
<tr>
<td>Stage 3:</td>
<td>Planning for Implementation: Who does what, when, how, and how to get it going?</td>
</tr>
<tr>
<td>Stage 4:</td>
<td>Monitoring: How is it working and what can we learn? (A variation of this stage is sometimes included in Stage 1 in identifying problems.)</td>
</tr>
</tbody>
</table>

The start to the process is problem definition, which includes both perceived and ‘real’ problems, those that are measurable are included without initial distinctions.

Materials
Materials required are limited to markers of some kind, large sheets of paper (any kind: wrapping paper, newsprint, cardboard, unfolded boxes) and a place for display of outputs.

Tools
Charts structure the workshop and mixed-background/mixed discipline groups during the workshop sessions. The charts are prepared on large pieces of paper for display purposes and with a minimum of formality to highlight the working nature of the sessions. They remain with the community as a record of discussions and agreements. At the conclusion, the community has a prioritized list of problems, a plan of action for implementation for key agreed options and an appointed person to liaison with authorities.
3.3 Conclusion

In examining the above methodologies it becomes possible to structure a proposed framework for the identification, description of and transfer of technology with poor urban communities in and outside South Africa.

Below is a summary table of the indicators identified by the four identification and description methodologies discussed above.

Figure 2  Comparative Table of Criterion and Indicators used to Identify and Describe Poor Urban Communities in South Africa

<table>
<thead>
<tr>
<th>Study</th>
<th>Criterion</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN</td>
<td>Income poverty</td>
<td>poverty head count ratio, proportion of underweight children under 5, adult literacy rates</td>
</tr>
<tr>
<td></td>
<td>relative poverty</td>
<td></td>
</tr>
<tr>
<td></td>
<td>malnutrition</td>
<td></td>
</tr>
<tr>
<td></td>
<td>literacy</td>
<td></td>
</tr>
<tr>
<td>SA Census</td>
<td>geographic area, EA type, household size, household characteristics, services, household income, head of household characteristics</td>
<td>hh size, type of dwelling, dwelling ownership, migrant workers absent form hh, migrant workers present in hh, fuel used for cooking, fuel used for heating, fuel used for lighting, main water supply, toilet facilities, refuse disposal, telephone facilities, additional money generated, remittances received, highest individual income, gender of highest income recipient, derived hh income, gender of head of household, age of head, population group of head, highest education level of head, employment status of head, occupation of head</td>
</tr>
<tr>
<td>PE Study</td>
<td>demographic profile of the household, access to basic services, wealth, land tenure, housing health</td>
<td>economic disparities (commodity ownership), household composition, migration, education, suitability of land for settlement and access to basic services, need for space, privacy and protection, tenure, housing structure, size of dwelling, building material, crowding, bio-climatic issues, indoor risks and air quality, ventilation, smoking, access to household water supply, water quality, payment for water, access to sanitation services, health risks, hygiene behaviour, solid waste handling and pests, incidence of animal husbandry, health risk to children, health risk to adults</td>
</tr>
<tr>
<td>Worcester Study</td>
<td>human capital productive capital social capital</td>
<td>health, housing, transport, financial capital, education and employment</td>
</tr>
</tbody>
</table>

3.3.1 Identification and description technologies

UN development indicators

The UN human development indicators operate at a country level and are too broad for individual community identification and description. However they provide ideal information for cross border and temporal comparison of poverty which mixes information about income poverty, access to basic services and needs provision at an objective level. These indicators are compiled on a yearly basis and are easily accessed on the internet and in hard copy from UN offices.
South African census

The South African census data operates at the EA level and is collected every 5 years. Quality of life, as objectively defined by the census data collected, is available through lifestyle segmentation at R5 000 per province. While the weakness identified in the last census is potentially significant, if this information is used for initial identification purposes in conjunction with more subjective community information, it is potentially very valuable. In combination with geological and land cover data for the country, the lifestyle segmentation data is an important identification and description tool within a proposed framework for identifying and describing poor urban communities in South Africa.

The PE and Worcester studies

The PE study employed primary research gathering techniques which are relatively time consuming, compared with easily accessed South African census data. The techniques employed in PE are ideal for a regional rather than a community understanding of poverty related issues. While extremely thorough, the methods employed on a whole are geared to a different type of process than that envisaged for the identification and transfer of appropriate technologies. One very useful aspect to the PE study however was the measure of wealth in commodities instead of income, which is more sensitive to formal and informal earnings.

While the Worcester study gathered much more subjective level information than would be possible as a matter of course within a proposed framework, some important lessons can be carried forward from this study. The use of spatially based questionnaires to identify poor urban communities is useful in the absence of clear intra EA information by the lifestyle segmentation method. This mapping of poor communities is also important in cases where lifestyle segmentation is not available.

The conceptual tool of social, human and productive capital in assessing source of poverty is valuable in maintaining a systems perspective of a community. A proposed framework would need to assess dysfunction between these criterion to identify system priorities. Communities which have greater control over their relationships to these forms of capital are better able to achieve sustainable livelihoods. Although not within the scope of this review, it would be of potential value to include natural or biophysical capital as a criterion in this balance.

While the methodologies employed in PE and Worcester are generally too cumbersome to be undertaken with any regularity within an IDP process, the mixture of objective and subjective and qualitative and quantitative data is important to include in any proposed framework.
3.3.2 Technology transfer methodologies

A systems perspective and TSSL

While TSSL's focus is on building networks using information communication technologies, the requirements that technologies be presented as a portfolio, be adaptable to change, be suitable to local conditions, be mixed to address the system as a whole, include initiatives for improved productivity of materials and be focused on multidisciplinary research should be included in the proposed framework. In addition, TSSL's focus on broad stakeholder links and imperatives with regards to political sensitivity, stakeholder responsibility, team composition, representation and information sharing are all valuable to a proposed framework.

Consensus-based PPA

While the methodology and tools employed by PPA in South Africa are too time consuming and cumbersome as a whole to be used within a proposed framework, there are some useful points to be carried forward. Visioning is an important starting point to PPA, which is important in developing a programme of action. The emphasis on community people as the analysts and outsiders as facilitators is a recurring theme which is repeated across the PE and Worcester studies as well as TSSL and effected by the PPA. The group research and visual sharing is important as a tool where community members are unable to participate verbally. The focus on delivery agents, policy makers and researchers echo the aims of TSSL in understanding system dynamics.

PPA is valuable outside South Africa where census data or the combined lifestyle segmentation, geological and land cover data is not available. The information generated by a PPA would be important in combination with UN human development indicators in an initial poor urban community identification process. PPAs are becoming increasingly available for countries outside South Africa.

Consensus-based CAP

The methodologies and tools employed by CAP seem ideally suited to provide community based, problem-driven and fast settlement programmes which are designed and implemented by the community and which is linked to government policy. The focus on actions identifying subsequent actions while building the programme rather than imposing a pre-emptive of prepackaged programme is important in identifying and transferring appropriate technologies. The simplicity of the tools and responsibility located with community to develop an appropriate programme of action makes this method applicable within the proposed framework.
4. PROPOSED FRAMEWORK FOR IDENTIFYING AND DESCRIBING POOR URBAN COMMUNITIES AND TRANSFERRING TECHNOLOGIES

Based on the above review of methodologies for the identification and description of poor urban communities several important points emerge:

- Ultimately this framework needs to operate as a decision-making tool towards the identification of appropriate technologies for enhanced environmental management.
- Any method or framework needs to be linked to a programme of action.
- The framework needs to be participative and include all stakeholders in the visioning, content and structure of the data gathering and programme of action.
- The process employed needs to integrate subjective, objective, qualitative and quantitative methods.
- The framework needs to operate within the IDP process in South Africa in terms of ensuring that the programme of action operates within a legislated framework and supports local government’s commitment to sustainable development.
- Best use must be made of available data from the IDP process and needs to feedback any information gathered to the IDP process so as to build local government’s resources with regards to poor communities.
- The complexity of poverty needs to be taken into account and in so doing be able to measure dysfunction between elements to identify source and priority. As such a minimum of criterion need to be employed in the identification and measurement of poverty. These criterion need to stay static across communities which are assessed so as to provide comparison and to strengthen our understanding of the imbalance in capital which results in poverty.
- The technology transfer process needs to meet a minimum of requirements to ensure equity and appropriateness. In view of these issues, the following framework is proposed.

4.1 Proposed IDP process framework

<table>
<thead>
<tr>
<th>Phase 1: Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gather a combination of lifestyle segmentation, geological and landcover data in order to identify poor urban communities at the EA level where this has not already been done.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase 2: Identification and description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gather any available IDP information for the areas identified in Phase 1.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase 3: Description and technology transfer process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employ a combination of System and Consensus-based methodologies for verifying and expanding information gathered in Phases 1 and 2 towards the identification and transfer of appropriate technology. A visioning exercise with stakeholders is important in developing a structure, content and programme of action.</td>
</tr>
</tbody>
</table>

The dominant methodology employed would be CAP with a strong focus on understanding system dynamics from a stakeholder perspective. Thus, the planning, implementation and responsibility for any programme of action would be undertaken by the stakeholders together.
Tools employed would be taken largely from CAP but could be expanded to include some PPA tools where appropriate.

**Phase 4: Implementation and monitoring of appropriate technology**

Implement the proposed portfolio mix of technologies with community and monitor using indicators developed through objective and subjective data.

Minimum criterion to be measured and monitored by these indicators include health, housing, transport, financial capital, education and employment. These criterion allow for an assessment of dysfunction in the social, human and productive capital accessed by a community. This assessment will allow area of dysfunction, focus and degree of poverty to be identified at system level. In terms of wealth assessment, commodity ownership rather than income should be assessed where possible. The addition of natural capital to the criterion would be beneficial to the assessment.

Technologies introduced need to be presented as a portfolio, be adaptable to change, be suitable to local conditions, be mixed to address the system as a whole, include initiatives for improved productivity of materials and be focused on multidisciplinary research.

Ensure that the information is fed back to the IDP process. This information needs to include the description of communities assessed and monitoring of the programme of action needs to continue for the communities assessed. Further communities need to go through the framework process in terms of accessing urban communities which are absolutely and relatively poor.

### 4.2 Proposed non-IDP process framework

**Phase 1: Identification**

Gather UN human development indicators and any PPA data available for the relevant country to identify poor urban communities if this has not already been done.

**Phase 2: Identification and description**

Approach relevant authorities and undertake a spatially based-questionnaire to identify potential candidate communities for further investigation.

Approach those poor urban communities identified by authorities and undertake a similar mapping exercise in order to establish a relative hierarchy of need between the candidate communities identified in Phase 1.

**Phase 3: Description, technology transfer, implementation and monitoring**

Employ a combination of System and Consensus-based methodologies for verifying and expanding information gathered in Phases 1 and 2, and towards the identification and transfer of appropriate technology. A visioning exercise with stakeholders is important in developing a structure, content and programme of action.

The dominant methodology employed would be CAP with a strong focus on understanding system dynamics from stakeholder perspective. Thus, the planning, implementation and responsibility would be undertaken by the stakeholders together.

Tools employed would be taken largely from CAP but could be expanded to include some PPA tools where appropriate.

Implement the proposed portfolio mix of technologies with community and monitor using indicators developed through objective and subjective data.
Minimum criterion to be measured and monitored by these indicators include health, housing, transport, financial capital, education and employment. These criterion allow for an assessment of dysfunction in the social, human and productive capital accessed by a community. This assessment will allow area of dysfunction, focus and degree of poverty to be identified at system level. In terms of wealth assessment, commodity ownership rather than income should be assessed where possible. The addition of natural capital to the criterion would be beneficial to the assessment.

Technologies introduced need to be presented as a portfolio, be adaptable to change, be suitable to local conditions, be mixed to address the system as a whole, include initiatives for improved productivity of materials and be focused on multidisciplinary research.

Ensure that the information is fed back to the appropriate authorities. This information needs to include the description of communities assessed and monitoring of the programme of action needs to continue for the communities assessed. Further communities need to go through the framework process in terms of accessing urban communities which are absolutely and relatively poor.

The proposed framework has the potential to identify, describe and transfer technology with poor urban communities in South Africa. However, if we are to promote sustainable development, a system of learning to implement the results of a technology identification process needs to be developed. Thus the proposed framework, while achieving the objectives set out in this report, falls short in providing a sustainable implementation process for stakeholders once appropriate technologies have been identified and transferred.

5. CONCLUSION

Great disparities in objective and subjective quality of life exist between communities in South Africa. The role of this document was to review methodologies and propose a framework for the identification and description and transfer of technology with poor urban communities in South Africa. Decision-making processes with regards to poverty alleviation have demonstrated that quantitative information takes precedence over qualitative information in policy decisions despite the depth of understanding gained from qualitative data. The proposed framework includes a combination of methods and data sources in an attempt to overcome this information block in decision-making.

The proposed four phase framework would operate within the IDP process. A combination of South African census, geological and land cover data could be employed with available IDP information to identify poor urban communities in South Africa. Description of these communities needs to come from available identification data and through applying systems and consensus-based methods and tools with individual communities. Through this process a list of priorities is identified and linked to a programme of action for all stakeholders. This can be monitored and changed by using indicators which are derived through objective and subjective data gathering. It is also imperative that any information gained through application of the proposed framework be fed back to the IDP process. The strong link with the IDP process acts to ensure that the programme of action operates within a legislated process which supports local government to uphold its commitment to sustainable development. The proposed framework can also operate outside an IDP process and without the minimum baseline information available from a census.
In terms of indicators for monitoring poor urban communities, disparities can be measured in terms health, housing, transport, financial capital, wealth, education and employment, as well as energy sanitation and water. A minimum of criterion need to be employed in the identification and measurement of poverty which stay static across communities assessed, so as to provide comparison and strengthen our understanding of the transfer of technology in the context of poverty. In understanding these disparities as imbalances between social, human, productive and natural capital we can identify source and priority for action within these communities in a holistic and systemic way.

The proposed framework needs further testing with relevant authorities, technology developers and communities before it can be used with any certainty towards the identification of appropriate technologies for enhanced environmental management.
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**Interviews**

## APPENDIX 1

List of Participants in the Preliminary Review

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harold Alderman</td>
<td>World Bank</td>
</tr>
<tr>
<td>Andre Brits</td>
<td>CSIR, Boutek</td>
</tr>
<tr>
<td>Maria Coetzee</td>
<td>CSIR, Boutek</td>
</tr>
<tr>
<td>Catherine Cross</td>
<td>Rural Urban Studies Unit (UND)</td>
</tr>
<tr>
<td>Eugene de Beer</td>
<td>Urban Econ</td>
</tr>
<tr>
<td>Rob Dorrington</td>
<td>University of Cape Town</td>
</tr>
<tr>
<td>Jeremy Evans</td>
<td>CSIR, Environmentek</td>
</tr>
<tr>
<td>Elsha Hall</td>
<td>Human Sciences Research Council</td>
</tr>
<tr>
<td>Angie Kekana</td>
<td>Human Sciences Research Council</td>
</tr>
<tr>
<td>Liezl Malan</td>
<td>Independent</td>
</tr>
<tr>
<td>Angela Mathee</td>
<td>Medical Research Council</td>
</tr>
<tr>
<td>Julian May</td>
<td>Centre for Social and Development Studies (UND)</td>
</tr>
<tr>
<td>Melinda McCann</td>
<td>McIntosh, Xaba and Associates</td>
</tr>
<tr>
<td>Rebecca Megown</td>
<td>CSIR, Environmentek</td>
</tr>
<tr>
<td>Natasha Morris</td>
<td>Human Sciences Research Council</td>
</tr>
<tr>
<td>Mark Napier</td>
<td>CSIR, Boutek</td>
</tr>
<tr>
<td>Cathy Oelofse</td>
<td>University of Natal DBN</td>
</tr>
<tr>
<td>Kerry Schwartz</td>
<td>Scott Wilson Kirkpatrick</td>
</tr>
<tr>
<td>Aki Stavrou</td>
<td>Data Research Africa</td>
</tr>
<tr>
<td>E. van Dyk</td>
<td>Onderstepoort</td>
</tr>
<tr>
<td>Graham van Maltitz</td>
<td>CSIR, Environmentek</td>
</tr>
<tr>
<td>Ingrid Wollard</td>
<td>University of Port Elizabeth</td>
</tr>
<tr>
<td>Andrew Whiteford</td>
<td>Associate to WEFA</td>
</tr>
<tr>
<td>Craig Schwabe</td>
<td>Human Sciences Research Council</td>
</tr>
</tbody>
</table>
APPENDIX 2
Core Municipal Planning Requirements

<table>
<thead>
<tr>
<th>Act/Regulation</th>
<th>Municipal Planning Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development Facilitation Act,</td>
<td>Contains general principles for land development.</td>
</tr>
<tr>
<td>67 of 1995</td>
<td>Provides that LDOs must be prepared by municipalities, failing which the MEC will set them.</td>
</tr>
<tr>
<td></td>
<td>Time limits and procedures are to be covered in regulations. Provinces,</td>
</tr>
<tr>
<td></td>
<td>excluding KwaZulu/Natal and the Western Cape have passed regulations on the drawing up of LDOs.</td>
</tr>
<tr>
<td></td>
<td>The regulations in general provide for their preparation on an annual basis.</td>
</tr>
<tr>
<td></td>
<td>The regulations all contain stipulations on public participation, co-ordination and time limits.</td>
</tr>
<tr>
<td></td>
<td>The subject matter of LDOs is set out in the DFA but is supplemented by the different provincial regulations.</td>
</tr>
<tr>
<td></td>
<td>In broad terms the subject matter from the Act is as set out below:</td>
</tr>
<tr>
<td></td>
<td>• LDOs must deal with how people will gain access to basic services the standard of those services.</td>
</tr>
<tr>
<td></td>
<td>• LDOs must contain objectives relating to urban and rural space and form, particularly how poorer areas will be integrated into the area as a whole; how the environment will be used in a sustainable manner; how transportation will be planned; how bulk infrastructure for the purpose of land development will be provided; what densities there should be in settlements; how land development should be co-ordinated with other authorities; how land use should be controlled; and how natural resources should be optimally used.</td>
</tr>
<tr>
<td></td>
<td>• LDOs must contain strategies in relation to how to optimise the involvement of sectors of the economy, particularly financial institutions and developers in land development; how to obtain finance for land development; and how to build adequate administrative and institutional capacity to deal with land development in the area.</td>
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<td>• LDOs must contain goals that are quantifiable, such as the number of housing units and other facilities planned for; the nature of housing development; and the rate of delivery and how much it will increase in the future.</td>
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<td>A municipality may require that environmental evaluations are undertaken to check on the impact LDOs are likely to have on the environment.</td>
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<td>LDOs must be approved by the MEC, which approval can only be withheld if they do not deal with the required subject matter, they are inconsistent with other planning objectives or the procedures have not been followed.</td>
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<td>LDOs form the basis of decision-making by tribunals, and they override plans made in terms of the Physical Planning Act, 1991.</td>
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| Local Government Transition Act, 209 of 1993 | Municipalities must draw up IDPs.  
An IDP is defined as ‘a plan aimed at the integrated development and management of the area of jurisdiction of the municipality concerned in terms of its powers and duties, and which has been compiled having regard to the general principles contained in Chapter I of the Development Facilitation Act, and where applicable, having regard to the subject matter of a land development objective contemplated in Chapter 4 of that Act’.  
Municipalities must regularly monitor and assess their performance against their IDPs and must annually report to and receive comments from the community regarding the objectives set in IDPs.  
The Schedules state that metropolitan councils and metropolitan local councils must formulate IDPs which incorporate metropolitan land use planning, transport planning, infrastructure planning and the promotion of integrated economic development.  
Municipalities must prepare financial plans in accordance with the IDPs and they must ensure that their budgets are set are in accordance with the IDPs they have set. Capital programmes must be compiled which include investment programmes for municipal infrastructure, and these must ‘have regard to IDPs.  
The LGTA does not state that IDPs must be approved by the MEC. |
| National Environmental Management Act, 107 of 1998 | The Act sets out general environmental principles that apply to all organs or state throughout the country.  
All listed national departments must prepare environmental implementation and management plans every four years.  
Provides that an organ of state (including municipalities) must consider every environmental implementation and management plan when exercising any function it may have under any law.  
The Director-General may give written notice, if there is non-compliance, calling for the organ of state to comply or remedy any failure to comply. Conciliation procedures are provided for.  
Provinces are specifically tasked with the duty to ensure that the relevant provincial environmental plans are complied with by each municipality in the province.  
Provides that MECs may publish regulations laying down procedures to investigate environmental impacts of policies, programmes, plans or projects. |