agriculture,
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AGROFORESTRY STRATEGY FRAMEWORK

FOR SOUTH AFRICA

FINAL DRAFT

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EXECUTIVE SUMMARY

Agroforestry is a land use system that includes the use of woody perennials and agricultural crops and / or animals in combination to achieve beneficial ecological and economic interactions for food, fibre and livestock production. Properly managed agroforestry systems provide multiple benefits and contribute to improved livelihoods and income generation while providing a range of positive environmental outcomes, including climate resilience, carbon sequestration and landscape rehabilitation. Recognising the potential for agroforestry as a system that can benefit farmers, foresters and pastoralists in a range of contexts, the Department of Agriculture, Forestry and Fisheries (DAFF) undertook a process of strategy development to support the wider application of this beneficial land use system. This document presents the agroforestry strategy framework that resulted from this process.

This agroforestry strategy framework was developed through a process of a literature review, key stakeholder interviews and extensive stakeholder engagement. A review of local and international literature was conducted to better understand the socio-economic and environmental benefits of agroforestry as well as to understand the role of agroforestry in contributing to national policy objectives. Key informants were interviewed to determine the challenges and opportunities associated with agroforestry development. This was followed by a series of stakeholder engagements, including a number of national and provincial multistakeholder workshops to present the draft strategy and develop the final strategy based on stakeholder input.

The literature review found that agroforestry improves water use and water quality, while reducing erosion and improving soil health. Improved biological diversity and ecological benefits were also identified. From a climate change perspective, agroforestry systems increase carbon sequestration by the soil, contributing to climate change mitigation, while also contributing to climate change adaptation by supporting diversified and resilient land use practices. Livelihood and food security advantages were also noted, arising from improved soil nutrient and water status and diversification of crops, resulting in a range of economic benefits, including higher income and reduced risk.

There have been few recent studies or research on agroforestry in South Africa, although there is substantial potential for the application of agroforestry. Barriers to adoption of agroforestry include institutional, technical, economic, policy, governance and social factors that would need to be addressed. The strategy that has been developed aims to address these barriers through a range of interventions.

A working definition for agroforestry in South Africa, which seeks to accommodate the various socio-cultural and socio-economic contexts that exist in South Africa and allow agroforestry systems to be applied at a local, farm-level and landscape scale is provided, which is:

“Agroforestry is a sustainable land management system that deliberately includes woody plants with crops and / or animals within the same land management system resulting in positive socio-economic

and / or ecological interactions between the woody and non-woody components; and is applied in a manner and scale that is compatible with the local cultural, socio-economic and agro-ecological context."

The vision of the strategy is to achieve the integration and mainstreaming of agroforestry as an accepted land use that contributes to food security, improved livelihoods and income generation while building resilient, climate smart systems that sustain our natural resources. To achieve this vision, three strategic themes were identified:

- Theme 1: Creating the enabling environment
- Theme 2: Knowledge development.
- Theme 3: Putting agroforestry into practice.

For each strategic theme, a number of goals and objectives were identified, providing an integrated framework for achieving agroforestry development in South Africa. These are elaborated in detail in the strategy. Linked to the strategy is an implementation plan, which details specific activities to be implemented. Included in the implementation plan is a set of indicators to monitor progress in implementing the strategy.

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LIST OF ABBREVIATIONS

AEZ	Agro-ecological zone
AF	Agroforestry
AfDB	African Development Bank
ARC	Agricultural Research Council
CARA	Conservation of Agricultural Resources Act
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DED	Department of Economic Development
DRDLR	Department of Rural Development and Land Reform
DST	Department of Science and Technology
DWS	Department of Water and Sanitation
FAO	Food and Agriculture Organisation
ICRAF	International Centre for Research in Agroforestry (Now known as World Agroforestry Centre)
NDP	National Development Plan
NEMBA	National Environmental Management: Biodiversity Act
REDD	Reducing Emissions from Deforestation and Forest Degradation
SADC	Southern African Development Community

PREFACE

South Africa is faced with multiple challenges of land degradation, low levels of productivity in rural communal areas and persistent rural poverty. As a water scarce country, these challenges have been brought into sharp focus by the recent (and possibly ongoing) devastating drought, which affects farmers, pastoralists and foresters. This is further exacerbated in the face of climate change where the incidence of extreme events such as droughts is predicted to increase and further erode rural livelihoods.

As a signatory to the Paris Climate Agreement, all South Africans are obliged to take action on climate change. Pledges to mitigation efforts focus largely on agriculture and land use changes to reduce carbon emissions and increase sequestration. In addition, building climate resilient land use systems is critical for ensuring that land users adapt to climate change.

The Sustainable Development Goals (SDGs) of the United Nations highlight the importance of reconciling social, economic and environmental objectives. Transition to more sustainable land use practices is critical to achieve ecological integrity and sustain and advance rural livelihoods.

Agroforestry is a land use system combining the use of woody perennials with agricultural crops and / or animals that aims for beneficial ecological and economic interactions for food, fibre and livestock production. Agroforestry systems aim to provide multiple benefits and can contribute to many social, economic and ecological objectives, including food security, income generation, additional fuel and fibre resources, carbon sequestration, erosion control, landscape rehabilitation and enhanced climate resilience.

It is within this context that the Department of Agriculture, Forestry and Fisheries (DAFF) identified agroforestry as a system that can benefit farmers, foresters and pastoralists in a range of contexts. This agroforestry strategy framework provides a starting point to develop this alternative land use system for the benefit of the people of this country.

This document was prepared through a collaborative effort between **Department of Agriculture, Forestry and Fisheries** and the **Institute of Natural Resources**

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1 BACKGROUND

This section provides an overview of the strategy development process, summarises the outcomes of the literature review), provides a problem statement and considers the policy context that informed the development of the agroforestry strategy framework.

1.1 The process of strategy development

This agroforestry strategy framework has been developed over a period of 12 months, through a collaborative effort between the Institute of Natural Resources (INR) and the Department of Agriculture, Forestry and Fisheries (DAFF). The strategy framework was informed by input from various stakeholders, including national, provincial and local government, academics, foresters, farmers and development practitioners.

The activities to inform the strategy started with an information sharing session with DAFF representatives to gather available information and understand key issues that were to be considered in the development of the strategy. This was compiled into a key issues paper (see Appendix 1). A review of literature on agroforestry as well as a policy review was conducted. The purpose of this was to identify how and where agroforestry practices can contribute to current policy objectives, in particular, those related to food security, income generation, diversifying livelihoods, addressing environmental degradation and climate change. Subsequent to the literature review, interviews with key informants in the private sector, the public sector and researchers were conducted to understand the current status of agroforestry in South Africa, and to learn what is required to amplify agroforestry practices.

The first draft of the strategy was presented to DAFF stakeholders at a national workshop in May 2016 and was amended based on this input. The second draft of the strategy was then presented to provincial stakeholders in a series of multi-stakeholder workshops, which were completed in July 2016. The input from the multi-stakeholder workshops resulted in further refinement of the strategy and the development of an implementation plan to give effect to the strategy.

This strategy framework provides a summary of the literature review and policy review, highlighting key challenges for agroforestry development. It provides a vision for agroforestry; proposes a working definition of agroforestry for South Africa and defines key principles that should inform thinking when implementing the strategy.

This is followed by the strategy itself, which is made up of three themes:

- Theme 1: Creating the enabling environment
- Theme 2: Knowledge development
- Theme 3: Putting agroforestry into practice.

For each strategic theme there are a number of goals and for each goal, a set of objectives that are necessary for each goal to be achieved. Associated with the strategy is the implementation plan which provides detail on key actions and outputs from the strategy and indicators against which progress with implementing the strategy can be monitored.

1.2 Summary of the literature review

This section highlights key findings from the literature review that was conducted to inform strategy development. The full literature review is provided in Appendix 2.

1.2.1 Development and definition of agroforestry

Prior to the development of modern agriculture, dominated by monocropping systems, farmers were engaged in practices that included a variety of crops. Recognising the benefits of multicropping systems, there was a resurgence of research into agroforestry as a land use practice from the 1980s. This arose from the recognition that large-scale deforestation and associated land degradation were compromising farming systems and local ecology. This resulted in the formation of the International Centre for Research in Agroforestry (ICRAF), now known as World Agroforestry Centre, which has conducted extensive research on agroforestry systems worldwide.

The first official agroforestry definition was introduced by ICRAF in 1982, where agroforestry was defined as:

Deliberate growing of woody perennials on the same unit of land as agricultural crops and / or animals, either in some form of a spatial arrangement or sequence; which must consist of a significant interaction (positive or negative) between the woody and non-woody components of the system either ecological and / or economical (Lundgren 1982).

It was later refined into the following widely used definition:

Agroforestry is a collective name for land-use systems and technologies where woody perennials are deliberately used on a same land management unit as agricultural crops and / or animals, in some form of a spatial arrangement or temporal sequence. In agroforestry there are both ecological and economic interactions between different components (Lundgren and Raintree 1982).

The Food and Agriculture Organisation of the United Nations (FAO) on the other hand defines agroforestry as:

A system that includes both traditional and modern land use systems in which trees are managed together with crops and / or animal production systems in agricultural settings.

Agroforestry includes a full range of tree planting and woodlot management practices e.g. living fences, hedges, woodlots, fruit trees near houses and woodland use. The definitions show that agroforestry can be defined by a region or country based on the dominant systems and practices

dictated by the biophysical and socio-economic attributes of a particular area. Therefore the agroforestry strategy for South Africa should define agroforestry in a local context taking into consideration the suitable and preferred agroforestry systems and the local socio-economic context and should include a holistic approach to land use.

Three major agroforestry systems are recognised, namely:

- Agrisilvicultural – a combination of crops and tree species
- Silvopastoral – a combination of trees, pastures and animals
- Agrosilvopastoral – a combination of crops, trees, pastures and animals

Within each main category, there are a range of different practices, which are detailed in Appendix 2 (the full literature review).

1.2.2 Benefits of agroforestry

The review of the literature identified a number of benefits associated with properly managed agroforestry systems. These are summarised below as environmental, climate and livelihood benefits. It should be noted that there are important linkages between the elements and that these benefits are often delivered simultaneously, for example, while reduced soil erosion is an environmental benefit, it is also a benefit to land users in terms of maintaining productive capacity and thus delivers livelihood and economic benefits. It is therefore important to consider the individual benefits discussed here in a holistic manner.

Environmental benefits

From a soil water and water quality perspective, agroforestry trees planted on terraces increase soil water content and reduce non-point source pollution by intercepting and filtering pollutants. Furthermore, increased infiltration resulting from agroforestry systems reduces runoff and improves deep percolation to provide winter flows. The leaf litter and increased root mass associated with agroforestry systems can also increase soil fertility, structure and organic matter, thus improving soil ecology. In addition, agroforestry contributes to improved landscape connectivity by supporting ecological processes such as the presence and spread of fauna and flora, improving microclimates and reducing pests and diseases. Higher biodiversity is associated with agroforestry systems when compared with monocultures.

Climate change – mitigation and adaptation

Climate mitigation relates to reducing greenhouse emissions and / or sequestering carbon. While agroforestry systems can help reduce emissions, the carbon sequestration potential of agroforestry is high, and agroforestry is recognised as the land use system with the greatest potential for carbon sequestration, when compared with other improved land use management practices.

Climate change adaptation relates to how land users adjust their responses to actual or expected climate effects and agroforestry is increasingly recognised as a land use system that can build

resilience in the face of climate change. Agroforestry can diversify the production mix, while increasing output per unit area, improving soil and water conservation and soil physical and chemical properties, stabilising crop yields and improving microclimates to build more resilient farming systems.

Livelihoods and food security

Agroforestry plays an important role in the livelihoods of many rural households in sub-Saharan Africa by providing diverse food sources including grains, vegetables and fruit. In addition, the tree component provides raw materials for construction, fuelwood and fibre. From an agricultural perspective, the inclusion of nitrogen fixing trees and shrubs improves soil fertility and soil moisture, resulting in increased and more stable yields in both the tree and the crop components of the system, while reducing input costs, in particular fertilisers. The use of fodder trees as sources of high quality fodder with high protein content associated with silvipastoral and agrisilvopastoral systems increases the productivity of mixed crop and livestock production systems.

From an economic perspective, multiple harvests at different times of the year benefit the availability of household food while improving income generation throughout the year. While the tree crop and the understory crop do compete for nutrients, light and water, the loss of production from the understory crop is more than offset by additional income generated from the tree component.

1.2.3 Agroforestry in the South African context

There is a lack of recent research on agroforestry in the South African context. While agroforestry is being practiced in South Africa, it occurs at a limited scale and extent however, two recent studies have identified the potential for expansion of agroforestry in South Africa. In an evaluation of four case studies of agroforestry in South Africa, the following goods and services provided by agroforestry were identified:

- Economic goods and services
    - Increase in yield/production
- Environmental services
    - Improvement in soil fertility
    - Water treatment and purification; improved water use / management
    - Climate change adaptation – increased resilience
- Social services
    - Improvement in public opinion regarding agricultural and forestry activities
- Land use services
    - Integrated sustainable land use management

A SWOT analysis conducted on selected agroforestry projects in South Africa by Guiney (2016) is provided in Table 1.1.

Table 1.1 SWOT analysis of selected agroforestry projects in South Africa (source: Guiney, 2016)

STRENGTHS	WEAKNESSES
• Increased agriculture / forestry production • Increased provision of environmental services • Diversification of income and risk reduction • Climate change adaptation and mitigation benefits • Monetary benefits – increased income from agroforestry adoption • Decreased operational costs (e.g. herbicides and labour) • Potential prevention of forest fires	• Management of projects is remote – many people on the ground needed and increased management costs • Lack of national coordination of agroforestry interventions • Delayed benefits from agroforestry activities (Long term investment of 5-7 years) • Lack of focussed and documented research • Limited practical knowledge and applied research to address issues that affect agroforestry • Lack of on the ground technical skills • Skills shortage – management and administration of on the ground operations • Lack of monitoring and evaluation of agroforestry efforts • Lack of a national agroforestry research / information sharing network • Competition with other crops
OPPORTUNITIES	**THREATS**
• Global carbon market (and other environmental service markets) • Potential government formal policy / programme to support the development and implementation of agroforestry • Increased land value – preservation of land productivity and restoration of degraded land • Potential linkages with conservation and climate smart agriculture • Co-benefits (socio-economic) such as honey production, and tourism, increased wildlife viewing • Incentives to promote the development and implementation of agroforestry activities • Markets for diverse goods • Coordinated and collaborative research	• No formal government policy / programme to support agroforestry • Climate change and climate variability • Unpredictability of carbon markets and lack of government legal and institutional framework for carbon markets • Lack of markets or incentives for ecosystem services or non-carbon benefits • Maintaining positive image for voluntary carbon markets • Potential risks of fire, pest and disease, theft, destruction • Insecure land tenure and land reform

To summarise, agroforestry involves combining multi-purpose trees, legume trees or timber species with, beneficial grasses or crops. Besides livelihoods or economic benefits, such practices also improve soil organic matter, replenish sol fertility, reduce erosion and excessive runoff, thus mantaining healthy landscape and reducing land degradation. Agroforestry systems are known to harbour and provide habitat to different beneficial species ranging from pollinator insects, biocontrol organisms and seed dispersal birds that sustain ecosystem service function. In summary, these systems provide multiple benefits, addressing economic, ecological and social needs.

An important starting point for agroforestry development is an effective and enabling policy environment. The effective promotion and regulation of agroforestry through relevant policies or strategies can also aid in addressing the issues identified in the SWOT analysis above. Furthermore,

effective strategies are necessary for support and buy-in to achieve effective collaboration between government, development practitioners and researchers to support new agroforestry initiatives. Finally, it should be noted that agroforestry is not easy to define as it ranges from “subsistence, livestock, silvopastoral systems through to home gardens, on-farm timber production, tree crops of all types integrated with other crops, all operating within a wide diversity of biophysical conditions and socio-ecological characteristics” (Zomer et al, 2014). More recently, the term has also come to include the role of trees in landscape-level interactions, such as nutrient flows from forest to farm, or community reliance on fuel, timber or biomass available within an agricultural landscape.

1.3 Problem statement

Agroforestry is a system that can potentially provide social, economic and environmental benefits to farmers, foresters and pastoralists in South Africa. However, the lack of an enabling environment to achieve the adoption and upscaling of agroforestry requires an inclusive strategy that will guide the development of agroforestry as a sustainable system of land use practices for the benefit of all.

1.4 Policy context

For the promotion and widespread adoption of agroforestry, it is necessary to ensure that this land use practice can contribute to national policy priorities. Lack of support from the policy level is one of the main hindrances to wider adoption of agroforestry. This section examines various policy priorities and reviews relevant priorities of the National Development Plan (NDP).

1.4.1 The National Development Plan 2030

The vision of the NDP is to eliminate poverty and inequality by 2030. This vision will be achieved through drawing on the energies of South African people, growing an inclusive economy, building capabilities, enhancing the capacity of the state, and promoting leadership and partnerships throughout the society; with a focus on broad partnerships that advance growth (NDP, 2011). The NDP realises that climate change has the potential to reduce food production and affect livelihoods with a disproportionate impact on women and children. This calls for industries and households to reduce their impacts on natural environments and for the resilience of people and economy to be enhanced.

The NDP promotes the development of a strategy that **ensures household food security** through strengthening links between agriculture and nutrition. The NDP proposes policy measures that promote an improved intake of fruits and vegetables and reduced intake of saturated fats, sugar and salt, as recommended in the South African Food Security Policy. Agroforestry has been reported to have a significant impact on the livelihoods of many rural households in African countries. The diversity of commodities involved in an agroforestry system contributes to food security and income generation.

The NDP aims to achieve **environmental sustainability and resilience to future shocks,** with a goal to maintain or restore the value of the natural environment for future generations. The NDP

proposes a long-term plan to promote biodiversity, conservation and rehabilitation of natural assets. Investment in community involvement in rehabilitation and conservation of biodiversity assets and ecosystem services is required. Agroforestry can potentially impact positively on biodiversity and ecosystem services, which clearly shows its relevance to the NDP in this regard.

Enhancing the resilience of people and the economy to climate change is one of the key actions the NDP seeks to undertake. It has been noted that the effects of climate change and environmental degradation fall heavily on the poor. Therefore South Africa needs to strengthen the resilience of its society and economy to climate change effects. This will be achieved through increasing investments in agricultural technologies, research and development of adaptation strategies. Agroforestry is becoming popular as a farming system that enhances the resilience of agricultural landscapes in the face of climate change (Lasco et al, 2014).

1.4.2 Additional policies relevant to agroforestry

The following policies, strategies and legislation have a bearing on the agroforestry strategy for South Africa. Key aspects of the policies that are relevant to agroforestry are mentioned below:

- **New Growth Path**: Setting the sector on a trajectory of higher economic growth and employment creation.
- **The Medium Strategic Framework**: Emphasis on employment creation, vibrant economy, rural development and environmental conservation.
- **Agricultural Policy Action Plan (APAP)**: Agroforestry fits well into the Fetsa Tlala programme of the APAP as it promotes integrated food production characteristics. The APAP promotes Climate Smart Agriculture (CSA) and hence agroforestry, since agroforestry is one of the CSA land use practices which can contribute to sustainably increasing agricultural productivity and income; adapting and building resilience to climate change and reducing emission of greenhouse gases (FAO, 2013).
- **DAFF Strategic Plan 2015/16 – 2019/20:** The plan lists the implementation of the agroforestry strategy as a mechanism to ensure food security for small timber growers, while still waiting for their harvest. It is under the responsibility of the Director: Small scale Forestry. DAFF is also developing policies and strategies on: (1) Conservation farming, (2) Food security & nutrition and (3) LandCare. Agroforestry can contribute to all three initiatives and there is a need to ensure that the alignment of these initiatives is achieved.
- **The White Paper on Sustainable Forest Development, 1997 and The National Forest Act, 1998**: The component of these policies and legislation which speaks directly to agroforestry is community forestry and sustainable forestry management. This is a form of forestry that allows the local community to play a role in forest management and land use decision making. It includes farm forests, agroforestry or village planting, woodlots and woodland management. The policy acknowledges that community forestry has been neglected in South Africa, with more emphasis on commercial farm forestry.

- **National Greening Strategy, 1996**: This involves the creation of sustainable livable settlements. The strategy supports agroforestry in an urban, town and informal settlement setting. The rolling out of the greening programme indirectly introduces agroforestry in these environments.
- **National Research and Development Strategy, 2002**: this document makes reference to both the agriculture and forestry sectors which allows an opportunity to approach research in an integrated manner that can include agroforestry.

2 THE STRATEGY FRAMEWORK

2.1 Purpose

Agroforestry is a complex and novel system of farming and requires good management to maximise positive interactions and minimise negative interactions between the different components of the system. To achieve the full benefits of agroforestry, a supportive environment is necessary to develop the correct systems that are locally appropriate. It is on this premise that the strategy framework for supporting agroforestry is based.

2.2 Vision for agroforestry

The following is a proposed vision for agroforestry in South Africa:

To achieve the integration and mainstreaming of agroforestry as an accepted land use that contributes to food, fuel and fibre security, improved livelihoods and income generation while building resilient, climate smart systems that sustain our natural resources.

2.3 Principles of the strategy

1. The principles of drawing on the energies and skills of the South African people, enhancing capacity and developing broad partnerships, as stated in the NDP, are supported.
2. In enabling the principle of inclusiveness, agroforestry should consider not only farm-scale systems, but also include agroforestry as part of the broader landscape to contribute to natural resource, forestry and agricultural policy objectives.
3. Agroforestry systems are area and climate specific – it is necessary to develop agroforestry systems that are locally relevant, and that consider the biophysical and socio-economic context (including land tenure) on a case by case basis. Both urban and rural agroforestry systems must be supported.
4. Agroforestry should contribute to food, energy and fibre sovereignty.
5. Agroforestry means different things to different people – an inclusive approach that recognises traditional systems and indigenous knowledge as a basis for building locally sustainable systems is necessary.
6. A bottom up approach that builds on agroforestry systems currently being applied in South Africa is necessary – knowledge and decision-making at a local level should be supported. The approach should be developmental rather than a macro-economic focus (i.e. it should build peoples capacity).
7. There are 22 000 plant species indigenous to South Africa. Indigenous species that can be applied in agroforestry systems should be identified and developed.
8. The strategy should apply the SMART principles (simple, measurable, achievable, realistic and time-bound). It should be implementable and realistic, and have a horizon of 5-10 years.
9. The strategy should focus on systems and supporting people, rather than on buying inputs and should have a programmatic rather than project based approach, with ongoing learning.

2.4 Strategic themes

To achieve the vision of the strategy, three key strategic themes are used as the basis for agroforestry development. These are:

- The enabling environment – *create an enabling institutional and governance framework for agroforestry.*
- Knowledge development - *develop the science of agroforestry, demonstrate the benefits of agroforestry and develop the skills for agroforestry.*
- Putting agroforestry into practice – *adopt and integrate agroforestry into land use systems*.

The interlinked elements of research, policy and implementation should be regarded as an ongoing process in developing the agroforestry sector in South Africa. As shown in Figure 2.1, ongoing monitoring, evaluation and adaptive management are integral to sustaining the strategy and continued development of the sector. The goals and key actions under each of these themes are provided in Figure 2.1

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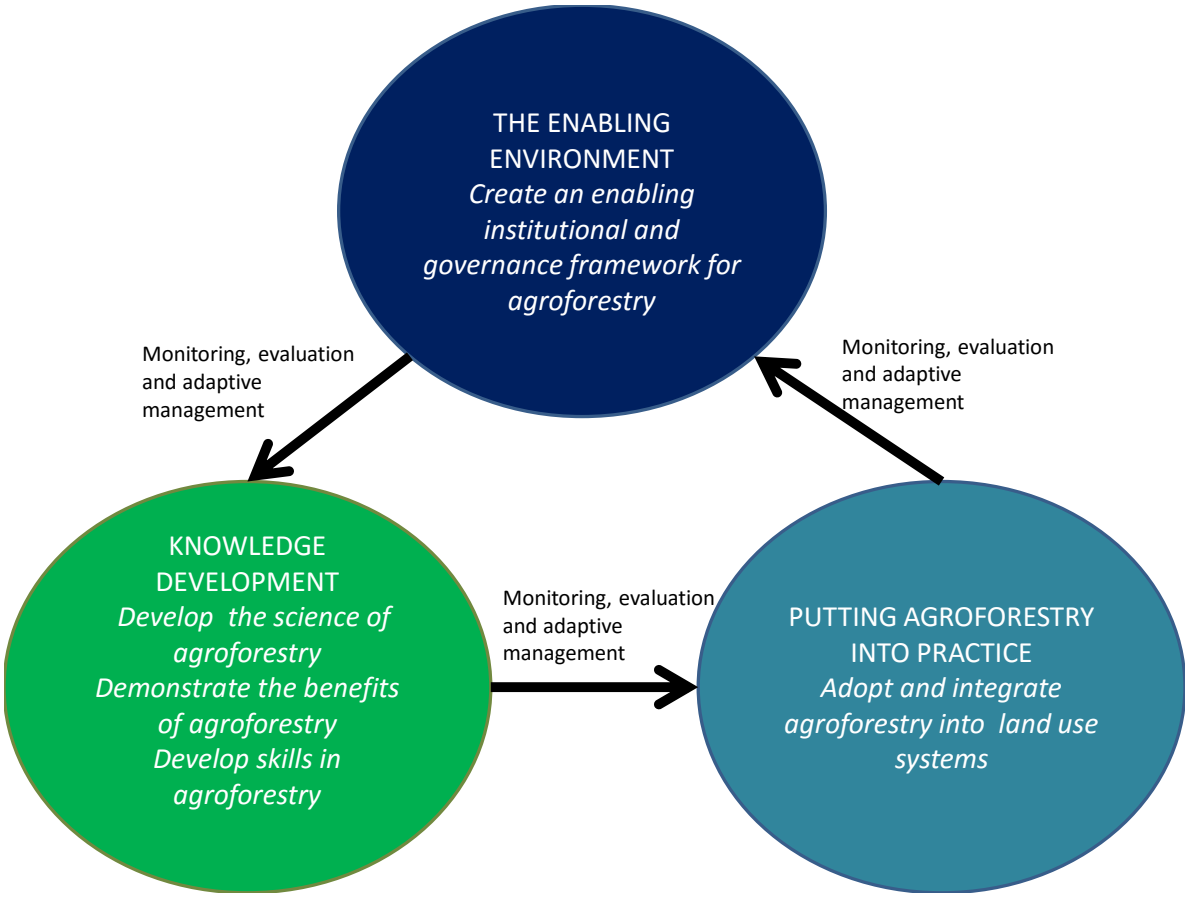

Figure 2.1: Monitoring, evaluation and adaptive management for sustained agroforestry development

Figure 2.2: Strategy framework for supporting agroforestry development in South Africa

The goals and key actions, discussed further below, have been formulated address the major constraints and to take advantage of the opportunities that agroforestry systems offer. Achievement of these goals will ensure that agroforestry is able to achieve the potential benefits that have been identified.

2.5 Towards a working definition for agroforestry in South Africa

Agroforestry systems are not easy to define as they range from communal subsistence livestock silvopastoral systems, to home gardens, commercial farms and timber planting operations. Furthermore, agroforestry can be applied in a range of agro-ecological conditions and socio-economic circumstances. Furthermore, the scale at which interactions occur between the components of the system may be at a homestead scale, farm scale, or at a landscape scale. Different agroforestry systems have different objectives. In different cases, agroforestry is applied for land rehabilitation purposes and the enhancement of ecological services, to diversify crops for risk management, food security, climate resilience or mitigation, or for the commercial production of food, fuel and fibre products. Nevertheless, it is necessary to establish a working definition of agroforestry for South Africa. The proposed definition for South Africa is as follows:

"Agroforestry is a sustainable land management system that deliberately includes woody plants with crops and / or animals within the same land management system resulting in positive socio-economic and / or ecological interactions between the woody and non-woody components; and is applied in a manner and scale that is compatible with the local cultural, socio-economic and agro-ecological context."

This definition is designed to accommodate the various socio-cultural and socio-economic contexts that exist in South Africa and allow agroforestry systems to be applied at a local, farm-level and landscape scale. This definition represents a starting point and further improvements to the definition may arise over time.

2.6 The strategy at a glance

Theme 1: Creating the enabling environment	
Goal 1.1: Supportive governance and institutions	1.1.1: Develop a common understanding of agroforestry in South Africa
	1.1.2: Support the inclusion of agroforestry as a sustainable land use practice in the implementation of current policies
	1.1.3: Specify agroforestry as a sustainable practice in future policy development
	1.1.4: Establish institutional structures and systems to support the strategy
	1.1.5: Promote agroforestry systems that are appropriate for the different land tenure systems in South Africa
Goal 1.2: Unlock resources to support agroforestry research and implementation	1.2.1: Commit state resources (human and financial) to support agroforestry
	1.2.2: Unlock additional resources to support agroforestry
	1.2.3: Provide incentives for the adoption of agroforestry
Theme 2: Knowledge development	
Goal 2.1: Strengthen agroforestry knowledge development	2.1.1: Conduct a knowledge audit
	2.1.2: Establish centres of excellence to lead agroforestry research
	2.1.3: Develop an agroforestry information system for South Africa
Goal 2.2: Conduct agroforestry research	2.2.1: Develop a research agenda for agroforestry
	2.2.2: Document agroforestry initiatives in South Africa
	2.2.3: Identify and test agroforestry systems that suit the climatic, environmental and socio-economic conditions of the country
	2.2.4: Conduct research to optimise positive interactions and minimise negative interactions between components of the agroforestry system
	2.2.5: Conduct plant breeding research to achieve germplasm improvement and cultivar development
	2.2.6: Conduct research to generate the argument for agroforestry
Theme 3: Putting agroforestry into practice	
Goal 3.1 Share knowledge and information on agroforestry	3.1.1: Generate awareness of agroforestry and disseminate information across all stakeholder groups
	3.1.2: Link extension services and other natural resource management practitioners to researchers
Goal 3.2: Develop skills in agroforestry	3.2.1: Develop training curricula in schools, colleges and universities
	3.2.2: In-service training of extension workers
	3.2.3: Skills development and training of farmers and practitioners
Goal 3.3: Enable adoption of agroforestry	3.3.1: Organise and mobilise farmers around agroforestry
	3.3.2: Make seed and planting material available
	3.3.3: Develop markets for agroforestry products
	3.3.4: Provide targeted and long-term extension.
	3.3.5: Identify support and replicate existing successful agroforestry initiatives
Goal 3.4: Support agroforestry implementation	3.4.1: Integrate agroforestry into existing farmer-support programmes
	3.4.2: Identify, support and replicate existing successful agroforestry initiatives
	3.4.3: Integrate agroforestry into redistributed timber enterprises

2.7 Themes, goals and key actions

2.7.1 Theme 1: Creating the enabling environment

The lack of coordination between the sectors in South Africa has resulted in the use of agroforestry as a land use practice to enhance food security, resource conservation and retention or restoration of ecosystem services having been overlooked. There is a great emphasis on commercial agriculture and forestry production systems, which are usually monocultures. Furthermore, in the case of forestry, land users may be reluctant to introduce new crops into their timber. This is often a result of policies promoting certain agricultural systems. For example, the Massive food production programmes promote high input systems that use genetically modified seed. Issues relating to insecure land tenure and shortages of land also discourage farmers from investing in agroforestry. It is therefore necessary to create an enabling policy, governance and institutional environment that supports agroforestry.

Goal 1.1: Supportive governance and institutions

Objective 1.1.1: Develop a common understanding of agroforestry in South Africa

According to the Food and Agriculture Organisation of the United Nations (FAO), agroforestry systems include both traditional and modern land use systems in which trees are managed together with crops and / or animal production systems in agricultural settings. However, from the stakeholder engagement meetings, it became clear that there is no common understanding of agroforestry locally. Confusion between mixed farming and integrated farming systems still exists. For example, some stakeholders consider a mixed farming system that includes trees, crops and / or livestock to be agroforestry while, in reality, agroforestry is a combination of trees and crops and / or livestock within a single field. In order to overcome these issues, the following specific actions have been identified:

- Review existing agroforestry definitions.
- Review the South African socio-economic and agro-ecological context.
- Establish a definition for agroforestry for South Africa based on the socio-economic and agro-ecological context.

Based on the definitions promoted by internationally recognised organisations that support agroforestry – such as the FAO and the World Agroforestry Centre (previously ICRAF), there are a variety of systems that are all recognised as agroforestry. Key words include: forests, land, livestock, communities, crops, sustainable, ecosystems, indigenous, income, food security, job creation and medicinal. Furthermore, agroforestry should be driven by the concept of food sovereignty, which promotes the local ownership of the production system and food diversification. The definition of agroforestry should be cognisant of international / classical definitions, but should also consider local social, ecological and landscape contexts. Food security is a national policy priority across sectors and agroforestry can make substantial contributions to achieving this.

A proposed definition for South African agroforestry is provided below:

"Agroforestry is a sustainable land management system that deliberately includes woody plants with crops and / or animals within the same land management system resulting in positive socio-economic and / or ecological interactions between the woody and non-woody components; and is applied in a manner and scale that is compatible with the local cultural, socio-economic and agro-ecological context."

Objective 1.1.2: Support the inclusion of agroforestry as a sustainable land use practice in the implementation of current policies (agriculture, forestry and environment-related)

It has been identified that agroforestry, due to its multidisciplinary nature and multiple benefits, is highly relevant to a number of sectors supported by the government - especially Environment, Agriculture and Forestry sectors. In addition, other government sectors also stand to benefit (e.g. Health and Land reform).

Recognising that policy formulation can be a drawn out process, and noting that if a policy is to be developed before the strategy is implemented, then implementation will be severely delayed. Furthermore, it is suggested that in many cases, agroforestry is recognised as a practice that contributes to policy objectives, even if it is not mentioned specifically. For example, in climate policy (adaptation and mitigation), there is reference to climate smart agricultural practices, although agroforestry is not mentioned specifically. Achieving this objective would require lobbying various government departments to acknowledge where agroforestry can contribute meaningfully to existing policy objectives.

To work towards achieving acceptance of agroforestry, it is suggested that we appeal to the interests of the different departments and sectors by highlighting the relevance of agroforestry as a mechanism to achieve their objectives. This will require ongoing interdepartmental communication and meetings. Furthermore, it is suggested that local examples of agroforestry be documented to describe what agroforestry means in a South African context and provide detail on how agroforestry is currently being applied locally. This is discussed further in Theme 2: Knowledge development.

Objective 1.1.3: Specify agroforestry as a sustainable practice in future policy development

Considering Objective 1.1.2 above, it would still be appropriate for policies developed in future to specifically define and support agroforestry activities. Many programmes that support agriculture, particularly for smallholder farmers or foresters, focus on monoculture systems and as a result, more complex but potentially more beneficial systems such as agroforestry may not be adequately considered in national support policies and programmes.

Recognising that there will be a need to continue supporting monocultures, policies need to recognise the multidimensional nature of agriculture and forestry land use systems and allow for alternative and novel systems of production to be supported alongside conventional production systems.

We propose a range of research activities in Theme 2, which will inform the development of policies that will support agroforestry. Thus establishing any policies supporting agroforestry will be a long term process.

Objective 1.1.4: Establish institutional structures and systems to support the strategy

Given the integrated and multidisciplinary nature of agroforestry, it is necessary that institutional support structures and systems are established. This requires not only intra- and inter-departmental collaboration to develop the agroforestry sector, but also engagements and partnerships with NGOs, academia and the private sector.

As a first step, in-principle support for agroforestry and the strategy is required at a national level. It is suggested that with DAFF as lead, in collaboration with other key departments (e.g. DRDLR, DED, DWS and DEA), oversee the support and implementation of agroforestry in South Africa. This will also enhance inter- and intra-sectoral collaboration in support of agroforestry.

Consequently there should be further engagement with key stakeholders who have already been engaged as part of the strategy development process. Institutional arrangements should be designed to support implementation of the strategy and create the space for funding. An expert working group should be established, with the ultimate vision of establishing an agroforestry community of practice across the country.

Objective 1.1.5: Promote agroforestry systems that are appropriate for the different land tenure systems in South Africa

It is important to be cognisant of the different land tenure arrangements that exist in South Africa and develop systems to support agroforestry that respond to the requirements of farmers in the different systems. For example, a rural farmer in communal tenure land may have more interest in food security, compared to a farmer on redistributed land who may be more profit focussed. Furthermore, tenure security arrangements (e.g. communal tenure) may limit the ability of farmers to access capital and may be a disincentive for the farmer to invest in new farming systems. It is necessary to explore novel tenure arrangements that can allow farmers to invest in agroforestry.

The timber sector is characterised by a situation where farms claimed through the land reform process have not retained their prior level of productivity. One of the reasons is that claimants have differing opinions about how to use their land. Some may wish to be able to keep livestock or grow other crops. Agroforestry could allow for the integration of other enterprises into existing timber-based farms, without the total change in land-use and reduced contribution of fibre to the industry.

Goal 1.2: Unlock resources to support agroforestry research and implementation

Objective 1.2.1: Commit state resources (human and financial) to support agroforestry

To develop the agroforestry sector, it is necessary to secure funding sources for agroforestry research and development. Funding partnerships to support agroforestry (e.g. with research institutions and DST) should be established to develop research and development programmes. In addition to this, support for agroforestry development should be included in state budgeting processes. This should also aim to unlock funding for research, education, training and skills development around agroforestry. Dedicated staff should be allocated to oversee and support the implementation of agroforestry in South Africa.

Objective 1.2.2: Unlock additional resources to support agroforestry

It is recognised that the state alone cannot provide the full suite of activities required to support agroforestry development. Building on the correct institutional arrangements to support agroforestry, state resources should be used to mobilise other sources of funding to support agroforestry. These could include private sector commitments, regional grants (e.g. SADC, AfDB) and other incentive programmes (e.g. REDD, Carbon sequestration, carbon credits, etc.).

Objective 1.2.3: Provide incentives for the adoption of agroforestry

Incentives for the adoption of agroforestry should be developed. These could include rebates, tariff exemptions and other mechanisms that would support agroforestry development. This is particularly applicable where partnerships between large scale commercial and small-scale / emerging farmers can be supported. Actions that support economic transformation, especially of the youth, should be supported.

2.7.2 Theme 2: Knowledge development

There has been limited recent agroforestry research in South Africa. Research is also motivated by the availability of funding. Therefore the development of agroforestry research in South Africa depends on the development of a comprehensive, well-funded research programme.

Goal 2.1: Strengthen agroforestry knowledge development

Objective 2.1.1: Conduct a knowledge audit

There has in the past been some research into agroforestry systems in South Africa. Furthermore, there are a number of recognised agroforestry experts in academia, government and the private sector. It is necessary to understand what has already been learnt about agroforestry, before proceeding with developing new knowledge. An audit of current knowledge in South Africa is a necessary starting point and a knowledge audit that reviews, summarises and catalogues previous agroforestry research through a search of various state and university libraries is required.

Objective 2.1.2: Establish centres of excellence to lead agroforestry research

Centres of excellence should be identified and established as lead research agents in agroforestry systems. These may include universities, agricultural colleges, forestry colleges, research stations and state research agencies (e.g. ARC). It is suggested that a number of centres be established and provided with funding for agroforestry research. The geographic location of these centres should reflect the different agro-ecological zones (AEZ) that occur in South Africa and the research focus should be on systems best suited to the AEZ in which the centre is located. The state should provide seed funding for research and assist the centres with securing funding from other sources (.e.g. Water Research Commission, SADC funding mechanisms, etc.). The centres of excellence should investigate the technical, social, environmental and economic elements of agroforestry, with a particular focus on shared learning and participatory action research.

Objective 2.1.3: Develop an agroforestry information system for South Africa

In order to share and disseminate information on agroforestry (see Theme 3: demonstration and implementation), it is necessary to have a centralised system of gathering and collating information. Building on the research activities conducted, it is recommended that the centres of excellence be responsible for developing a knowledge management system for the collation and dissemination of agroforestry knowledge. Key elements of the database should be developed in consultation with DAFF, natural resource management professionals and farmers.

Goal 2.2: Conduct agroforestry research

Objective 2.2.1: Develop a research agenda for agroforestry

In consultation with DAFF and associated state actors, and recognised agroforestry experts, a research agenda for agroforestry should be developed. Agroforestry has a transdisciplinary and integrated nature; therefore an integrated approach to developing the research agenda is recommended. The agenda should include plans for securing and ring fencing funding for agroforestry, pursuing global collaborations (e.g. World Agroforestry Centre, agroforestry practitioners in India and South America) to address gaps from different role players.

Objective2.2.2: Document agroforestry initiatives in South Africa

It is critical that locally developed or applied agroforestry systems are documented – indigenous knowledge systems that use agroforestry as well as locally developed systems that are currently working in South Africa are most likely to be suitable for upscaling and outscaling. Furthermore they would have developed under the unique socio-economic context of South Africa, meaning that they are more likely to be sustainable. Through the literature review and stakeholder engagements, a number of current agroforestry activities have been identified and have been included as an initial database (see Appendix 3). These initiatives and others that are identified through further

investigations should be documented in detail to provide case studies for promoting agroforestry development in South Africa.

Objective 2.2.3: Identify and test agroforestry systems that suit the climatic, environmental and socio-economic conditions of the country

Due to limited agroforestry research and practice in South Africa, we often refer to the agroforestry systems presented in the international literature. These systems have been developed, tested and adopted by other countries based on their climatic and biophysical properties. Therefore there is a need to develop systems that will suit the climatic, environmental and socio-economic conditions of South Africa. Beginning with the documented agroforestry from Objective 2.2.2, additional research should be conducted to identify suitable species combinations for different agro-ecological zones and social-economic contexts.

Objective 2.2.4: Conduct research to optimise positive interactions and minimise negative interactions between components of the agroforestry system

South Africa is a water stressed country, as a result, breeding research is concentrated at developing varieties that can withstand drought and water stress. Currently, little research has been conducted in South Africa on the best combinations and practices for agroforestry. Because this practice introduces competition between the canopy and understory components, the best spatial and temporal arrangements need to be identified for optimal production.

Objective 2.2.5: Conduct plant breeding research to achieve germplasm improvement and cultivar development

Many popular agroforestry species are either not allowed to be propagated in South Africa, in terms of the Conservation of Agricultural Resources Act (CARA), or are erratic in their production characteristics. There is a need to identify and evaluate the most promising high value agroforestry species. There has been little work to improve the quality of indigenous species (such as *Sesbania sesban*) for use in agroforestry. Agroforestry species growth and productivity may be relatively low and variable, often owing to lack of access to better quality germplasm. Seed collection, propagation and multiplication methods, as well as vegetative propagation methods, are poorly understood, and advanced propagation methods are not available. There is therefore a need to develop improved varieties that produce consistently and produce material of high quality.

Objective 2.2.6: Conduct research to generate the argument for agroforestry

There are various socio-economic barriers to the adoption of agroforestry. These include a lack of market for products from new or novel agroforestry species, perceptions of high initial capital and labour costs, and delayed returns on initial investments (particularly in timber plantations). Furthermore, there are management challenges associated with integrating trees and shrubs into

cropping systems (and integrating crops into forestry systems). Building a sound economic argument to support agroforestry is necessary.

2.7.3 Theme 3: Putting agroforestry into practice

Goal 3.1 Share knowledge and information on agroforestry

Objective 3.1.1: Generate awareness of agroforestry and disseminate across all stakeholder groups

A lack of awareness of the benefits of agroforestry exists across different sectors in South Africa. There is overdependence on conventional agricultural methods and hence farmers lack interest in pursuing more sustainable agricultural methods. Professional advisors, policy makers and farmers have a negative perception towards agroforestry for a variety of reasons including different labour requirements, unestablished markets and local beliefs, while failing to identify benefits that agroforestry can offer. Furthermore previous agroforestry research has not been transferred to extension services or to the farmer.

Most of the South African agroforestry research initiatives have focused on investigating the potential of the technology for improving water use efficiency. While this element is important in a national context, more focus on how these systems directly benefits farmers is required; if a farmer does not perceive value from the system, it will not be adopted. Thus agroforestry needs to be considered from an environmental (e.g. water and climate), economic (e.g. income and labour) and a social (e.g. livelihoods and food security) perspective if wider adoption is to be achieved.

There is therefore a need to provide information about agroforestry in terms the benefits and different systems that are available and devise innovative approaches to promote agroforestry. Guidelines and best practices information should be shared among stakeholders. This should include extension services, development practitioners and natural resource management professionals.

Objective 3.1.2: Link extension services and other natural resource management practitioners to researchers

Platforms that link researchers with extension services and other stakeholders are important for sharing information. Events such as farmers' days, conferences and symposiums, peer to peer sharing and publications (journal and popular articles) should be supported. Furthermore, institutional arrangements proposed in Goal 1.1 (Supportive governance and institutions) should support the establishment of information sharing networks to ensure that information is provided to farmers in a way that is accessible.

Goal 3.2: Develop skills in agroforestry

Since this technology is new in the country, professionals need to be educated and trained to improve awareness, enhance researchers' interest in pursuing agroforestry research and support extension

practitioners to implement agroforestry systems. There is a need to develop a local knowledge base for agroforestry.

Objective 3.2.1: Develop training curricula in schools, colleges and universities

Linked to the research theme and also to develop the necessary skills to support agroforestry in South Africa, it is necessary to develop training curricula for professionals and practitioners in agroforestry. This should include formal education, (schools, colleges and universities), short courses and training modules focussed on farmers.

Objective 3.2.2: In-service training of extension workers

The lack of transfer of information between researchers and extension officers – and ultimately farmers, is widely recognised. In order for agroforestry information to reach farmers, there is a need to ensure that researchers package their findings in a way that can be used by extension workers and then for farmers. It is suggested that a farmer field school approach be applied where researchers and agroforestry specialists work with extension workers and farmers to co-develop suitable agroforestry systems for local application.

Objective 3.2.3: Skills development and training of farmers and practitioners

Associated with the in-service training of extension workers, training courses should also be provided to farmers, NGOs and organisations supporting agroforestry. This should include capacitating officials involved in farmer support programmes, such as LandCare and environmental officers involved in the DEA Natural Resource Management Programme.

Goal 3.3: Enable adoption of agroforestry

Objective 3.3.1: Organise and mobilise farmers around agroforestry

To effectively provide support and increase uptake of agroforestry practices, it is necessary to make use of existing structures to organise and mobilise farmers around agroforestry. There are a variety of organisational arrangements that farmers can rally around. These may be farmers associations which usually have a geographic focus, or they can be around a specific commodity where grower structures are in place. These structures should be used to mobilise farmers and it is suggested that farmers currently involved in agroforestry practices should be mobilised first.

Objective 3.3.2: Make seed and planting material available

The acquisition of planting material of agroforestry species is a challenge in South Africa because they are generally invasive or not commercially available in the country. Some species are affected by lack of research which results in poor quality germplasm. These factors can limit farmers' adoption as they are not able procure the planting material necessary for agroforestry. This issue must be

addressed if farmers are to be able to adopt agroforestry practices. Nurseries and seed companies should also be supported to propagate and supply agroforestry species to farmers.

Objective 3.3.3: Develop markets for agroforestry products

The introduction of new and novel agroforestry crops will require that new markets for these commodities be explored and developed. Building on the information gathered from research, market assessment and development should be undertaken. This should include identifying markets for existing agroforestry products (e.g. Pigeon pea / dhal) and finding markets for new and novel products (e.g. Moringa)

Goal 3.4: Support agroforestry implementation

Objective 3.4.1: Integrate agroforestry into existing farmer-support programmes

There are a number of programmes and systems that can already contribute meaningfully to agroforestry implementation. These include Land Care, permaculture, environmental programmes, food security interventions and informal agroforestry practices at farm level. Some private sector companies and NGOs are already engaging in agroforestry but it is not easy to identify these initiatives due to a lack of coordination between sectors.

Objective 3.4.2: Identify, support and replicate existing successful agroforestry initiatives

If agroforestry is to be adopted, evidence of the potential benefits must be realised locally. Lack of evidence on the ground could leave room for more doubts about the potential benefits of the agroforestry practices. Building on the local case studies, extension and training support should initially cluster around existing successful agroforestry practices and upscale these locally (i.e. among neighbouring farmers). At the same time, success stories of early adopters should be documented and shared along with cost-benefit analyses of adopting the technology. Once local upscaling has been achieved, efforts should focus on outscaling (introducing the practice to new communities in a different geographic area).

Objective 3.4.3: Integrate agroforestry into redistributed timber enterprises

It is suggested that a specific effort be made to support agroforestry on redistributed timber enterprises. Adoption of agroforestry in timber production provides opportunities for short term income from the understory crops, while also securing long-term income from the timber production. It is suggested that a number of pilots be developed in the timber growing regions of South Africa.

2.7.4 Monitoring, evaluation and adaptive management

Ongoing monitoring, evaluation and adaptive management are necessary to support the development of agroforestry in South Africa. A monitoring framework is included as part of the implementation plan

for the strategy. It identifies a set of indicators against which progress in applying the strategy and developing the agroforestry sector can be assessed (See implementation plan report).

REFERENCES

FAO. 2013. Agroforestry, food and nutritional security. Food and Agricultural Organisation, Rome.

Guiney, I. 2016. Agroforestry development and implementation in South Africa: An assessment of selected case studies. M. Forestry Thesis. Faculty of Agrisciences, Stellenbosch University.

Lasco, R.D., Delfino, R.J.P., Catacutan, D.C., Simelton, E.S., and Wilson, D.M., 2014. Climate risk adaptation by smallholder farmers: the roles of trees and agroforestry. Current Opinion in Environmental Sustainability 2014, 6:83–88

National Development Plan (NDP). 2011. National Development Plan 2030: Our Future-make it work. National Planning Commission of South Africa.

Zomer, R. J., Trabucco, A., Coe, R. and Place, F. (2009). Trees on Farm: Analysis of Global Extent and Geographical Patterns of Agroforestry, World Agroforestry Center, Nairobi, Kenya, Working Paper No. 89, 1-72.