KEY ISSUES PAPER

Trees in gardens and homesteads: a review of the livelihoods importance of non-forest trees and their institutional and policy drivers

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Water affairs and forestry

Department
Water Affairs and Forestry
The Republic of South Africa

Acronyms and Abbreviations

CARA	Conservation of Agricultural Resources Act
DfID	Department for International Development
DoA	Department of Agriculture
DEAT	Department of Environmental Affairs and Tourism
DME	Department of Mineral and Energy
DWAF	Department of Water Affairs and Forestry
EPWP	Expanded Public Works Programme
IERM	Institute for Environment and Recreation Management
ISRDS	Integrated Sustainable Rural Development Strategy
FAO	Food and Agriculture Organisation
FED	Forestry Enterprise Development
FIETA	Forestry Industry Education, and Training Authority
FTFA	Food and Trees for Africa
ha	Hectare
KZN	KwaZulu Natal Province
km^2	Square kilometres
LED	Local Economic Development
m	Metres
MoA	Memorandum of Agreement
MTEF	Medium Term Expenditure Framework
NEMA	National Environmental Management Act
NFA	National Forest Act
NFAP	National Forestry Action Programme
PFM	Participatory Forestry Management
RDP	Reconstruction and Development Programme
SADC	Southern Africa Development Community
SAFCOL	South African Forestry Company Limited
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SFD	White Paper on Sustainable Forest Development
SHS	Solar Home System
SPSAA	Strategic Plan for South African Agriculture
Stats SA	Statistics South Africa
TOF	Trees Outside Forests
TROF	Tree Resources Outside Forests
WfW	Working for Water

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Executive Summary

This document is a key issues paper for the Department of Water Affairs and Forestry project: Trees in gardens and homesteads: a review of the livelihoods importance of non-forest trees and their institutional and policy drivers. The outcome of this report is to support Department of Water Affairs and Forestry to establishing a firm policy position on its support to forestry outside of forests. This draft key issues paper on trees outside forests outlines the:

- Legal and political context for institutions to support non-forest forestry
- Profile of non-forest tree planting in South Africa
- Opportunities and constraints for livelihoods opportunities from non-forest tree planting
- Outlines the key policy issues/implications for the Department of Water Affairs and Forestry, including recommendations on roles & responsibilities of the various spheres of Government
- Proposed framework for moving forward on non-forest forestry in Department of Water Affairs and Forestry

Trees outside forests are defined as trees (and shrubs) on land not defined as forest and other wooded land. Trees outside forests can occur on agricultural land, including meadows and pasture, built on land (including settlements and infrastructure), and barren land (including sand dunes and rocky outcroppings). Trees outside forests serve a number of ecological and economic functions which may be similar to those of forests in principle although different in extent. In the defining trees outside forests the forestry disciplinary components include: agroforestry, farm forestry, community forestry, woodlots, amenity forestry, urban greening, urban forestry and social forestry amongst others.

The importance of trees outside forests for rural and urban areas is presented. The difficulties in quantifying trees outside forests are discussed as well as the fact that South Africa has not quantified the extent of these resources to date. The legal context for trees outside forests is given and includes the White Paper on Sustainable Forest Development, the National Forest Act and the National Veld and Forest Fire Act. International agreements are also briefly looked into in terms of trees outside forests. The government roles for managing trees outside forests are done mainly by the Department of Water Affairs and Forestry, by the then Community Forestry Directorate – which has been phased out, Participatory Forestry Directorate with other greening initiatives by the non-governmental organisations and the South African Biodiversity Institute. The importance of managing trees outside forests through a multi-departmental initiative is stressed to cover the scope of the resource. Results of a nationwide tree planting survey from a personal and organisational perspective is summarised with the complete findings being supplied in the Appendixes. The paper is concluded with recommendations on partnerships for managing trees outside forests and a proposed framework for moving non-forest forestry forward within the Department of Water Affairs and Forestry.

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1 INTRODUCTION

This document is a key issues paper for the Department of Water Affairs and Forestry (DWAF) project: Trees in gardens and homesteads: a review of the livelihoods importance of non-forest trees and their institutional and policy drivers. DWAF's vision for forestry is:

> *"Forests are managed for people and we need to create an enabling environment for social development through sustainable forestry, especially at the local levels"*

It is against this background that DWAF now looks beyond the conventional views and roles of forestry by now expanding their scope to non-forest forestry and trees outside forests. Since this is a new focus area within DWAF it was deemed necessary to develop a key issues assessment to inform new policy development or change in current policy. This key issues paper will investigate and document findings with regards to trees outside of forests in order to assist DWAF in justifying a course of action for policy development.

The purpose of this study is for DWAF to have a better understanding of:

- Why people plant trees, what they are used for once grown,
- What trees are planted and
- How they are supplied.
- What is the role of Provincial authorities such as Environment, Agriculture and Housing, initiatives such as the Expanded Public Works Programme (EPWP), in supporting greening in villages and settlements,
- The role of privateers and NGOs who supply and possibly buy trees.
- What are the agroforestry benefits of the tree planting (are they intercropped with agriculture?)

The outcome of this report is to support DWAF to establishing a firm policy position on its support to forestry outside of forests. It is particularly important that DWAF's role and that of other National Governments (such as agriculture & housing) and provincial governments of housing, agriculture and environment are clear so that the appropriate policy position can be explained. This key issues paper will explore options for action which may include integration of this policy guideline with the municipal by-laws and be expedited using employment creation opportunities as part of the Expanded Public Works Programme (EPWP).

2 BACKGROUND

Poverty alleviation is the national government's first priority. Forestry is frequently an important economic activity in rural areas, and is therefore seen as a key player in rural poverty alleviation. From both these angles, poverty reduction is a core interest to DWAF. The Department has a new vision for Forestry, which places people and their development at its heart. This vision also includes trees which fall outside of forests.

In alignment with the 2005 Budget Speech given by Minister Manuel, which identified key areas of focus as: growth and development; fighting poverty and inequality; and social development. One of the key areas for further support was identified as investment in housing and the development of residential communities on the strength of a new Plan for the Development of Sustainable Human Settlements. The central aim of this is to replace or upgrade all informal settlements, which currently house some 1,4 million households by 2014. During this MTEF period, R3 billion of the exchange control amnesty proceeds will be invested in community infrastructure, targeted at lifting the quality of life in new housing areas, upgraded informal settlements and old townships. Minister Manuel noted that this will be a shared project of national and provincial government, municipalities, community organisations and the private sector. In this context the EPWP could use tree planting as to integrate it with housing developments and beautification of other infrastructure. DWAF currently has programmes with the EPWP for example the Working for Water Programme and Working on Fire, however these projects do not reflect DWAF's new vision for forestry. There is still a need to develop new projects that will reflect on DWAF forestry's new vision as current DWAF EPWP projects have not been redirected towards achieving this new forestry vision. EPWP programmes are not funded from new funding mechanism, but from current budgets, which will call for an innovative approach on how to integrate projects that advocate for TOF to agencies of state entrusted with implementation.

The policies that regulate trees are found in different legislative acts and therefore can created conflict. For example the National Forest Act, 1998 (NFA) and the Conservation of Agricultural Resources Act, 1983 (CARA) can be in conflict when regulating trees. The NFA legislate the promotion of greening while CARA regulates which species can be planted and their control. All institutions, even DWAF itself is struggling with the interpretation of existing legislation and this problem is compounded when it comes to the general public without technical and institutional support. For instance, these regulations have created manageable conflict in the institutionalised tree planting sector and more confusion for the individual tree planter. Some tree species are determined to be invasive is some areas while they are not invasive in other areas due to climatic conditions. However CARA does not spatial specify which species are invasive in which geographic areas for all species, and certain species are known not be invasive in all areas of South Africa but have been categorised as invasive for all areas. The category of species (I, II, III) in CARA is also confusing to the general public, more so when this legislation is used by agencies of state as a punitive measure for non-compliance, with disregard of the socio-economic impact of the Act on livelihoods..

Tree planting in homesteads and gardens in rural villages and rural-peri-urban settlements is common, and forests in urban areas (such as the Johannesburg Metro which has over 1 million trees planted within its boundary.) Whilst many of these trees are planted for amenity purposes (particularly in metros) fruit trees are reportedly the most commonly planted in compounds in rural villages and peri-urban areas. The role of Government as well as private sector in supporting this tree planting and management initiatives needs to be better understood so that DWAF can focus its policy and financial resources appropriately in supporting those institutions most relevant to greening. Data to provide a better understanding of the resource base for trees outside forests is not readily available to policy makers. If data where available it could be used to set targets and review management strategies.

DWAF plays a role in supporting forestry in settlements. This role is changing over time as the National Departments leave implementation to provincial and municipal governments. DWAF no longer manages nurseries and plant trees in selected areas, but rather supports greening initiatives throughout the country by supporting the integration of greening into

provincial and local planning processes. It is through the development of this capacity, where potentials for EPWP can be realised.

DWAF is going through a process of change, and like many national Government institutions, is focusing on policy and regulation (of forestry development), and enabling delivery to be managed through local government and the private sector. DWAF retains a responsibility to ensure greening is done, even though it does not do it itself (just as for example, DWAF no longer supplies water). It should be noted through that greening and water satisfy different levels of need, the poor will pay a price for water but it is unlikely they will do the same for trees prior to meeting other essentials. DWAF focus is on the poor areas of the country and the use of tree planting to promote socio-economic, development, and environmental improvements.

This draft key issues paper on trees outside forests outlines the:

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- Profile of non-forest tree planting in South Africa
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- Outlines the key policy issues/implications for DWAF, including recommendations on roles & responsibilities of the various spheres of Government
- Proposed framework for moving forward on non-forest forestry in DWAF

3 NON-FOREST TREES DEFINED

In order to examine trees and gardens and homesteads it is first important to define the topic. Trees in gardens and homesteads are in essence ‘trees outside forests’ or ‘non-forest trees’. Defining non-forest trees is complex which is one reason why management of them has often been ignored.

3.1 Trees Outside Forests

According to the Food and Agriculture Organistion (FAO) there is no direct definition of ‘Trees Outside Forests’ (TOF), however they define TOF as trees (and shrubs) on land not defined as forest and other wooded land (FAO, 2002). TOF can occur on agricultural land, including meadows and pasture, built on land (including settlements and infrastructure), and barren land (including sand dunes and rocky outcroppings). This definition includes trees planted in homesteads and gardens.

The FAO further specifies that TOF may also include trees on land that fulfils the requirements of forest and other wooded land except that; i), the area is less than 0.5 ha; ii), the trees are able to reach a height of at least 5 m at maturity *in situ* but where the stocking level is below 5 percent; iii), trees not able to reach a height of 5 m at maturity *in situ* where the stocking level is below 10 percent; iv), trees in shelterbelts and riparian buffers of less than 20 m width and 0.5 ha area (FAO, 2002).

TOF can also include agroforestry systems, orchards, small clumps of trees, permanent meadows and pastures, trees growing on farms and in urban and peri urban zones, in lines

along rivers, canals and roads, and in gardens, parks and towns (FAO, 2002). TOF may be productive; such as orchards, and trees in fields and other agroforestry systems, or protective; such as trees with an ecological or landscaping function; or ornamental; such as trees around houses, and in parks and towns (FAO, 2002). The trees may be predominantly natural and maintained, such as woodlots, gallery forests and riparian buffers. In spatial terms, they may be scattered discontinuously on farmland and pasture, or growing continuously in line plantings along roads, canals and watercourses, around lakes, in towns, or in small aggregates with a spatial continuum such as clumps of trees, sacred woods, urban parks (FAO, 2002). TOF comprise of tree formations ranging from single discrete trees to systematically managed trees in agroforestry systems (Klienn, 2000). From these descriptive definitions of TOF it is apparent that these trees have a multitude of ranges, purposes, usages, formations, etc. Figure 1 gives an aerial view of TOF and emphasis the various formations of non-forest trees.

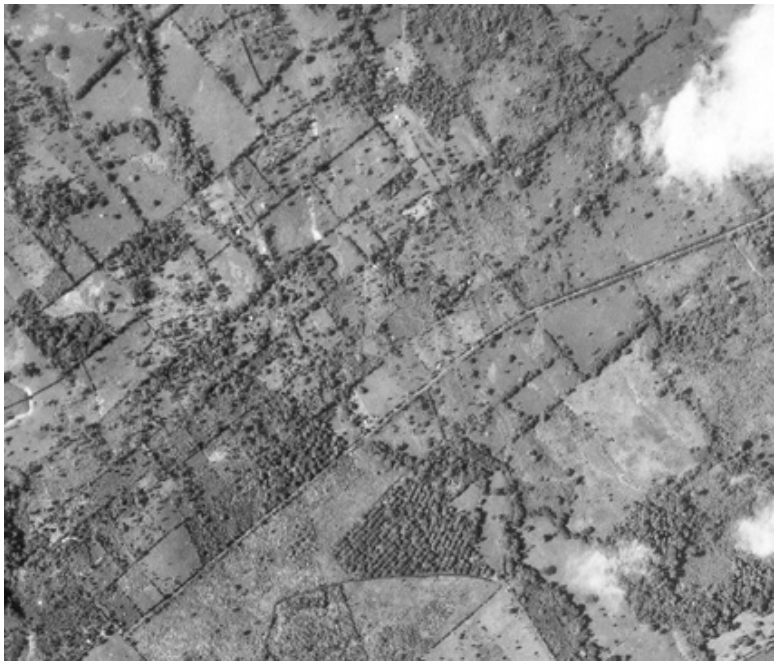

Figure 1: Aerial photograph of Trees Outside Forests (Klienn, 2000)

TOF serve a number of ecological and economic functions which may be similar to those of forests in principle although different in extent (Klienn, 2000). TOF are little recognized in natural resources assessments, particularly for large areas i.e. nationwide, and it is only recently that this topic has emerged as a significant research issue (Klienn, 2000). This is also true in South Africa and TOF are an important resource as only less than 7 177km^2 or 0.56% of the country's total area is covered by indigenous forests (ed Lawes et al, 2004). Under a broad definition of woodlands now occupy 315 228km^2 or 25.8% of South Africa (ed Lawes et al, 2004). This definition of woodland is vegetation formations dominated by trees, but not to the extent that the canopies are continues or overlapping. Exotic plantation forests cover 15 181 km^2 or 1.2% of South Africa (Owen, 2000). The scarcity of wood resources compounded by increasing demand for wood which exceeds the rate at which trees are replanted makes TOF essential to people. TOF are valuable assets in a either rural or urban domestic settlement that supplement people's need for forest resources.

In the defining TOF the forestry disciplinary components include: agroforestry, farm forestry, community forestry, woodlots, amenity forestry, urban greening, urban forestry and social forestry amongst others. Some of these disciplines will now be defined to clarify where similarities exist.

3.2 Agroforestry

The International Council for Research in Agroforestry (ICRAF) worldwide accepted definition of agroforestry is: a collective name for land-use systems and technologies where woody perennials (trees, shrubs, palms, bamboos, etc.) are used on the same land management unit as agricultural crops and/or animals, either in some form of spatial arrangement or temporal sequence (Esterhuyse, 1994). This definition shows that TOF are used on agriculture land including both agrarian and pastoral land. Agroforestry is also defined as a dynamic, ecologically based, natural resource management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production, enhancing social, economic and environmental benefits for land users at all levels (FAO, 2002). The FAO definition highlights the benefits of agroforestry for land users and at all levels.

Agroforestry includes the management of trees in gardens and homesteads. These trees are intentionally planted by the land owner for a beneficial purpose. In agroforestry systems, there are both ecological and economical interactions between the different components (Esterhuyse, 1994). Agroforestry is the integration of different agricultural or farming activities with forestry for the benefit of the ecosystem and the farmer (Mudau, et al 2000). The South African Forestry Handbook (2000) states that agroforestry is:

- a collective name for land use systems involving trees combined with crops and/or animals on the same unit of land;
- Combines production of multiple outputs with protection of the resource base;
- Places emphasis on the use of indigenous multi-purpose trees and shrubs;
- Is particularly suitable for low input conditions and fragile environments;
- Is more concerned with socio-cultural values than most other land use systems;
- Is structurally and functionally more complex than single crop production (monoculture) (Mudau et al, 2000)

In the South African context the objectives of agroforestry are to, amongst others:

- Improve crop yields without high cost inputs such as fertilisers;
- Prevent soil erosion and improve water retention in the soil;
- Provide fodder for animals all year round;
- Overcome fuelwood shortages;
- Provide construction timber for houses and storage barns as well as fencing material;
- Effect better use of poor land;
- Conserve wildlife and water resources;
- Improve aesthetic value of landscapes (Mudau et al, 2000).

Trees planted in agroforestry systems have a multitude of purposes and uses for which they are planted. These trees provide valuable services and benefits to the land owner. Although the above is the intended objective, these practices are predominantly not practiced in a large scale and their full potential is yet to be realised in South Africa. Agroforestry is currently not a core management function of the Department of Agriculture or DWAF. The general low rainfall in South Africa is the main limiting factor for agroforestry. The culture and

history of monocultural tree planting, irrigated agriculture and intensified dry land cropping has also posed negative perception on the practice (Modise, pers. com.). There are however natural systems in South Africa of which the agro-pastoral system is one and characteristic with the woodlands.

3.3 Woodlots

Woodlots are small planting or clumps, of trees near villages, as well as larger plantings which are intended for fuelwood, building material, poles, laths and droppers for local villages, but not for industrial purposes such as production of sawtimber, mining timber, or pulpwood (van der Merwe, 2000). Woodlots are also TOF and the definition of woodlots has been included in this paper because woodlots in most cases are associated with a community. The lack of access to natural growing forests and history of land tenure in South Africa led to the establishment of woodlots to meet wood requirements by communities. These trees fall outside forests and are either located within a village or on the periphery of a community for the purpose of providing basic wood requirements. The woodlots may be owned and managed by local authorities or by local people or a community. Due to lack to access to forests and woodlands because of scarcity, woodlots served the purpose of providing forest resources to people. Woodlots are a preferred option to meet subsistence timber requirements, since most homesteads choose to rather plant fruit trees and/or amenity trees in their garden or homestead. Woodlots are currently being devolved to other entities from DWAF.

3.4 Farm Forestry

Farm forestry is an intermediate between commercial plantations or production woodlots and closely integrated agroforesty, of trees, crops and/or animals (Haigh, 2000). Woodlots, line tree planting (windbreaks, hedges or avenues), single tree planting (shelter, fruit, fodder, or honey) are all components of farm forestry (Haigh, 2000) and TOF. Farm forestry in the South African context is largely practiced by commercial farmers who have land rights for their holdings and are well resourced to undertake such an investment with no immediate need for a return. The diversity of trees planted, is informed by a perceived demand to meet future resource requirements, whether for the farm or to supply the commercial processing sector. Since forestry is largely preferred in the utilization of marginal lands, the extent to which the farm would be afforested is partly dependent on availability of land that is deemed to be of no agricultural use. Farm forestry is practiced in South Africa but is not a core function of DWAF or the Department of Agriculture.

3.5 Community Forestry

Community forestry is defined in the White Paper on Sustainable Forest Development in South Africa as "forestry designed and applied to meet local social, household and environmental needs and to favour local economic development". Community forestry includes tree planting and greening. The DWAF Directorate Participative Forestry oversees community forestry functions. The role of this DWAF Directorate is discussed in detail in Section 7.1.1 of this paper.

3.6 Urban Greening

Urban greening is an integrated, city-wide approach to the planting, care and management of all vegetation in a city to secure multiple environmental, social and economic benefits for both urban and peri-urban dwellers (Sorenson, 1996). Urban greening is similar to urban forestry defined in Section 3.7, but urban greening focuses on all vegetation not only trees as in urban forestry. Urban greening describes a wide range of sustainable, eco-economic urban development actions, including urban forestry, urban agriculture / permaculture, agroforestry, and open space management (Mudau, 2000). Urban greening in South Africa is mainly focused on tree planting to improve livelihoods of the poor by using trees which can provide fruit or other purposes of to beautify and enhance the environment in the urban interface.

Urban greening is a multidisciplinary profession that includes sociology, psychology, economics, landscape architecture, geography, hydrology, soil science, agriculture, forestry, biology, geology, and public administration (Mudau, 2000). Urban greening functions fall under DWAF's Participative Forestry Directorate and is undertaken by municipalities. Rural greening was highlighted to be a function of DWAF post the National Forestry Action Programme (NFAP) but is no longer seen as a function of DWAF. This along with the Institution of the Arbour City / Town Award is now discontinued but did bear fruit (Esterhuyse et al, 2001). Plants for urban greening initiatives in South Africa are supplied by private, government, and community nurseries. Community nurseries are typically run by community based organisations or non-governmental organisations. The role of community nurseries is vital in the greening supply chain and the business also contributes to sustaining livelihoods.

3.7 Urban Forestry

Urban forestry is a specialized branch of forestry that has as its objective the cultivation and management of trees for their present and potential contribution to the physiological, sociological and economic wellbeing of urban society.... in its broadest sense, urban forestry embraces a multi-managerial system that includes municipal watersheds, wildlife habitats, outdoor recreation opportunities, landscape design, recycling of municipal wastes, tree care in general and the... production of wood fibre as a raw material (Kuchelmeister, 1993).

Urban (and peri-urban) forestry includes the management of single trees and clumps of trees which have either sprung up by themselves or been planted in urban areas (Besse et al, 1998). The term 'urban forestry' embraces tree cropping, green spaces and afforested peri-urban areas. Both the quality of life and the aesthetics of the landscape in a wholly manmade environment owe much to the presence of greenery (FAO, 2002). In the South African context urban forestry falls under the realm of urban greening, however urban forestry only focuses on tree matters. There is a potential in develop urban forestry practitioners with support from DWAF in partnership with the EPWP which will be discussed further in this paper.

4 IMPORTANCE OF NON-FOREST TREES

Non-forest trees have an important role to play in the urban and rural environment. Tree resource conservation and even expansion is a strategic issue in less-forested countries, TOF growing in rural or urban areas, in orchards, gardens, savannah or agroforestry parklands, as shade trees or permanent crops constitute a genuine and essential source of the wood and non-wood products crucial for people's day-to-day needs (FAO, 2002). In South Africa TOF although not quantified provide a vital resource to people which will be discussed in both the rural and urban context. While their contribution to local economies is significant, their contribution to the conservation of biodiversity is inestimable (FAO, 2002).

A nationwide tree planting survey was conducted for this key issues paper to gather personal opinions on what tree planting activities South Africans are engaging in their gardens. The sample size was 139 respondents from 9 provinces. Eighty one percent of the sample said that they had planted a tree before. When queried about the type of trees they have planted in their yards 41% said fruit trees, 40% said indigenous trees, and 19% said exotic trees, see Figure 2. When asked what the main purpose trees were planted in Figure 3 for a variety of responses were made, the majority being to provide shade and to make an area beautiful.

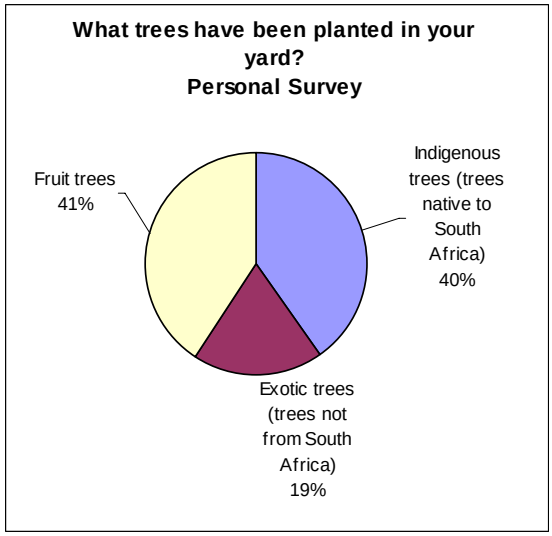

Figure 2: Tree type preference from personal survey on tree planting

When asked what impact it would have on the respondents if tree resources were not available 47% said it would have a high impact, 23% medium impact and 15% for both low impact and no impact. See Figure 4.

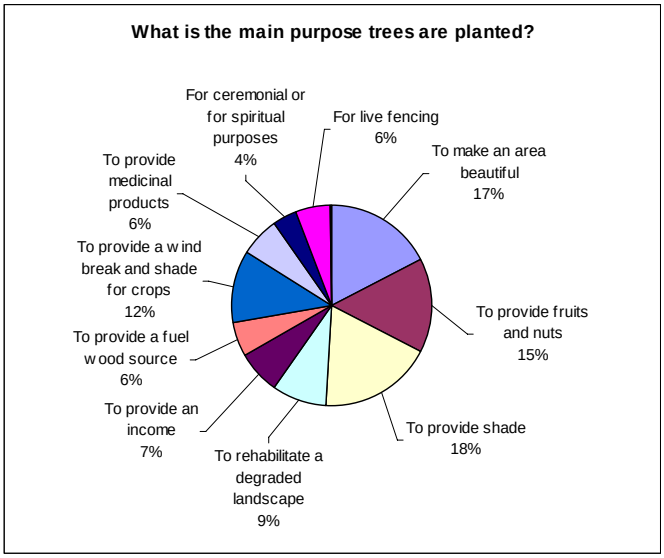

Figure 3: Purpose trees are planted personal survey on tree planting

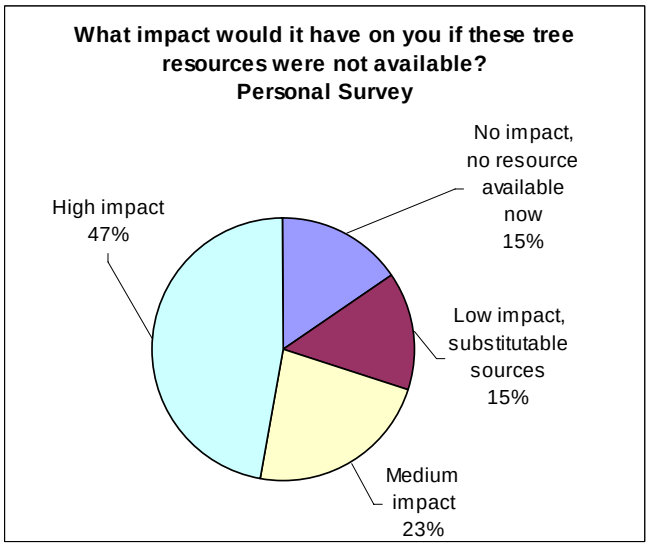

Figure 4: Impact on having no tree resources personal survey on tree planting

The full text of responses to the personal survey is provided in Appendix 2. "We must look after our trees. We can't live without them. Even if we don't know their names or where they're from, and they may look ugly, they're here for a purpose," said Maathai, Nobel Peace Prize winner 2005 before planting a tree with Jeunesse Park from the Food and Trees for Africa (FTFA).

4.1 Non-forest trees in Rural Areas

Non-forest trees in rural areas provide valuable benefits and services however these may differ from the value that urban trees may provide. TOF are found in most rural landscapes and many agroforestry systems (FAO, 2002). Forests and trees-on-farms are, by their very nature, located in rural areas and are important tools in addressing rural poverty and hunger (Roberts and Roper, 2005). The little knowledge on the diversity of tree species and people's preference for certain tree species, beyond the obvious fruit tree species, presents a challenge on what trees should be propagated for planting; and which trees dominate the landscape, may not be a priority in the urban or rural greening initiative.

4.1.1 Implications of Settlement Patterns in South Africa

When discussing the role of TOF in rural areas in South Africa it is first important to highlight the political settlement patterns due to historical governmental policy. In South Africa historical imbalances due to apartheid, household surveys conducted in the post apartheid era in late 1993, found that 53% of the population lived in poor households and among the poor, 95% were African (RDP, 1995). These historical imbalances created divided cities in South Africa and a disparity of available wood to the marginalised population. A survey found that South Africa had one of the worst records in terms of social indicators (health, education, safe water and fertility) and income inequality, even when compared to countries at lower levels of development (Bhorat et al, 2001). The White Paper on Sustainable Forest Development (1997) states that generally, the use of land in South Africa has been poorly planned, with resultant inefficiencies, inequities, and environmental degradation. Although the most glaring consequences arise from the apartheid policies as applied in the former homelands, effects are evident throughout the rest of the country (SFD, 1997). The effects of settlement patterns due to apartheid created an unequal access to tree resources and inappropriate tree planting policies to meet the needs of the poor and marginalised. The communities that were removed were often resettled on inferior land (according Apartheid Group Areas or outside the proclaimed parks), where previously livelihoods could not be sustained and crowed conditions led to further degradation of the land (Aliber, 2002). This series of events served to reinforce the already prevalent view that poor people impact negatively on the environment, which therefore needs to be protected by their exclusion (Aliber, 2002). By settling a large poor population on the most marginal land created a greater disparity in the amount of wood resources available.

Prior to 1995 the role of forestry was predominately for commercial plantations with some efforts towards woodlot management. These forests were planted on grassland that was not suited for any other type of agriculture. One of the major confusions on the role of the forest and foresters arises from the fact that forestry functions within the environmental and as such often operate on land areas that has no (or very few) trees at all e.g high mountain elevations, loose drifting sands along the coast or urbanized grasslands (Owen, 2000). Some of these forests were planted in the former homelands and managed by those governments.

4.1.2 Agroforestry

Agroforestry or the planting of trees with crops is typical in the rural setting. In South Africa, agroforestry systems are used by many farmers however their use of these trees may not be defined as agroforestry (Ngcobo, 2002). The adoption of agroforestry can significantly contribute to sustainable livelihoods and reduced vulnerability for the rural poor (Roberts and Roper, 2005) and the promotion and improved management of agroforestry systems in South Africa is needed to improve livelihoods of the impoverished. Agroforestry can improve soil fertility, provide animal fodder, create a favourable micro-climate for crops and livestock, produce tree fruits, expand fuelwood supplies, and produce a variety of wood products for farmers' home use, thereby producing greater economic and environmental benefits than planting trees, growing crops, or raising animals alone (Roberts and Roper, 2005). Agroforestry is especially suited to cash-poor small farmers who cannot afford to buy costly agricultural inputs (Roberts and Roper, 2005). Since agroforestry is neither a function of DWAF or the Department of Agriculture its potential in South Africa has not been realised.

In South Africa, agroforestry systems, although not specifically identified by that name, are already partly practiced by many farmers (Ngcobo, 2002). For example, in the tree-rich savannah veld of South Africa, such as parts of the Eastern Cape, Northern KwaZulu Natal (KZN), Mpumalanga, Bushveld in the Limpopo Province and the Kalahari where livestock farming is practiced, trees are protected for the production of additional fodder for drought season, as a source of fencing material and firewood, for stabilizing soil, for providing shade and for general environment conservation purposes (Ngcobo, 2002). Trees and shrubs can supplement fodder for livestock as they remain green during the winter months in the savanna landscapes of KwaZulu Natal (Ngcobo, 2002). In some areas where communal grazing is used in areas outside of homesteads and gardens fodder is supplied from trees in the common grazing areas and not on the individual's property. Great efforts are made by the land owner to protect trees and shrubs from being eaten by livestock within their property by use of fencing, brick fortresses around small shrubs and trees or use of thorn branches to protect the vegetation, and use of kraals.

Exotic trees (mostly legumes) such as *Prosopis* spp., *Ceratonia siliqua*, *Sesbania sesban*, *Leucaena* and *Chamaecytisus palmensis* are tree species that are commonly used for fodder and other purposes (Ngcobo, 2002). Indigenous species used as fodder trees include: *Trema orientalis*, known to be palatable to livestock and is reputed to have anthelminthic properties; *Acacia* species: *Acacia robusta* and *Acacia karoo* and large proteinaceous pods (Ngcobo, 2002). Limited projects of various kinds such as trials of *Leucaena leucocephala* have been carried out by the Agricultural Research Council, by DWAF with communities in Limpopo Province. Other projects have been implemented in the Eastern Cape to test their agroforestry systems (Ngcobo, 2002). Non-governmental organizations (NGOs) have supported an extensive array of trials of new species throughout the country since 1985. NGOs working in rural development have fostered the use of fruit trees in household gardens and fields (Ngcobo, 2002). NGOs such as FTFA have been focusing recently on food security tree planting. The benefits of agroforestry in South Africa can be further realized with institutional support. This can be enhanced with partnerships between DWAF, National Department of Agriculture and South African National Biodiversity Institute, amongst others.

4.1.3 Conservation of Biological Diversity

Home gardens and agroforests in many countries offer refuges for certain rare plant and tree species contributing to the biological spectrum (FAO, 2002). This *ex situ* species conservation of tree resources is not accounted for in biological diversity assessments. Agroforests can also have high densities and great range of woody and nonwoody species, which render environmental services comparable to those of the forest (FAO, 2002).

Agroforests can provide a refuge for indigenous tree and shrub species which may also provide other uses such as the provision of traditional medicine. It is rather unfortunate that South Africa does not have *in situ* and *ex situ* seed conservation, rather the policy of the country protects natural forests from over-utilization (Ngcobo, 2002).

One example in South Africa of propagating and planting indigenous tree species is at the Tambualate Nursery in Thohoyandou, Limpopo Province that was founded by the Urban Greening Fund and implemented by FTFA. The nursery has produced over 7000 indigenous tree seedlings including from seeds harvested which are aiming to supply seedlings to schools and community projects in the area. This nursery is also listed with DWAF with hopes that they will purchase trees.

4.1.4 Biomass Initiative

In 1992 the Biomass Initiative was launched to address the fuelwood problem in rural South Africa and in light of the Reconstruction and Development Programme (RDP) objectives. According to the RDP policy (1995) immediate policies to meet energy needs must include improved management of natural woodlands, social forestry programmes, commercial woodlots, and support for the transport of wood from areas of surplus to areas of need. The Biomass project was motivated by the need to address the rapidly deteriorating energy situation in rural areas, symptomatic of increasing poverty, in which 90 percent of households are dependent on wood for energy and attempted to halt the environmental degradation due to pressure on the land (Ngcobo, 2002).

Since 1992 electrification in townships and rural parts of South Africa has increased dramatically, however there is still a heavy reliance on biomass in the form of fuelwood by households. Government's accelerated national electrification programme aims to raise the percentage of electrified homes to 85% by 2010 and around 450 000 households are being connected to the national electricity grid annually (MRC, 2002).

Figure 5: Rural settlement near Eshowe, KZN. The community energy needs are met by the woodland although there are electric power lines overhead.

Wood is used as an energy source due to the cheap cost to use, traditional preference for firewood, and the availability of the resource. The expected benefits of the Biomass Initiative were beyond the stabilized provision of firewood, and included revitalized subsistence farming, provision of food and fodder, improved soil fertility, stimulation of the local economy, improvement in health (particularly of wood collectors), prevention of natural resource degradation, improved water catchment management and greater protection of habitats (Ngcobo, 2002).

The Biomass Initiative identified potential areas of intervention including:

- agroforestry and social forestry systems focusing mainly on individual households;
- community woodlots and small plantations;
- control of invader bush in game, commercial farming and water catchment areas;
- utilization of forestry waste from the commercial forestry industry (Ngcobo, 2002).

The production component of Biomass Initiative involved:

- tree planting communal or individual woodlots, or agroforestry; nurseries owned by individuals or communities;
- training people in social forestry extension;
- fencing certain areas to protect scarce indigenous species and allow natural regeneration;
- installing biogas plants to assess their acceptability.

This component showed that although there is no general tree-planting ethic in rural areas, rural people are amenable to tree planting and veld management for their own benefit (Ngcobo, 2002). However even with the Biomass Initiative tree planting projects to replenish the wood used for fuelwood is not meeting the demand for the resource because there is a lack of replenishing woodland resources, planting of woodlots and afforestation. Alternative energy sources such as electricity are increasingly being used; however due to low cost associated with wood resources this fuel continues to be used and preferred. The slow process of switching from use of wood to other energy sources at household level, indicate that even with the introduction of alternative energy resources there will still be a demand for wood as a fuel resource. The Biomass Initiative was successful in paving the way for the design and implementation of a long-term social forestry programme and lessons from the project are being used to formulate social forestry policy (Ngcobo, 2002). The initial drive from DWAF to promote the Biomass Initiative should not be lost as the programme had many merits in improving livelihoods.

Figure 6: Mother collecting wood living nearby to a timber plantation in KZN.

4.1.5 Dependency on Wood as a Fuel Source and Alternatives

It has been noted that the role of forest and non-forest lands may change significantly from one place to another depending upon local woodfuel demand and supply situations in different parts of the country or an administrative district (FAO, 2000). Hence the closer and more accessible fuelwood resources are to local people either in natural forests, woodlands, or woodlots the more people have a reliance on these wood sources to meet their domestic fuel requirements. Fuelwood accounts for 51 percent of domestic energy use in South Africa and represents the highest volume of forest products used by rural people (Geldenhuys, 1999). Fuelwood gathering focuses on forests where woodlands or exotic plantations do not surround forests

and woodlots have not been developed (Ngcobo, 2002) and in areas where available TOF resources are found.

The further rural households are away from the fuelwood sources the more they have managed to find alternative cheap fuel sources such as mealie cobs, cow dung, coal, etc. The use of woodfuel, other biomass (crop or animal residues) or commercial fuels appears to depend on the access to and/or availability of alternative sources to meet the energy needs of the traditional users, including their fuel choice and mix however the extent of this dependency is not at all clear (FAO, 2000).

In wood scarce areas poor households resort to using other biomass fuels such as mealie cobs and cow dung as these fuels are gathered are not bought. Figure 7 shows a household in KwaZulu Natal Province collecting mealie cobs for energy use for heating and cooking. The mealie cobs can be seen as a substitute to the use of wood when it is not available or has a high premium.

Figure 7: A family in KZN collecting mealie cobs for fuel use at dusk.

According to research by the Medical Research Council (MRC) (2002) the rates of transition to electricity and sustained levels of use of electricity have been disappointing in some areas, and have not followed a simple, linear modernisation model. The MRC state that 'backswitching' has occurred, with households reverting to using solid and liquid fuels during colder periods, times of economic hardship and for reasons such as cultural or social preference. For example a study done by the MRC (2002) in North West Province village indicated that only 18% of households sampled in a village had purchased an electrical cooking appliance immediately after being connected to an electricity supply. While in the same study more than three and a half years after the provision of electricity, 44% of households still had not purchased a stove (MRC, 2002). Figure 8 gives the results of this study and shows the delay time for households in the North West Province village to transfer to using electricity for oven stoves and space heating.

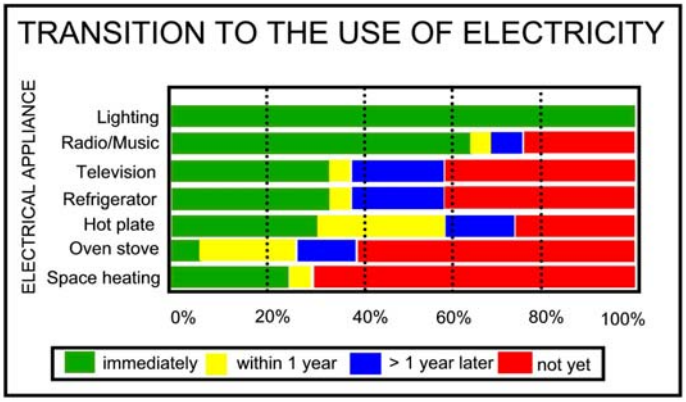

Figure 8: Time post-electrification when selected electrical appliances were first used

This trend in the long transition time to purchase and afford electricity and electrical appliances has implications for trees outside forests as these trees may become a target for fuelwood use. The trend also has implications for municipalities if people are not using electricity infrastructure to its anticipated capacity. This is so because the full financial returns anticipated by the municipalities in return for the electricity services provided and for the maintenance of this infrastructure will not be received as anticipated.

Another study done by the Energy Research Centre at the University of Cape Town exemplifies the amount of wood used in Limpopo province in Figure 9.

The Firewood puzzle

Households using and wanting to use different fuels for cooking (in %) - Limpopo

	Not electrified		SHS users		Grid-connected	
	Using	Wanting to use	Using	Wanting to use	Using	Wanting to use
Grid Electricity	-	78	-	77	22	-
Wood	99	0	91	2	71	4
Paraffin	0	0	3	0	7	0
LP Gas	1	0	6	0	0	0

Figure 9: Firewood puzzle in Limpopo Province of the percentage of households using and wanting to use different fuels for cooking (Prasad et al, 2004)

Figure 9 compares: not electrified households, solar home system (SHS) users and electricity grid-connected households. In this comparison the use and preference to use wood for cooking was analyzed as well. The fuel usage for cooking shows that 99% of the households not electrified are using wood, 91% of the SHS users are using wood, and 71% are using wood that are connected to grid electricity (Prasad et al, 2004). The households wanting to use wood however greatly differs and ranges between 0%, 2% and 4% respectively in each case. This says much about what energy type the households use for

cooking due to what they can afford or what is available where 77% - 78% are desire to use grid electricity (Prasad et al, 2004). It can be inferred from this study that if people in Limpopo could afford and have access to electricity they would prefer to use it over wood for cooking.

Figure 10 shows another household in KwaZulu Natal who uses wood for heating and cooking even though they have grid electricity. They are using the electricity for lighting and small appliances including TV.

Figure 10: KZN household in the Drakensberg that has electricity but still uses wood and other fuels for cooking and heating.

4.1.6 Food Security

Trees planted in gardens and homesteads in rural areas are more likely to provide fruits and nuts as a food source for households. This seasonal harvest enhances food security to rural households. Observations of homesteads with orchards, woodlots or plantations showed a tendency to plant other species of trees besides the main crop on their property, while homesteads with no tree planted crops tend to plant less trees. Agroforestry initiatives supplement food security by not only enhancing the crops the trees surround but these trees often provide fruit and nuts themselves. Fruit trees such as pawpaw, mango, avocado, litchi, citrus fruits, marula, banana are widely grown in South Africa in rural and urban gardens where the climate is suitable. NGOs and community based nurseries have contributed to many fruit tree planting initiatives through the country. They have worked in collaboration with DWAF during Arbour Week and are sponsored by various donors including the private sector.

Figure 11: Trees planted for shade and fruit in Branddraai community, Mpumalnga.

4.1.7 Medicinal tree resources

Trees may be grown in gardens, homesteads, and communal lands for medicinal purposes. South Africa uses 20,000 tons of natural herbs as traditional medicines; some of the herbs are derived from tree bark and roots (INR, 2002). Medicinal plant tree species are becoming extinct in the wild due to over collection by herb gatherers and medicinal plants that still remain are now far removed from the cities and towns leading to additional costs for the gatherers (Modise, pers. comm.). It would be worth while to view TOF as another mechanism for the conservation of the genetic pool of threatened trees in gardens instead of non-sustainable harvesting in wildlands for medicinal purposes. There are an estimated 28 million users of medicinal plant products in South Africa and 255 000 traditional healers in southern Africa (SADC) (INR, 2002). Over 400 species are traded in the markets, both wholesale and retail. Products are sold in both the whole form or in a semi-processed form, where products are chopped into small pieces (INR, 2002).

Figure 13 shows a traditional healers project sponsored by DANIDA in Mpumalanga for growing indigenous medicinal plants and trees.

Figure 12: Indigenous plant nursery in Salique Mpumalanga

4.1.8 Other uses for TOF in rural areas

TOF are also used in rural areas for live fencing, to demarcate property boundaries and to shade houses. Figure 13 shows an example of using Jatropha species as a live fence in KwaZulu Natal. The use of Jatropha tree seeds to be an additive to biodiesel is being researched in South Africa as a possible avenue for income generation in light of the worldwide increasing demand for petroleum.

Figure 13: Example of a live Jatropha fence in KZN

4.1.9 Benefits of Non-Forest Trees in Rural Areas

Table 1 provides an overview of the benefits of rural non-forest trees.

Table 1: Benefits of rural non-forest trees

BENEFITS OF RURAL NON-FOREST TREES	
Multi resource Benefits	Economic Benefits
Shade and Shelter	Wood Products
✓ Shade for people and animals ✓ Shade for other plants and crops ✓ Windbreaks	✓ Fuelwood ✓ Craft wood
Enhancement of rural and scenic surroundings	Timber and Service Wood
✓ Environmental protection	✓ Planks, poles, beams, roofing materials, furniture, fencing materials, construction wood
Enhance food security	✓ Non – Wood Products
✓ Major food source ✓ Help to promote dietary balance and diversity ✓ Promote good health	✓ Fruit and Seeds ✓ Foliage ✓ Stems and Bark ✓ Flowers ✓ Sap
Medicinal Uses	Environmental Benefits
Livestock feed and Live stock services	For soil and water
✓ Major source of livestock feed ✓ Fodder source ✓ Shelter ✓ Channelling herd access and movements ✓ Live fences	✓ Trees preserve organic matter contained in soil and boost its fertility ✓ Halt advancing of deserts ✓ Checking wind and water erosion ✓ Facilitating the percolation of rainwater ✓ Enhancing agricultural production in the long term
Mark of territory boundaries	For biological diversity
✓ Demarcate holdings ✓ Demarcate living quarters ✓ Important land marks (historical)	✓ *Ex situ* conservation in botanical gardens, arboretums, and conservation stands ✓ *In situ* conservation where farmers draw upon their knowledge of the interactions between the environment, genetic resources, and their own management practices to protect biological diversity.
Symbolic, cultural, and religious value	Concerning Climate
✓ Trees of Remembrance ✓ Trees planted in burial grounds or cemeteries ✓ Trees planted at religious sites or places of worship	✓ Trees act as both reservoirs and potential sources of carbon. ✓ Management practices to protect biological diversity.

4.2 Non-forest trees in Urban Areas

Trees in urban areas fall outside of forests however some cities such as Johannesburg are so heavily treed that an aerial overview of the city shows a dense canopy cover with a high diversity of species, Figure 14. There are six million trees in Johannesburg and satellite pictures of the city show the dense canopy cover, Figure 15. There are 1.2 million trees within the parks and on the pavements, and an estimated 4.8 million in private gardens throughout the suburbs (Davie, 2002).

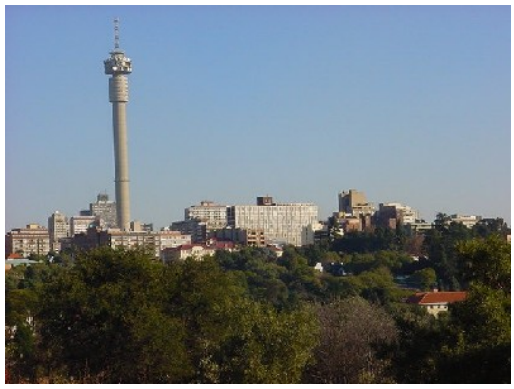

Figure 14: Hillbrow Johannesburg Source: http://www.joburg.org.za

Figure 15: Satellite photo of Johannesburg

City trees are adapted to a great many constraints, such as lack of space and soil, air pollution, damage by man and animals, and repeated cutting (FAO, 2002). Urban and peri-urban forestry is increasingly interested in the ecological and scenic aspects; and most developing country urban agglomerations have neither budgeted nor planned for urban trees, a core feature of integrated urban land management planning in the big cities of the industrialized countries (FAO, 2002).

Although trees have been an important part of human settlements throughout history, only recently has their full value to urban dwellers been recognized (Kuchelmeister, 1993). In the rapid growth and development of South Africa townships the full value of TOF is only now being realised as these developments are compared to older suburbs and urban developments with trees. According to a report on Urbanization in Developing Countries - Time for Action for National Forest Programs and International Development Cooperation for the Urban Millennium nearly 66 % of all South Africans live in cities and towns. A proliferation of urban forestry activities has been carried out as a fragmented series of projects (Kuchelmeister, 1999) however a more coordinated effort is needed.

4.2.1 Urban Greening

The rapid urbanization of poverty and the environmental impacts of urban growth on poor communities are receiving unparalleled attention in current international debates on development and in this context urban greening is increasingly acknowledged as a development tool (Kuchelmeister, 2000). South Africa could do more to integrate agroforestry in urban areas and in particular in townships. The Support Group on Urban Agriculture and the Global Initiative on Urban Agriculture is an urban agriculture forum which also integrates urban forestry and agroforestry activities (Kuchelmeister, 2000) and could be a starting point for South Africa to become more involved in agroforestry. South African cities have implemented Agenda 21 locally and have incorporated urban greening components; however, in current urban greening initiatives professional foresters still have a minor role

(Kuchelmeister, 2000). An urban forester in South Africa is an unknown profession by training where professionals who deal with urban trees are typically city park managers, horticulturalists, or environmental scientists.

Urban greening trees contribute significantly to urban renewal and beautification of cities. In urban renewal greening can revitalize inner city business districts. A national survey of consumers & merchants was conducted in the United States on urban trees. Surveys were distributed in cities throughout the United States having greater than 250,000 populations. The results of the survey showed that public preference for trees in business districts, and differences in response between people and nearby residents (University of Washington, no date). The survey also reflected the differences in shopping behaviours for business districts having trees where it showed that respondents would be willing to pay up to 12% for goods sold in a district having a quality urban forest. The survey then looked into trees in small city business districts and compared responses of residents and potential visitors. Respondents preferred having large trees in retail streetscapes and trees were shown to be associated with reported increase in patronage behaviour, and willingness to pay more for products (up to 9%). (University of Washington, no date).

Urban nature conservation issues in South Africa's western- grassland biome are overshadowed by the goal to improve well-being, with focuses on aspects such as poverty, equality, redistribution of wealth and wealth creation (Cilliers et al, 2002). Therefore urban greening or the planting of trees in cities has been considered less important than other socio-economic issues. However given the length of time for trees to grow the planting of trees there is a foregone opportunity by the lapse in time when trees are to be planted. The urban ecological studies in the western Grassland biome of South Africa, lack descriptive ecological data, long-term vegetation dynamics should be studied to give clear guidance on the management of urban open spaces (Cilliers, 2004). This ecological data should inform which species of trees would be adaptable to this biome as it is dominated by grassland.

4.2.2 Pollution abatement

TOF provide many benefits and services. Urban forests play a vital role in the protection of urban water supply, wastewater treatment systems and storm water management. Urban areas in developing countries face problems related to the lack of safe water, inadequate waste management and pollution control, occupation and degradation of sensitive lands, flooding and soil erosion in unauthorized settlements (Kuchelmeister, 2000). Environmental degradation occurs as a consequence of skew power relationships where environmental resources are used faster than natural produces them, or where wastes from human production / consumption pollute the environment faster than nature can clean them (Aliber, 2002). The potential for environmental degradation is therefore inherent in human existence (people sustain their living from the environment) and current expedited rate of consumption of resources (Aliber, 2002). It is thus unreasonable to require the poor to sustainably use natural resources such as TOF without degradation due to the resources demand that outstrips available resources.

Most poor cities face significant wastewater treatment challenges and could integrate stabilization ponds into park systems and reuse wastewater for urban forestry. Reusing city wastewater not only recharges aquifers but also reduces the demand exerted on scarce water reserves. The greatest potential of wastewater reuse, is in arid zones in developing countries (Braatz, 1994; Kuchelmeister, 1998).

Figure 16 and 17 show a sewer treatment plant in the Sekhukhune District, although the plant is fenced in, animals find their way in and the waste water treatment plants are dysfunctional, which implies that raw sewer without treatment mechanisms is retained in the evaporation ponds. This illustrates that in under resourced municipalities the budgets to provide infrastructure are not tied into long-term maintenance budgets, which results in poor maintenance and inadequate use of waste water treatment plants. It is through the introduction of appropriate technology coupled with an ability to sustain the financial requirements for managing the system. Integration of greening for water treatment could be an option for appropriate technology in this case. If trees were to be planted where water is discharged this would be a typical EPWP project.

Figure 16: Sewer treatment plant in Sekhukhune District, Limpopo

Figure 17: Waste water evaporation ponds in Sekhukhune District, Limpopo

A project called Siyathuthuka implemented by FTFA through the Urban Greening Fund has supported the development of four parks by community members in partnership with Johannesburg City Parks on land that was previously used for dumping rubbish in Phiri and Senoane, Soweto. This shows another example of how greening initiatives can be used to rehabilitate a degraded landscape.

The mining industry has been the bedrock of the South African economy for more than a century (Mandela, 1994) however this has come at a cost to the environment. South Africa has a proliferation of mine dumps throughout the country and many dumps have been left abandoned without owners to rehabilitate them. With the Mineral and Petroleum Resources Development Act (2003) now in effect mine dumps must be rehabilitated and the costs to do this are paid for by the mining company. There have been recent examples in South Africa to use trees or tree products to rehabilitate mine dumps, slimes dams, and gold tailings.

The following is an extract of the Mine Woodlands Project (Weiersbye, 2003):

> *The environmental `footprint' of gold mining activities in the Witwatersrand Basin far exceeds the boundaries of the waste deposits (`slimes dams' and rock dumps), with dust, salinity and acidic mine drainage impacting severely on the surrounding environment. The establishment of tolerant, mostly indigenous, trees on and around slimes dams is being considered as a pollution containment measure. An experimental gold mine closure plan that is using indigenous woodlands and potentially exotic plantations to encapsulate slimes dams and contain pollution called the `the Mine Woodlands Project' is being implemented. This project is incorporating approved woodlands and the associated industries into the mining environment on three gold mines near Carletonville, Klerksdorp and Welkom. Between 2002 and*

2007, up to 10 000 ha of woodlands are being established on the tops of slimes dams, and on polluted seepages around slimes dams. These woodlands are being assessed for their ability to prevent seepage of polluted water from slimes dams, and to de-contaminate polluted soils and ground water. A major focus of the project is to provide economic opportunities from forestry in the regions post-mining. If the woodlands are successful in containing polluted water, then up to 60 000 ha of woodlands (predominantly indigenous) could be established on the goldfields between 2008 and 2025. As mining operations, and the generation of polluted water, ceases, it is envisaged that the area of these woodlands would shrink to between 20 000 ha and 30 000 ha, with the tops of slimes dams being used in perpetuity for tree production. Products from woodlands would include poles, timber, charcoal, fibres and chemicals (tannins and pharmaceuticals). The beneficiation from the woodlands will be centred on the goldfields, with local industries being fostered to produce tree seedlings, as well as plant, manage, harvest and process the tree products. Indigenous woodlands on mining waste are an attractive land-use option, and potentially have high environmental and economic gains for the goldfields post-mining.

A study conducted in Welkom in the Free State looked into using 8 different types of tree species and other vegetation for rehabilitating gold slimes dams (Theunissen and van Deventer, 2001). Other studies being conduct is by Envirogreen (Pty) Ltd where they have been actively researching and developing dry land re-vegetation techniques appropriate to South African conditions (Steenekamp et al, 2001). They have been working on assisting with the rehabilitation of Hartebeestfontein's No. 7 tailings dam where the special challenge was to rehabilitate without any water for irrigation or leaching and using indigenous species which would enable a self sustainable plant community (Steenkamp, et al 2001). Envirogreen established a diversity of trees in clusters on the re-profiled tailings dam. Additional clusters of trees were established selectively on all the other terraces, tailings ponds and areas where tailings spillages will be removed (Steenkamp, et al 2001). Taking climatic conditions and site specific factors into consideration the species were established. The topsoil that was applied as part of the amelioration process, contains a large number and variety of seeds of indigenous tree and shrub species found adjacent to the site. It is anticipated that these tree and shrub seeds will germinate and establish on the dam and contribute to further increased diversity and abundance of woody species over and above the seedlings planted (Steenkamp, et al 2001). The natural succession process will be enhanced in order to reach a sustainable climax ecosystem (Steenkamp, et al 2001).

Many resource-poor people are malnourished and TOF could provide many benefits to improve their livelihoods. Only multi-resource urban forest management is feasible in poor neighbourhoods as these trees are planted for many reasons. For example, in Durban, KwaZulu Natal, multifunctional parks are a component of slum improvement programmes; parks are used for storm water catchments and wastewater, sewage treatment, recreation and gardening (Kuchelmeister, 2000).

It is essential to note that besides the above mentioned benefits urban trees have been proven to be effective reducing noise and air pollution. The *Rekord Newspaper* reported that the Jacaranda trees growing in Tshwane city are effective in absorbing lead from the fuel fumes in the air (study conducted by University of Pretoria. 2005).

It is should be noted that some urban forests may be subject to vandalism and dumping of waste if not well planned and managed. However, many problems are related to poverty and remind us that urban forestry in low income settlements must be planned and implemented together with the residents as an integrated part of urban planning (Kuchelmeister, 1996).

4.2.3 Wood as a Fuel Source

Urban households have opted for alternative commercial fuels wherever available and affordable (FAO, 2000). However wood fuels are still used in urban areas but urban residents pay a high premium for this resource they are far from the source. The use of off cuts and trimmings from pruning garden trees should be promoted to be used as fuelwood instead of just dumping these valuable materials into a landfill site as what is waste to one person may be a useable resource to another. For example, within urban settlements in South Africa there is a mix of informal jobs seekers and casual labour for new housing or property developments that are unaccounted for in the normal use of the neighbourhood municipal services as they are informal and temporary dwellers. These people are still reliant on cheap fuel sources for cooking and heating and could use the tree trimmings wood for fuel.

4.2.4 Food Security

Just as in rural areas TOF provide an essential food source from fruit trees planted in gardens and homesteads. The prevalence of poverty in South African urban areas makes the planting of TOF a valuable food source and provides some income used as a survival strategies. They also play an important role in soil fertilisation and nutrient recycling.

One example of this is a programme initiated during in Arbour Week 2005 where more than 15 000 trees will be delivered to houses in Ekurhuleni each year for the next three years in a Planting a Tree and Growing Our Future drive (The Star, 2005). The DWAF Minister was quoted as saying “the project will enable the community to move into a shadier and environmentally friendlier future” (The Star, 2005) Ekurhuleni Fruit Trees for Homes is a concept that was adopted from FTFA’s award-winning Trees for Homes programme, that includes training local unemployed residents as community-based educators in order to spread awareness about the need to plant fruit trees and vegetables for food security and a greener environment (The Star, 2005).

4.2.5 Trees in Informal Settlements

Of the total population in South Africa 23% live in informal dwellings and 40% to 60% of the residents of informal settlements constitute the labour force in many cities (Engelbrecht, 2004). In 2001 there were approximately one million households living in informal settlements in the nine largest cities in South Africa (Engelbrecht, 2004). Informal settlement households could benefit from TOF if there was adequate policy to address their needs however planting

trees in informal settlements is a complex issue. Despite the impressive housing delivery track record, the absolute number of households living in informal settlements has steadily increased over the last 10 years (Engelbrecht, 2004). These statistics on informal

settlements in South Africa are relevant because tree planting initiatives in these areas are also informal. Figure 18 shows a picture of Diepsloot a dense informal settlement in Gauteng.

At the 5th World Parks Congress in Durban, South Africa in September 2003 it was highlighted that in South Africa, the provision of low-cost housing on a massive scale, a policy of the post-Apartheid regime, helped reduce both the numbers of slum dwellers (by 170,000), as well as their share in the total urban population (from 46 per cent to 33 per cent). The illegal status, environmental threats to and impoverishment of residents require solutions which simultaneously enhance political and social inclusion; address health and safety needs; and promote economic development (Engelbrecht, 2004). Recommendations for informal settlement upgrading by the South African Cities Network propose significant enhancement of legislation and regulation by:

1. Appropriate planning mechanisms and simplified arrangements for the delivery of secure tenure must be developed.
2. The National Housing Subsidy Scheme and the National Building Regulations must be revised to allow for greater flexibility and to introduce effective institutional and financial mechanisms to support community-based, self-built and incremental housing approaches.
3. A comprehensive review of engineering service standards and environmental policies must be undertaken to address existing tension between affordability, financial viability and environmental sustainability.
4. Finally, attention must be focused on securing access to appropriate forms of credit by poor households in order to promote empowerment and assist households to meet their long-term housing needs (Engelbrecht, 2004).

Point 1 above emphasizes securing tenure in informal settlements which is an inhibiting factor for a household to plant trees on their plot as land tenure has not been secured. People residing in informal settlements are one of the poorest segments of the population and could potential benefit most from trees in their property to enhance their livelihoods. Point 2 raises the issue of community driven housing initiatives by incorporating the importance of tree planting in the financial and institutional mechanisms it would ensure that trees are planned for and planted in gardens to subsidize food security. Item 3 above suggests a comprehensive review of environmental polices to address existing tension between affordability, financial viability and environmental sustainability which is directly related to planting trees in gardens. TOF policy should be integrated with the strategies government is developing for upgrading informal settlements.

Figure 19: Informal settlement outside of Knysna Western Cape.

4.2.6 Trees for Amenity Purposes

Trees planted in urban areas are also planted simply for amenity purposes in order to make an area green and beautiful. The South African Forestry Handbook (2000) states that trees and plants used for urban greening should have the following characteristics:

- Light, open crown that lets sunlight through,
- Ability to resprout quickly after pruning or pollarding,
- Few and shallow lateral roots,
- Ability to assist in nitrogen fixation,
- Well adapted to local environmental conditions,
- Shelter conferring and soil stabilisation attributes,
- Capabilities to withstand management practices, and
- Add beauty to the landscape (Mudau, 2000)

Historically street trees planted in Johannesburg were mainly exotic species and preference was given to trees the colonials were familiar with: oaks, planes and jacarandas. Bluff states that “indigenous trees don't make good street trees – a lot of them have thorns which could puncture car tyres or hurt passersby. The perfect street tree must be quick growing, grow straight up, tolerate pruning, and have a root system that does not interfere with the underground systems or break the tar paving above" (Davie, 2002). It was also stated that indigenous trees do not like pruning and they can interfere with the underground systems when planted along streets. Therefore indigenous trees in the city are found in yards, parks and open spaces (Davie, 2002).

Using appropriate tree species in the urban environment is important and some cities have developed their own urban greening guidelines as to prevent inappropriate planting of trees or problematic trees. For example if road reserves with or without sidewalks may be too narrow to plant trees altogether, this is the case in some densely populated townships. Some trees many be planted underneath telephone and power lines and may interfere with infrastructure. Another example of problematic trees is the amount of exotic species planted in the suburbs along the Liesbeek River in Cape Town, Western Cape. The exotic trees, mostly from Europe, shed their leaves in a single pulse during autumn which has lead to a desynchronising of food inputs and invertebrate life cycles will alter food chains that depend on the original, seasonal, pattern of food supply that would have been inputted into the river if the indigenous vegetation were present (Davies and Day, 1998). Although a ‘Greening the City’ initiative was undertaken by the Cape Town City Engineers’ Department to increase the recreational and conservation value of the Liesbeek River little planning went into improving the river by planting appropriate indigenous tree or shrub species. Planning for urban greening can mitigate costly management of problematic trees and other negative consequences. Urban greening initiatives need to be integrated with the engineering, town planning, hydrology, social, agricultural, environmental and landscape architecture professions.

4.2.7 Benefits of urban trees

Some of the benefits of urban trees are included in Table 2.

Table 2: Benefits of urban non-forest trees

BENEFITS OF URBAN NON-FOREST TREES	
Benefits	Why?
Improving air quality	✓ Since emission of many air pollutants increases with higher temperatures trees can improve air quality by lowering air temperatures. ✓ Trees absorb gaseous pollutants into their leaves and trapping and filtering particulates on and through their leaves, stems, and twigs. ✓ Trees have the potential to impact pollutants emitted from power plants by shading buildings and lowering air temperatures in the summer and blocking winds in the winter, which reduces the use of energy for air conditioning and heating. ✓ Trees planted in parking lots provide shade and can also reduce pollutants emitted from vehicles.
Reduce stormwater runoff and erosion	✓ Leafy canopy catches precipitation before it reaches the ground, allowing some of it to gently drip and the rest to evaporate. This interception lessens the force of storms and reduces runoff and erosion. ✓ Research indicates that 100 mature trees intercept about 100,000 gallons of rainfall per year in their crowns, reducing runoff and providing cleaner water. ✓ Tree roots also hold soil in place. ✓ Decaying leaves form an organic layer on the ground that allows water to percolate into the soil, which also reduces runoff and soil erosion. ✓ All of this helps reduce flooding in the streets and sedimentation in streams.
Temper local climate	✓ Trees modify local climate, chiefly by lowering air temperature and increasing humidity; they can also influence wind speed and reduce glare. ✓ Inner cities are commonly known as "heat islands" because the buildings and pavement absorb solar energy and radiate it back. Trees lining streets or near buildings provide shade that can reduce the heat-island effect, lessening the amount of air conditioning needed. ✓ Evaporation of water from trees through the transpiration process also has a cooling effect, especially in hot climates or seasons.
Conserve energy	✓ Community trees can conserve energy with their shading and evapotranspiration effect. For example, three or more large trees strategically placed on sunny sides of a house shade it from the hot summer sun, thus reducing the air-conditioning cost as much as 30 percent. ✓ Deciduous trees are best for this use because they lose their leaves in winter, exposing the house to the warming winter sun, which lowers the energy needed to heat the house. ✓ Coniferous trees, because they retain their needles year round, make fine screens and serve well as windbreaks when placed in the path of the prevailing winds, usually the north and northwest sides. ✓ These trees can also reduce energy use in a house by shielding it from the most severe cold ✓ These energy savings, spread over many houses and many neighbourhoods, can reduce the demand for power production by utility plants, which in turn reduces the air pollutants produced by these plants.
Good for the economy	✓ Community trees provide subtle but real economic benefits. ✓ The value of houses on lots with trees is usually higher than those of comparable houses on lots without trees. ✓ Studies have shown that shoppers linger longer along a shaded avenue than on one barren of trees. ✓ Shaded thoroughfares are not only more physically comfortable but also psychologically more attractive. ✓ And an abundance of trees "says something" about a community that makes it more appealing to newcomers as well as residents. ✓ In addition to enhancing the home and business environment in an urban area, recreation areas such as parks, greenways, and river corridors that are well stocked with trees tend to keep recreation seekers "at home" rather than driving many miles to find suitable places to play. ✓ Here again, less fuel is used and less pollution created. It would be difficult to put a dollar value on such urban playgrounds, but if each visit were valued at only one dollar, the total for the typical city would be in the thousands of dollars per year.
Create habitat for plants and animals	✓ Wherever trees are established, wildlife and other plants are sure to follow. ✓ Trees and associated plants provide shelter and food for a variety of birds and small animals. ✓ The presence of trees creates an environment that allows the growth of plants that otherwise would not be there,

	enhancing the diversity. ✓ Again, the monetary value of such diversity is incalculable, but it is well known that residents of and visitors to a community appreciate and enjoy it. Simply put, the presence of trees creates an environment that is much more pleasant for living, working, and playing.
Improve health	✓ It is known that green environments reduce stress in people, making them more productive at work and happier at home. ✓ Trees and their associated vegetation have a relaxing effect on humans, giving them a general feeling of calmness and well-being. ✓ Among those who benefit from the proximity of trees are hospital patients. Studies show that patients with a window view of greenery recover faster and suffer fewer complications and medications that those without such views. ✓ Further, children with Attention Deficit Disorder (ADD) were found to have better behaviour in green environments. The presence of trees and other vegetation seems to have a soothing effect that tempers excessive behaviour. ✓ Recreation; urban parks provide much needed recreational space. ✓ Waste water use; nutrient rich waste water can be successfully used for tree growing. ✓ Food security; urban agriculture has huge potential to help families address their everyday food requirements through a number of low input, high yield, home garden technologies.
Serve as screens	✓ Densely planted rows of trees around homes and buildings and along streets and roads can serve as screens to preserve privacy and shut out unwanted or unsightly views. Wide belts of such plantings can also help to muffle sound. ✓ Landscape improvements, trees add colour, texture and height to urban landscapes as well as reducing glare and reflection.
Promote community	✓ A stronger sense of community, an empowerment of inner city residents to improve neighbourhood conditions, and the promotion of environmental responsibility and ethics can be attributed to involvement in urban forestry efforts. ✓ Active involvement in tree planting programs enhances a community's sense of social identity, self-esteem, and ownership; it teaches residents that they can work together to choose and control the condition of their environment. ✓ Planting programs also project a visible sign of change and provide the impetus for other community renewal and action programs. ✓ Several studies show that participation in tree-planting programs influences individuals' perceptions of their community. ✓ Conversely, a loss of trees within a community can have significant psychological effect on residents. ✓ Educational value, trees provide a range of educational value in parks and botanic gardens as well as in schools.
Other Uses	✓ Fuelwood; despite electrification in much of South Africa's urban areas fuelwood is still an important need particularly in peri-urban areas as many families cannot afford electricity for heating and cooking. ✓ Traditional medicine; the importance of natural medicines in local culture cannot be underestimated.

Source: (USDA Forest Service, 2003 and Mudau, 2000)

5 QUANTIFICATION OF TREES OUTSIDE FORESTS

There has been no quantification or inventory of trees outside forests in South Africa. There have been several land cover inventories done at a national scale such as Low and Rebelo, 1996; DEAT, 2001; CSIR 2000; DEAT and SANBI, 2004; however none of these quantified trees outside forests. These land cover data sets do quantify forests, woodlands, thicket, bush land, agricultural land and other land cover types. TOF have not been inventoried most likely due to the scale at which the land cover data was collected and the aims and objectives of the survey. DWAF initiated a national indigenous forest assessment in 2000 however this study only focused on indigenous forests up to one hectare in size. There are also GIS coverages done by DWAF and private industries of commercial plantations but these only cover commercial plantation forests. The question arises, is there a need to quantify trees outside forests? The study of the importance of trees outside forests is a rather new area of interest worldwide as more research is conducted into livelihood strategies, poverty initiatives, and deforestation.

Statistics South Africa conducted a Commercial Agricultural Census in 2002 as per Section 16 of the Statistics Act, 1999 (Act No. 6 of 1999). This census included two questions on the area (in hectares) on the farm with: 25) Plantation (trees for wood production) and 26) Woodland, forest and underbrush that cannot be utilized for cultivation or pastures (Stats SA, 2002). These questions are related to the quantification of trees outside forests and could provide an initial estimate of the land area in hectares of trees on farms in South Africa. At the time of drafting this paper Stats SA has not released the results of these questions in their post analysis of the census. DWAF should request this information as it would be the only known attempt to quantify trees on farms.

Although a standard methodology for estimating tree volume and growth has been developed for natural forest and plantations none has been developed for trees grown in non-forest areas (Wood Energy News, 2000). Since the natural forests have shrunk to a critical mass and the awareness to conserve them for ecological and environmental reasons has also increased, the potential role of trees growing in non-forest areas has begun to attract the attention of planners and foresters (Wood Energy News, 2000). However it is near impossible to manage a resource that is not known and quantified in order to determine if there is a surplus or a shortage. For example the campaigns for saving the rain forest came about as more satellite imagery from space indicated the deforestation practices. Once this resource was quantified on a large scale appropriate management could then be implemented to mange the forest.

Satellite imagery as in Figure 20, indicate the encroachment of agriculture to forested lands and clearly depicts the impact associated with change in land-use. It is through the use of such imagery and information updates upon which appropriate policies can be enacted to regulate land-use practices that threaten the functioning of ecosystems such as the rain forest. Before such imagery and information derived from related technology combing remote sensing and satellite imagery upon which action was taken at a higher level involving a wide spectrum of civil society. In is noted that such imagery to conduct and inventory for TOF comes at an expense. This expense needs to be weighed against the anticipated value that TOF has to South Africa.

Figure 20: Satellite image of Amazon River and surrounding forests

In the same note trees outside of forests attract little attention in terms of a concerted effort for management as no data is being collected for Trees Resources Outside of Forests (TROF), this was concluded by the TROF Conference in Arusha 1999. (It is noted that the terminology TROF and TOF are both used in this paper and a quoted accordingly as per the literature cited.) This presents a challenge to management on how to provide adequate policy measures of a resource that is not quantified. Anecdotal information on the decline of urban and rural greening in the South African context can be derived from the Invasive Alien clearing programme, but little can be collected in terms of re-greening as greening programmes are sporadic and fragmented. Cross cutting policies are thus used in the regulation on trees outside forests. Such policies would range from the protection of endangered tree species, the eradication of non desirable tree species to municipally by laws on the control of trees that affect utilities.

5.1 Methods to quantify trees outside forests

In order to quantify the volume of trees outside of forest, in the urban areas, traditional forestry enumeration techniques are presented with a quagmire of challenges from cruising to modelling. Access to measure the trees in a consistent manner can prove to be difficult especially where access to yards where the trees are located is restricted. Governments and organizations have employed Remote Sensing (RS) and Geographic Information Systems (GIS) to capture and analyze spatial data for land cover / use and sustainable management (Zhaoli, 2003) and this could be potentially adapted to quantify TOF in rural and urban areas on a large scale.

It is recommended to use high resolution multi spectral imagery for TOF, but the costs are prohibitive. Research methods need to be developed, and application of local knowledge is essential in selecting the suitable sampling methods for TOF variables data collection and

social and economic factors in developing the analysis models (Zhaoli, 2003). It is through a better understanding of the resource base, upon which policies can be developed informed by data that supports the need to provide additional resources for management.

A Forest Survey in India, Dehradun study by Ashutosh (2002), provides adequate information on the use of GIS to quantify trees outside forests. IRS 1C PAN and LISS III imagery data of a specified period, preferably during the summer season can be used in a study to assess the current status of trees outside forests. The data can be analysed using ERDAS IMAGINE 8.4.1 and ARC/INFO software on WINDOWS NT workstation platform. The images can be geometrically rectified with the help of Survey of toposheets on 1:50,000 scale. PAN and LISS III images can then be fused using Brovey's algorithm (Figure 21).

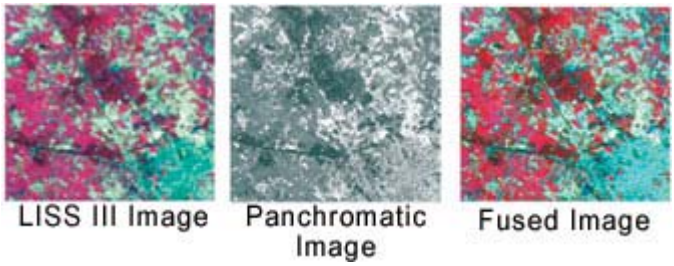

Figure 21: Fusion on Multi spectral and Panchromatic images

A hierarchical approach of classification can then be adopted to pick up features of interest (Figure 22). The LISS III image can be classified into tree cover, agriculture, settlements, water bodies and other dark appearing surface areas using maximum likelihood.

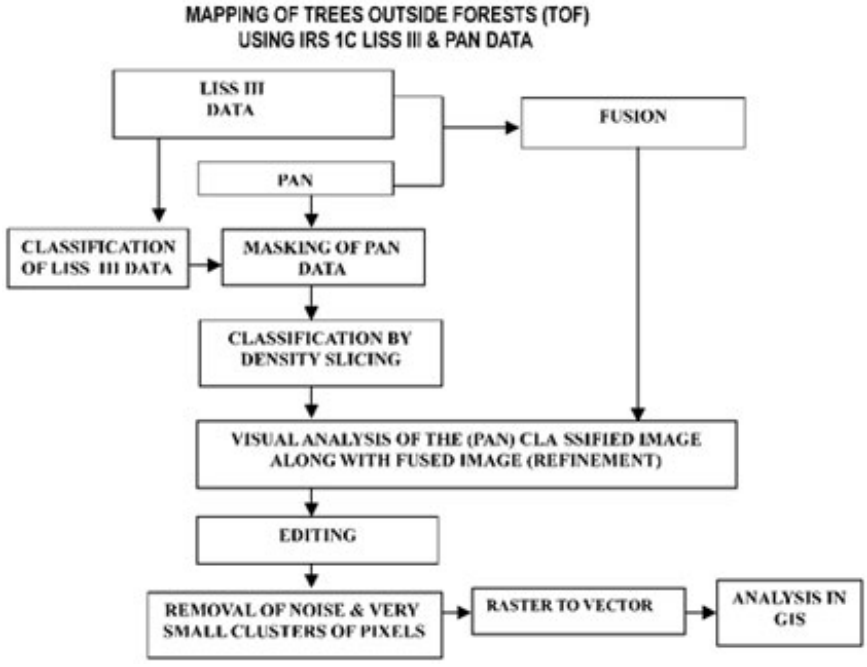

Figure 22: Process of Mapping Trees Outside Forests

The digital image processing and GIS analysis in Figure 21 provides a methodology for using multi spectral and panchromatic data for mapping of trees outside forests (TOF). The flow chart depicting methodology is shown in Figure 22. A case study undertaken to develop the model above concluded that patches of TOF greater than 0.014 ha can be mapped and through ground validation, the mapped points were in agreement with ground validation

(Ashutosh, 2002). However, omission of few patches was noticed in the mapping. On analysis it was found that small patches of size >>0.2 ha with low canopy density (< 0.2) could not be picked up in the mapping (Ashutosh, 2002).

A new approach is being developed by the University of South Africa to come up with innovative mechanisms on how to evaluate urban trees. DWAF and municipal structures will benefit being able to attach value to trees growing in urban areas. This tool could be adapted and further developed to be implemented in other circumstances (Modise, pers. comm).

5.2 Classification of Non-forest trees

Another difficulty in quantifying trees outside forests is to devise a standardized classification system as TOF are a highly diverse resource. Such a classification is primarily needed for the better understanding of the structure and composition of the resource (Klienn, 2000). An evaluation of the resource and comparison among different TOF studies is needed to devise a classification system. A formal classification system is particularly necessary to enable presentation in maps, where for large areas not every single tree can be depicted (Klienn, 2000).

Some examples of classifications of TOF are according to the land where they are found for instance:

- Trees in urban and peri-urban areas
- Trees associated with permanent crops
- Trees associated with annual crops
- Trees associated with pastures
- Trees along "line features" such as property borders, roads, railways, canals, creeks
- Tree groups (that do not comply with the area requirements of the forest definition)
- Trees on not cultivated/not managed lands (parts of savannah land, mountainous regions, peatlands) (Klienn,2000)

TOF could also be classified according to geometry for example where little or no direct inter tree interactions occur and result in isolated scattered trees or by zoned trees, exhibiting a more or less clear shape, i.e. trees in lines or groups of trees (Klienn, 2000).

A study in Central America demonstrates why large-area information on TOF would be useful to respond to the following questions:

- What is the role of TOF in the context of carbon sequestration?
- What is the role of TOF in the context of conservation of biodiversity and the implementation of biocorridors?
- To what extent do TOF contribute to soil conservation, water protection and erosion control, particularly on cultivated slopes?
- What is the role of TOF in the context of timber production?
- Can some non-forest land with trees be considered a potential reserve of forest land? (Klienn, 2000)

DWAF would need to integrate a TOF inventory with a number of government bodies, institutes, projects and NGOs to gather a wide range of baseline information on TOF. This could then be linked with other forest and woodland inventories in South Africa. Integration with the Statistics South Africa Agricultural Census 2002 would also be useful however a spatial dimension would need to be added. There are also linkages with the National Biodiversity Assessment and existing land cover datasets. In the planning of a TOF inventory it is therefore good practice to contact other possibly interested parties as they might have good information ready in their archives - or they might show interest in participating actively in the new inventory (KIienn, 2000).

An example of South African attempt to map TOF are the maps constructed in the biotope mapping exercise have already been used by municipal authorities of the city of Potchefstroom in the North West Province in the development of Integrated Development Plans (IDPs) for the city planning in accordance with the Municipal Systems Act (South Africa, 2000). These efforts have placed the city of Potchefstroom on the forefront of urban nature conservation in the North-West Province (Cilliers, 2004).

Policy-makers and managers have for the most part long ignored these familiar trees and shrubs, probably because the resource involves so many sectors. Forest resources are usually routinely assessed and well-known, but data and information on trees growing outside forest lands are still fragmentary, dispersed, and unincorporated into databases; and they appear likely to remain so (FAO, 2002). To compound the challenge associated with TROF data, there are no parameters for measurement of TROF in available literature (Zhaoli, 2003). This challenge can be overcome by progressive policies that advocate for the establishment of incentives to retain experienced and trained professionals in the forestry field as they are better equipped to provide leadership and technical analysis on course of action to be undertaken to address such shortcomings. Public sector institutions have a responsibility to advance the body of knowledge in a changing environment; support to academia in the field of forestry research should be further promoted to advance research in the least studied areas. Figure 23 and 24 contrast two different types of mapping methods that could be used for TOF. Figure 23 is uses a 3-D satellite image and Figure 24 is a simple street map marking overgrown or problematic trees which will be felled in an older neighbourhood.

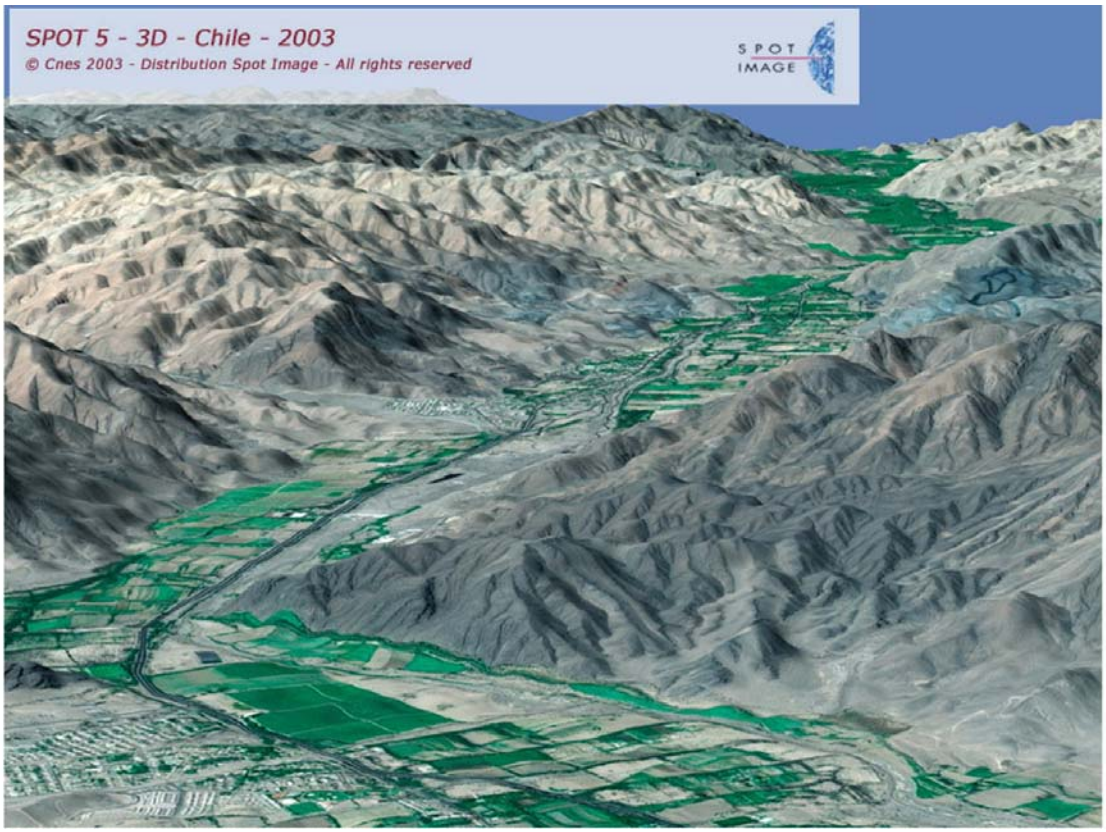

Figure 23: Example of a Spot 5 – 3D Image of Chile 2003.

Figure 24: Example of a tree map for Colorado Springs 2004

6 LEGAL CONTEXT FOR INSTITUTIONS TO SUPPORT NON-FOREST FORESTRY

Trees outside forests will not be managed properly unless there is legislation in place and being implemented for their management. The National Forest Act, 1998 and the Forest and Veld Fire Act, 1998 are the two main pieces of legislation controlled by the forestry section of DWAF. However there is a general consensus that research and development in the forest sector in South Africa are currently not capable of delivering the necessary services needed to support all the aspects of a thriving forest sector, which include community forestry, industrial forestry and the management of natural forests and woodlands (Ngcobo, 2002). In part the competency in forestry having been greatly influenced by commercial forestry plantations, has presented a skewed picture of research and practicing forestry professionals favouring commercial exotic tree research over indigenous tree research. The bias for commercial forestry influences research, to address private sector needs which are profit driven rather than to increase the forestry sector body of knowledge. For example biotechnology and tree tissue typing are technologies widely associated with plantation forestry research than natural forests and woodlands.

DWAF is undergoing institutional transformation and functions restructuring from being a traditional forestry support department to a policy and regulatory department. Strategies that were developed over the past 10 years have been led by different leadership with different technical backgrounds including non technical forestry expertise which promoted discontinuity of certain programmes, functions and directorates with inadequate phasing out towards closure. Hence there is a disjuncture in information available about the Department and what the Department is currently doing or planning for the future. With this in mind a historical review of the White Paper is made in terms of TOF. Legislation mandated by DWAF to support non-forest forestry or TOF is then presented. Other legislation promulgated by Departments such as Agriculture and Environment and Tourism that also regulates TOF is also highlighted.

6.1 The Environmental Conservation Act (1995) and the National Environmental Management Act (1998)

The National Environment Management Act (Act 107 of 1998) (NEMA) is the main Act in the protection and sustainable management of natural resources. It promotes co-operative governance in environmental management through National Environmental Strategy and Action Plans (NESAP). It also promotes the fair and equitable sharing of the benefits arising out of the utilisation of natural resources. It promotes capacity building, ensuring that people and their needs are placed at the forefront and their physical, psychological, development, cultural and social interests are met.

In terms of Chapter Three of the NEMA, every national department listed in Schedule 1 as exercising functions which may affect the environment must prepare an environmental management plan (EMP). The purpose of EMPs is to co-ordinate and harmonise the environmental policies, plans, programmes and decisions of the various national departments that exercise functions that may affect the environment or are entrusted with powers and duties aimed at the achievement, promotion, and protection of a sustainable environment, and of provincial and local spheres of government, in order to give effect to the principle of co-operative governance.

6.2 White Paper on Sustainable Forest Development in South Africa

The White Paper on Sustainable Forest Development (SFD) in South Africa drafted in 1997 lays the foundation for the National Forest Act, 1998. This document emphasises the importance of having a forest policy that manages the relationships between people and the resources provided in the forest. It says that forestry includes the use and husbandry of the wood, fruits and other products that come from trees. Trees outside forests fall in the realm of community forestry and it is described in the White Paper as:

> *"…forestry designed and applied to meet local social, household, and environmental needs and to favour local economic development. It is implemented by communities or with the participation of communities. It includes farm forestry, agroforestry, community or village planting, woodlots and woodland management by rural people, as well as tree planting in urban and peri urban areas."*

According to the SFD community forestry has been neglected in the past as the government only focused on woodlots for construction timber and fuelwood. The SFD highlights commercial farm forestry as farm windrows, shelter belts, and woodlots, and states that it has proven quite successful, and no longer need much support. It notes that community forestry among African people has had little success, perhaps only in some parts of the Eastern Cape, where woodlot establishment around indigenous forests has helped to conserve the natural resource, and in scattered cases where woodlots have been incorporated into the local resource use system. However agroforestry has been practiced throughout all sectors of South African society as observed by the extensive tree planting in gardens in the country.

The SFD states that generally, the lack of adequate community forestry programmes is reflected in, amongst other things, the pervasive shortfalls between fuelwood demand and fuelwood production, the severe degradation of woodlands in many districts, as well as local destruction of natural forests, and the fact that few communities have been able to build tree growing into their local development initiatives. The SFD then emphasizes that this overall failure reflects the past lack of recognition of the value of natural and plantation forest resources to rural households, in economic, environmental, and social terms. It also states that there has been an absence of sound policy that recognised local needs, as well as a suitable supporting institutional framework. This includes the lack of recognition for the value of trees outside forests and the supporting institutional framework to promote this for local needs and livelihoods.

Community forestry gained impetus through changes in DWAF programmes, from the days of the Biomass Initiative and others however the implementation of these programmes have been difficult to sustain in common with international experience (SFD, 1997). However, this has changed significantly since the drafting of the White Paper as DWAF is now involved in the community with the Participatory Forestry Management (PFM) programme and Forestry Enterprise Development (FED). Ongoing governmental support is required to sustain any initiatives and the revised policy should start to address skills transfer as opposed to provision of infrastructure and resources (SFD, 1997). As traditionally community forestry support was mainly in the provision of nursery and implements which is no longer a function of DWAF, little emphasis was placed on the competency of the community beneficiaries to acquire associated technical skills (SFD, 1997). The SFD says this is due to the minimal literature in simple form for non technical forestry professionals in the nursery management field. According to the National Forest Act (Section 28-32), these functions are still a responsibility of DWAF. The recently approved capacity building strategy also talks of building capacity at community structures.

A Greening Conference held in South Africa near the time of the publication of the SFD affirmed the need for effective community forestry programmes with emphasis on the role of women in such programmes (SFD, 1997). These programmes were stressed to be locally based and supported to develop the capacity to influence and control projects and programmes (SFD, 1997).

According to Section 2.6 of the SFD the policy for community forestry is outlined and says that government recognises that community forestry can contribute to improving the environment, enriching the resources, and creating income opportunities in previously disadvantaged communities in rural, peri urban and urban environments. Community forestry is said to be an important component in the range of activities that is needed in every rural district to create employment (SFD, 1997). The second element of community forestry in Section 2.6 of the SFD is directly related to TOF where is states the policy will be to encourage people to plant trees, particularly indigenous trees, in gardens and fields, on streets and in parks, and in managed plantations, to build the local resource base and improve the living environment. This second element includes the support to small forest based enterprises to ensure place in local markets as well as in the national economy.

Government's role in community forestry policy is to have a community forestry strategy which will form part of the national forestry strategy, coherent with the rural development, urban development, energy provision, and other relevant policies for South Africa, to provide the necessary leadership in community forestry (SFD, 1997). It further states that community forestry will be integrated into local development plans (SFD, 1997). Government will facilitate progress toward coherent policy through linkage between the forestry function and other government departments, sections or bodies:

- Land Affairs, Agriculture and the RDP in regard to land-use planning and new legislation as a basis for district level framework plans;
- Water Affairs, regarding development towards integrated catchment management, supported by land use planning laws
- Public Enterprises, with respect to SAFCOL
- Environmental Affairs and Tourism, regarding
  - integrated environmental management,
  - the conservation of biodiversity,
  - the combating of desertification, and
  - establishment of criteria and indicators of sustainability
- Labour, regarding progressive labour agreement and a sectoral Bargaining Chamber for the forest sector
- Trade and Industry, regarding industry and trade policy, competition issues, strategies for competitive advantage and greater value-addition in South Africa, and international environmental standards applicable to the forest sector
- RDP office, on rural development strategy
- Mineral and Energy Affairs, on integrated energy planning
- Science and Technology, on research and development
- other Government landholders on protection of forests and woodlands under their control

- the National Parks Board, regarding forest and woodland conservation
- Provincial planning, environment and agricultural departments, and conservation agencies, regarding land-use planning, rural development, and environmental management (SFD, 1997).

Since the SFD linkages have been made with these departments but further collaboration is need for an effective policy to implement active tree planting outside forests. Although the SFD recognizes the contribution made by research development to the industrial forest sector and to the improved management of natural forests and woodlands; however it identifies a lack of focus on community forestry and the interface between people and resources, as well as a failure to develop synergies between research and existing indigenous technical knowledge (Ngcobo, 2002).

6.3 National Forest Act, 1998

In relation to non-forest trees the National Forest Act of 1998 (Act number 84 of 1998) (NFA) states in Chapter 1 Section 1 that the Act's purpose is to provide special measures for the protection of certain forests and trees and to promote community forestry. Community forestry is defined in section 2(v) as forestry by a community in terms of an agreement referred to in sections 30 and 31(xx).

In Chapter 4, Use of Forests Part 3 Assistance for community forestry is addressed in section 32 (1) where community forestry includes, in addition to the definition of that term and under Section 32(1) (b) the planting of trees by any person or organ of State for aesthetic reasons or to improve the quality of life, and in rural or an urban area and whether in or outside of a State forest. Section 32(1) (b) directly identifies DWAF's role to provide assistance for community forestry for the planting of trees outside forests in rural and urban areas. Section 32(2) says that the Minister may-

(a) provide information, training, advice and management and extension services for community forestry;

(b) establish and maintain nurseries and other facilities to provide seed and plants for community forestry;

(c) provide material or financial assistance for community forestry, including recovery from disaster, if no such grants are available from any other source.

Related to TOF are definitions of protected trees and trees in the NFA. In the definitions of the NFA, (xxvii) 'protected tree' means a tree declared to be protected, or belonging to a group of trees, woodland or species declared to be protected. A 'tree' (definitions, xxxvi) includes any tree seedling, sapling, transplant or coppice shoot of any age and root, branch or other part of it.

Under Chapter 3 Special Measures to Protect Forests and Trees, Part 3 of the NFA is for the protection of trees and allows the Minister to declare a tree, a group of trees, woodland or a species of trees as protected. This means that a tree outside of forests may be declared protected. As per Section 12 (1) the Minister may declare – (a) a particular tree, (b) a particular group of trees, (c) a particular woodland: or (d) trees belonging to a particular species, to be protected. In Section 12 (2) The Minister may make such a declaration only if he or she is of the opinion that the tree, group of trees, woodland or species is not already adequately protected in terms of other legislation. In Section 15 the effect of declaration of

protected trees is provided where (1) no person may – (a) cut, disturb, damage, destroy or remove any protected tree; or (b) collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree except under a license granted by the Minister.

Figure 25: Road redirected to protect a tree in Hoedspruit, Limpopo

In Chapter 6 Administration of the Act Section 51 the Minister may authorize officials in the Department to perform services in connection with trees on land which is not a State forest- (a) at the request or with the consent of the registered owner and (b) on appropriate conditions. Section 53 (2) says the Minister may make regulations to deal with- (e) protected trees, including – (i) the cultivation and grazing of land around any protected tree, (ii) financial assistance for erecting stock-proof fences, (iii) the preparing and maintenance of firebreaks for the protection of such a tree, (iv) the control of the collection, removal, transport, export, purchase, sale or donation of parts or produce of protected trees; and (v) management plans for protected trees.

6.4 National Veld and Forest Fire Act, 1998

The National Veld and Forest Fire Act, 1998 (Act Number 101 of 1998) is the other piece of legislation managed by the forestry side of DWAF and is reviewed for any relevance to trees outside forests. Under Chapter 2 on Fire Protection Associations in Section (3) the Minister must consult the fire protection association for the area, if any, before granting any exemption and this exemption includes the exemption from prohibitions on damaging plants in Section 16. In this section the right or duty to prepare and maintain a firebreak in prevails over any prohibition in any other law on the cutting, disturbance, damage, destruction or removal of any plant or tree, except that the owner must - (a) where possible, transplant any plant which is protected in terms of any law; or (b) where it is safe and feasible, position the firebreak so as to avoid such a plant or tree.

In Chapter 5 Fire Fighting Section 18 (5) Any person acting in terms of subsection (1), (2), (3), or (4) may, if he or she considers it necessary for the protection of life, property or the environment or for preventing a fire from spreading or for extinguishing it – (b) destroy trees, grass, crops, or other vegetation.

6.5 Integrated Sustainable Rural Development Strategy (ISRDS) and Programmes

The ISRDS state that 72% of poor people in South Africa live in rural areas and 70% of all rural people are poor. Of the many factors associated with poor communities, food insecurity,

food shortage and low-income levels of the major indicators linked to poverty and vulnerability. Food shortage is often associated with the inability to generate income, as this is the means through which most households obtain food.

The Integrated Sustainable Rural Development Strategy (ISRDS) is aimed at attaining socially cohesive and stable rural communities with viable institutions, sustainable economies and access to social amenities, ability to attract and retain skilled and knowledgeable people equipped to contribute to local growth and development. TOF have the potential to contribute to the achievement of the government's remarkable objectives of poverty alleviation in the rural areas. However, its contribution (and that of other Forests) towards rural development is not adequately covered in the ISRDS document.

6.6 Strategic Plan for South African Agriculture (SPSAA)

The objective of this strategy is to enhance farmers' capacities to use resources in a sustainable manner and to ensure the wise use and management of natural resources. Its goal is to guide all the relevant social partners in their quest to deliver a range of strategies and programmes. Envisaged programmes will be generated and implemented in accordance with basic premises and value such as security of tenure for present and future participants, equitable access to resources and production factors and sustainable use of natural and biological resources. DWAF can learn and replicate this strategy in dealing with the forests and TOF. Trees play an important part in Agriculture. They provide important browsing material for goats and game, serve as windbreaks for crops and animals.

6.7 Comprehensive Agricultural Support Programme (CASP)

Through the Strategic Plan for the Department of Agriculture (DoA) 2003 – 2006, the DoA has aligned its policies and strategies by developing a Comprehensive Agriculture Support Programme (CASP) as a key deliverable for reversing the skewed participation in the sector and responding to the recommendations of the Strauss Commission report. The primary aim of DoA with the CASP is to provide effective agricultural support and to streamline the provision of services to the targeted four different levels of clients within the farming continuum. It is meant to be the "the strategic plan for South African Agriculture into action". In aligning itself with this programme, forestry will not only benefit from enhanced prominence but could link up with well spread Agricultural structures through the country.

6.8 Housing Code 2000

The Housing Code 2000 sets out in one comprehensive document, the National Housing Policy of South Africa. This housing vision is confirmed in the Housing Act, 1997 (No. 107 of 1997). Within the Housing Act, “housing development” is defined as:

1(vi) “… the establishment and maintenance of habitable, stable and sustainable public and private residential environments to ensure viable households and communities in areas allowing convenient access to economic opportunities, and to health, educational and social amenities in which all citizens and permanent residents of the Republic will, on a progressive basis, have access to:

(a) permanent residential structures with secure tenure, ensuring internal and external privacy and providing adequate protection against the elements; and

(b) potable water, adequate sanitary facilities and domestic energy supply."

Two visions for urban and rural housing are described in the Housing Code. In relation to TOF the urban vision states that by 2020 urban settlements will be centres of economic, environmental and social opportunity where people can live and work in safety and peace. Urban settlements will be environmentally sustainable, marked by a balance between quality built environment and open space; and renewable and non-renewable resources. The Rural Vision by 2020 is to have much greater access for rural people to government support and information and to commercial services. It also includes the close availability of water, sanitation, and fuel sources, giving everyone more time for economic productivity and better health.

6.9 National Water Act, 1998

The National Water Act (Act No. 36 of 1998) provides the legal framework for the effective and sustainable management of our water resources, It also provides a framework to protect water resources against over exploitation and to ensure that there is water for social and economic development and water for the future. The Act recognises that water belongs to the whole nation for the benefit of all people. Water for planting trees in gardens does not require a water license as per Schedule 1 of the Act: Water use with small impact on the water resource. In Schedule 1 outlines the permissible uses of water where a license is not required and these are activities what have a very small impact on the water resource. These activities include "small gardening that is not for commercial purposes" under Schedule 1 (1) (b) (ii).

6.10 Conservation of Agricultural Resources Act

In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA) landowners are legally responsible for the control of invasive alien plants on their properties (Henderson, 2001). This Act is administred by the Department of Agriculture. There are 198 alien species listed as declared weeds and invaders which are divided into 3 categories:

- Category 1 plants: are prohibited and must be controlled
- Category 2 plants: (commercially used plants) may be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread
- Category 3 plants: (ornamentally used plants) may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading, except within the flood line of watercourses and wetlands.

The legalities of CARA are presented as it has implications on what TOF can be planted in South Africa. In *Alien Weeds and Invasive Plants* 155 species of trees and shrubs are listed as declared weed under CARA or are species which are not declared under the Act but are invasive or potentially invasive. Species listed in CARA and its regulations have legal restrictions and cognisance of this must be taken when promoting and planting TOF.

6.11 National Environmental Management: Biodiversity Act

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10, 2004) provides for the management and conservation of South Africa's biodiversity within the framework of

the National Environmental Management Act, 1998; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing benefits arising from bioprospecting involving indigenous biological resources; and the establishment and function of a South African National Biodiversity Institute. Another objective of the act is to provide for co-operative governance in biodiversity management and conservation.

Alien species as defined in the Act means (a) species that is not an indigenous species; or (b) indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention. The Act also states that an indigenous species means a species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced in the Republic as a result of human activity. The Act further states that an invasive species means any species whose establishment and spread outside of its natural distribution range- *(a)* threaten ecosystems, habitats or other species or have demonstrable potential *(b)* may result in economic or environmental harm or harm to human health.

According to Section 39 (1) the National Biodiversity Framework must (a) provide for an integrated, co-ordinated and uniform approach to biodiversity management by organs of state in all spheres of government, non-governmental organisations, the private sector, local communities, other stakeholders and the public. Also Section 39 (1) (d) says that the national biodiversity framework must reflect regional co-operation on issues concerning biodiversity management in Southern Africa. It further states in Section 29 (2) that the national biodiversity framework may determine norms and standards for provincial and municipal environmental conservation plans. The Act also specifies the requirements for Biodiversity Management Plans under Section 45.

6.12 International Agreements

International agreements signed by South Africa were reviewed in terms of policy for trees outside forests. There are a number of international agreements (e.g. the Forest Principles of Agenda 21, the Convention on Biological Diversity and the Framework Convention on Climate Change) that emphasize that a sound database is a prerequisite for good management of natural resources worldwide (Klienn, 2000) and have a relationship with TOF. While these agreements generally refer explicitly to forest, the idea of sustainable management of natural resources applies to TOF as well (Klienn, 2000). The United Nations Conference on Environment and Development (UNCED) called for inventories of all lands (Lund, 1996) and this could also include an inventory of TOF. The UN conferences on nature conservation in 1992 in Rio and 1996 in Istanbul (Habitat II) also enforced the nature conservation efforts in cities (Cilliers, 2004) which included the management of TOF.

These international commitments emphasise the necessity for the involvement of local communities in the management of natural resources. These international policy requirements are further strengthened by the South African constitution that calls for rights of individuals to a healthy beneficial environment. In order to affect these policies and to increase value of TOF and improving equity and justice for local people, it becomes necessary that real partnerships be forged with the structures on the ground (NFA provides for the CFA).

6.12.1 Southern African Development Community (SADC) Protocol on Forestry

South Africa is a signatory to the Southern African Development Community (SADC) Protocol on Forestry. In the definitions in the Protocol forest land, forestry, and sustainable forest management are clarified. “Forest land" means any land covered by trees or which is designated in any legislation, or national or sub-national forest plan, or land-use plan as forest land or as land for afforestation or reforestation. "Forestry" means the art, science and practice of managing trees and forests on, but not limited to, forest land. "Sustainable forest management" means the management and development of all types of forests and trees in a manner that ensures that the ecological functions of the forest are maintained and that the ecological, economic, social and aesthetic value of the forest to current and future generations is not impaired.

Article 2: Application says that This Protocol shall apply to all activities relating to development, conservation, sustainable management and utilisation of all types of forests and trees, and trade in forest products throughout the Region. It is noted that trees are specifically emphasised and therefore TOF. Article 3: Objectives section 1 (a) says the objectives of this Protocol are to promote the development, conservation, sustainable management and utilisation of all types of forests and trees. Industry, Trade and Investment is discussed in Article 18 and (e) says to adopt and apply appropriate measures to restrict or eliminate trade in protected tree species. Lastly Article 21 on Reporting and Information Exchange Section 1 says State Parties shall, exchange data and information concerning the management of forests and the implementation of this Protocol, including data and information relating to: a. status of all types of forests and trees in the Region based on national assessments undertaken in accordance with Article 9 and in conformity with any methodology developed pursuant to paragraph 2 of Article 9.

6.12.2 Millennium Development Goals

The United Nations (UN) Millennium Development Goals have a link to trees outside forests the full goals are as follows:

- Goal 1: Eradicate extreme poverty and hunger
- Goal 2: Achieve universal primary education
- Goal 3: Promote gender equality and empower women
- Goal 4: Reduce child mortality
- Goal 5: Improve maternal health
- Goal 6: Combat HIV/Aids, Malaria, and other diseases
- Goal 7: Ensure environmental sustainability
- Goal 8: Develop global partnership for development

In terms of Goal 7: Ensure Environmental Sustainability and Target 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources. Indicators currently used to measure progress on Goal 7 are:

- Proportion of land covered by forest
- Ration of area protected to maintain biological diversity to surface area
- Energy use (kg oil equivalent) per $1000 GDP (PPP)
- Carbon dioxide emissions per capita and consumption of ozone-depleting CFCs

- Proportion of population using solid fuels (UN Statistical Division, 2005)

Sustainable management of forests, woodlands, and on-farm tree/shrub resources contribute to a sustainable environment and to sustainable livelihoods, which are the foundation for achieving all of the Millennium Development Goals (MDGs) (Roper and Roberts, 2005). Some forestry, agroforestry or planting TOF actions to contribute to achieving Goal 7 of the Millennium Development Goals include:

- Establish greater cooperation and coordination among all important stakeholders on forest-related issues.
- Strengthen institutions responsible for forests: their mandates, human and material resources, political support.
- Integrate policies and development plans: adopt a multi-sectoral approach as witnessed in the National Forest Programs and National Forest Strategies being implemented by many countries worldwide.
- Encourage policy and institutional reforms that create the enabling environment for sustainable forest management.
- Implement the international conventions on the conservation of biological diversity, on climate change, and on combating desertification.
- Implement the proposals for action of the UN Intergovernmental Panel on Forests and International Forum on Forests.
- Support initiatives that target environmentally sound watershed management.
- Support monitoring initiatives to assess progress to expanding the area under forest cover and the area protected to maintain biodiversity.
- Support the establishment of intensively managed forest plantations to meet the global wood demand, thereby emphasizing the value of the environmental services of the world's natural forests.
- Compensate communities for not exploiting forest resources, payment for revenues foregone based on comprehensive valuations of natural resource management options (Roper and Roberts, 2005).

In terms of Forests, Trees and Health, Education, and Gender (Goals 2,3,4,5,6,) the contribution of forests and trees to achieving the MDGs is indirect but sustainable forest management and agroforestry interventions that can contribute are:

- Support watershed management to improve sanitation and potable water supplies.
- Support agroforestry to improve food security and nutrition.
- Improve women and children's health by adopting efficient, smoke-free cook stoves and improved fuelwood/charcoal use.
- Promote reforms to policies and institutional arrangements that currently impede women entering careers in forestry and agroforestry.
- Improve women's access to forest resources, including fuelwood, as a positive step toward women's empowerment and economic progress.
- Support public education campaigns that raise public awareness of the social, economic, and environmental values of forests (Roper and Roberts, 2005).

The sustainable management of forests and trees can make a meaningful contribution towards achieving the MDGs by:

- The management, harvesting, processing, and marketing of wood and non-wood forest products can provide opportunities for employment and income generation.
- The adoption of agroforestry practices can increase food production and food security, provide wood products for sale or consumption, provide a source of household energy, and improve soil composition and structure.
- Watershed management can provide multiple goods and services, especially enhanced and sustained water production that is important to health and sanitation.
- Sustainable forest management can protect biodiversity, moderate climate change, and reverse desertification (Roper and Roberts, 2005).

6.13 Policy for Trees Outside Forests?

There is a trend that is emerging in an effort to resist and challenge management decisions. This trend has been the tendency to legislate problems away when there are conflicting demands on the resources. In the current policy discourse, policy is advocated for as a priority to enhance resource management, with little or no research undertaken to clarify the socio-economic impact of such policies. Lessons to be learnt would primarily be on the position taken by the USA in signing on the Kyoto Protocol. Though globally the protocol has immense benefits, the USA government has not signed for reasons of protecting their way of life. President Bush clearly states that he will not sign such protocols if they harm the American economy "We will not do anything that harms our economy, because first things first are the people who live in America" (United Church of Canada, 2001). The Bush administration has withdrawn from the Kyoto Protocol negotiating process but has stated that it takes the issue of climate change seriously and is committed to addressing it (United Church of Canada, 2001). A cabinet-level review is being conducted on their climate change position. All other countries which have spoken publicly, have expressed opposition to the US action though some have indicated 'understanding' of the reasons for the decision (United Church of Canada, 2001).

It is through a better understanding of the ramifications of a post policy environment upon which policy dialogue should be focused, supported by adequate research to justify a course of action that may restrict certain policies from speedily enactment. Poor policy relevance to the current economic trends also adds to government gridlock and impacts negatively on economic growth which is required to improve livelihoods. Therefore it is recommended that a review of current policies and their implications for economic growth, environmental sustainability and social responsibility should be undertaken prior to the development of a new policy for TOF. Past DWAF programmes and policies such as the National Forestry Action Programme and the White Paper on Sustainable Forest Development contain elements and suggestions on TOF management with various terminologies which also should be reviewed before re-inventing the wheel.

7 ROLES & RESPONSIBILITIES OF THE VARIOUS SPHERES OF GOVERNMENT

7.1 National Government

The White Paper on Sustainable Forest Development highlights that the following government agencies are involved in the management of forests and woodlands: DWAF, the Department of Environmental Affairs and Tourism, and DoA. While the Department of Land Affairs and the Department of Mineral and Energy Affairs are said to have influencing roles in the management of forests (SFD, 1997). The Department of Trade and Industry is involved in the development of industrial forestry and the forest products industries. SAFCOL falls under the management the Department for Public Enterprises while the National Parks Board manages extensive areas of natural forests and woodlands (SFD, 1997). In terms of managing TOF departments must work together and collaborate on many issues. Inter-Department committees have previously been established such as DWAF and the Department of Agriculture for afforestation permits, and the Interdepartmental Committee for the Biomass Initiative (SFD, 1997). However views on the efficacy of these committees differ; some feel that they were relatively ineffective, others believed that they worked, and could have been more effective if they met more often (SFD, 1997). Others argue that the problem lies in overlapping and conflicting policies and legislation, and those committees are a symptom of the problem rather than a solution for it (SFD, 1997). Managing TOF is a multi-departmental function which has overlapping functions in all spheres of government.

7.1.1 Department of Water Affairs and Forestry

The DWAF has undergone radical changes in its strategic approach to supporting rural and urban development. It worked within the framework of the National Forestry Action Programme (NFAP) and various other policies that cascaded from the NFAP viz. Draft Urban Greening strategy, Participatory Forest Management, KIP on Poverty and Forest Enterprises development. This is the process of translating policy into effective service delivery and ensuring that Forestry does contribute to social and economic upliftment of all peoples of South Africa. Currently TOF is the responsibility of various organisations depending on land ownership. These organisations range from metros, municipalities, NGOs, government departments and individuals. DWAFs role is mainly reactive rather than proactive.

On paper DWAF has functions relating to support services on non-state land. A process of provincial strategic planning has been implemented within Forestry, to ensure that each province provides appropriate and effective service. In recent times, it has been unclear whether greening function is a priority function of DWAF or not. This uncertainty has caused relapse in manner in which the task of greening and TOF are managed. DWAF is also not properly resourced to take forward its functions adequately. There is a considerable difference if compared with other similar departments namely Agriculture.

The Directorate Participative Forestry aims to manage forests with people to improve their quality of life. This Directorate was previously known as Community Forestry. The Participative Forestry Directorate aims to translate policy into effective service delivery by driving the pro-poor forestry programmes of DWAF which includes support to the sustainable use of forests and forest resources to serve the livelihoods of poor and marginalised urban and rural communities. This Directorate was created in response to the DWAF forestry vision:

"Forests are managed for people and we need to create an enabling environment for economic and social development through sustainable forestry, especially at the local level."

It can be noted that in this vision that TOF are not included and that only forests themselves are rather than individual trees. However the Directorate does support the sustainable use of forest resources to serve the livelihoods of poor and marginalised urban and rural communities. Forest resources include trees which therefore could be inferred to also be TOF. This vision of the Directorate Participatory Forestry can be contrasted against the previous vision of the Community Forestry Directorate which was "to contribute to social and economic upliftment of all peoples of South Africa by promoting the responsible and sustainable utilisation of natural resources and encouraging tree centred development in the country." In the old vision encouraging "tree" centred development is mentioned which is directly related to TOF. Why TOF was de-emphasised in the new vision is unclear.

The Participatory Forest Management (PFM) Policy and Strategy Framework are to:

- Institutionalise PFM by clearly defining DWAF's role as a national department.
- Ensure that DWAF staff at national and regional offices levels are informed, trained, and equipped to undertake their responsibilities.
- Promote equitable access to natural forest resources to improve quality of life and dignity for all.
- Promotes PFM planning at local government level within the framework of IDP and Local Economic Development (LED)
- Encourages and facilitates economic opportunities such as Forestry Enterprise Development (FED) for poor people in line with the principles of Sustainable Forest Management.

Forest Enterprise Development

- National Water Act and the Conservation of Agricultural Resources Act are key legislations governing the new planting of trees. The former is more concerned with stream flow reducing plantings and the latter with control of alien invasive plants. In addition the two legislations, the NFA also seek to protect certain trees that are listed as protected. *In lieu* of these legislations the development of forest and tree related enterprise for income generation need to be approached with caution. The FED opportunities with reference to TOF are the following:
- Maintenance of recreational parks
- Felling and removal of unwanted trees in homesteads and various areas
- Road site maintenance (major roads)
- Clearing of trees under telecommunications and power lines
- Seed collection (particularly rearing species)
- Plant supply and nursery management
- Crafting and processing of off cuts (e.g. Jacaranda in Tshwane)

FED involves facilitating links between the municipalities, private sector and communities, and includes supporting communities and entrepreneurs with business and marketing skills.

Urban Greening

- Assists local government in the development of the urban forestry aspects of urban greening. This includes supporting the development of urban greening strategies with municipalities, and the provision of trees and seedlings to urban communities through local government. Urban areas include cities, towns, townships, informal settlements and densely populated areas. The aim is to support the development of sustainable livelihoods in urban areas and to improve the urban environment. A national Urban Greening Strategy has already been prepared and this report on TOF will complement the strategy.

Rural Greening

- Supporting local government and other service providers in working with communities to develop sustainable rural livelihoods. This includes supporting the provision of trees and seedlings to rural communities for agroforestry, reclamation, soil erosion control, rural enterprise, community woodlots, and other projects. The aim is to provide practical examples of the means by which trees contribute to rural socio-economic development. Due to the recent demarcation of municipal areas, the rural and urban greening functions must be seen as one function.

The full potential of urban forestry is not experienced by the majority of areas in South Africa. This is due to lack of an integrated strategy for urban forestry. This is despite the fact that the National Forest Action Programme (NFAP) identified it as one of the key subjects of South African Forestry. It will be important for DWAF to intensify the current Greening Strategy and to link it up with other strategic documents.

The ‘Tree of the Year’ campaign that the department promoted over the years has lost momentum due to the changing times and perceived society priorities. In general the resource allocation to back such campaign can be said to be limited considering that urban nature conservation issues in South Africa are overshadowed by other issues such as poverty, equity, redistribution of wealth and wealth creation (Cilliers, 2004). The tree of the year campaign however could be promoted and marketed to address the current issue trends in South Africa. The role of different state organs in the promotion of tree planting has to be supported by a monitoring system which will amongst other uses be used as a volume assessment method per tree species. Through the promotion of a certain tree species, diversity of tree species within an area can be altered. Continuous mono culture tree species planting poses a risk of eliminating certain tree species. This phenomenon can be observed in some parts of the Mopani District where one finds more mango trees planted comparative to mopani trees and in the Northern Cape (presopis trees).

7.1.2 South African National Biodiversity Institute

The South African National Biodiversity Institute (SANBI) contributes to one of the key performance areas of government known as the urban renewal programme. In urban renewal programme outreach greening projects are mobilised through schools in environmentally hostile urban areas. Collaboration with community based organisations (CBOs) and non-governmental organisations (NGOs) are done for the urban renewal projects; through educator and learner training; etc. SANBI also contributes to DEAT’s key focus area to “protect and enhance the quality and safety of the environment”. They do this

through research into environmentally sound farming practices, vegetation rehabilitation, urban greening, wetland and forest conservation, global climate change impacts (COs and UVB increase), and environmental impact of genetically modified organisms (GMOs).

7.2 Provincial and Local Government

Provincial government agencies involved with DWAF include Departments of Agriculture, and various agencies for conservation and environmental management (SFD, 1997). Local government consists of the demarcation of the district and local municipalities. Provincial and local government have done various greening and alien clearing initiatives throughout South Africa. Their role in implementing the propagation, management and monitoring of the level TOF at a local is essential for success. DWAF can provide support to local and provincial government by its regulatory and advisory functions.

The first consolidated database of local government budgets for greening projects was conducted by Institute of Environment and Recreation Management (Africa) (IERM) in 2003 for DWAF. This database contains information on all aspects of greening initiatives that municipalities reported back. Greening initiatives included new parks, tree planting, verges, alien clearing or eradication, community gardens, sports facilities, play parks, stream cleaning, open space developments, Arbour week initiatives, conservancies, golf courses, etc. Specific budget spent on tree planting only for all of South Africa for 2001-2005 was a little over R8.4 million rand, see Figure 25.

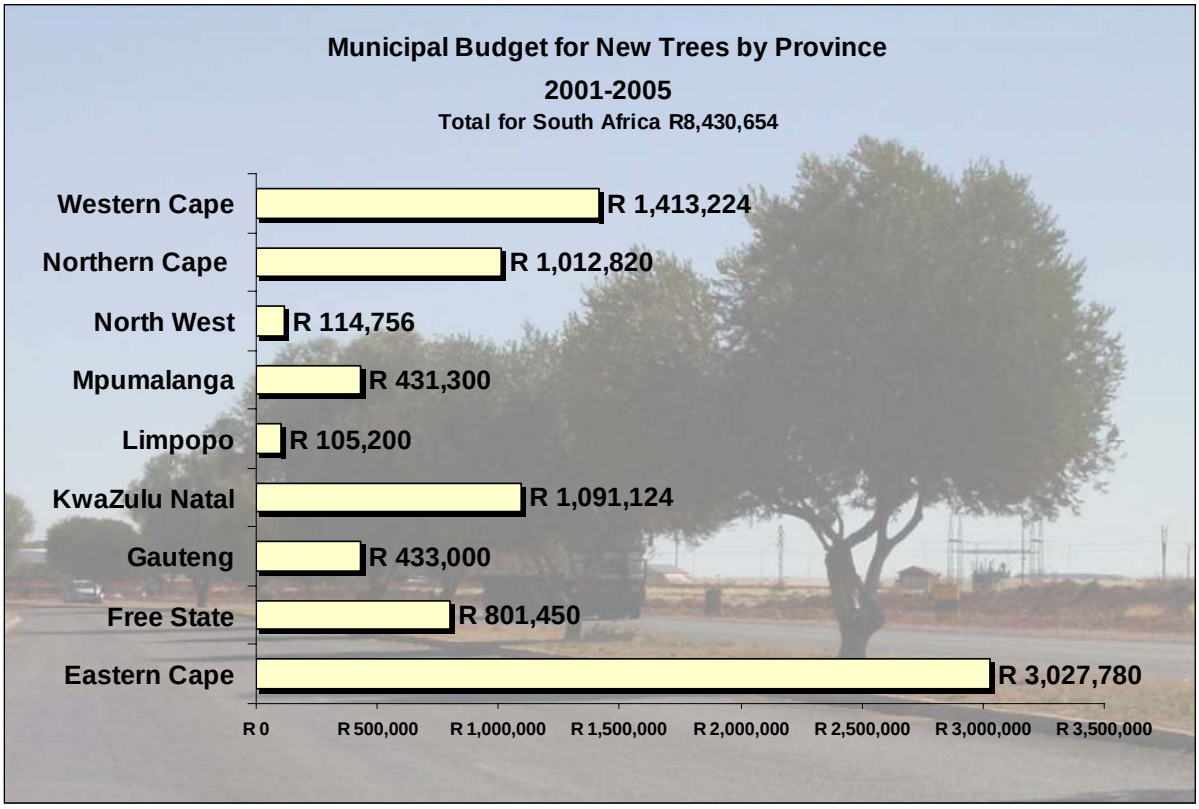

Figure 26: Municipal budget for new trees by province 2001-2005

From the personal nationwide survey (See Appendix 2) on planting trees questions were asked about what they thought local government role was in terms of tree planting and greening, Figure 26. Forty-five percent of the respondents felt that municipalities should plant trees in the city and parks, 38% felt that they should plant trees outside their yards next to the road and only 3% felt they should plant trees in their yard. Fourteen percent replied to all of the options supplied. One of the limitations of the survey as it was designed to provide a quick overview of information and knowledge nationwide on TOF to an audience who would not normally be dealing with this topic. However the snapshot provided by the survey shows that there is an overwhelming response that municipalities should be planting TOF.

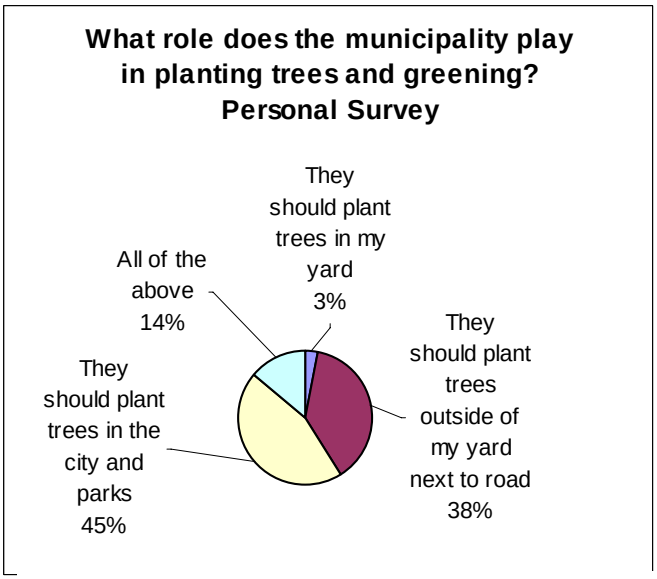

Figure 27: Role of the municipality in planting trees and greening

When asked if they thought it is the municipalities role to provide land for planting trees for: 29% responded for fuelwood, 27% for medicinal products, 22% for construction wood and 22% fruit, nuts and seeds, Figure 27. These figures show that the municipality should be planting multi-purpose trees on their land.

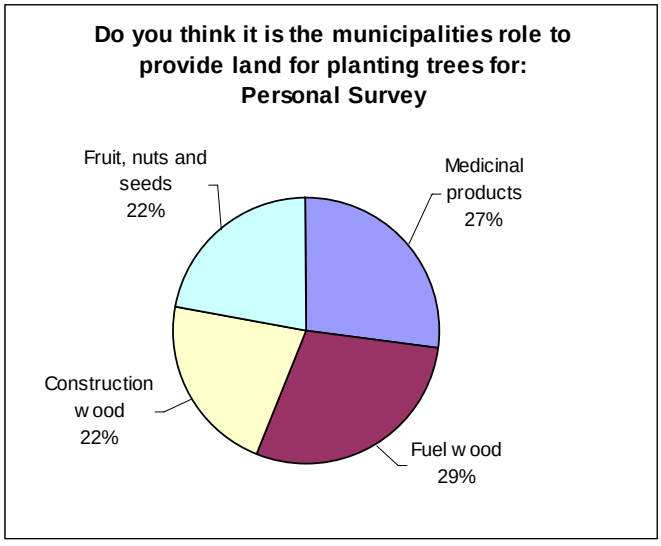

Figure 28: Municipalities role to provide land for planting trees

When asked in the municipality has given them support with planting trees and overwhelming 74% said no and 26% said yes, Figure 28. This response is most likely due to the function of local government to focus tree planting in city areas. However some efforts have been made to initiate tree planting in the townships.

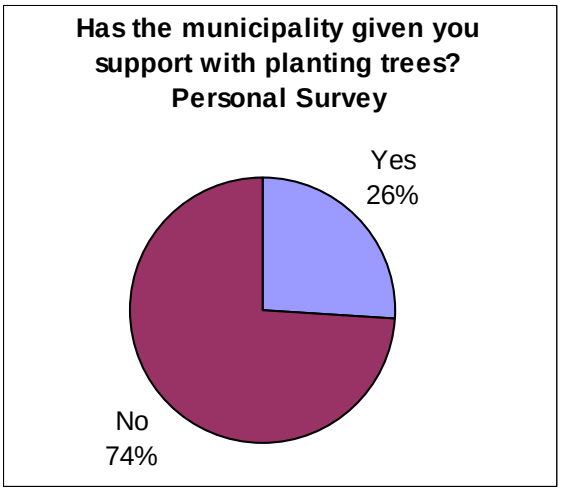

Figure 29: Municipal support for tree planting

Some of the most vulnerable are people residing on farms and rural areas far from the reaches of municipal services as they do not receive support from the municipality.

Appendix 4 is the complete results of the nationwide organisation survey on tree planting. The sample size was 122 individuals and the majority of respondents were from local government, 36%, Figure 29. It is noted that only 5% of the sample was of non-governmental organisations, however, it is known that NGOs and community based organisations play a vital role in supplying, implementing and supporting TOF to poorer communities.

When asked if the organisation had a greening plan 47% said no, while 39 % said yes as shown in Figure 30.

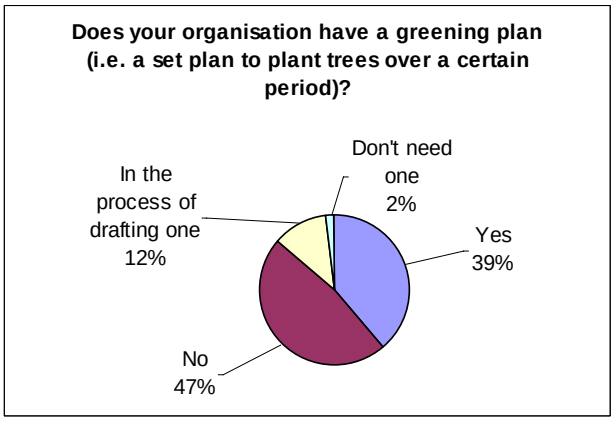

Figure 32: Organisations with greening plans

Figure 31 shows the purpose organisations are planting trees where the priority tree planting has been for amenity purposes. Figure 32 shows the results of what type of trees have been planted by organisations, 68% have planted indigenous trees, 22% exotic trees and 10% fruit trees. These statistics can be contrasted with the need for fuelwood and food by communities.

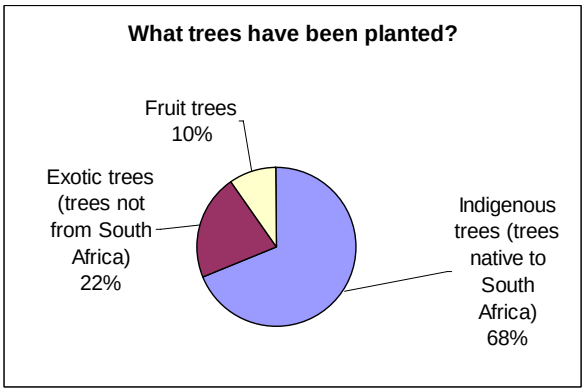

Figure 33 Trees planted by organisations

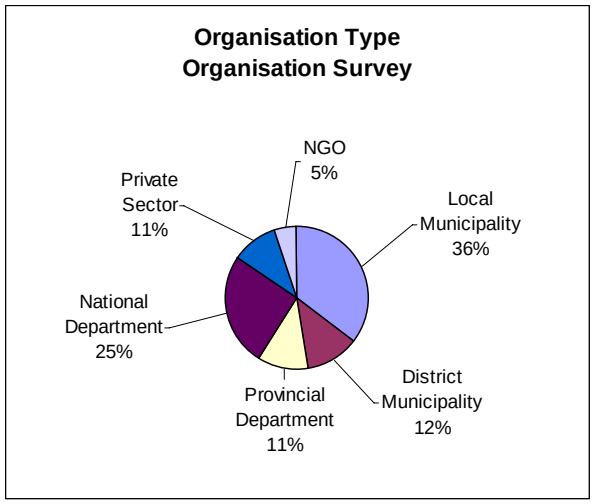

Figure 30: Organisation types sampled

The development of a greening plan can formulate a strategy for planting TOF over several years for local government. A formalised greening plan can also inform other local governmental documents such as the Integrated Development Plans, and Local Economic Development Plans.

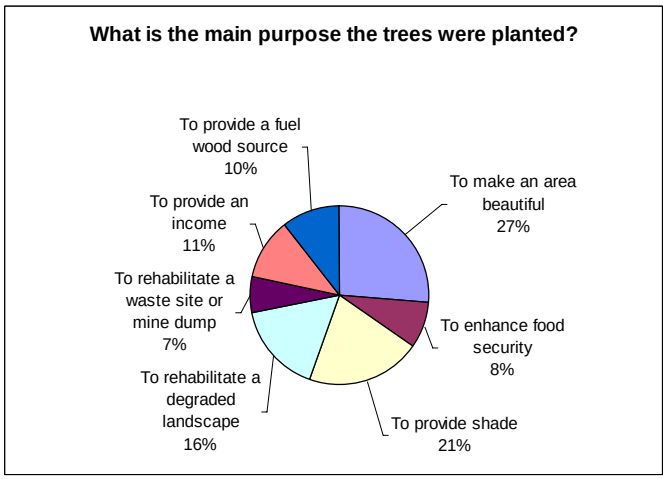

Figure 31: Purpose organisations are planting trees

8 CONCLUSION

Management of TOF is complex and has been ignored on a large scale in South Africa because of the many government departments and spheres of government and NGOs that initiate TOF. TOF once planted are then left for private land owners or other institutions to manage without any post monitoring or review. The value of TOF has been seen in the scattered TOF initiatives throughout the country but TOF have not been utilised to their full potential. The individual initiatives to plant TOF in gardens and homesteads has been scrutinised in terms of CARA, promoted in terms of Arbour Week, and planted by individuals for a variety of reasons. The question now arises should DWAF be concerned with TOF and involved in their management.

This Key Issues Paper has shown that TOF have a multitude of benefits in both the rural and urban context which benefits all levels of society. For the poor TOF provide a vital resource by providing wood for energy requirements, a seasonal food source, medicine, shade, and other amenities. Planting a tree in ones garden signifies establishing a home and a sense of ownership to that property as it takes commitment to plant a tree. In rural areas TOF may be planted in larger numbers, to demarcate property, to provide shade for crops, to stabilise soil, to provide a fuel wood source, and to provide fruits and nuts. In urban areas TOF provide similar benefits but are most recognised for their beautification purposes to bring a natural visualisation back to the urban setting. Further benefits of TOF such as pollution abatement and economic importance are only recently being realised and studied. If the full potential value of TOF in terms of social, economic and environmental benefits is to be realised, it recommended that DWAF take a leading role in creating an enabling environment for a multi faceted responsibility in TOF management.

South Africa is very poorly endowed with natural forests and woodlands, with the result that the major thrust over the past century has focused on timber production from man-made plantations (Owen, 2000). In the past ten years, the focus has further changed primarily driven by the new role of the DWAF in the post apartheid South Africa, where the amalgamation of different forestry departments from the former homelands were consolidated under one National Department. Immediately after the consolidation, the restructuring process began demanding a lot of the department's attention as the process was riddled with numerous challenges not previously witnessed in the history of forestry. Over this period departmental resources were over stretched to meet deadlines within limited timeframes. The vision and attitudes of leadership were changing. The structures and operations of government and industry were slow to adjust to new priorities (Poffenberger and McGean, 1998). Also through this restructuring DWAF's new vision for forestry arose with a pro-poor policy to manage forests and forest resources for people. Though there has been reasonable advancement in the development of policies, unparallel effort is observed in the articulation of changes in policy at grassroots level and the implications of such policies on livelihoods. Lack of knowledge, vested interest in maintaining the status quo, and the sheer scale of management transformation required has slowed adaptation of forest stewardship systems (Poffenberger and McGean, 1998).

8.1 DWAF's Legal Obligation for Managing TOF

The NFA refers almost exclusively to woodlands, indigenous forests and commercial forestry plantations with minimal regard to TOF. Protected tree species are regulated in the NFA Chapter 3. Community forestry is legislated to plant TOF in the NFA Chapter 4, Use of Forests Section 32(1) (b) the planting of trees by any person or organ of State for aesthetic reasons or to improve the quality of life, and in rural or an urban area and whether in or outside of a State forest. This Section directly identifies DWAF's role to provide assistance for community forestry for the planting of trees outside forests in rural and urban areas. Section 32(2) says that the Minister may-

(a) provide information, training, advice and management and extension services for community forestry;

(b) establish and maintain nurseries and other facilities to provide seed and plants for community forestry;

(c) provide material or financial assistance for community forestry, including recovery from disaster, if no such grants are available from any other source.

The NFA clearly defines DWAF's role for planting trees in urban and rural areas, for providing information, training, advice and management and extension services for community forestry. According to Section 32 of the NFA, DWAF is regulated to manage TOF.

The NFA allows for the interpretation for managing trees outside forests but the policy's implementation is not being optimised to manage TOF. This is most likely due to the vastness and cross departmental realm of TOF. This function could be done with the Department of Agriculture, Department of Environmental Affairs and Tourism, Department of Mineral and Energy Affairs, etc. to strengthen the position and status of TOF as a management issue. In light of the Municipal Systems Act, local government needs to take an active role in the management, propagation and support to small scale suppliers for TOF. For example many Integrated Development Plans throughout the country advocate for an increase in craft projects in their municipalities while on the other hand the source of raw materials such as wood are not being analysed to see if this industry could be sustained without planting more trees. The replenishing of TOF after wild fires is also where relief could be provided to supply TOF.

8.2 EPWP TOF Model

DWAF's contribution to the EPWP using TOF would be for DWAF to enter into a Memorandum of Agreement (MoA) with Forestry Industry Education, and Training Authority (FIETA) and other public bodies (i.e. metro, local municipality, etc.) for placing learnerships at that public body to run rural and urban greening programmes. Planting TOF could be integrated with the EPWP in many ways. Leadership models for TOF managers could be developed to build capacity in this sector. This would include learnership models on nursery development and the data collection and analysis of TOF. SAFCOL reviving forestry areas needing attention for rehabilitation to promote low scale primary processing is another example of how the TOF programme could be integrated with EPWP. The proliferation of bush mills indicate the need for improvement of the small scale saw milling sector, therefore learnerships could also be introduced to improve the technical capabilities of the informal saw milers, an area SAFCOL can promote their experience in this line of business.

The learnership beneficiary would be trained in the following areas:

- Inventory and assessment of existing TOF resource
- Green belt management strategies
- Planning and designation of green belts to avoid conflict with other utilities and services
- Management of procured services for green belt management
- Small scale sawmilling and marketing to secondary industries
- Institute and adopt-a-open space in a road reserve and source labour paid at minimum wages as per EPWP for the upkeep of these area.

Additional learnership MOAs with State owned enterprises and the private sector could look into pollution abatement projects (i.e. reclamation of mine dump and other degraded areas).

Such a calibre of learnerships will create a wealth of rural and urban forestry practitioners who understand local government systems and functions which would make them marketable for permanent employment as forestry practitioners in municipalities and therefore curbing the current lack of capacity. This initiative will also complement the Department of Provincial and Local Government (DPLG) Project Consolidate. DWAF would provide technical forestry expertise and project manage the learnerships and provide mentorship and advocacy of these learnerships to various government entities. The other organs of state would play a role to employ the learnership beneficiaries for the duration of their practical training. FIETA will provide training facilitators to train the learnership beneficiaries and will pay stipends during the time of training.

It is recommended that DWAF concentrate on the following elements of TOF:

Trees Outside Forests (TOF) Element	**Proposed DWAF Role**
Agroforestry	Through Forestry Enterprise Development (FED): ✓ Provide advice on what species to plant for shelterbelts, wind breaks, and live fences ✓ In collaboration with the Department of Agriculture (DoA) and Food and Trees for Africa (FTFA) provide advice on which species to plant for improving crops, for food security, medicine and other multiple uses. ✓ Collaborate with the DoA and FTFA on training and extension services. ✓ Develop learnership with DoA and FTFA for extension officers through the EPWP. ✓ Establish pilot areas for devising appropriate agroforestry ✓ Work with provincial departments of environment, agriculture and housing on implementing effective agroforestry systems that assist poor households. ✓ Request Agricultural Census 2002 data on TOF from Statistics South Africa for analysis of hectares of TOF on commercial farms.

Urban Forestry / Urban Greening	Through FED: ✓ Develop learnerships for extension officers through EPWP. Consult with existing professions which carryout urban forestry functions (i.e. city parks, horticulturalists, etc.) ✓ Quantify tree resources and impact on a city. ✓ Provide technical advice and extension support to local municipalities and metros for management of urban trees for disease control, problematic trees, Illegal trees in terms of CARA, and for old and dying trees. ✓ Provide advice and support for developing urban greening plans for cities and monitor their implementation to assess where more support is needed. Assist in determining what species to plant in which areas for what reasons. Maximise the use of removed trees. Urban greening plan to be reflected in the IDP, Spatial Development Framework (SDF), and Integrated Environmental Management Plan for municipalities. ✓ Use existing database from WfW to quantify hectares of invasive trees removed and analysis the socio-economic impact of this and devise where interventions are needed. ✓ Work with municipal planners (town planners, SDF, LED) on existing TOF resources and identify needs. ✓ Work with provincial departments of environment, agriculture and housing on implementing effective beneficial urban greening initiatives for poor households ✓ Coordinate tree planting data from municipalities to be regularly reported in urban greening plan and updated in a central database. Use existing IERM database as model.
Non-forest trees in rural areas Wood Energy Woodlots / Farm forestry	Through FED: ✓ Ensure that existing woodlots meet the legislative requirements of CARA and do a socio-economic assessment on illegally planted woodlots before their removal. ✓ Enhance degraded woodlots through silvicultural practices via the EPWP programme. ✓ Develop learnerships for extension officers through EPWP. ✓ Work together with the Working for Water Programme (WfW) and Land Care to see review, evaluate and monitor were interventions have already taken place. ✓ Use existing database from WfW to quantify hectares of invasive trees removed and analysis the socio-economic impact of this and devise where interventions are needed. ✓ Work with DME and municipalities on addressing energy poverty to meet shortfall energy demand before electricity can be installed and afforded and a total energy switch is made electricity or other source. ✓ Assist municipalities in identifying TOF and woodlot resources which are vital to communities. ✓ Work with provincial departments of environment, agriculture and housing on implementing effective beneficial TOF planting initiatives for poor households ✓ Benefits of TOF to be reflected in the IDP, Spatial Development Framework (SDF), and Integrated Environmental Management Plan for municipalities. ✓ Coordinate tree planting data from municipalities to be regularly reported in urban greening plan and updated in a central database. Use existing IERM database as model.
Ex-situ tree conservation	Through FED: ✓ Work in partnership with SANBI on advising where tree planting initiatives are needed. ✓ Promote the establishment of indigenous tree nurseries and seed bank for protected tree species. ✓ Coordinate tree planting data from municipalities to be regularly reported in urban greening plan and updated in a central database. Use existing IERM database as model.

8.3 Policy Review for TOF

New policy re-engineering still needs to emerge from experiences learned from past experiences and the new policies, which are still challenged with implementation difficulties due to conflicting objectives that result in gridlock. DWAF should initially embark on a more intensive Impact Assessment (Environmental, Economic and Social) of the current policies to determine the cost and benefit associated with conflicting policies. This would include the economic and social impact on livelihoods of the policies and decisions taken by the department. The process of transferring responsibilities should be provided with adequate resources. It has to prepare extensive plans and allow for adequate lead in time for the lead

receiving entity with the capacity and resource base in order to meet the technical and financial requirements associated with the functions. For example: the organisation survey highlights the lack of knowledge about what the best tree species are needed to address the requirements of the people. Policy such as the Conservation of Agricultural Resources Act, 1983 (Act Number 43 of 1983) (CARA) legislates the control and eradication of invasive alien species and the Working for Water Programme (WfW) has done much marketing for advocating for the removal of alien species and propagation of indigenous species. This can be reflected in the survey results however the literature review shows that due to the amount of poverty in the country, trees are needed for priority issues such as fuelwood and fruit for food. In some cases these resources would be faster returned from alien species than indigenous species. However research for tree improvement has been focused mainly on alien species. The question, which now arises, is what are the implications of the CARA on alien species, which could faster meet the livelihood requirements of the poor majorities in South Africa?

8.4 Proposed Framework for TOF Management

As it is now known, DWAF is moving away from being a manager of forest assets and resources, to a new role of policy formulation, regulation and monitoring. The Forestry Function is focusing on amongst others, ensuring the sustainable development and management of indigenous forests to optimise their social, economic and environmental benefits, and ensuring that communities and disadvantaged groups are empowered to make use of tree and support resources to support sustainable livelihoods. TOF is a new and old area that DWAF has to concentrate on as it sheds other responsibilities

The following is a proposed framework for moving forward on non-forest forestry in DWAF

- Multi-stakeholder inventory of trees resources outside the forest through consolidation of existing information and standardised reporting for new TOF.

- Sharing of information across the various greening initiatives to be consolidated primarily in a municipal level data base. This can be coordinated at the DWAF Regional Office level as interaction takes place at the municipal level. Information also to be sourced from NGO tree planters through joint partnerships with DWAF either at the National or regional level depending on the organisation. Further research in data capturing, analysis, updating and sharing mechanisms to be emphasised. Support and review of municipal greening plans to be done by DWAF Regional offices.

- Harmonizing of greening strategies at least at local municipal level to address priorities consistently across the different sectors of government and NGOs

- Re affirm the ability for application and interpretation of legislation at local municipal level. Initially this will be done by relaying DWAF's position on TOF to the regions and then through consultation by DWAF Regional Offices with Municipalities. Ultimately national legislation and municipal by-laws should be reflected in the municipal greening plans.

- Pro TOF promotional programmes and campaigns to steer public opinion and resource allocation towards mass mobilization of greening initiatives that address backlogs especially in the marginalized sectors of society.

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Appendix 1:

Terms of Reference

Appendix 2:

Questionnaire – Personal

TREES IN GARDENS AND HOMESTEADS: A REVIEW OF THE LIVELIHOODS IMPORTANCE OF NON-FORERST TREES AND THEIR INSTITUTIONAL AND POLICY DRIVERS
GREENING QUESTIONNAIRE
PERSONAL

We are conducting research to gain knowledge on tree planting throughout South Africa. We kindly ask for 10 minutes of your time to complete this questionnaire, so as to help us gather information on greening or tree planting. The information in this questionnaire will remain strictly confidential. Please ☒ where applicable

Section A: Respondent's Details

Date ____/____/ 2005
Name _____ (optional)
Household type?

- ☐ House structure on a separate stand or yard
- ☐ Traditional dwelling/hut/structure made of traditional materials
- ☐ Flat in block of flats
- ☐ Town/cluster/semi-detached house (simplex; duplex; triplex)
- ☐ House/flat/room in back yard
- ☐ Informal dwelling/shack in back yard
- ☐ Informal dwelling/shack NOT in back yard
- ☐ Room/flatlet not in back yard but on shared property

Settlement type?

- ☐ Suburb
- ☐ Township
- ☐ Informal settlement
- ☐ Rural village
- ☐ Farm
- ☐ In city

Section B: Planting of Trees

1. Have you planted trees?
- ☐ Yes
- ☐ No

2. How do you see your role in planting trees?
- ☐ I should buy trees to plant in my yard
- ☐ Government should supply me with trees to plant in my yard
- ☐ A donor or someone else should give me trees to plant
- ☐ Other_____

3. How many trees have you planted?
- ☐ I have never planted a tree
- ☐ 1-10 trees
- ☐ 11-25 trees
- ☐ 26-50 trees
- ☐ 51-100 trees
- ☐ Other _____

4. Can you recall the last time trees were planted in your neighbourhood?
- ☐ 0-1 year
- ☐ 2-5 years
- ☐ 6-10 years
- ☐ 11-20 years
- ☐ 21- or more years
- ☐ We have never had trees planted in our neighbourhood
- ☐ Don't know
- ☐ Other _____

5. Were the trees planted as part of an Arbor Week initiative?
- ☐ Yes
- ☐ No

6. What role does the municipality play in planting trees and greening? (Tick all that apply)
- ☐ They should plant trees in my yard
- ☐ They should plant trees outside of my yard next to road
- ☐ They should plant trees in the city and parks
- ☐ All of the above

7. Has the municipality given you support with planting trees?
- ☐ Yes
- ☐ No

8. Do you think it is the municipalities role to provide land for planting trees for:
- ☐ Medicinal products
- ☐ Fuel wood
- ☐ Construction wood
- ☐ Fruit, nuts and seeds

9. What impact would it have on you if these tree resources were not available?
- ☐ No impact, no resource available now
- ☐ Low impact, substitutable sources

☐ Medium impact ☐ High Impact

10. What trees have been planted in your yard?
- ☐ Indigenous trees (trees native to South Africa)
- ☐ Exotic trees (trees not from South Africa)
- ☐ Fruit trees

11. What is the main purpose trees are planted? (Tick all that apply)
- ☐ To make an area beautiful
- ☐ To provide fruits and nuts
- ☐ To provide shade
- ☐ To rehabilitate a degraded landscape
- ☐ To provide an income
- ☐ To provide a fuel wood source
- ☐ To provide a wind break and shade to crops
- ☐ To provide medicinal products
- ☐ For ceremonial or for spiritual purposes
- ☐ For live fencing
- ☐ Other _____

12. Where did you get the tree planted in your yard?
- ☐ Bought them from private nursery
- ☐ Bought trees from government nursery
- ☐ Bought trees from community based nursery
- ☐ Trees were donated
  - By whom _____
- ☐ Other _____

13. How much did you spend on planting trees? _____(Estimated amount)

14. Why don't you plant trees? (Tick all that apply)
- ☐ Not a priority
- ☐ Too expensive
- ☐ Don't know how
- ☐ Trees use too much water
- ☐ Don't know which trees to plant
- ☐ Planting trees in my yard should be done by government
- ☐ No trees are available to plant
- ☐ No money to plant and maintain planted trees
- ☐ The environment (climate, soils, etc.) is not suited to plant trees
- ☐ Another organisation should be planting trees in my yard not me
- ☐ No space in my yard
- ☐ Other

15. What are the restrictions to planting trees? (tick all that apply)
- ☐ Don't know what species to plant
- ☐ Don't know how to manage the trees once them have been planted (water, trimming, overgrowth)
- ☐ No money for planting trees
- ☐ Other_____

16. How many trees have you ever removed from your yard or somewhere else?
- ☐ 0-50
- ☐ 51-150
- ☐ 151-500
- ☐ 501-1000
- ☐ 1-5 hectares
- ☐ 5-20 hectares
- ☐ 21-50 hectares
- ☐ 51-150 hectares
- ☐ Don't know

17. Why were the trees removed? (tick all that apply)
- ☐ Over grown trees
- ☐ Planted in the wrong areas
- ☐ Undesirable species
- ☐ Problematic trees
- ☐ Trees cut to be used for firewood, or other use
- ☐ Removed as part of the Working for Water Programme
- ☐ Dead or dieing trees
- ☐ Other _____

18. What are the restrictions for removing trees? (tick all that apply)
- ☐ Don't know what species to remove
- ☐ Don't know how to manage stumps once they have been removed
- ☐ No money for removing trees
- ☐ Want to remove tree but it is not on my property
- ☐ Other_____

Appendix 3:

Results of Personal Questionnaire

Appendix 4:

Questionnaire Organisation

TREES IN GARDENS AND HOMESTEADS: A REVIEW OF THE LIVELIHOODS IMPORTANCE OF NON-FORERST TREES AND THEIR INSTITUTIONAL AND POLICY DRIVERS
GREENING QUESTIONNAIRE
ORGANISATION

We are conducting research to gain knowledge on tree planting throughout South Africa. We kindly ask for 10 minutes of your time to complete this questionnaire, so as to help us gather information on greening or tree planting. The information in this questionnaire will remain strictly confidential. Please ☒ where applicable

Section A: Respondent's Details

Date ____/____/ 2005

Organisation_____

Organisation type?

- ☐ Local Municipality
- ☐ District Municipality
- ☐ Provincial Department, type_____
- ☐ National Department, type_____
- ☐ Private Sector
- ☐ NGO

Town_____ Province_____

Section B: Planting of Trees

19. Does your organisation plant trees?

- ☐ Yes
- ☐ No

20. How do you see your organisation's role in planting trees?

- ☐ It is our responsibility to implement greening in our area
- ☐ It is our responsibility to provide expertise on greening and support
- ☐ It is our responsibility to fund greening initiatives, but not implement them
- ☐ It is our responsibility to fund greening initiatives and to implement them
- ☐ We are a recipient of greening initiatives brought to us
- ☐ Don't know what our organisation's responsibility should be for planting trees

21. How many trees have been planted?

- ☐ Organisation has never planted trees
- ☐ Annually
- ☐ Less than 100 trees
- ☐ 101-500 trees
- ☐ 501-1000 trees
- ☐ 1001-2000 trees
- ☐ Above 2000
- ☐ Other _____

22. Can you recall the last time trees were planted by your organisation?

- ☐ 0-1 year
- ☐ 2-5 years
- ☐ 5-10 years
- ☐ 11-20 years
- ☐ 21- or more years
- ☐ We have never planted trees

23. Were the trees planted as part of an Arbor Week initiative?

- ☐ Yes
- ☐ No

24. Does you organisation have a greening plan (i.e. a set plan to plant trees over a certain period)?

- ☐ Yes
- ☐ No
- ☐ In the process of drafting one
- ☐ Don't need one

25. What trees have been planted?

- ☐ Indigenous trees (trees native to South Africa)
- ☐ Exotic trees (trees not from South Africa)
- ☐ Fruit trees

26. What is the main purpose the trees planted? (Tick all that apply)

- ☐ To make an area beautiful
- ☐ To enhance food security
- ☐ To provide shade
- ☐ To rehabilitate a degraded landscape
- ☐ To rehabilitate a waste site or mine dump
- ☐ To provide an income
- ☐ To provide a fuel wood source
- ☐ Other _____

27. Where did your organisation get the trees planted?

- ☐ Bought them from private nursery
- ☐ Bought trees from government nursery
- ☐ Bought trees from community based nursery
- ☐ Trees were donated
  - By whom _____
- ☐ Other _____

28. In what areas were the trees planted?

- ☐ In the central business district
- ☐ In new suburbs
- ☐ In the townships
- ☐ In parks
- ☐ Along roadways
- ☐ In new private residences
- ☐ In new RDP houses
- ☐ In gardens as part of an agro-forestry project
- ☐ In a woodlot for community use
- ☐ In new cemeteries

29. How much did your organisation spend on planting trees/greening? _____
(Estimated amount)

30. What constraints does your organisation encounter to plant trees? (Tick all that apply)

- ☐ Not a priority in IDP
- ☐ Too expensive
- ☐ No capacity
- ☐ Trees use too much water
- ☐ Don't know which trees to plant
- ☐ Planting trees is not the function of our organisation
- ☐ No trees are available to plant
- ☐ No budget to plant and maintain planted trees
- ☐ Lack of political motivation in organisation to plant trees
- ☐ No spatial area available to plant trees
- ☐ Planting of trees is a non funded mandate
- ☐ Planting trees is a waste of our organisation's resources
- ☐ The environment (climate, soils, etc.) is not suited to plant trees
- ☐ Another organisation should be implementing greening in our area not us
- ☐ Waiting for private donor or NGO to plant trees in our area
- ☐ Other

31. What are the restrictions of planting trees? (tick all that apply)

- ☐ Zoning of appropriate areas to plant trees
- ☐ Don't know what species to plant
- ☐ No budget for planting trees
- ☐ Other_____

32. How many trees has your organisation removed?

- ☐ 0-50
- ☐ 51-150
- ☐ 151-500
- ☐ 501-1000
- ☐ 1-5 hectares
- ☐ 5-20 hectares
- ☐ 21-50 hectares
- ☐ 51-150 hectares
- ☐ Other

33. Why were the trees removed? (tick all that apply)

- ☐ Over grown trees
- ☐ Planted in the wrong areas
- ☐ Undesirable species
- ☐ Problematic trees
- ☐ Removed as part of the Working for Water Programme
- ☐ Dead or dieing trees
- ☐ Other _____

34. What are the restrictions to removing trees? (tick all that apply)

- ☐ Don't know what species to remove
- ☐ Don't know how to manage the trees once they have been planted (water, trimming, overgrowth)
- ☐ No budget for removing trees
- ☐ Problem trees located on private property and not part of jurisdiction
- ☐ Other_____

Section C: Optional Information

Would you like to be contacted to provide further information?

- ☐ Yes
- ☐ No

Telephone: _____
Fax: _____
Email: _____

Appendix 5:

Results of Organisation Questionnaire