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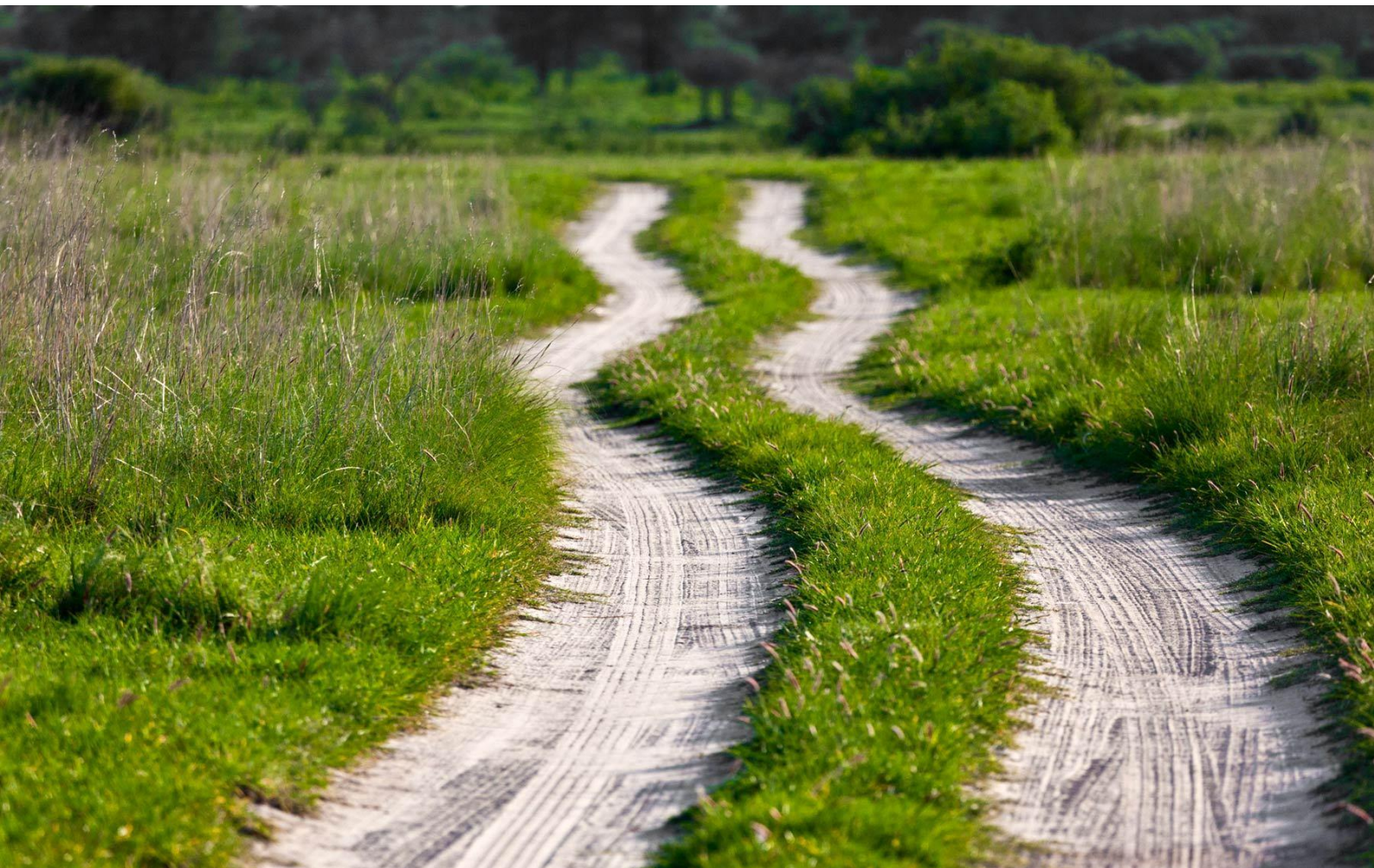
C A R B O N



A National Climate Change Monitoring and Evaluation system of the AFOLU Sector

A study to inform design, development and implementation

July, 2015



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Executive Summary

The Agriculture, Forestry and Other Land (AFOLU) use sector plays an important role in South Africa’s journey towards a lower carbon economy. Furthermore, to enhance South Africa’s National Greenhouse Gas Inventory, it is vital to translate existing AFOLU data into emissions and climate change related data.

In order to fully understand the potential and progress of this sector with respect to climate change, the monitoring of its emissions and current activities needs to be effective. This has prompted the need to develop a monitoring, reporting and evaluation (M&E) system for the AFOLU sector. This study has been completed in July 2015, while the draft Greenhouse Gas emissions reporting regulation is in the public comment phase.

The diverse nature of the AFOLU sector requires a robust monitoring system which will allow for the structured collection, collation and dissemination of information. AFOLU comprises a variety of sectors, ranging from agriculture to land use change. This study identifies the various mandates that are currently in place to collect AFOLU data. Existing methods of data collection were assessed across the government and private sectors. This enabled an assessment of the scope of mandates in relation to current data collection practices.

The assessment found that a number of mandates and data collection practices are in place to collect data which could be used in monitoring the AFOLU sector. In addition, substantial AFOLU data is collected in the private sector through voluntary industry associations. There is no clear understanding and synthesis between government and private entities in terms of data collection / practices / mandates. This leads to fragmented data collection practices which are not formally structured. As a result, continuous data monitoring is hampered.

The proposed M&E system must be based on well-defined indicators. This study applied a two-

pronged approach to determining key AFOLU indicators. The first branch was to look at the AFOLU definition and the related mandates, resulting in key categories. The second was to align the thematic areas discussed in the Draft AFOLU Strategic Plan with the Intergovernmental Panel on Climate Change (IPCC) Guidelines for

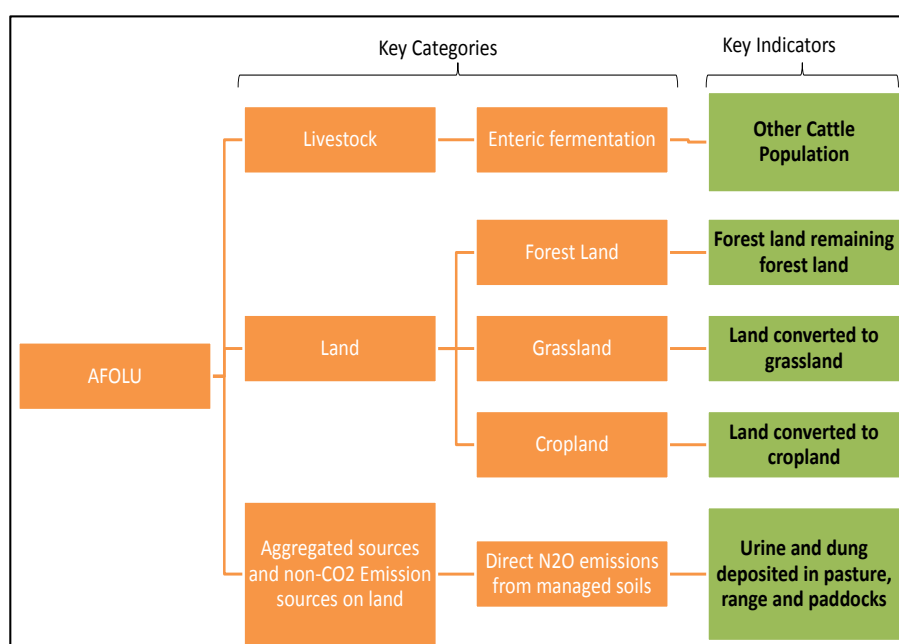


Figure 1: Key AFOLU mitigation indicators

National GHG Inventories with existing mandates. Based on this process, key mitigation indicators were determined by analysing the key sources of emissions for the AFOLU sector as discussed in the national GHG inventory.

This study emphasises the need to achieve an M&E system which is holistic in nature. The AFOLU sector plays an important role in the social and economic development context of South Africa. Therefore it is important to include adaptation indicators to be measured. Baskets of indicators, based on key development strategies and adaptation focussed programmes, will serve as key adaptation indicators.

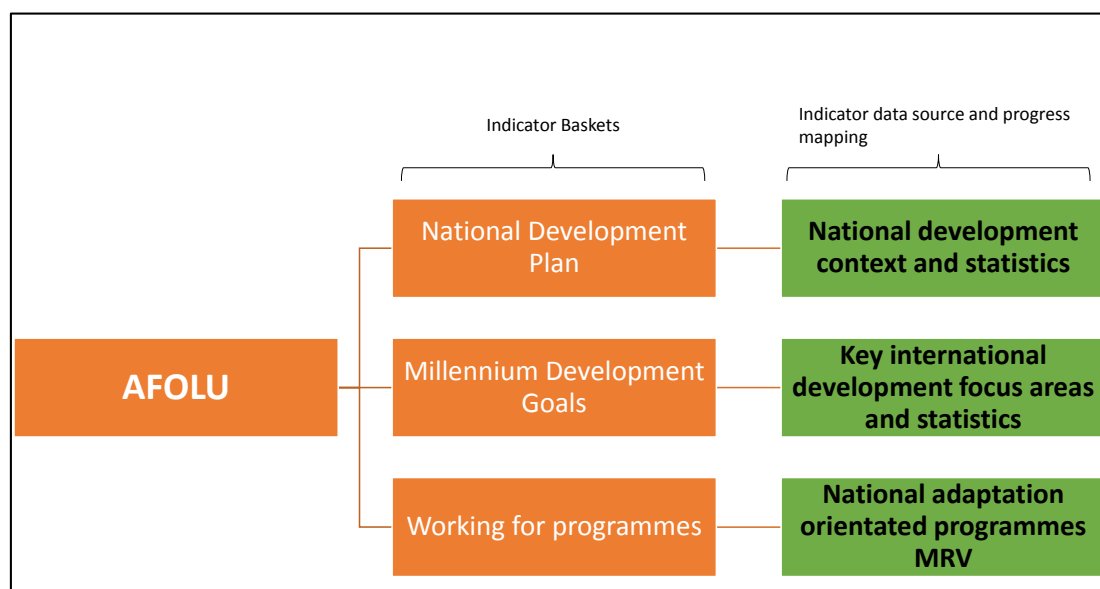


Figure 2: Key AFOLU Adaptation indicators

In order to develop a robust monitoring system, it is important to move away from ad-hoc data collection and collation processes. A formalised data collection system should be informed by *inter alia* engagement with the various data custodians, maximising existing data collection practices and integrating both adaptation and mitigation across the monitoring spectrum. Data collation should be supported by dedicated resources and processes to optimise information received for various consumption requirements.

Importantly, such a system should be implemented in a phased manner. This will allow the M&E system to mature by coordinating and formalising partnerships across the various AFOLU sectors. Phasing the implementation of the monitoring and evaluation system will allow for the integration of learning, capacity and improvements across the system in a sustainable manner. This following diagram illustrates the envisioned phased process and highlights the alignment between the various role-players.

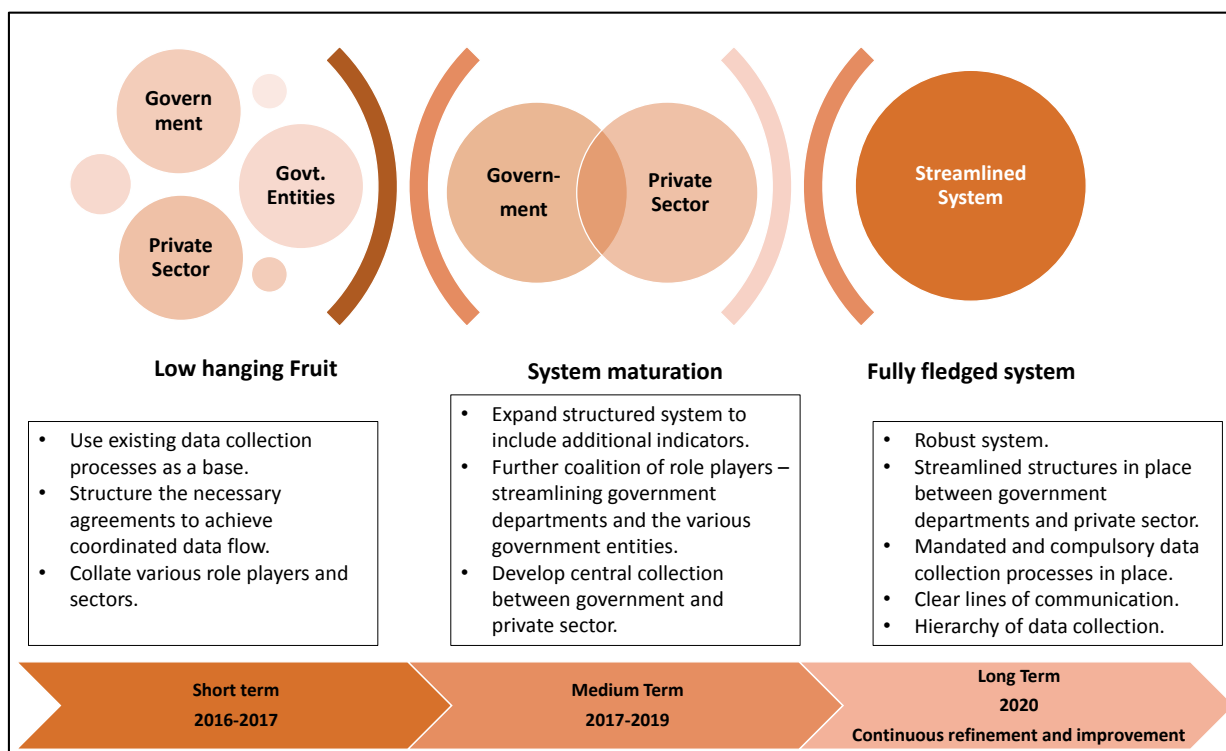


Figure 3: Proposed phased approach to AFOLU M&E system

This study recognised the strategic importance of aligning the AFOLU M&E system with the National Climate Change Response Monitoring and Evaluation System Framework. As a result the proposed AFOLU M&E system consists of three components that should be implemented in the short term and which are directly linked to the above-mentioned framework. These three components are a data collection platform, specific resources to enable data collation and data processing to share information. The purpose of the AFOLU M&E system is to provide a centralised point where data can be submitted and processed to understand and communicate emission trends within the AFOLU sector.

The AFOLU sector provides unique opportunities with regards to mitigation and adaptation in the context of South Africa’s climate change and socio-economic needs. However, in order to optimise these opportunities, a monitoring and evaluation system is required to ensure, facilitate and streamline data collection across all relevant sectors of AFOLU.

Through a process of systematic analysis and assessment, this study succeeded in mapping current mandates in relation to the AFOLU sector and effectively linking these mandates to both mitigation and adaptation indicators which should be measured. This study has effectively addressed the project objectives as set out in the terms of reference. The following table provides a summary of these objectives in relation to the information and input contained in this report.

Project Objective	Cross reference in AFOLU M&E Report
<p><i>To describe the extent and impact of current mandates (e.g. legislation, policies, regulations, frameworks, etc.) of key authorities involved in the regulation of land management in South Africa, with the view to inform the design, development and implementation of the national climate change Monitoring and Evaluation (M&E) system of AFOLU.</i></p>	<p>Chapter 4 deals specifically with the applicable mandates to the AFOLU sector. This section:</p> <ul style="list-style-type: none"> • Describes the methodology followed; • Details the various applicable mandates; • Maps the interrelationships between the key AFOLU categories and legislated data collection entities.
<p><i>To identify key indicators that should be monitored by the climate change M&E system of AFOLU.</i></p>	<p>Chapter 5 of this documents discusses the various IPCC indicators required to feed into the AFOLU M&E system. This chapter includes mitigation and adaptation monitoring requirements. Chapter 6 details the key indicators as well as the application of these indicators.</p>
<p><i>To determine the costs and viability (cost effectiveness) of MRV for varying AFOLU mitigation practices.</i></p>	<p>Chapter 8 of this report deals with the cost and viability assessment of the proposed AFOLU M&E system. This chapter provides details on the system components as well as proposed costing related thereto.</p>
<p><i>To describe options of how the information can be shared between the key authorities, stakeholders and the DEA.</i></p>	<p>Chapter 9 of this reports details the proposed institutional arrangements. This includes a proposed stakeholder engagement process to guide the information sharing process.</p>
<p><i>Support the development and implementation of the national climate change M&E system and production of annual GHG inventories, specifically the component of the AFOLU sector.</i></p>	<p>Chapter 8 deals with the proposed M&E system and Chapter 9 details proposed institutional arrangements.</p>

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Acronyms

AFOLU	Agriculture, Forestry and Other Land Use
ARC	Agricultural Research Council
BUR	Biennial Update Report
CGE	Consultative Group of Experts on National Communications from Parties
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DED	Department of Economic Development
DHS	Department of Human Settlements
DPME	Department of Performance Monitoring and Evaluation
DRDLR	Department of Rural Development and Land Reform
DSD	Department of Social Development
DWAS	Department of Water Affairs and Sanitation
FOSAD	Forum of South African Directors-General
GHG	Greenhouse Gas
IGCCC	Intergovernmental Committee on Climate Change
IRMU	International Reporting Management Unit
IPCC	Intergovernmental Panel on Climate Change
M & E	Monitoring and Evaluation
MFMA	Municipal Finance Management Act
MINMEC	Ministerial political structures
MINTECH	Ministerial technical structures
MRV	Measure, Report and Verify
NAEIS	South African National Atmospheric Emissions Inventory System
NAMC	National Agricultural Marketing Council
NCCMESF	National Climate Change Monitoring and Evaluation system framework
NCCRWP	National Climate Change Response White Paper
NDP	National Development Plan
NEDLAC	National Economic Development and Labour Council
PDCA	Plan Do Check Act
SALGA	South African Local Government Association
SANBI	South African National Biodiversity Institute

SPLUMA	Spatial Planning and Land Use Management Act
STATS SA	Statistics South Africa
UNFCCC	United Nations Framework Convention on Climate Change

1 Introduction

The Agriculture, Forestry and Other Land Use (AFOLU) sector is strategically important in terms of both adaptation and mitigation relating to climate change analysis and planning in South Africa. However, the broad nature of this sector requires structured input and action from various government departments, parastatals and a very active and diverse private sector.

The benefits of monitoring emissions within the AFOLU sector includes trend analysis of various development indicators such as the growth of the agricultural sector. This analysis enables monitoring of changes in development indicators and allows for opportunities applicable to adaptation and mitigation strategies to be identified.

The broad nature of the AFOLU sector requires a monitoring and evaluation (M&E) system which is sufficiently robust to include all sector influences, yet is streamlined enough to manage the various data points effectively. A phased approach should be adopted to mature the AFOLU M&E system. This is illustrated in Figure 4 below. The AFOLU M&E system should be built on practical and current data collection trends. Building on, strengthening and enhancing current data collection practices will enable the future roll-out of the system to include IPCC Tier 2 and Tier 3 details.

Figure 4 illustrates the phased approach to developing the AFOLU M&E system indicating short, medium and long-term goals.

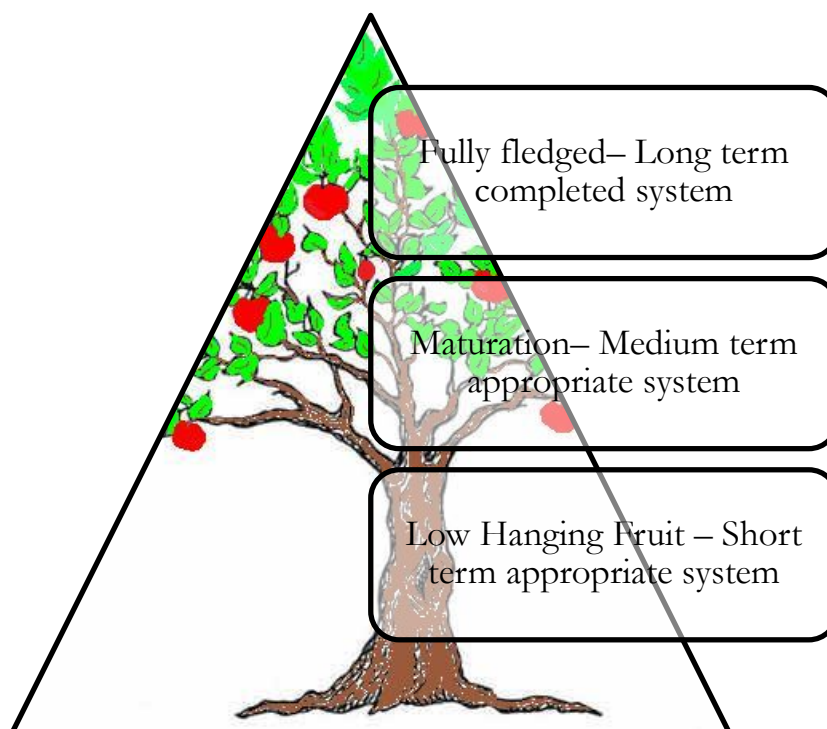


Figure 4: Phased approach to AFOLU Sector M&E

The M&E Chief Directorate of the Department of Environmental Affairs (DEA) is responsible for determining the extent to which South Africa’s transition towards a lower carbon and climate-resilient economy is taking place. To manage this task, the DEA requires the following:

- i. Identification of and clarity on indicators that characterise the transition towards a lower carbon and climate-resilient economy and society;
- ii. Information and data necessary to quantify this transition;
- iii. Availability of, and access to, the information and data;
- iv. Clarity on who has the legal mandate (including extent and impacts) and responsibility to monitor and report land management activities; and
- v. The costs and viability (cost effectiveness) of measuring, reporting and verifying (MRV) AFOLU mitigation practices.

Table 1 Aligning definitions from the IPCC Guidelines for National GHG Inventories (2006) with the definitions used within this AFOLU M&E Report.

IPCC Definition	AFOLU M&E Definition
Activity data: “Data on the magnitude of a human activity resulting in emissions or removals taking place during a given period of time. Data on ... land areas... lime and fertilizer use ... are examples of activity data.”	Indicators: Include activity data, emission factors; default values and assumptions that form part of the sub-category emissions calculation.
Category: “Categories are subdivision of the four main sectors Energy; Industrial Processes and Product Use (IPPU); Agriculture; Forestry and Other Land Use (AFOLU); and waste. Categories may be further divided into sub-categories.”	Category: Livestock; Land; Aggregate Sources & Non-CO2 emission sources on land; Other. Sub-categories: Enteric fermentation; Manure management; Forest land; Cropland; Grassland; Wetlands; Settlements; Other land; GHG emissions from biomass burning; Liming; Urea application; Direct and Indirect N2O emissions from managed soils; Indirect N2O emissions from manure management; Harvested wood products.
Key Category/Source: “A key category is one that is prioritised within the national inventory system because its estimate has a significant influence on a country’s total inventory of GHGs in terms of the absolute level of emission and removals, the trend in emissions and removals, or uncertainty in emissions or removals.”	Key Category: The same definition as the IPCC is used for this report. Key Indicator: A key indicator is one that is prioritised within the national inventory system because its estimate has a significant influence on the sub-category in which it falls. Key categories and indicators within this report were identified based on the key sources section of the AFOLU chapter of South Africa’s National GHG Inventory.

In addition, South Africa, as part of the enhanced reporting agreements for developing countries under the United Nations Framework Convention on Climate Change (UNFCCC), needs to develop a focussed approach to the management of:

- Legal mandates;
- Institutional arrangements; and

- Data flows between the appointed national focal points and other key stakeholders.

Various government departments collect data pertaining to the AFOLU sector, and data collection practices are fragmented across the various government departments and within select voluntary industry associations in the private sector. This makes it difficult to pin-point data collection outputs to one specific department. As a result, the process of data compilation with regards to the AFOLU sector is unclear. In order to effectively monitor this sector, data collection processes must be mapped and responsibility determined for various indicator data sets.

National GHG inventories are not adequately estimating, analysing or representing emissions from the South African AFOLU sector. This is primarily because climate change data, information, indicators and knowledge application are lacking due to legal mandates not being implemented with regards to data collection and reporting. Additionally, the absence of formative structures to collect and share information and progress makes it difficult to develop an AFOLU sector knowledge base. Therefore, we recommend that all applicable mandates should be determined and current data collection practices interrogated to understand the scope of mandates as well as the status thereof.

2 The Project Approach

The diverse nature of the AFOLU Sector informed the need for a robust, yet practical and streamlined M&E system of mandates and data collection.

The Promethium project team undertook a systematic review to ensure all regulated mandates were included and to allow for comparison with current data collection processes. This method allowed the project team to identify gaps in data collection and to source and confirm alternative data repositories.

Data requirements of the AFOLU sector were identified and linked to the various stakeholders involved in current data collection.

The AFOLU mitigation indicators were identified based on the National GHG Inventory of 2010 (aligned with the 2006 IPCC Guidelines for GHG Reporting) and the First Biennial Update Report for South Africa. These indicators were then compared with the indicators monitored by Stats SA in line with the Standard Industrial Classification Coding System of all Economic Activities (SIC Codes). In addition adaptation indicators were identified based on the Millennium Development Goals (MDGs) and the National Development Plan (NDP).

The process followed in synthesising the mandates with the proposed AFOLU indicators is described in Figure 5 below:

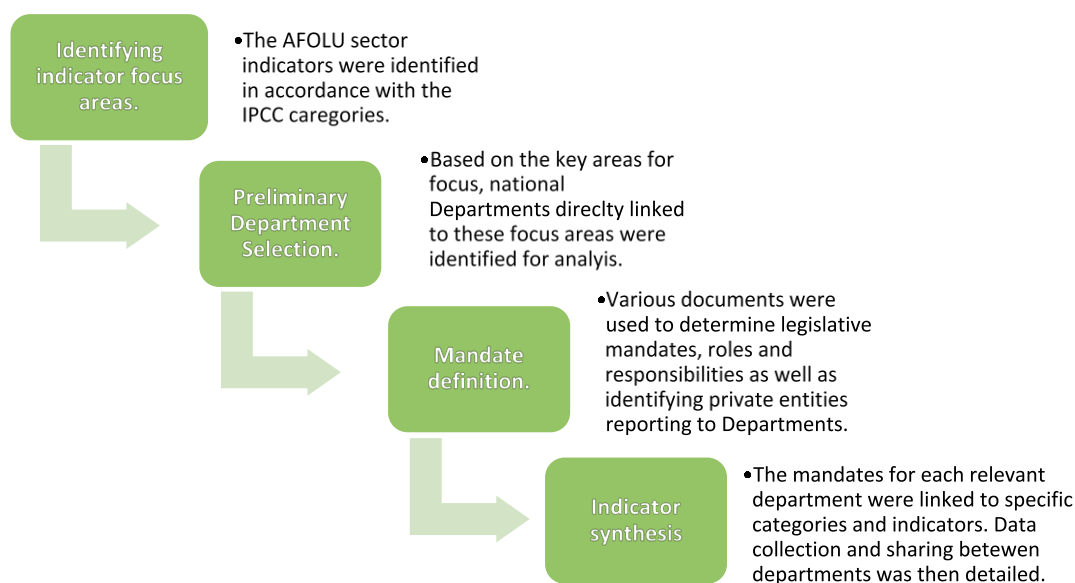


Figure 5: Determining Mandates and Indicator Synthesis

2.1 Understanding the AFOLU Sector in the context of Climate Change Services

There is a growing need in the AFOLU sector to improve our understanding of climate change in terms of predictions and use of information. As a result the proposed M&E system for the AFOLU sector aims to develop climate change service capabilities. A climate change service is considered to be the provision of climate change information in such a way as to assist decision-making by individuals and organisations¹. The service component involves appropriate engagement, effective access mechanisms and responsiveness to user-needs.

Climate services involve the combination of the following²:

- Accumulation of knowledge about the past, present and future state of the climate system;
- Identification of the type and form of services involving information about the climate and its effects that are needed within the community at large and within specific sectors that are particularly sensitive to climate variability and change;
- Development and delivery of advice and a range of ‘products’ based on climate knowledge and driven by identified needs; and
- Effective uptake and application of the advice and products to help achieve desired outcomes.

The AFOLU M&E system should align with the Framework for Climate Services as shown in Figure 6 and Table 1 below.

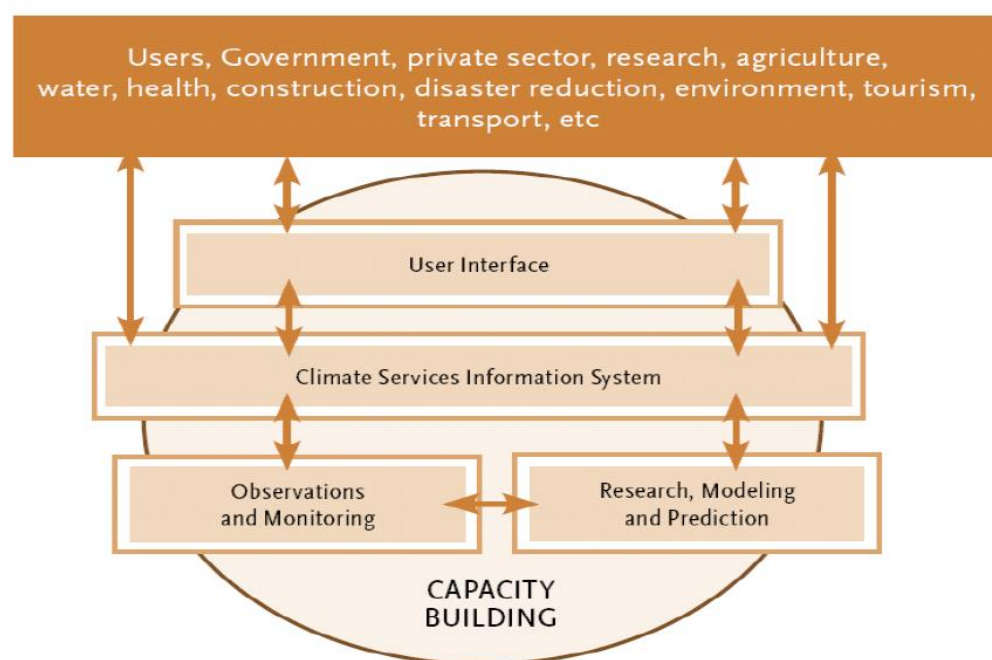


Figure 6 Generic framework for Climate Change services³

¹ GCEF Guideline: Development of the Global Framework for Climate Services at the national level; GCEF, 2014

² GCEF Guideline: Development of the Global Framework for Climate Services at the national level; GCEF, 2014

³ GCEF Guideline: Development of the Global Framework for Climate Services at the national level; GCEF, 2014.

Table 2: Framework for Climate Change Services and the application to the AFOLU M&E System.

Framework for climate services: Components	Application to the AFOLU M & E System
<p><i>User Interface Platform:</i></p> <p>A structured means for users, climate researchers and climate information providers to interact at all levels.</p>	<ul style="list-style-type: none"> • The M&E system will provide for the implementation of mandatory data collection actions and clear channels of communication in this regard. • Due to the nature of the AFOLU sector and the phasing of the proposed M&E system, the mapping of communication and mandates will provide information on who is collecting what and where this will be collated.
<p><i>Climate Services Information System:</i></p> <p>The mechanism through which information about climate (past, present and future) will be routinely collected, stored and processed to generate products and services that inform often complex decision-making across a wide range of climate-sensitive activities and enterprises.</p>	<ul style="list-style-type: none"> • A dedicated AFOLU M&E system will enable the trending of data pertaining to the AFOLU sector in terms of climate change to support policy change and implementation. • Understanding the impacts of climate change on this sector as well as understanding the impacts of AFOLU and its related activities on GHG emissions will enable a comprehensive interpretation of the sector. Such an understanding will enable and support more holistic decision-making. • Centralising information pertaining to the AFOLU sector, in terms of collecting and storing data, will ensure streamlined input into all required international and national reports. • Centralising information in this way implies a clear sense of who does what and when. • For this reason AFOLU M&E system should clearly define communication lines and the reporting hierarchy. This will ensure that all role players understand their role and function pertaining to data collection and data sharing.
<p><i>Observations and Monitoring:</i></p> <p>To ensure that climate observations and other data necessary to meet the needs of end users are collected, managed and disseminated and are supported by relevant metadata.</p>	<ul style="list-style-type: none"> • To strengthen current AFOLU data processes, a broader and more structured approach to data collection is required. • Hence, in order to meet the needs of end users the AFOLU M&E system must take into consideration the mandates of a number of departments and ensure efficient cross-sector and trans-disciplinary data collection. • The M&E system must allow for the collection, collation and storing of data at key points in the process.
<p><i>Research, Modelling and Prediction:</i></p> <p>To foster research towards continually improving the scientific quality of climate information, providing an evidence base for the impacts of climate change and variability and for the cost-effectiveness of using climate information.</p>	<ul style="list-style-type: none"> • The AFOLU M&E system must incorporate inputs from a variety of sectors into the data collection process. Therefor a holistic picture will be created on which to model the climate change impacts of / on the AFOLU sector. • More accurate predications will be developed through the holistic approach to the AFOLU sector data collection process, ensuring that all relevant disciplines are incorporated.
<p><i>Capacity Development:</i></p> <p>To address the particular capacity development requirements identified in the other pillars and, more broadly, the basic requirements for enabling any Framework-related activities to occur.</p>	<ul style="list-style-type: none"> • Information sharing across all necessary sectors will facilitate continued learning and internal capacity building.

2.2 Addressing the Project objectives

This project had a number of objectives. These included understanding the current mandates, the need to define key AFOLU sector indicators, costing an implementation system and aligning the proposed indicators and AFOLU M&E system to existing processes and strategies. These objectives were met through a focussed and systematic analysis of applicable mandates and combining an understanding of relevant mandates and IPCC GHG inventory requirements. Finally this study provides a practical framework for implementation.

Table 3 below discusses the project objectives, the study context and a cross reference in terms of this report.

Table 3: How the AFOLU M&E Report met the project objectives

Project Objective	How the objective was addressed in this study	Cross reference in AFOLU M&E Report
<i>To describe the extent and impact of current mandates (e.g. legislation, policies, regulations, frameworks, etc.) of key authorities involved in the regulation of land management in South Africa, with the view to inform the design, development and implementation of the national climate change Monitoring and Evaluation (M&E) system of AFOLU.</i>	✓ A detailed analysis of legislative mandates pertaining to the AFOLU sector was undertaken. This enabled the project team to map data collection and reporting across, as well as within, various departments. Legislative mandates were linked to specific AFOLU indicators. This indicates the extent to which mandates exist to collect the required AFOLU data.	Chapter 4 deals specifically with the applicable mandates to the AFOLU sector. This section: <ul style="list-style-type: none"> • Describes the methodology followed;; • Details the various applicable mandates; • Maps the interrelationships between the key AFOLU categories and legislated data collection entities.
<i>To identify key indicators that should be monitored by the climate change M&E system of AFOLU.</i>	✓ This project holistically analysed and determined key indicators for the AFOLU sector. The key indicators were based on key sources as described in South Africa's National Greenhouse Gas inventory. In addition, key aspects to consider in terms of adaptation was also included. Although not individual indicators, this report presents a case for using "baskets" of indicators to collect and collate adaptation data.	Chapter 5 of this documents discusses the various IPCC indicators required to feed into the AFOLU M&E system. This chapter includes mitigation and adaptation monitoring requirements. Chapter 6 details the key indicators as well as the application of these indicators.
<i>To determine the costs and viability (cost effectiveness) of MRV for varying AFOLU mitigation practices.</i>	✓ The proposed AFOLU M&E system was discussed in terms of function, objective and proposed costing in this report. In this regard this study provides an overview of expected operational and implementation costs of the system.	Chapter 8 of this report deals with the cost and viability assessment of the proposed AFOLU M&E system. This chapter provides details on the system components as well as proposed costing related thereto.

Project Objective	How the objective was addressed in this study	Cross reference in AFOLU M&E Report
<i>To describe options of how the information can be shared between the key authorities, stakeholders and the DEA.</i>	✓ The implementation and sustainable management of the AFOLU M&E system depends on effective data sharing. This project effectively mapped current data sharing practices, indicating where these can be enhanced through structured agreements. This report further investigates institutional arrangements. These arrangements should form the basis from which to implement the proposed M&E system in terms of data sharing.	Chapter 9 of this reports details the proposed institutional arrangements. This includes a proposed stakeholder engagement process to guide the information sharing process.
<i>Support the development and implementation of the national climate change M&E system and production of annual GHG inventories, specifically the component of the AFOLU sector.</i>	✓ The proposed AFOLU M&E system components were informed by the national climate change M&E system. In addition, the proposed AFOLU M&E system takes relevant mandates and current data collection practices into consideration. This enables the system to ensure streamlined data collection in support of the compilation of the AFOLU sector in the GHG inventory.	Chapter 8 deals with the proposed M&E system and Chapter 9 details proposed institutional arrangements.

From the above table it is clear that this study endeavoured to address the various project objectives. In addition, the various chapters discussed in Table 3 provides a clear indication that these objectives were effectively addressed in this study.

3 Relevant Policies and Strategies to consider for the AFOLU Sector

The following sections provide a summary of key aspects and considerations across a wide range of current policies and documents with specific relevance to the AFOLU sector. These documents were selected for their strategic relevance in impacting on, or guiding climate change related activities within a number of government spheres / sectors.

The following documents are discussed:

- The National Climate Change Response White Paper;
- The National Development Plan;
- The latest greenhouse gas reporting regulations;
- The National Carbon Sink Assessment; and
- The Spatial Planning and Land Use Management Act, 2013.

These documents discuss climate change, mitigation approaches and land use management (of specific relevance to the AFOLU sector) within the context of South Africa's developmental considerations. The AFOLU sector plays a major role in the socio-economic upliftment of South Africa. This sector could contribute through *inter alia* job creation, programme development and strengthening rural economies to achieving South Africa's socio-economic development objectives. In addition, the AFOLU sector also plays a major role in climate change adaptation, mitigation and contributing to the resilience of communities and agricultural / forestry industries.

Therefore key aspects of these documents are discussed with specific reference to the AFOLU sector. This will provide a framework within which relevant mandates will be further unpacked and indicators be selected.

3.1 The National Climate Change Response White Paper

On a national level, South Africa's transition to a lower carbon economy is guided by the country's vision for 2030, as detailed in the National Climate Change Response White Paper (NCCRWP) published in 2011. To achieve this vision, South Africa has outlined long term strategies for both adapting to the effects of climate change through adaptation policies and reducing its carbon emissions in line with its domestic targets. South Africa's climate change priorities, together with the national vision, are presented in the table below.

Table 4: South Africa's climate change priorities (Department of Environmental Affairs, 2011)⁴


National Climate Change Response White Paper	Priorities
Risk reduction and management	Near-term adaptation interventions that address immediate and observed threats to the economy, ecosystem services and the health and well-being of people. Research and develop short, medium and longer-term climate resilience, risk and vulnerability management policies and measures.
Mitigation actions with significant outcomes	Cost effective and beneficial mitigation policies to reduce the GHG emission trajectory, so that GHG emissions peak between 2020 and 2025, plateau for approximately a decade and begin declining in absolute terms thereafter.
Sectoral responses	Prioritise, in accordance with the provisions of this policy, the requirement for all key actors, organisations or participants in relevant sectors or sub-sectors. This includes preparing, submitting, implementing, monitoring and reporting on the implementation of detailed climate change response strategies and action plans. These plans would need to clearly articulate their roles, responsibilities, policies, measures, and interventions or actions that would contribute to the achievement of the National Climate Change Response Objective in a measurable way.
Policy and regulatory alignment	<p>Prioritise interventions already envisaged by national policies, legislation or strategies that have climate change co-benefits. Particularly those that also contribute towards the national priorities of job creation and poverty alleviation or have other positive socio-economic benefits.</p> <p>Review existing national policies, legislation or strategies, with a view to optimising and maximising the climate change co-benefits of the interventions.</p> <p>Integrate into the relevant existing or new policies, legislation or strategies with climate change response interventions that stimulate new economic activities, as well as those that improve the efficiency and competitive advantage of existing activities.</p>
Integrated planning	Mainstreaming of climate change considerations and responses into all relevant sectors, and national, provincial and local planning regimes.
Informed decision-making and planning	Prioritise research, systemic observation, knowledge generation, information management and early warning systems. These will increase our ability to measure and predict climate change and the implications of its adverse effects on the economy, society and the environment.
Technology research, development and innovation	Prioritise cooperation and the promotion of research. Including investment in acquisition of adaptation, lower-carbon and energy-efficient technologies. As well as practices and processes for employment by existing or new sectors or sub-sectors.
Facilitated behaviour change	Use of incentives and disincentives, including regulatory, economic and fiscal measures. This is to promote behaviour change towards a lower-carbon society and economy.
Behaviour change through choice	Prioritise education, training and public awareness programmes to build general public awareness of climate change. Empowering all South Africans to make informed choices that contribute to an economy and society that is resilient to climate change.

⁴ (DEA, 2014)

National Climate Change Response White Paper	Priorities
Resource mobilisation	Prioritise the development of comprehensive resource and investment mobilisation strategies, capacity, mechanisms or instruments. These will support and enable implementation of climate change responses at the scale required.

It is evident from the above that effectively monitoring and evaluating climate change adaptation and mitigation within the AFOLU sector is aligned with the key priorities as set out by the NCCRWP.

KEY MESSAGES: NCCRWP



- The AFOLU sector can play an important role in the transitioning to a lower carbon economy, in terms of both adaptation and mitigation.
- In terms of NCCRWP priorities, the proposed AFOLU M&E system aligns specifically to a few of these, including:
 - **Policy and regulatory alignment** – adaptation and mitigation options in the AFOLU sector specifically provides for a number of co-benefits related to socio-economic development. The M&E system will subsequently be critical to monitor and share data in this regard. Information will ensure that the opportunities within the AFOLU sector is maximised.
 - In terms of **integrated planning** the AFOLU sector M&E system will streamline data sharing across various sectors.
 - The AFOLU M&E system will enable and support **informed decision making**.
 - The AFOLU sector provides for numerous opportunities related to mitigation and adaptation through **technology research, development and innovation**. However in order to optimise these advances data and progress must be shared in a systematic manner.
 - The proposed AFOLU M&E will support **resource mobilisation**. This does not only pertain to the DEA, but to other data custodians as well.

3.2 The National Development Plan

The National Development Plan (NDP) offers a long-term perspective on growth and development in South Africa. It defines a desired destination and identifies the role different sectors of society need to play in reaching that goal.

The NDP aims to eliminate poverty and reduce inequality by 2030. According to the plan, South Africa can realise these goals by drawing on the energies of its people, growing an inclusive economy, and building capabilities.

The NDP sets a clear vision with regards to ensuring sustainability and an equitable transition to a low-carbon economy. The Plan’s vision for 2030 includes “an environmentally sustainable, climate-change resilient, low-carbon economy and just society” and identifies the following steps towards this vision:

- Sustaining South Africa’s ecosystems and using natural resources efficiently.
- Building sustainable communities.
- Responding effectively to climate change.
- Mitigation and adaptation.
- Managing a just transition.
- Enhancing governance systems and capacity.

The NDP takes a pro-active approach in acknowledging the impact of climate change and the need for innovative solutions as part of our developmental journey. There is also a major focus on the social context through ensuring rural accessibility and ensuring equality in transition. In this regard adaptation and mitigation are not merely strategic drivers but should be implemented within the context of local communities.

The agricultural sector and land use change, play definitive roles in the economic strategy of the NDP. In addition, climate change is a key concern discussed in the NDP. The monitoring of the AFOLU sector thus becomes increasingly important as it will feed into national development strategies.

KEY MESSAGES: NDP

- In terms of the NDP steps in achieving its development vision, the following are key aspects to consider with regards to the AFOLU M&E system:
 - **Sustaining South Africa’s ecosystems and using natural resources efficiently** : The AFOLU M&E system will encourage effective resource management through data trending and programme analysis. Data collection will enable an understanding of the impacts of improved technology and practices as part of mitigation and adaptation strategies.
 - **Building sustainable communities:** he nature of the AFOLU sector lends itself to strengthening local resilience. The M&E system will allow for a better understanding of the socio-economic context and impacts of activities and programmes being undertaken in the AFOLU sector.
 - **Responding effectively to climate change:** The M&E system enables data collection and information sharing to determine the effectiveness and applicability of responses in the AFOLU sector.
 - **Mitigation and adaptation:** The proposed AFOLU M&E system will integrate both adaptation and mitigation monitoring.
 - **Enhancing governance systems and capacity:**

3.3 GHG Emission Reporting Regulations

The recently published Draft National Greenhouse Gas Emission Reporting Regulations (11 May 2015) provides valuable institutional context to inform a new system. These regulations state that:

- Data on total greenhouse gas emissions arising from energy activities, industrial process and product use; agriculture forestry and other land use and waste must be submitted to the National Atmospheric Emissions Inventory System (NAEIS) by 31 March each year;
- The data provider must submit calculated emissions data using tier 2 or tier 3 methods in compliance with the “Technical Guidelines for Monitoring, Reporting and Verification of Greenhouse Gas Emissions by Industry”;
- A competent authority must provide on-site data verification once every two years;

Further to this the regulations specify that NAEIS data and information may only be placed in the public domain if it does not:

- Promote unfair competition in terms of the Competition legislation;
- Contravene section 36 of the Promotion of Access to Information Act, 2000 (Act No.2 of 2000); and
- Contravene section 17 of the Statistics Act, 1999 (act No. 6 of 1999).

KEY MESSAGES: GHG Reporting Regulations

- The AFOLU M&E system will allow for a structured process of data collection, for use in the National Greenhouse Gas Inventory.
- This will enable the management of data collection, timeous submission and the collation of information for public consumption.
- Due to the centralisation of data collection in the form of the DEA, the Competition Commission concerns could potentially be averted.
- Data will be used to provide holistic sector trends and analyses rather than commercial information.
- **A formalised and structured AFOLU sector M&E system will support the roll-out of the Greenhouse Gas Emission Reporting Regulations.**

The specification on data sharing is important to note for the AFOLU M&E project, as the project aims to outline data sharing methods. In order to align with the regulations set out by the Competition Commission, it is suggested that a formal request for an advisory is submitted by the AFOLU M&E team after which the commission will prepare an advisory opinion regarding data sharing.

At the time of finalising this report, the National Greenhouse Gas Emission Reporting Regulations were yet to be approved.

3.4 The National Carbon Sink Assessment

The National Carbon Sinks Assessment was commissioned by the Department of Environmental Affairs during 2012. The aim of the assessment was to better understand the emissions generated from land-use and potential mitigation opportunities in South Africa. The assessment formed part of the climate change mitigation activities implemented under the National Climate Change Response Policy with the purpose of “...assessing the current national carbon sinks related to afforestation, forest restoration, wetlands, agricultural practice, bio-fuels, urban greening and all significant changes in land use and to quantify the potential future carbon sinks under varying climate change scenarios and land use change.”

Part of the assessment’s deliverables was to understand the status and dynamics of the national carbon sink. This involved calculating the principle fluxes, determining the effect of climate change on carbon stocks and assessing the direct human drivers of land use. This information will form part of the data and indicators that are required to be monitored by the AFOLU M&E system. In addition the carbon sinks assessment investigated potential climate change mitigation opportunities that would assist in reducing the National GHG Inventory. The assessment reviewed the current status and future needs of supporting policies within the AFOLU sector that impacts on terrestrial carbon sinks and GHG emissions. This work on policies will feed into the AFOLU M&E system to assist with the data flows and information sharing between government departments and the private sector.

3.5 The Spatial Planning and Land Use Act, 2013

Since 1994, there have been various initiatives to reform the legislative framework that regulates spatial planning and land development. The aim has been to formulate coherent development planning legislation that will address the inefficient and racially based apartheid spatial planning legacy.

The white paper on spatial planning and land use management has the ultimate goal of a legislative and policy framework that would enable government, (especially local government) to formulate policies, plans and strategies for land use and land development. These would address, confront and resolve the spatial, economic and environmental challenges facing the country.

After extensive consultation with relevant stakeholders the Spatial Planning and Land Use Management Act (SPLUMA) was published for information in August 2013. The SPLUMA provides for a uniform system of regulating land development throughout the country. Municipalities are the key stakeholders in the implementation of the provisions of the SPLUMA and it is therefore important to highlight some of the implications of this legislation for municipalities.

The SPLUMA makes provision for:

- A uniform, effective and comprehensive system of spatial planning and land use management for the Republic;
- A system of spatial planning and land use management that promotes social and economic inclusion;
- Common development principles, norms and standards to inform land development;
- Sustainable and efficient use of land to be the key consideration when making decisions involving land development;
- Cooperative government and intergovernmental relations across all the spheres of government; and

- Redressing the imbalances of the past and ensuring that there is equity in the application of spatial development planning and land use management systems.

Implications in terms of monitoring within the AFOLU sector include the following:

- Within 5 years of the SPLUMA coming into operation, municipalities are required to prepare and adopt land use schemes. These will replace the current zoning/town planning schemes. Land use schemes must give effect to Municipal Spatial Development Frameworks and once adopted will have the force of law.
- Municipalities shall receive and consider all land development applications as the authority of first instance.

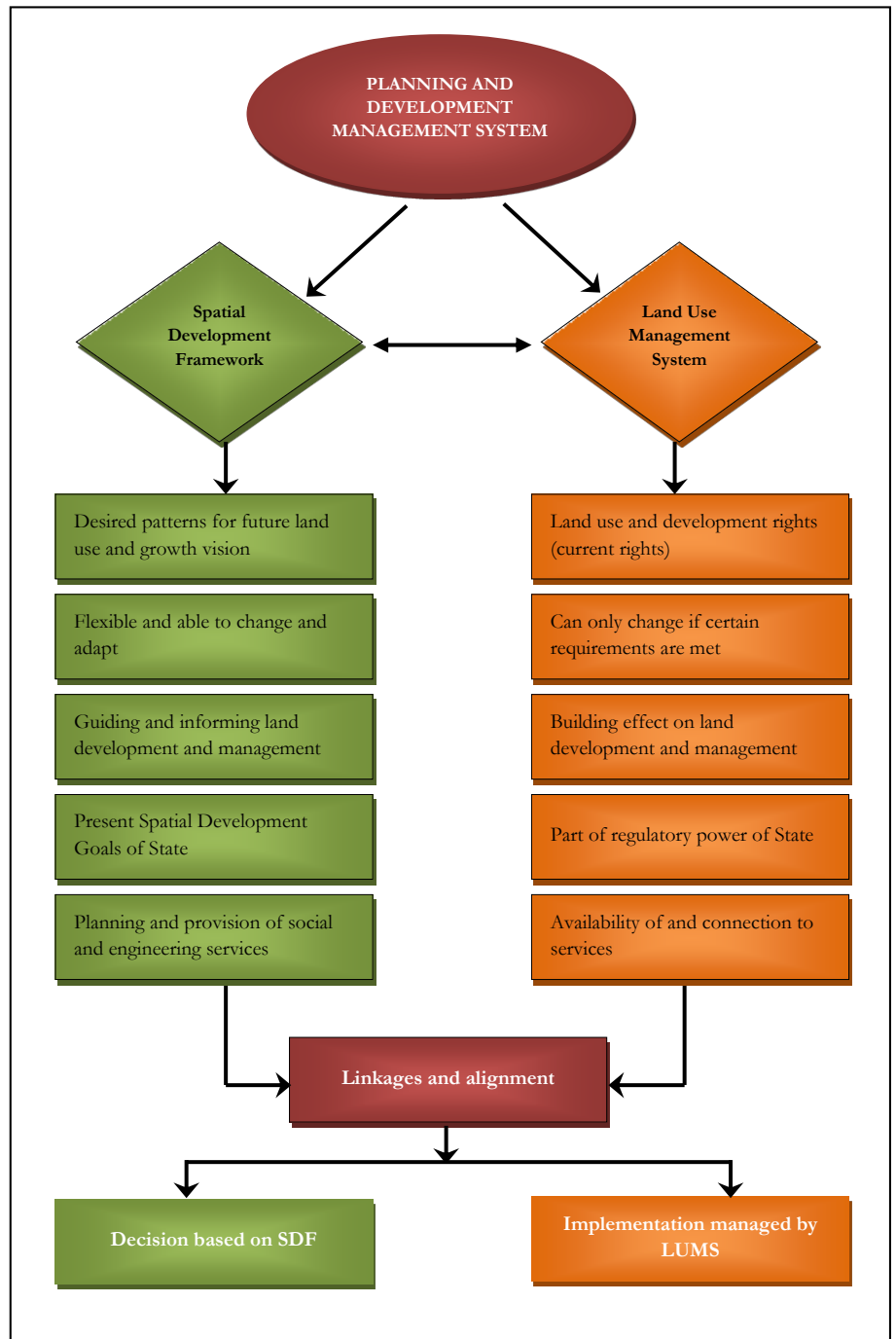
In terms of the AFOLU sector the proposed SPLUMA legislation implies a centralisation of land data covering land use and land use change. Local authorities will be the custodians of this data, but a legislative process will enable streamlined and recordable data collection for relevant AFOLU indicators.

At the time of finalising this report, the SPLUMA legislation has yet to be promulgated.

3.5.1 Land use management in the AFOLU Sector - the process of data collection and collation

All development processes are subject to the guidelines and stipulations set out in the municipal land use management system and in the spatial development policy. As a result, all urban components will become more intricately interwoven and interdependent. As this happens urban management becomes increasingly important to ensure the creation of healthy and sustainable cities. Hence, data collection and structured reporting form an integral part of urban and rural development management.

Urban planning comprises two primary fields: strategic planning and land use management or land use control. As illustrated alongside, strategic planning involves the compilation of flexible and informative development plans. These are often referred to as spatial development frameworks, master plans or precinct plans. Comparatively land use management involves the establishment of land use management systems. These assign land use rights and regulate land use changes of individual land parcels. The two fields inform one another and cannot exist successfully without each other. Land use control needs to be informed by an overall plan which depicts desirable urban growth and form at some future date. However, the plan has no relevance if development on the ground cannot be controlled to conform to the proposals contained in the strategic plan. By undertaking both fields of planning sustainable urban development can be achieved.



This interaction is illustrated in Figure 7.

Figure 7: Planning Development and Management

Land use management plays a critical role in this regard. The entire land use management system focuses on providing land security, stability, certainty and predictability. Accordingly, land utilisation must be managed for land to become an investment opportunity. Facilitating this is the implementation of land use controls, zoning schemes, appropriate governing structures, approval processes and transparent management. Local authorities and metropolitan authorities are the data custodians of this process.

Land use management provides a legislative system by which data is collected and recorded. These land use controls, in conjunction with strategic spatial inputs, form a robust database of land information. This covers current land use and the trending of land use change. This information is critical in terms of the “other land use” category as part of the AFOLU sector.

3.5.2 South African Local Government System

There are 278 municipalities in South Africa, comprising eight metropolitan, 44 district and 226 local municipalities. Their primary focus is on growing local economies and providing infrastructure and services.

Section 156 of the Constitution establishes 3 distinct categories of municipalities and stipulates that national legislation must define the different types of municipalities that may be established within each category, as shown in Figure 8 below.

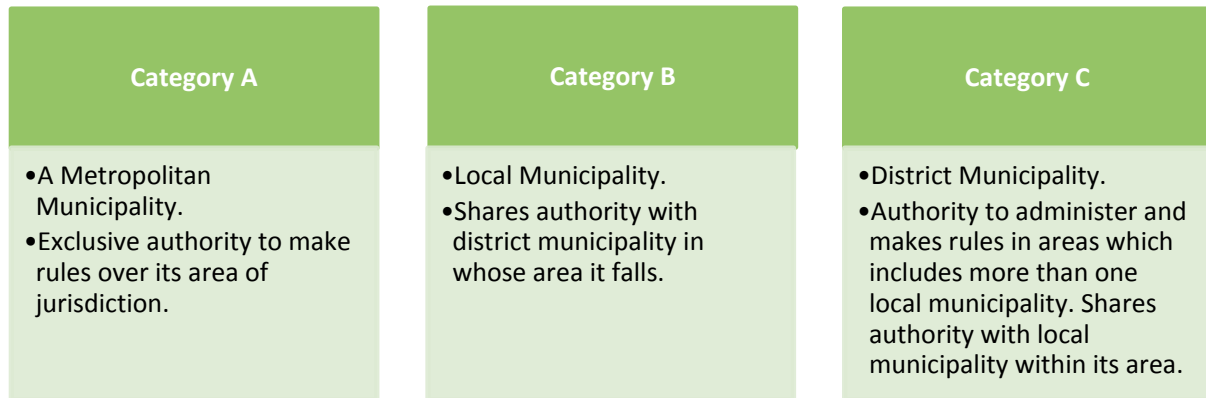


Figure 8: Municipality Categories

The local government arena is largely regulated through the following key pieces of legislation:

1. The Constitution of South Africa - Chapter Seven of the Constitution deals with Local Government and embodies the core principles that inform the basis for developmental local government in South Africa.
2. The Municipal Structures Act - The Local Government Municipal Structures Act 117 of 1998 provides for the establishment of a new generation of municipalities. It also lays the foundation for a new system of local government in South Africa. Essentially, the Structures Act gives flesh to the categories of municipalities identified in the Constitution and goes on to define the different types of municipalities that can be established within each category. The Structures Act also divides the powers and functions between the categories of municipalities and regulates matters connected with local government its systems and structures.
3. The Municipal Systems Act - The Municipal Systems Act 32 of 2000 defines the legal nature of a municipality and provides for the manner in which municipal powers and functions are exercised and performed. In addition, the Systems Act provides the framework for local public administration.
4. The Municipal Finance Management Act 56 of 2003 (MFMA) - is intended to ensure sound and sustainable financial management in municipalities and deepens the budgetary process in municipalities by making community involvement compulsory. The MFMA will be phased in from the 1st of July 2004. One of the most important objectives of the MFMA is that of developing sound financial governance within every municipality. This means developing a comprehensive system clarifying and separating the responsibilities of mayors, councillors and officials. The MFMA read together with the Systems and Structures Act provide clear guidance on the roles and responsibilities of councillors and officials.

The Constitution, in terms of sections 156 and 229, assigns particular functions and powers to municipalities. These include the directive that a municipality must seek to achieve integrated, sustainable and equitable social and economic development in its area through:

- Ensuring integrated development planning for the district as a whole;
- Promoting bulk infrastructural development and services for the district as a whole;
- Building the capacity of municipalities in its area to perform their functions and exercise their powers where such capacity is lacking; and
- Promoting the equitable distribution of resources between the municipalities in its area to ensure appropriate levels of municipal services within the area.

Managing the development and the planning objectives within municipal boundaries requires centralised data collection and recording on a municipal level. In this way the AFOLU sector, due to agricultural activity, agricultural land use as well as changes in land use, impacts on the various levels of municipal planning. These aspects are recorded in a number of formats by municipalities, including Integrated Development Plans, Spatial Development Plans as well as Growth and Development Strategies. Localised data in the form of spatial plans and land use registers provide accurate and detailed information of agricultural land and land use change. These feed into the AFOLU monitoring and evaluation process.

KEY MESSAGES: SPLUMA AND LAND USE PLANNING



- The proposed regulated change will benefit the M&E implementation by making data more accessible.
- The SPLUMA provides for a centralisation of land use and land use change data. This will enable streamlined data collection as required by the AFOLU M&E system
- The SPLUMA provides a legislated process which mandates data collection.
- Land use development information is collected across various sectors and includes different processes. The system for land use development is mainly centred in local government. Therefore, provincial and local government structures must form a cardinal part of the AFOLU data collection process.
- The proposed AFOLU M&E system is aligned to SPLUMA provisions:
 - The AFOLU M&E system is based on existing mandates. **Proposed data collection is comprehensive therefore supporting the proposed SPLUMA system.**
 - Indicators selected as part of the AFOLU M&E system include both mitigation and adaptation. **There are a number of indicators which will provide context for integrated social and economic analysis.** This will ensure that data collected for AFOLU can be collated for use by other departments and sectors.
 - The AFOLU M&E system will be **catalytic in encouraging and facilitating intergovernmental arrangements** across various sectors.

The municipal system and structure depends on an effective flow of information, both top/down and bottom/up. In this regard municipal structures are well placed to assist in the primary collection of specific data pertaining to the AFOLU sector. Municipal structures should be optimised to support the collection of information in across various departments such as the Department of Agriculture, Forestry and Fisheries (DAFF).

4 Overview of South Africa’s current M&E System

The Department of Environmental Affairs has established an M&E technical working group (M&E-TWG). The working group aims to develop a climate change M&E system that both addresses the broad national climate change M&E objectives and is reflective of national circumstances.

The AFOLU sector is a key component of the National Greenhouse Gas Inventory. Consequently the monitoring of data and national circumstances in the AFOLU sector is vital to ensure that climate change, on a national level, is addressed holistically.

The DEA, whilst working closely with the M&E-TWG, designed the framework of the system, which is presented in the figure below. There are four main elements to this system:

- Ex-ante appraisal of policies to determine what these policies are expected to achieve and deliver;
- On-going monitoring of the policies to track their implementation and effectiveness in reducing GHG emissions or adapting to climate change;
- Evaluation of the policies to assess the extent to which the policies are meeting their stated objectives; and
- Feeding this information back into the policy development cycle to inform existing policies and decisions on new policies.

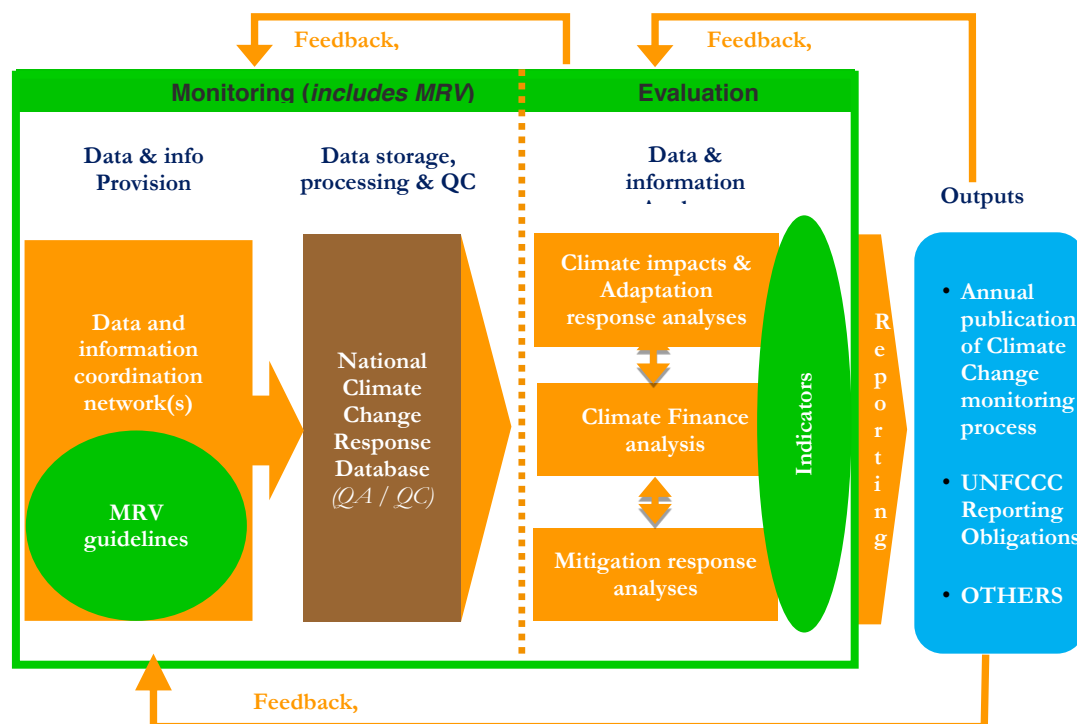


Figure 9: Proposed M&E structure (Department of Environmental Affairs, unpublished)

Correspondingly the above-mentioned elements pertain to this study, in particular with regards to mandate mapping, in the following ways:

- This study undertook an analysis of key documents pertaining to national climate change objectives, national development objectives and specific climate change monitoring and mitigation actions. Furthermore this study analysed existing mandates related to the AFOLU sector in detail.

This analysis provided an overview of the extent of the mandate and the actions this include with regards to data collection and data sharing.

- Through mapping the various role-players involved in AFOLU data collection this study provides a broad overview of the existing data monitoring activities. The study goes further to link these practices with specific indicators. Accordingly the AFOLU M&E system starts to take shape by identifying areas of current data collection as well as indicating areas where data collection could be enhanced.
- The proposed AFOLU M&E system will provide a platform for communication between various departments and sectors. Effective data collection within this sector will strengthen intergovernmental relations and encourage frequent and continuous data sharing.

The proposed climate change M&E system will cover elements of both mitigation and adaptation. In terms of mitigation, the system will:

- Monitor and report GHG data;
- Quantitatively analyse the impact of mitigation measures against South Africa’s emission trajectory range;
- Track the indicators defined in the DEROs and mitigation plans;
- Record the implementation status of DEROs and mitigation actions; and
- Record sustainable development benefits of the mitigation actions.

In terms of adaptation, the system will:

- Record and report on the implementation of adaptation activities, based on a set of defined adaptation indicators;
- Ensure that nation-wide climate change and atmosphere monitoring systems are maintained and enhanced where necessary;
- Ensure that climate change impacts are monitored at appropriate spatial density and frequency;
- Establish a monitoring system for gathering information and reporting progress on the implementation of adaptation actions; and
- Identify key role-players involved in monitoring and measuring these indicators, and describe how these role-players will share and report information on observed actions.

The system will track the effectiveness and impact of the country’ National Climate Change Response Flagship Programmes. It will also track domestic and international support in terms of finance, technology and capacity-building.

The proposed AFOLU M&E system includes both mitigation and adaptation indicators and will report on similar aspects as discussed above. However, these aspects will be specific to the AFOLU sector and will provide for detailed feedback on a sectoral basis.

This implies that, ultimately the AFOLU M&E systems shares the benefits of the national climate change M&E system which include:

- Showcase climate change actions;
- Effectively co-ordinate and communicate with different stakeholders; and
- Provide a platform for learning.

KEY MESSAGES: SA's national climate change M&E system



- The benefits of the proposed AFOLU M&E system as aligned to and in support of those of the national climate change M&E system include:
- **Showcase climate change actions:** An AFOLU M&E system will focus specifically on actions taken within the AFOLU sector. This will enable a detailed overview of actions within sectors such as agriculture and forestry. Collecting this information as well as processing the information in a readable format, will allow for showcasing and awareness within and around the AFOLU sector. This is critical in order to mature the monitoring system.
- **Effectively co-ordinate and communicate with different stakeholders:** Collecting information and having a structured data system in place will open the door for effective communication. The diverse nature of the AFOLU sector requires streamlined communication across a number of sectors. This requires clear lines of communication and process which will be present in a formalised M&E system for the AFOLU sector.
- **Provide a platform for learning:** Data sharing is not only about submitting data. In order to effectively monitor and evaluate this data needs to be processed. This means that information should be used to, for example, identify trends and develop benchmarks. Sharing data in an analysed format allows the various role-players in the AFOLU sector to use the information more effectively in decision making and policy development.

5 Mandates pertaining to the AFOLU Sector

The DEA plays the lead role in climate change reporting in South Africa. As such they are responsible for the coordination and management of all climate change-related information, such as:

- Mitigation;
- Adaptation; and
- M&E programmes (including compiling and updating national GHG inventories).

Within the DEA, the Chief Directorate for Climate Change M&E is responsible for the coordination and compilation of National GHG emission inventories. The DEA cannot compile GHG emissions data in isolation, and relevant departments, industries and agencies play a supportive role in terms of information provision across relevant sectors.

Climate change information is not limited to the DEA only. A number of departments need to provide information on emission sources as well as practical mitigation and adaptation alternatives. The AFOLU sector is particularly dependant on data from varied sources. Accordingly this study analysed the various mandates related to data collection within the AFOLU sector.

5.1 Current Data Collection Practices regarding the AFOLU sector

The AFOLU Sector is diverse in nature and therefore mandated responsibility is not centralised.

There are various different economic sectors contained under the AFOLU definition. DEA is taking action to monitor climate change across the economy and this includes AFOLU. This necessitates an efficient approach to the collection and the analysis of AFOLU data. In addition, in order to ensure a holistic M&E system, the system should include both mitigation and adaptation components. Figure 6 illustrates the diverse nature of the AFOLU sector.

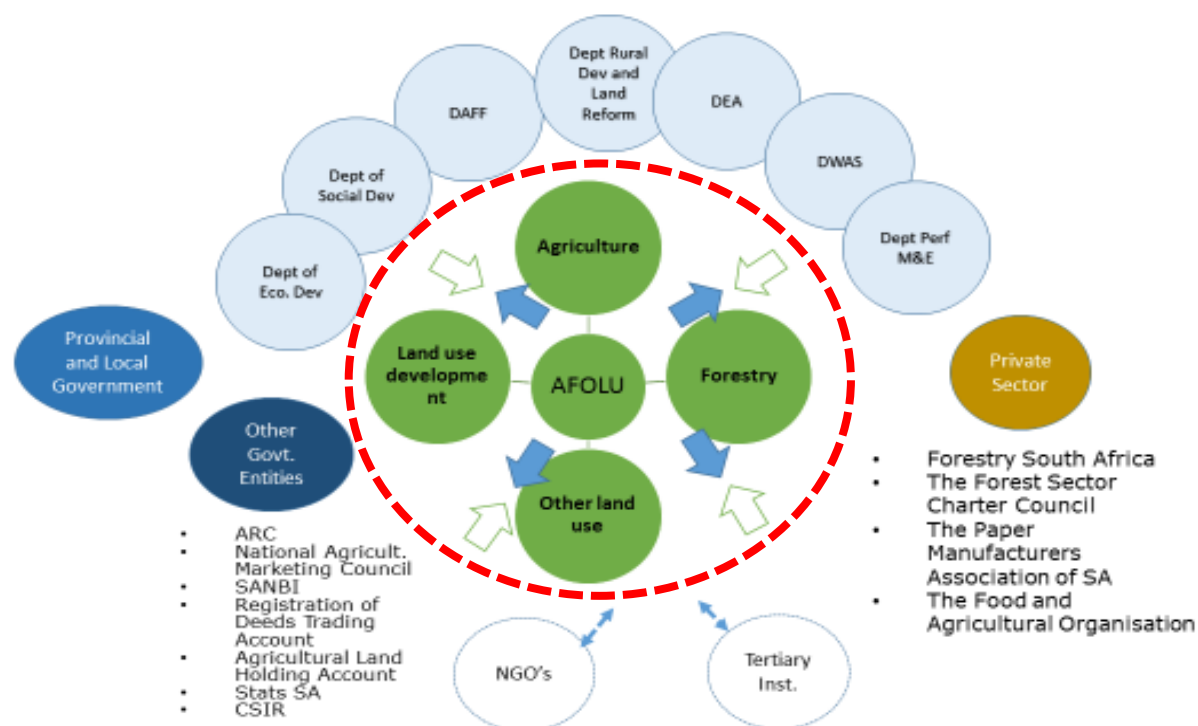


Figure 10: The diverse nature of the AFOLU sector

The current data collection / institutional arrangements within the AFOLU sector, as illustrated in Figure 10, do not all interact (directly) with DEA. Figure 6 further emphasises the varied nature of the AFOLU sector in terms of role-players, stakeholders and the various government departments.

In the context of dispersed data sources and in the absence of a formalised M&E system the question then is where / how does the DEA currently collect AFOLU data. The DEA currently obtains AOFLU data using the institutional arrangements⁵ as detailed in 5.

Table 5: Current institutional arrangements within the AFOLU sector

Government / Agency	Role
Government Departments	
Department of Agriculture, Forestry and Fisheries (DAFF)	Provides information on the AFOLU sector.
Department of Environmental Affairs (DEA) GIS Unit (Geographic Information System)	Provides an archiving system for forestry maps.
Private Sector and other institutions	

⁵ (DEA, 2014)

Government / Agency	Role
GeoTerra Image	Geo Terra Image publishes data user reports and meta data on Southern African: <ul style="list-style-type: none"> - Land cover for 2014; - Development of new land cover; - Water data layer sheets; - Land use change for 1990-2000-2013; - Plantation data layer sheets; and - Wetlands data layer sheets.
Agriculture Research Council (ARC)	The ARC conducts and promotes research within the agricultural sector of South Africa. The AgroClimatology Programme maintains data from weather stations and a climate databank. ARC's Earth Observation is a course resolution satellite imagery database that covers: <ul style="list-style-type: none"> - Vegetation Index; - Active Fire; - Land Surface Temperature images; - Land Processes Distributed Active Archive Centre; ARC also covers research on a National Invasive Alien Plant Survey Project.
Forestry South Africa (FSA)	FSA publishes timber statistics reports, forestry and forest product statistics on a yearly basis. The most recent year available (2014) is only available to members and will be published for public access by 2016. Historical databases are available on the FSA website.
Agriculture South Africa (AgriSA)	Provides information for compiling GHG emissions from the agriculture sector.
University of Pretoria (UP) and Tshwane University of Technology (TUT)	Undertakes research related to the AFOLU sector.

Within DEA, the bulk of current data custodians for AFOLU is from the private sector and industry associations. This holds various implications for the M&E system, which is currently done on a voluntary basis. As an overall observation:

- Information is collected in a fragmented manner. Very little synthesis or correlation of information between the various data points of the AFOLU sector occurs.
- Information is collected on a voluntary and ad-hoc basis. This implies that information is not consistently collected or centrally archived which makes trending analysis virtually impossible.

However, as per the AFOLU MRV Strategic Plan the following thematic areas should be monitored⁶:

- Land management types and land use definitions – consistent with IPCC 2006 guidelines;
- Historical and current changes in forest cover – including drivers of change;
- Forest management – historical and current practises;
- Historical and current changes in land cover and land use – including drivers of change. For this purpose, data will need to be obtained about the impact of individual events or processes on carbon stocks/emissions and how events are combined in management regimes;
- Land management practises that affect GHG emissions;

⁶ Draft Strategic Plan, Climate Change Response Monitoring and Evaluation system for AFOLU, South Africa Land Sector MRV Capacity Building Project, 2014.

These thematic areas are as per the AFOLU MRV Strategic Plan and does not include mention of livestock.

- Activity data, key categories and emissions factors for the National GHG inventory;
- On-going key responses to climate change – adaptation & mitigation - (plans, strategies, policies and actions.)

The above-mentioned thematic areas were analysed against the IPCC 2006 tier 1 indicators currently collected within the DEA as part of the National GHG emissions inventory. This high level analysis shows that data for these thematic areas are only partially collected.

Table 6: AFOLU sector data collection GAP Analysis

AFOLU MRV Strategic Plan requirements	Current collection status in DEA			Links to possible partners for data collection
	Partial data collected	No data collected	Potential Partner	
				Partner
Land management types and land use definitions – consistent with IPCC 2006 guidelines.	●		✓	DAFF, local and provincial government, national land cover data set.
Historical and current changes in forest cover – including drivers of change.	●		✓	DAFF, national land cover data set.
Forest management – historical and current practises.	●		✓	DAFF, Forestry SA, national land cover data set.
Historical and current changes in land cover and land use – including drivers of change. For this purpose, data will need to be obtained about the impact of individual events or processes on carbon stocks/emissions and how events are combined in management regimes.		●	✓	DAFF, DEA, local and provincial government, national land cover data set.
Land management practises that affect GHG emissions.		●	✓	DAFF, DEA, local and provincial government, national land cover data set.
Activity data, key categories and emissions factors for GHG inventory.	●		✓	DAFF, DEA, local and provincial government, national land cover data set.
On-going key responses to climate change – adaptation & mitigation (plans, strategies, policies and actions).	●		✓	DAFF, DEA, local and provincial government, private sector entities.

The above analysis has two important findings: the first is that there are numerous existing data collection processes in place, even though these do not cover the entire scope of thematic areas. This is important to note as the phased approach for the AFOLU M&E system proposes that the initial focus for the development of such a system should fall on refining and developing existing data collection practices. The second important aspect is that although data is currently collected, this does not pertain to all necessary indicators or data coverage per indicator such as livestock (according to IPCC 2006 Tier 1). This illustrates that there are ample opportunities within the context of legal mandates to update and strengthen current data collection practices within the AFOLU sector.

5.2 Context of AFOLU Sector and related mandates

The diverse nature of the AFOLU sector leads to information being fragmented across a number of different departments. In this regard a systematic approach was applied to understanding the legislative context of relevant departments in terms of AFOLU, and more specifically actions related to these functions. The objective is to identify potential actions, either within the mandate or as per current activities undertaken by the departments / directorates. This will contribute towards practical input into the proposed AFOLU M&E system.

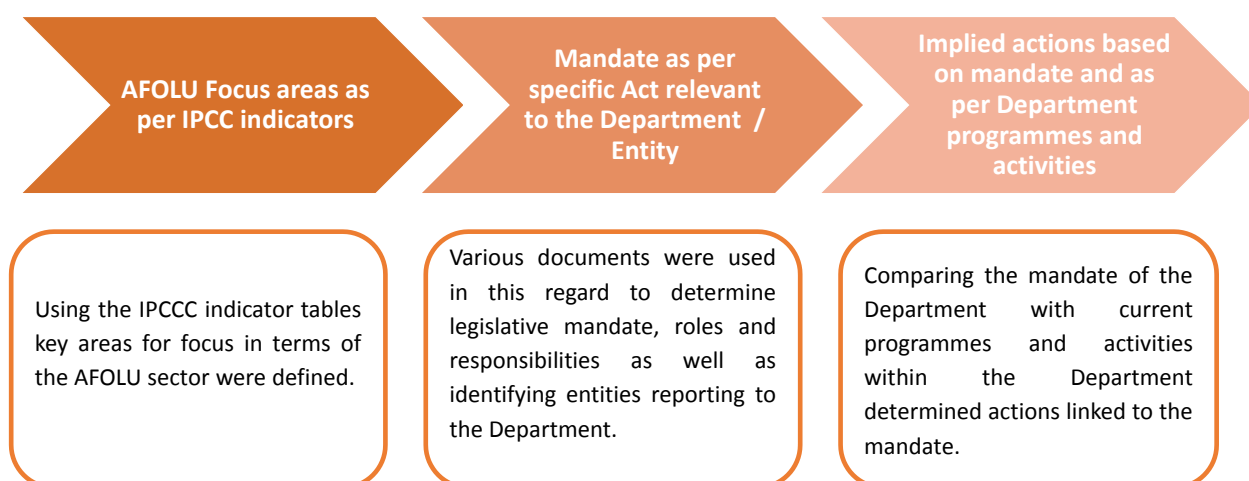


Figure 11: AFOLU Mandate Action Determination

Reviewing the AFOLU related mandates provides a legislative overview for determining roles and responsibilities with regards to the various departments and entities.

The 2006 IPCC Guidelines, Volume 4 identifies the following categories as part of the AFOLU sector:

Table 7: IPCC AFOLU Categories

Category	Emission Sources
Livestock	Enteric Fermentation
	Manure Management
	Definition
Forest land	All land with woody vegetation consistent with thresholds used to define forest land in national inventory
Cropland	Cropped land, including rice fields, and agro-forestry systems where the vegetation structure falls below the thresholds for forest land
Grassland	Rangelands and pasture land that are not considered cropland, and systems with woody vegetation and other non-grass vegetation that fall below the threshold for forest land
Wetlands	Areas of peat extraction and land that is covered or saturated by water for all or part of the year
Settlements	All developed land, including transportation infrastructure and human settlements of any size
Other	Bare soil, rock, ice, and all land areas that do not fall into any of the other five categories
	Emission Sources
Aggregate	GHG emissions from biomass burning
	Liming

Category	Emission Sources
sources and non-CO ₂ emissions sources on land	Urea application
	Direct N ₂ O from managed soils
	Indirect N ₂ O from managed soils
	Indirect N ₂ O from manure management
	Harvested Wood Products
	** Rice cultivation (not relevant in South African context)

Based on the above AFOLU categories key departmental authorities involved in the regulation of land management in South Africa are:

- Department of Agriculture Forestry and Fisheries (DAFF).
- Department of Environmental Affairs (DEA).
- Department of Rural Development and Land Reform (DRDLR).

However, looking at the AFOLU sector in terms of adaptation, socio-economic indicators should be part of this study. This led to the inclusion of the following Departments:

- Department Social Development (DSD).
- Department Economic Development (DED).

The Department of Human Settlements have not been included in this mandate description. This is due to the fact that data collected with regards to land use change, such as township development, will form part of the local / district and metropolitan legislated processes. Importantly also, the introduction of SPLUMA will streamline the land use change process and centralise data collection and record keeping. The Department of Rural Development and Land Reform are the custodians of this legislation.

This project recognised the work being done by the National Planning Commission in terms of the National Development Plan for the use of AFOLU sector information. In addition to the above, Statistics South Africa has been included in this analysis due to the existing reporting and data collection mandate of this entity.

5.3 Institutional mandates pertaining to the AFOLU Sector

The following table provides a detailed overview of the various mandates pertaining to the AFOLU sector, the relevant departments and branches / directorates responsible for executing these mandates as well as the activities pertaining to the mandate execution. These activities link to the monitoring and evaluation of the AFOLU sector in terms of what is currently being done with regards to data collection and data recording.

It is important to note that only Government Departments are mandated to perform certain functions. Policies and strategies cannot be mandated to perform functions. These are rather results and outputs from departmental mandated actions. Therefore, in discussing mandates, the focus is on the department rather than strategies prepared by the department.

Table 8: Departmental and Entity Mandate Definition in terms of the AFOLU Sector

Department/Entity	Legal Mandate	Key actions for department based on mandate	Information to support M&E
DAFF	Act Derived from sections 24(b) (iii) and 27(1)(b) of the Constitution. The DAFF is primarily responsible for Acts relating to agriculture, forestry and fisheries.	Definition of Mandate	
	Animal Improvement Act, 1998 (Act No. 62 of 1998)	The Act provides for the breeding, identification and utilisation of genetically superior animals in order to improve the production and performance of animals.	<ul style="list-style-type: none"> • Data collection. • Record keeping. • Reporting.
	Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947)	The Act provides for the appointment of a Registrar of Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies; the registration of fertilisers, farm feeds, agricultural remedies, stock remedies, sterilising plants and pest control operators; the regulation or prohibition of the importation, sale, acquisition, disposal or use of fertilisers, farm feeds, agricultural remedies and stock remedies and the designation of technical advisers and analysts.	<ul style="list-style-type: none"> • Data collection. • Record keeping. • Reporting.
			Additional information to support the Fertilizer related indicators.

Department/Entity	Legal Mandate		Key actions for department based on mandate	Information to support M&E
DAFF	<p>Plant Breeders' Rights Act, 1976 (Act No. 15 of 1976)</p>	<p>The Act provides for a system whereby plant breeders' rights relating to varieties of certain kinds of plants may be granted and registered; for the requirements which have to be complied with for the grant of such rights; for the protection of such rights and the granting of licences in respect of the exercise thereof.</p>	<ul style="list-style-type: none"> Registration of projects and applications. Record keeping. 	<p>Information to feed into the Forest Land, Cropland and Grassland indicators.</p>
	<p>Agricultural Research Act, 1990 (Act No. 86 of 1990)</p>	<p>The Act provides for the establishment of a juristic person to deal with agricultural research; the determination of its objects, functions, powers and duties.</p>	<ul style="list-style-type: none"> Data collection. Research. Record keeping. 	<p>Depending on the research or data sets available, information could be utilised for agriculture related indicators. Research could also possibly be influenced to include indicator specific requirements.</p>
	<p>Agricultural Product Standards Act, 1990 (Act No. 119 of 1990)</p>	<p>Provides for the control over the sale and export of certain agricultural products, control over the sale of certain imported agricultural products and control over other related products.</p>	<ul style="list-style-type: none"> Data collection. Record keeping. Programme management. Reporting. 	

Department/Entity	Legal Mandate	Key actions for department based on mandate	Information to support M&E
DAFF	<p>Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)</p> <p>National Forests Act, 1998 (Act No. 84 of 1998)</p> <p>National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998)</p>	<p>The Act provides for control over the utilisation of the natural agricultural resources of the RSA in order to promote the conservation of the soil, water sources and vegetation and combating of weeds and invader plants. Promote the sustainable management and development of forests for the benefit of all; create the conditions necessary to restructure forestry in state forests in relation to protection and sustainable use.</p> <ul style="list-style-type: none"> • Data collection. • Record keeping. • Programme management. • Reporting. 	<p>Information could potentially be linked to the indicators pertaining to land availability for agriculture / forests etc. In addition the programmes promoted relating specifically to forestry would greatly contribute to current forestry indicator information collection. Furthermore this could link to the adaptation related indicators specifically with regards to conservation and education.</p>

Department/Entity	Legal Mandate	Key actions for department based on mandate	Information to support M&E
DAFF	Subdivision of Agricultural Land Act, 1970 (Act No. 70 of 1970)	<ul style="list-style-type: none"> • Application registration. • Record keeping. • Data management. • Programme management. • Reporting. 	This mandate will allow for the collection of information pertaining to the change of land use from agricultural purposes to other types of development. This will provide valuable information in terms of the Other Land Use and specifically settlements indicators.
DRDLR	Physical Planning Act, No. 88 of 1967	<ul style="list-style-type: none"> • Application registration. • Record keeping. • Data management. 	This mandate will allow for the collection of information pertaining to settlements which will / should also include information on transportation infrastructure in terms of land size. Furthermore this record keeping should contribute to information on the changing of agricultural land use.
	Spatial Data Infrastructure Act, No. 54 of 2003	<ul style="list-style-type: none"> • Data collection. • Record keeping. • Mapping. 	The provision of up to date and geographically correct mapping will provide important information in terms of land available, used and allocated for agriculture / settlements. In addition mapping will provide information on environmental spatial information such as forests, grasslands and wetlands.

Department/Entity	Legal Mandate		Key actions for department based on mandate	Information to support M&E
DEA	<p>The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004),</p> <p>Areas Act, 2003 (Act No. 57 of 2003)</p> <p>The National Environmental Management: Protected Areas Amendment Act, 2004 (Act No. 31 of 2004)</p>	<p>The Act sets out the mechanisms for managing and conserving South Africa's biodiversity and its components; protecting species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bioprospecting, including indigenous biological resources; and the establishment of the South African National Biodiversity Institute (SANBI).</p> <p>The Act provides for the protection and conservation of ecologically viable areas. It further provides for the establishment of a national register of protected areas and the proclamation and management of these areas.</p> <p>The Act provides for a national system of protected areas in South Africa as part of a strategy to manage and conserve the country's biodiversity.</p>	<ul style="list-style-type: none"> • Data collection. • Record keeping. • Data management. • Programme management. • Reporting. <ul style="list-style-type: none"> • Record keeping. • Data management. • Programme management. • Reporting. • Mapping. 	<p>Information pertaining to environmental stewardship will be collected within DEA. In addition, indicators pertaining to conservation and natural resources will need to be included in terms of the AFOLU sector as part of the Millennium Development Goals (MDG).</p>



Department/Entity	Legal Mandate		Key actions for department based on mandate	Information to support M&E
DSD	National Development Agency Act, 1998		<p>This Act established the National Development Agency (NDA), which is responsible for promoting appropriate and sustainable partnerships between government and civil society organisations (CSOs) aimed at eradicating poverty and its causes. The NDA is mandated to grant funds to civil society organisations (CSOs) in order to enhance their capacity to meet the developmental needs of poor communities, and promote development dialogue.</p> <ul style="list-style-type: none"> • Data collection. • Record keeping. • Data management. • Programme management. • Reporting. 	<p>Social development data would feed into the Millennium Development Goals and the further detailing of these goals in terms of the AFOLU sector. With regards to adaptation, the socio economic and development context are important factors to consider in terms of the AFOLU sector.</p>

Department/Entity	Legal Mandate	Key actions for department based on mandate	Information to support M&E
DSD	<p>White Paper on Population Policy for South Africa, 1998</p>	<p>This White Paper is aimed at promoting the sustainable development of all South Africans by integrating population issues with development planning in all spheres of government and all sectors of society. Its mandates the DSD to plan, implement, and monitor population policy and its impact on population trends and dynamics in the context of sustainable human development. It states that government departments and their counterparts in civil society should be capacitated and supported to understand the vital linkages between population and development, and integrate population issues in development planning, through research and the dissemination of data and information.</p>	<ul style="list-style-type: none"> • Data collection. • Record keeping. • Data management. • Programme management. • Reporting. • Mapping.

Department/Entity	Legal Mandate	Key actions for department based on mandate	Information to support M&E
DED	<p>The Economic Development Department (EDD) was formally established on 7 July 2009, following President Zuma's announcement of a new structure for national government. The President stated on 10 May 2009 that "Cabinet... has been reorganised to achieve better alignment between the structure, our electoral mandate... and the developmental challenges that need to receive immediate attention from government".</p> <p>The Department is responsible for developing economic policy with a broad, cross-cutting focus so that macro and micro-economic policy reinforce each other and are both aligned to the electoral mandate. The Department will also be responsible for economic development planning and will work collegially with other departments to ensure coordination around a programme that places decent work at the centre of government's economic policies in order to secure better employment outcomes.</p>	<ul style="list-style-type: none"> • Data collection. • Record keeping. • Data management. • Programme management. • Reporting. 	<p>Economic data could be used specifically with regards to adaptation related indicators.</p>
DWAS	<p>The National Water Act, 1998 (Act No. 36 Of 1998)</p>	<p>The National Water Act seeks to ensure that the country's water resources are protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all people.</p> <p>The Act assigns the national government as the public trustee of the water resources. Acting through the Minister, it has the power to regulate the allocation, use, flow and control of all water in the Republic.</p>	<p>The provision of up to date and geographically correct mapping will provide important information in terms of land available, used and allocated for agriculture / settlements. In addition mapping will provide</p>

Department/Entity	Legal Mandate		Key actions for department based on mandate	Information to support M&E
	<p>The Water Services Act, 1997 (Act No. 108 of 1997)</p>	<p>The Water Services Act prescribes the legislative duty of municipalities as water service authorities to supply water and sanitation according to national norms and standards. In addition, it regulates Water Boards as important water service providers. This Act compels the Minister to maintain a National Water Services Information System and to monitor the performance of all water services institutions. Currently, the provision of sanitation is governed by the Strategic Framework on Water Services (2003) and the Water Services Act. The Department's mandate is to develop policy, to regulate and oversee the provision of sanitation. The Department of Human Settlements on the other hand drives the sanitation policy review process which will result in the clarification of roles and responsibilities regarding sanitation.</p>	<ul style="list-style-type: none"> • Data collection. • Record keeping. • Data management. • Programme management. • Reporting. • Mapping. 	<p>information on environmental infrastructure to feed into the calculation of land and land available. In addition, data collected in this department would address indicators pertaining to sewerage.</p>
<p>Department of performance monitoring and evaluation (Presidency)</p>	<p>Established in January 2010, the Department of Performance Monitoring and Evaluation has been mandated by the President and Cabinet to:</p> <ul style="list-style-type: none"> • Facilitate the development of plans /delivery agreements for cross-cutting priorities or outcomes of government, and monitor and evaluate the implementation of these plans/delivery agreements. • Promote good monitoring and evaluation practices in government. 	<p>There been no change or revision to legislation or any significant policy shift related to the mandates outlined above. However, the department is consulting with other administrative centre of government departments about the possibility of introducing legislation to formalise the mandate of the department and to address planning and M&E issues in Government.</p>		

5.4 Government entities mandates

The following table provides an overview of the various mandates pertaining to specific government entities. In addition details is provided on the type and nature of research undertaken by these entities which link to the AFOLU monitoring and evaluation system.

Table 9: Government Entity Mandates

Department	Name of entity	Legislative mandate	Nature of operations	Indicators /research
DAFF	Agricultural Research Council (ARC)	Agricultural Research Act, 1990 (Act No. 86 of 1990)	Conducts fundamental and applied research with partners to generate knowledge, develop human capital and foster innovation in agriculture through development and transfer of technology, and the dissemination, and commercialisation of research results.	In response to the national priorities and in support of the Department of Agriculture, Forestry and Fisheries, the ARC introduced several programmes to enable it to achieve its strategic goals. The programmes are: - Crop Production, Improvement and Protection - Animal Health, Production and Improvement - Natural Resource Management - Mechanisation and Engineering - Agro-processing, Food Technology and Safety - Smallholder Agricultural Development - Agricultural Economics and Commercialisation - Training and Extension

Department	Name of entity	Legislative mandate	Nature of operations	Indicators / research
DAFF	Marine Living Resources Fund (MLRF)	Marine Living Resources Act, 1998 (Act No. 18 of 1998)	The MLRF manages the development and sustainable use of South Africa's marine resources and protects the integrity and quality of the marine ecosystem.	The MLRF covers: - Aquaculture and Economic Development - Fisheries Research and Development - Marine Resource Management - Monitoring, Control and Surveillance
	National Agricultural Marketing Council (NAMC)Re	Marketing of Agricultural Products Act, 1996 (Act No. 47 of 1996)	The NAMC provides strategic advice to the Minister on all agricultural marketing issues, improves market efficiency and market access by all participants, optimises export earnings and improves the viability of the agricultural sector.	The NAMC covers: - Markets and Economic Research - Statutory Measures - Agricultural Trusts - Agribusiness Development
	Ncera Farms (Pty) Ltd	A schedule 3B company in terms of the Public Finance Management Act, 1999 (Act No.1 of 1999)	The company was established to provide agricultural extension services, mechanisation of agricultural production, provide training and advice on crops, vegetable and animal production, and on marketing of agricultural products to farmers and nearby communities.	The strategic goals of Ncera Farms are: - Finance & Administration - Mechanisation - Livestock: To produce good quality livestock for breeding and income generation purposes - Crop production: To produce and sell vegetables to the market and locally, to generate income. - Human Resource Development

Department	Name of entity	Legislative mandate	Nature of operations	Indicators / research
DAFF	Onderstepoort Biological Products Ltd (OBP)	Onderstepoort Biological Products Incorporation Act, 1999 (Act No. 19 of 1999)	OBP's mandate is to prevent and control animal diseases that impact on food security, human health and livelihoods. It aims to ensure financial viability to sustain the strategic capabilities in manufacturing veterinary vaccines.	<p>Strategic goals and applied objectives of OBP are to:</p> <ul style="list-style-type: none"> - Build a successful, high performance organisation - Improve business processes and management practices - Build a profitable and sustainable company <p>Research includes:</p> <ul style="list-style-type: none"> - Research and development of vaccines - advanced research techniques and sterile production technologies <p>PPECB strategic objectives are:</p> <ul style="list-style-type: none"> - Enhancing the credibility of the South African Export Certificate - Supporting the export competitiveness of South Africa's perishable products industries - Strengthening the PPECB's capacity to provide a professional suite of services to its customers
	Perishable Products Export Control Board (PPECB)	Perishable Products Export Control Act, 1983 (Act No. 9 of 1983) and the Agricultural Product Standards Act, 1990 (Act No. 119 of 1990)	The Perishable Products Export Control Act requires the board to ensure the orderly export of all perishable products and to monitor the maintenance of a continuous cold chain for exports. The Agricultural Product Standards Act requires the board to monitor minimum quality standards and adherence to bilateral agreements with importing countries.	

Department	Name of entity	Legislative mandate	Nature of operations	Indicators / research
DEA	SANBI	SANBI was established in terms of the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)	The mandate of SANBI is to play a leading role in South Africa's national commitment to biodiversity management. In partnership with the Department of Environmental Affairs and the biodiversity sector, SANBI is tasked to lead the biodiversity research agenda; provide knowledge and information; give policy support and advice; manage gardens as windows to our biodiversity for leisure, enjoyment, spiritual upliftment and education; and engage in ecosystem restoration and rehabilitation programmes and best-practice models to manage biodiversity better	<p>SANBI programmes include:</p> <ul style="list-style-type: none"> - Manage and unlock benefits of the network of National Botanical Gardens - Provide scientific evidence to support policy and decision making relating to the conservation and management of terrestrial and aquatic biodiversity and the impacts of climate change - Co-ordinate and provide access to biodiversity information management and scientific knowledge - Provide science-based policy tools and advice for the effective management of biodiversity assets and ecological infrastructure in support of South Africa's development - Drive human capital development, education, awareness in response to SANBI's mandate - Render effective and efficient corporate services <p>Research includes:</p> <ul style="list-style-type: none"> - National Biodiversity Assessment (NBA) - Ecosystem and wetland classification - Biodiversity monitoring framework - Coral bleaching

Department	Name of entity	Legislative mandate	Nature of operations	Indicators / research
DEA	South African Weather Service (SAWS)	SAWS was established in terms of the South African Weather Service Act, 2001 (Act No. 8 of 2001)	The mandate of SAWS is to provide useful and innovative weather, climate and related products and services for all South African and the African Continent through the following: Enhancing observational data and communications networks; Effectively developing and managing talent within the sector; Enhancing collaborative partnerships and effectively disseminating weather services products to the users; Utilising cutting edge technology to convert data into meaningful products and services for risk mitigation; Advancing the science of meteorology; research and relevant applications; and enhancing fiscal discipline and resource mobilisation to ensure sustainability	The SAWS strategic objectives are: - To ensure the continued relevance of the organisation in delivering meteorological and related products and services in compliance with all applicable regulatory frameworks. -To ensure the effective management of stakeholder, partner and key client relations. - To address the short-term viability and long-term sustainability of SAWS revenue and ensure continued fiscal discipline. - To ensure continuous organisational effectiveness and efficiency. - To ensure the availability of strategy-driven human capital capacity for SAWS performance. Research: - Conducting Relevant Research, Enhancing Meteorological Knowledge - Weather and climate research - Research into the National Climate Database

Department	Name of entity	Legislative mandate	Nature of operations	Indicators / research
DEA	South African National Parks (SANParks)	SANParks was established in terms of the National Environmental Management Protected Areas Act, 2003 (Act No. 57 of 2003).	The mandate of SANParks is to oversee the conservation of South Africa's biodiversity, landscapes and associated heritage assets through a system of national parks. The core areas which provide a fundamental basis of the SANParks' mandate are; conservation management through the national parks system, constituency building and people focused eco-tourism management	<p>SAN Parks objectives are:</p> <ul style="list-style-type: none"> - Promoting effective budget management - Growing revenue - Enhancing organisational reputation - Growing societal benefit and providing access and benefit sharing - Promoting customer focused responsible tourism - Improving corporate governance - Improving conservation estate - Facilitating socio economic development - Promoting research and development - Promoting effective management of human capital <p>Other: Expanded Public Works Programme (EPWP):</p> <ul style="list-style-type: none"> - Working for the Coast - Working for Wetlands - Environmental Monitors - Working for Water - Working for Land: Rehabilitation and Bush Clearing - Eco Furniture Projects - Working on Fire

5.5 Mapping AFOLU Sector Mandates

The current data collection practices in the government departments, private sector and tertiary institutions within the AFOLU sector is represented in Figure 12. This mapping is based on the detailed findings of what data *should* be collected, what data *is* collected and *who* collects the data. This is further discussed in Chapter 4 in relation to the various indicators.

There are four broad categories pertaining to the definition of the AFOLU sector: Agriculture, Forestry, Other Land Use and Aggregate Sources & non-CO₂ emissions on land. This breakdown enables a grouping of role-players and data collection processes.

There are three main data input groups: Government departments (with various directorates and branches), Government entities and the private sector/industry associations. In addition to these there are academic institutions who are custodians of specific data sets but who also play a major role in terms of generating and publishing research for use.

The private sector, through a number of different intermediate entities, is collecting information to strengthen and support specific industry related issues. Information in this regard is collected on a voluntary basis and falls outside the ambit of legislative mandates. However, the private sector provides for a wealth of relevant, current and capacitated means to collect information. Possibilities to include this system of data collection as part of mandated processes would be possible through proposed legislation.

KEY MESSAGES: Mandates



- **AFOLU sector data is currently being collected.**
- Data collection is **fragmented** across various departments and similarly across the private and government sectors.
- The **extent of the mandates identified covers the range of proposed IPCC 2006 tier 1 indicators.** A vast array of data should be collected by the different departments and government entities in order to monitor and track various aspects. These include sector development, economic growth, quantities and any changes in annual data.
- Although data is collected, there is **no defined overarching objective** to centralise this data on a broader level. This results in data being kept in silo's in specific departments or government entities.
- The **impact of the various mandates allows for a complete change in the way AFOLU data is currently collected and used.** This is due to the fact that the mandates require a wide range of data to be collected. The AFOLU M&E system in turn provides a platform for data submission in light of a broader purpose. Such a system enables the use of collected information for strategic purposes.
- There is a **need to optimise the structures of current data collection.** This implies that existing data collection processes should be formalised and should be used as the basis on which to build the AFOLU M&E system.
- A **clear overarching objective** with regards to AFOLU sector data must be **communicated and integrated** across the various relevant government and private sector entities.

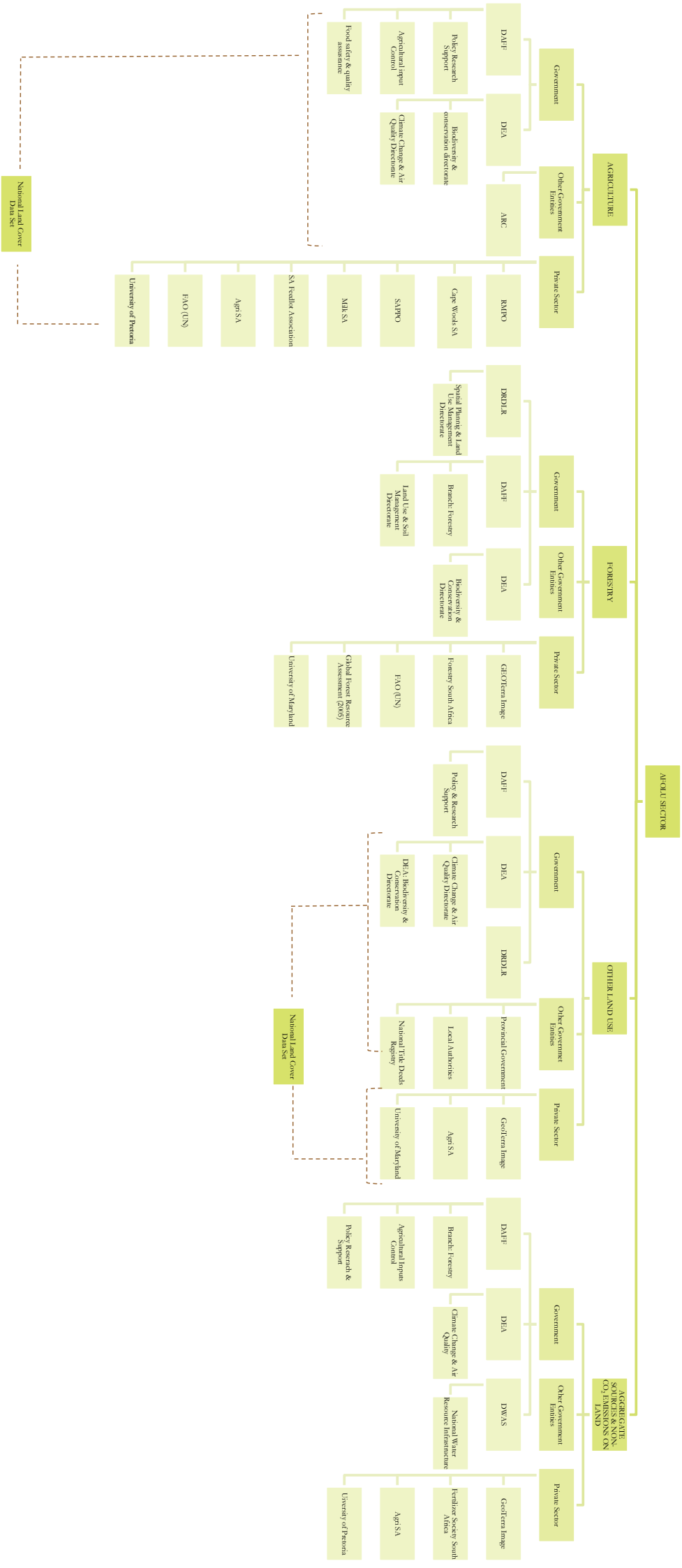


Figure 12: Mapping of AFOLU mandates

6 AFOLU data in the 2010 National Greenhouse Gas Inventory of South Africa

The primary AFOLU indicators were defined using the South African National GHG Inventory (2010) and the Guidelines for National Greenhouse Gas Inventories (IPCC, 2006). For each indicator listed it was identified whether it is currently monitored and whether the monitoring is conducted by a private entities or mandated government parties. Further detail specifies the mandate under which the specific indicators are classified, and the relevant department that is responsible for the indicators as per the mandate. In addition, alternative data sources for the indicators were identified such as private entities or academic institutions. The identified indicators and mandates are listed in the tables below as per the following IPCC categories:

- 3.A: Livestock;
 - o 3.A1 Enteric Fermentation;
 - o 3.A2 Manure Management;
- 3.B: Land;
 - o 3.B1 Forest land;
 - o 3.B2 Cropland;
 - o 3.B3 Grassland;
 - o 3.B4 Wetlands;
 - o 3.B5 Settlements;
 - o 3.B6 Other land;
- 3.C: Aggregate Sources and Non-CO₂ emission sources on land;
 - o 3.C1 GHG emissions from biomass burning;
 - o 3.C2 Liming;
 - o 3.C3 Urea application;
 - o 3.C4 Direct N₂O emissions from managed soils;
 - o 3.C5 Indirect N₂O emissions from managed soils;
 - o 3.C6 Indirect N₂O emissions from manure management;
- 3.D: Other;
 - o 3.D1 Harvested wood products.

An overview of the AFOLU categories and indicators as required per the IPCC (2006) guidelines are presented below from Table 7 to Table 18. The mandated action, department/directorate and other data sources are assessed for each indicator. A description of how the categories and indicators were reported on in the 2010 National GHG Inventory is described below each table.

6.1 3.A: Livestock

6.1.1 3.A1 Enteric Fermentation Indicators

There are 12 indicators that are required to be monitored by the IPCC (2006) guidelines for Enteric Fermentation, when following the tier 2 approach. The indicators in the table below are mostly covered by the Agricultural Research Act and are under the responsibility of DAFF. However the majority of indicators in the table below are also monitored by several private institutions in the livestock industry. All emission factor calculations fall under the National Environmental Management: Air Quality Act and are under the responsibility of DEA's Climate Change and Air Quality Directorate.

Table 10: 3.A1 Enteric Fermentation Indicators (IPCC 2006 Guidelines).

IPCC Group	Indicator	Mandated Action	Department/Directorate	Other Data Sources
3.A.1 Enteric Fermentation (overall Tier 2)	Commercial cattle, sheep, goat and swine population size	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	Red Meat Producers Organisation; Cape Wools SA; South African Pork Producers Organisation; Milk South Africa
	Sub categories for dairy, sheep and goats population size			
	Total communal population numbers for cattle, sheep, goats and swine	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	
	Feedlot cattle population size	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	South African Feedlot Association.
	Horses and donkeys population size	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	Food and Agriculture Organization of the United Nations.
	Game population size	National Environmental Management: Biodiversity Act (2004)	DEA: Biodiversity and Conservation Directorate	
	Live Weight data of all livestock categories and sub-categories apart for horses & donkeys	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	University of Pretoria
	Methane conversion factors for all livestock categories and sub-categories apart for horses & donkeys	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	
	Energy intake for all livestock categories and sub-categories apart for horses & donkeys	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	University of Pretoria
	Emission factor for horses and donkeys	National Environmental Management: Air Quality Act (2004)	DEA: Climate Change and Air Quality Directorate	
	Changes in feed quality	Fertilizers, Farm Feeds, Agricultural	DAFF: Agricultural Inputs Control	Agri SA.

		Remedies and Stock Remedies Act (1947)		
	Changes in milk production	Agricultural Product Standards Act (1990)	DAFF: Food Safety and Quality Assurance	Milk South Africa

DAFF provided the population data of commercial cattle, sheep, goat and swine. This information has been monitored since 1970 and is published in a formalized process, namely via the Agricultural Statistics publication (DAFF, 2012).

Sub categories for dairy, sheep and goats population sizes were collected via the University of Pretoria from the individual livestock industries.

The data available on the ratio of communal versus commercial livestock was provided by DAFF which has been recorded since 1996.

Feedlot cattle population size was obtained from the Feedlot Association of South Africa, but only for the years 2008-2010.

The horses and donkeys population size was available from DAFF census data. However, this data varied considerably from other sources (FAOSTAT, 2012) (Simalenga, 2002), and it was therefore decided to use the FAO data. Further to this it was found that currently the game population size, emission factor for horses and donkeys, changes in feed quality and changes in milk production are not monitored. Live weight data and methane emission factors of all livestock categories and sub-categories are collected on an ad-hoc basis by the University of Pretoria. In the National Inventory tier 2 methods were used to determine enteric fermentation emissions from major livestock categories. Country specific methodologies for the methane emission factor was developed by (Du Toit, et al., 2013a) (Du Toit, et al., 2013b) (Du Toit, et al., 2013c) and was based on climate, feed digestibility and energy intake of the various livestock.

6.1.2 3.A2 Manure Management Indicators

There are 8 indicators that are required to be monitored by the IPCC (2006) guidelines for Enteric Fermentation, when following the tier 1 approach. The indicators in the table below are covered by the Agricultural Research Act, National Environmental Management: Biodiversity Act and Air Quality Act as well as the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act. The responsible departments are therefore DAFF and DEA.

Table 11: 3.A2 Manure Management Indicators (IPCC 2006 Guidelines).

IPCC Group	Indicator	Mandated Action	Department/Directorate	Other Data Sources
3.A.2 Manure management (overall Tier 1)	Poultry Population size	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	South African Poultry Association
	Stratify the livestock population by climate or provincial data	National Environmental Management: Biodiversity Act (2004)	DEA: Climate Change and Air Quality branch.	

Live weight data of poultry sub-categories	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	South African Poultry Association
Categorizing of manure management systems	Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (1947)	DAFF: Agricultural Inputs Control	Agri SA.
Manure emission factors	National Environmental Management: Air Quality Act (2004)	DEA: Climate Change and Air Quality Directorate	Tshwane University of Technology.
Volatile solids for cattle, sheep, goats, pigs and poultry manure	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	Tshwane University of Technology.
Volatile solids for horses and donkeys	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	
Methane conversion factors	National Environmental Management: Air Quality Act (2004)	DEA: Climate Change and Air Quality Directorate	

The livestock population size data required to calculate the emissions related to enteric fermentation are also used in the manure management category. Additionally this category of emission sources requires the poultry population size as well as the poultry live weight (typical animal mass). This data was obtained from the South African Poultry association (Prinsloo, 2014).

For National Inventory, no information could be obtained relating to the stratification of the livestock population by climatic region or province. There is uncertainty relating to the types of manure management practices and where they occur.

Manure emission factors as well as volatile solids for cattle, sheep, goats, pigs and poultry manure have been calculated by the Tshwane University of Technology. The calculation is based on limited information and therefore manure management was only accounted for on a Tier 1 level. In order to improve this category to a Tier 2 level, a country specific manure emission factor would need to be determined based on country specific data.

Both the methane conversion factors and volatile solids for horses and donkeys are currently not available within South Africa and therefore IPCC default values were applied.

6.2 IPCC 3.B: Land

6.2.1 3.B1 Forest Land Indicators

There are 23 indicators that are required to be monitored by the IPCC (2006) guidelines for Forest Land, when following the tier 1 approach. The indicators in the table below are mostly covered by the Physical Planning Act, the National Forests Act and the National Environmental Management Act. The responsible departments are therefore the Department of Rural Development and Land Reform, DAFF and DEA. However the indicators are also monitored by private entities such as Geo Terra Images and Forestry South Africa.

Table 12: 3.B1 Forest Land Indicators (IPCC 2006 Guidelines).

IPCC Group	Indicator	Mandated Action	Department/Directorate	Other Data Sources
3.B.1 Forest land (Tier 1)	Land areas - dataset	Physical Planning Act (1967)	Department of Rural Development and Land Reform: Spatial Planning and Land Use Management Directorate	Geo Terra Images
	Land areas – modelling (interpretation)			
	Plantation Forestry	National Forests Act (1998)	DAFF branch: Forestry	Forestry South Africa
	Land stratification by soil type	Subdivision of Agricultural Land Act (1970)	DAFF: Land Use and Soil Management Directorate	
	Plantation annual growth data	National Forests Act (1998)	DAFF branch: Forestry	Forestry South Africa
	Forest annual above ground biomass growth value	National Forests Act (1998)	DAFF branch: Forestry	Midgley and Seydack (2006)
	Thickets annual growth data	Protected Areas Act (2003) The National Environmental Management Act (Act No. 107 of 1998).	DEA: Biodiversity and Conservation Act	
	Woodlands/savanna annual growth data	The National Environmental Management Act (Act No. 107 of 1998). Protected Areas Act (2003)	DEA: Biodiversity and Conservation Act	
	Root to shoot ratio woodland/savannas, acacia's and other plantation species and forests	National Forests Act (1998) The National Environmental Management Act (Act No. 107 of 1998).	DAFF branch: Forestry DEA: Biodiversity and Conservation Act	Global Forest Resource Assesment of SA (2005), Food and Agriculture Organization of the United Nations.
	Root to shoot ratio thickets	National Forests Act (1998)	DAFF branch: Forestry	
	Carbon fractions of dry matter for all forests	The National Environmental Management Act (Act No. 107 of 1998).	DEA: Biodiversity and Conservation Act	
	Dead wood to above ground biomass for all land classes	National Forests Act (1998)	DAFF branch: Forestry	Global Forest Resource Assesment of SA (2005), Food and Agriculture Organization of

				the United Nations.
Plantation wood harvesting	National Forests Act (1998)	DAFF branch: Forestry		Forestry South Africa
Biomass expansion and conversion factor	National Forests Act (1998)	DAFF branch: Forestry		Dovey and Smith (2005)
Plantation fuel wood removal	National Forests Act (1998)	DAFF branch: Forestry		Forestry South Africa
Natural woodlands and shrub lands fuel wood harvesting	National Forests Act (1998) The National Environmental Management Act (Act No. 107 of 1998).	DAFF branch: Forestry DEA: Biodiversity and Conservation Act		Global Forest Resource Assesment of SA (2005), Food and Agriculture Organization of the United Nations.
Woodlands / Savannas Biomass expansion and conversion factor	The National Environmental Management Act (Act No. 107 of 1998).	DEA: Biodiversity and Conservation Act		
Plantation losses due to fires and other disturbances	National Veld and Forest Fire Act (1998)	DAFF branch: Forestry		Forestry South Africa
Above Ground biomass losses	National Forests Act (1998)	DAFF branch: Forestry		
Woodlands/savannas disturbed by fires	National Veld and Forest Fire Act (1998)	DAFF branch: Forestry		University of Maryland Geo Terra Images Forestry South Africa
M_B (mass of fuel for combustion) for woodlands/savannas	National Veld and Forest Fire Act (1998) The National Environmental Management Act (Act No. 107 of 1998).	DAFF branch: Forestry DEA: Biodiversity and Conservation Act		
C_f (combustion factor)	The National Environmental Management Act (Act No. 107 of 1998).	DEA: Biodiversity and Conservation Act		
G_{ef} (woodlands/savannas burnt emission factor)	The National Environmental Management Act (Act No. 107 of 1998).	DEA: Biodiversity and Conservation Act		

The data sources used for land areas for ‘forest land remaining forest land’ and ‘land converted to forest land’ were obtained from the land-use change maps developed by Geo Terra Image (Geo TerraImage, 2013) while the plantation data was provided by Forestry South Africa (FSA, 1980 - 2011).

The land categories have not yet been stratified by soil type (this is planned for in the next inventory). The current GHG inventory references the carbon stock default value from the IPCC for the dominant South African soil type referenced from (Moeletsi, et al., 2013).

Annual plantation growth data was calculated from FSA data and dry matter conversion factors were obtained from (Dovey & Smith, 2005) The annual above ground biomass growth value was sourced from (Midgley & Seydack, 2006)

The IPCC (2006) default value for African forests was used for thickets annual growth data as suggested by (Mills, et al., 2005). Further research into thicket growth rates should be conducted so that uncertainty can be reduced and a country-specific value is used. In addition the IPCC 2006 default value was also used for woodlands/savanna annual growth data calculations. The root to shoot ratio of woodlands/savannas and forests was sourced from the Global Forest Resource Assessment SA (GFRASA, 2005) for Acacia and other plantation species, while the thickets root to shoot ratio was sourced from (Mills, et al., 2005). The IPCC default value was used for the carbon fraction of dry matter for all forest lands. The ratios of dead wood to above-ground biomass for the various land classes were determined from GFRASA (2005) data.

Loss of carbon due to wood harvesting was calculated for plantations using the FSA (2012) data. The biomass expansion and conversion factors for plantation species were calculated from the data in Dovey and Smith (2005).

FSA (2012) provided annual data on wood removed for fire-wood/charcoal which was used for the fuel wood removal calculation. For the natural woodlands and shrub lands fuelwood harvesting data was sourced from GFRASA (2005), however this data is not available at a national scale. There is little information on how this amount is split between the various vegetation types, therefore the whole amount was assumed to be taken from Woodlands/savannas with no removal from forests and thickets.

The IPCC default value for the Biomass Expansion and Conversion Factor (BECF) was used for woodlands/savannas. This was due to the fact that the calculated BECF value was much higher than previous inventories, therefore the IPCC default value was used until better data becomes available.

Losses due to fire disturbance were estimated for all forest land classes, and losses due to other disturbances were only included for plantations. Data on the area damaged during fire and other disturbances was obtained from FSA (2012). FSA had further detailed records from 1979 to 2000, detailing the extent of plantation damage, from slight to serious (timber sold or vegetation loss). This data was then used to calculate the weighted average fraction of biomass lost in the disturbance. The above ground biomass for the various plantation types were estimated from FSA data and Dovey and Smith (2005) species specific ratios.

The area of woodlands and savannas disturbed by fires was determined from MODIS burnt area. MODIS maps for monthly burnt areas were available from the University of Maryland for the period of 2000 to 2010. These maps were then overlaid with the land cover maps from GeoTerraImages. Due to the scale of the land cover maps corrections were made for the burnt area of plantations by using data provided by Forestry South Africa. Natural forests and thickets were assumed not to burn. The M_B factor for crops was sourced from DAFF and the C_f and emission factors were used from the previous GHG inventory (DEA 2009). The default emission factor for woodlands and savannas was used from the IPCC guidelines.

6.2.2 3.B2 Cropland Indicators

There are 10 indicators that are required to be monitored by the IPCC (2006) guidelines for Cropland, when following the tier 1 approach. The indicators in the table below are mostly covered by the Agricultural Research Act and are under the responsibility of DAFF. However some of the indicators are also monitored

by private entities such as Geo Terra Images and Agri SA. All emission factor calculations fall under the National Environmental Management: Air Quality Act and are under the responsibility of DEA’s Climate Change and Air Quality Directorate.

Table 13: 3.B2 Cropland Indicators (IPCC 2006 Guidelines).

IPCC Group	Indicator	Mandated Action	Department/Directorate	Other Data Sources
3.B.2 Cropland (Tier 1)	Land areas – data set	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	Geo Terra Images
	Land areas – modelling (interpretation)	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	
	Carbon stocks for annual croplands	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	Agri SA
	Carbon stocks for perennial crops			
	Losses due to fires	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	University of Maryland Geo Terra Images
	M _B (mass of fuel for combustion) for crops	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	
	C _f (combustion factor)			
	Land management, inputs, carbon stocks, disaggregated list of crops			
	Improve soil carbon data and stratify the crops by climate and soil	National Environmental Management: Air Quality Act (2004)	DEA: Climate Change and Air Quality Directorate	
	Cropland burnt emission factor			

The land areas data set and modelling were obtained from the land-use change maps developed by Geo Terra Image (2013) for ‘croplands remaining cropland’ and ‘land converted to croplands.’

IPCC default values were used for the carbon stocks for annual and perennial crops. The area of crop land disturbed by fires was determined from MODIS burnt area. MODIS maps for monthly burnt areas were available from the University of Maryland for the period of 2000 to 2010. These maps were then overlaid with the land cover maps from Geo Terra Images.

The M_B factor for crops was sourced from DAFF and the C_f and emission factors were used from the previous GHG inventory (DEA 2009). The emission factor used for the cropland burnt was sourced from the IPCC 2006 default values.

The GHG Improvement Programme formed by DEA, aims to collect improved cropland data (land management, inputs, carbon stocks) soil carbon data and stratify the crops by climate and soil.

6.2.3 3.B3 Grassland

There are five indicators that are required to be monitored by the IPCC (2006) guidelines for Grassland, when following the tier 1 approach. The indicators in the table below are mostly covered by the Physical Planning Act, the Agricultural Research Act and Resources Act, as well as the National Environmental Management Act and the National Forests Act. The responsible departments are therefore Rural Development and Land Reform, DAFF and DEA. However the indicators are also monitored by private entities such as Geo Terra Images, Forestry South Africa and Agri SA.

Table 14: 3.B3 Grassland Indicators (IPCC 2006 Guidelines).

IPCC Group	Indicator	Mandated Action	Department/Directorate	Other Data Sources
3.B.3 Grassland (Tier 1)	Land areas – data set	Physical Planning Act (No. 88 of 1967).	Rural Development and Land Reform DEA: Biodiversity and Conservation Act	Geo Terra Images
	Land areas – modelling (interpretation)	The National Environmental Management Act (Act No. 107 of 1998).		
	Forest converted to grassland	National Forests Act (1998)	DAFF branch: Forestry	Forestry South Africa
	Cropland converted to grassland	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate DAFF: Landuse and Soil Management DEA: Biodiversity and Conservation Act	Agri SA
	Sugarcane converted to grassland	Conservation of Agricultural Resources Act (Act No. 43 of 1983) The National Environmental Management Act (Act No. 107 of 1998).		

The land areas data set and modelling were obtained from the land-use change maps developed by Geo Terra Image (2013) for ‘grasslands remaining grassland’ and ‘land converted to grasslands.’ There is currently no distinction made between improved grassland, fynbos, natural grasslands and degraded grasslands. Data on forest converted to grassland was provided by FSA, while the IPCC 2006 default value was used for cropland converted to grassland. An average value of sugarcane converted to grassland was obtained from Donaldson 2009, Van Heerden et al. 2010 and Donaldson et al. 2008. The GHG inventory (2010) did not include dead organic matter due to insufficient data.

6.2.4 3.B4 Wetland

There are two indicators that are required to be monitored by the IPCC (2006) guidelines for Wetlands, when following the tier 1 approach. The indicators in the table below are covered by the Protected Areas Act and the National Environmental Management Act which falls under the responsibility of DEA.

Table 15: 3.B4 Wetlands Indicators (IPCC 2006 Guidelines).

IPCC Group	Indicator	Mandated Action	Department/Directorate	Other Data Sources
3.B.4 Wetland (Tier 1)	Area of waterbodies	Protected Areas Act (2003)	DEA: Biodiversity and Conservation Act	Geo Terra Images
	Emissions from flooded land - emission factor	The National Environmental Management Act (Act No. 107 of 1998).	DEA: Climate Change and Air Quality Directorate	

Data on area of waterbodies was sourced from Geo Terra Image (2013) land use maps, while the IPCC (2006) default emission factor was used for flooded land. Emissions from “wetlands remaining wetlands” and “land converted to wetlands” are not reported on. Wetlands and waterbodies are two sub divisions in this category. Peatlands are included under wetlands, but no distinction is made between the two, due to the resolution of the available mapping. As per the IPCC (2006) Guidelines (vol. 4 chapter 7) a distinction should be made between peatlands and wetlands.

6.2.5 3.B5 Settlements

There are two indicators that are required to be monitored by the IPCC (2006) guidelines for Settlements, when following the tier 1 approach. The indicators in the table below are covered by the Physical Planning Act and the National Environmental Management Act which falls under the responsibility of Rural Development and Land Reform and DEA.

Table 16: 3.B5 Settlements Indicators (IPCC 2006 Guidelines).

IPCC Group	Indicator	Mandated Action	Department/Directorate	Other Data Sources
3.B.5 Settlements (Tier 1)	Area of land converted to settlements	Physical Planning Act (No. 88 of 1967).	Rural Development and Land Reform	Geo Terra Images
	Conversion of settlements to grassland (as per grassland category)	Physical Planning Act (No. 88 of 1967). The National Environmental Management Act (Act No. 107 of 1998).	Rural Development and Land Reform DEA: Biodiversity and Conservation Act	

The area of land converted to settlements was obtained from the updated land use maps as developed by Geo Terra Image (2013). Land converted to settlements includes: forest land, cropland.

6.2.6 3.B6 Other Land

This category as defined by the IPCC 2006 Guidelines includes bare soil, rock, ice and all land areas that do not fall into any of the other five land-use categories, and is often unmanaged, therefore resulting in carbon stocks and non-CO2 emissions and removals that are not estimated. As per the GHG Inventory 2010, the Nama Karoo and Succulent Karoo biomes are included in the other land category. Currently no indicator information is reported on.

This section is important when estimating carbon stock changes for “land converted to other land.” When land is converted to other land as a result of vegetation removal it can result in severe degradation, release of carbon stocks and associated emissions. It would therefore be important to monitor vegetation removal within the Nama Karoo and Succulent Karoo biomes of South Africa, as it may impact the carbon stocks of other land.

6.3 3.C Aggregate Sources and Non-CO2 Emissions Sources on Land

6.3.1 3.C1 Biomass Burning

There are five indicators that are required to be monitored by the IPCC (2006) guidelines for Biomass Burning, when following the tier 2 approach. The indicators in the table below are covered by the National Veld and Forest Fires Act as well as the National Environmental Management Act which fall under the responsibility of DAFF and DEA. Other data sources pertaining to Biomass Burning indicators are the University of Maryland, Geo Terra Images and Forestry South Africa.

Table 17: Biomass Burning Indicators (IPCC 2006 Guidelines)

IPCC Group	Indicator	Mandated Action	Department/Directorate	Other Data Sources
3.C.1 Biomass Burning (Tier 2)	Burnt area data	National Veld and Forest Fire Act (1998)	DAFF branch: Forestry	University of Maryland Geo Terra Images Forestry South Africa
	Plantation areas burnt			
	Fuel density	National Veld and Forest Fire Act (1998)	DAFF branch: Forestry	
	Combustion factor			
	Emission factor	National Environmental Management: Air Quality Act (2004)	DEA: Climate Change and Air Quality Directorate	

For this category the Tier 2 methodology was applied. Burnt area data was determined from MODIS burnt area. MODIS maps for monthly burnt areas were available from the University of Maryland for the period of 2000 to 2010. These maps were then overlaid with the land cover maps from Geo Terra Images. Due to the scale of the land cover maps corrections were made for the burnt area of plantations by using data provided by Forestry South Africa.

The values for fuel density were source from the 2000 inventory (DEAT 2009), except for cropland density which was sourced from the 2004 Agricultural Inventory (DAFF 2010). Both the combustion factors and emission factors were also sourced from the 2000 GHG Inventory (DEAT 2009).

6.3.2 3.C2 Liming and 3.C3 Urea Application

There are three indicators that are required to be monitored by the IPCC (2006) guidelines for Liming and Urea Application, when following the tier 1 approach. The indicators in the table below are covered by the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act as well as the National Environmental Management: Air Quality Act which fall under the responsibility of DAFF and DEA.

Table 18: 3.C2 Liming and 3.C3 Urea Application Indicators (IPCC 2006 Guidelines).

IPCC Group	Indicator	Mandated Action	Department/Directorate	Other Data Sources
3.C2 Liming and 3.C3 Urea Application (Tier 1)	Amount limestone and dolomite	Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947).	DAFF: Agricultural Inputs Control	Fertilizer Society of South Africa
	Amount of urea	Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947).	DAFF: Agricultural Inputs Control	
	Emission factor	National Environmental Management: Air Quality Act (2004)	DEA: Climate Change and Air Quality Directorate	

The amount of limestone and dolomite was sourced from the Fertilizer Society of South Africa. A formal monitoring agreement should be set up between the Fertilizer Society of South Africa and DAFF. The amount of urea is not monitored, the data used was assumed to be the amount of urea imported in South Africa, and this is likely to be an overestimate. The emission factors for this category were sourced from IPCC 2006 defaults.

6.3.3 3.C4 Direct N₂O Emissions from managed soils

There are 17 indicators that are required to be monitored by the IPCC (2006) guidelines for Direct N₂O Emissions from managed soils, when following the tier 1 approach. The indicators in the table below are mostly covered by the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act as well as the Agricultural Research Act which fall under the responsibility of DAFF. The emission factor indicators are covered by the National Environmental Management: Air Quality Act under the responsibility of DEA. Other data sources are available from the Fertilizer Society of South Africa, Agri SA and the Tshwane University of Technology.

Table 19: 3.C4 Direct N₂O Emissions from Managed Soils Indicators (IPCC 2006 Guidelines).

IPCC Group	Indicator	Mandated Action	Department/Directorate	Other Data Sources
3.C.4 Direct N ₂ O emissions from managed soils	N fertilizer consumption data (F _{SN})	Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947).	DAFF: Agricultural Inputs Control	Fertilizer Society of South Africa
	Animal population data	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	Agri SA

Annual average N excretion per head of species			
Manure management system usage data	Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947).	DAFF: Agricultural Inputs Control	Lindeque du Toit. Tshwane University of Technology.
Managed manure nitrogen lost	Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947).	DAFF: Agricultural Inputs Control	Fertilizer Society of South Africa Agri SA
Amount nitrogen from bedding			
Fraction of managed manure used for feed, fuel, construction,			
N mineralization associated with loss of soil organic matter (F_{SOM})			
N from managed organic soils (F_{OS})			
N inputs from compost			
Waste water treatment data	The Water Services Act (Act No. 108 of 1997)	DWAS: National Water Resource Infrastructure	
End users of sewage sludge			
Actual data for crop residue left on land	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	Agri SA.
Crop production data			
Above and below ground residues	Agricultural Research Act (1990)	DAFF: Policy Research Support Directorate	
N ₂ O emission factor for managed soils	National Environmental Management: Air Quality Act (2004)	DEA: Climate Change and Air Quality Directorate	
Emission factor for pastures, rangelands, and paddocks			

National consumption data for N fertilizer was sourced from the Fertilizer Society of South Africa.

The calculation of emissions from organic nitrogen inputs (F_{ON}) required data from managed manure inputs (F_{AM}), compost and sewage sludge. To calculate managed manure inputs animal population data was sourced from the Abstracts of Agricultural Statistics 2012 and nitrogen excretion per head of species was estimated using the IPCC 2006 guidelines. In addition to this manure management system usage data for lactating cows and heifers was sourced from Du Toit et al. 2013a and 2013 b, as well as from DAFF 2010.

Insufficient data was available for the amount of nitrogen from bedding and the fraction of managed manure used for feed, fuel, and construction. The indicators “nitrogen mineralisation associated with loss of soil organic matter” and “nitrogen managed from organic soils” were excluded from calculations as per DAFF 2010. Nitrogen inputs from compost were sourced from DAFF 2010 and Otter 2011. Waste water treatment data was provided by DWA 2009 and end users of sewage sludge was sourced from Snyman et al. 2004.

To calculate nitrogen inputs from crop residue (F_{CR}), crop production data was sourced from Abstracts of Agricultural Statistics 2012. While IPCC 2006 default values were used for the above and below ground residues. To improve the accuracy of the emissions calculations it is suggested that South African specific factors are used for above and below ground residues.

The calculation for nitrogen inputs from manure deposited by livestock on pastures, rangelands and paddocks (F_{PRP}) sourced the animal population and nitrogen excretion per head of species data as per managed manure inputs above.

Lastly the IPCC 2006 default values were used for the N_2O emission factor for managed soils and the pastures, rangelands and paddocks, which was partly sourced from DAFF 2010. The largest component of N_2O emission from managed soils originated from the inputs of animal manure and manure deposited on pasture, rangelands and paddocks. Therefore it is important for South Africa to determine country specific emission factors for these emissions as opposed to using IPCC default values.

6.3.4 3.C5 Indirect N₂O Emissions from managed soils

There are eight indicators that are required to be monitored by the IPCC (2006) guidelines for Indirect N₂O Emissions from managed soils, when following the tier 1 approach. The indicators in the table below are covered by the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act as well as the National Environmental Management: Air Quality Act which fall under the responsibility of DAFF and DEA. Most of the indicators are also monitored by the Fertilizer Society of South Africa.

Table 20: 3.C5 Indirect N₂O Emissions from Managed Soils (IPCC 2006 Guidelines).

IPCC Group	Indicator	Mandated Action	Department/Directorate	Other Data Sources
3.C.5 Indirect N ₂ O emissions from managed soils (Tier 1)	N mineralization associated with loss of soil organic matter (F _{SOM})	Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947).	DAFF: Agricultural Inputs Control	Fertilizer Society of South Africa Agri SA
	Nitrogen inputs from manure deposited by livestock on pasture, range and paddock (F _{PRP})			
	Crop residue inputs (F _{CR})			
	Organic nitrogen inputs (F _{ON})			
	Synthetic fertilizer use (F _{SN})			
	Emission factors	National Environmental Management: Air Quality Act (2004)	DEA: Climate Change and Air Quality Directorate	
	Volatilization factor			
	Leaching factor			

The data used for F_{SOM}, F_{PRP}, F_{CR}, F_{ON}, and F_{SN} data was obtained from the same sources as described in 3.C4 direct N₂O emissions from managed soils, above. As per the DAFF 2010 report, F_{SOM} is assumed to be minimal and is therefore excluded. The emission, volatilization and leaching factors were sourced from the IPCC 2006 default table. In terms of the emission factors it is suggested that South African specific factors are developed for fertilizer emissions, volatilization and leaching.

6.3.5 3.C6 Indirect N₂O Emissions from manure management

There are three indicators that are required to be monitored by the IPCC (2006) guidelines for Indirect N₂O Emissions from manure management, when following the tier 1 approach. The indicators in the table below are covered by the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act as well as the National Environmental Management: Air Quality Act which fall under the responsibility of DAFF and DEA. The indicators are also monitored by Agri SA and the Tshwane University of Technology.

Table 21: 3.C6 Indirect N₂O Emissions from Manure Management Indicators (IPCC 2006 Guidelines).

IPCC Group	Indicator	Mandated Action	Department/Directorate	Other Data Sources
3.C.6 Indirect N ₂ O Emissions from manure management	Annual average N excretion per head of species	Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947).	DAFF: Agricultural Inputs Control	Agri SA
	Manure management system usage data	Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947).	DAFF: Agricultural Inputs Control	Lindeque du Toit. Tshwane University of Technology.
	Default factors N losses from manure management systems due to volatilization	National Environmental Management: Air Quality Act (2004)	DEA: Climate Change and Air Quality Directorate	

Annual average nitrogen excretion per head of species was estimated using the IPCC 2006 guidelines. In addition to this manure management system usage data for lactating cows and heifers was sourced from Du Toit et al. 2013a and 2013 b, as well as from DAFF 2010. Default fractions of N losses were sourced from the IPCC 2006 Guidelines.

Data from leaching and runoff losses is limited worldwide, no IPCC 2006 default values or tier 1 method is provided, only a Tier 2 method is provided by IPCC. There is currently insufficient data for SA to use the Tier 2 methodology, and therefore no estimate was calculated for manure management nitrogen losses due to leaching and runoff. It is recommended that South Africa works towards the monitoring of leaching and runoff, so that a Tier 2 approach can be used for the next national GHG inventory calculation.

6.3.6 IPCC – 3.D1 Harvested Wood Products

There is one indicator that is required to be monitored by the IPCC (2006) guidelines for Harvested Wood Products, when following the tier 1 approach. The indicator in the table below is covered by the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act which fall under the responsibility of DAFF. This indicator is also monitored by Food and Agriculture Organization of the United Nations.

Table 22: 3.C6 Harvested Wood Products Indicators (IPCC 2006 Guidelines).

IPCC Group	Indicator	Mandated Action	Department/Directorate	Other Data Sources
3.D1 Harvested Wood Products	Production, imports and exports of roundwood, sawnwood, wood-based panels, paper and paperboard, wood pulp and recycled paper, industrial roundwood, chips, and particles, wood charcoal and wood residues.	National Forests Act (1998)	DAFF branch: Forestry	Food and Agriculture Organization of the United Nations.

All data on production, imports and exports of roundwood, sawnwood, wood-based panels, paper and paperboard, wood pulp and recycled paper, industrial roundwood, chips, and particles, wood charcoal and wood residues, was obtained from the Food and Agricultural Organisation of the United Nations (FAOSTAT) database.

6.3.7 Statistics South Africa

The official statistics produced by Stats SA are in accordance with the Standard Industrial Classification Coding System of all Economic Activities (SIC Codes). The table below details the SIC codes used by Stats SA for the agriculture, forestry and fishery sectors and where possible, is aligned with the IPCC Guidelines for National Greenhouse Gas Inventories (2006).

The last census of commercial agriculture was conducted in 2007 and covered production statistics for the following:

- Growing of crops, market gardening and horticulture;
- Farming of animals;
- A combination of the above, mixed farming;
- Game propagation, including related services; and
- Fish hatcheries and fish farms.

The production statistics included the area planted and volume of production per crop type as well as number of livestock and livestock products sold. This data was not available for the 2011 as this census was classified as a population census.

In addition to censuses, Stats SA releases yearly Agricultural Surveys (most recent available from 2013), which serve to monitor trends within the agricultural industry. The survey aims to cover all commercial farms in South Africa and contains information regarding income and expenditure, employee remuneration and book value of assets. The scope of this survey covers:

- Growing of crops, market gardening and horticulture;
- Farming of animals;
- A combination of the above, mixed farming;
- Hunting, trapping and game propagation including related services; and
- Production of organic fertiliser.

Although the yearly Agricultural surveys do not include production statistics, the financial statistics can be used as a proxy to determine the accuracy of data gathered from other sources.

Currently surveys are not available for forestry and fisheries, however Stats SA plans to develop these on a yearly basis. Data from the 2007 Census was available for forestry and fisheries but was excluded from the publication due to data quality concerns.

Stats SA also assists with the Millennium Development Goals submissions for South Africa. The data from the Population Census of 2011 was the key contributor used for the 2013 Millennium Development Goal Report.

Table 23 SIC codes used by Stats SA for the agriculture, forestry and fishery sectors and where possible, is aligned with the IPCC Guidelines for National Greenhouse Gas Inventories (2006).

Division	Group	Class	Subclass	Description	IPCC Alignment
01				Crop and animal production, hunting and related service activities	
	011			Growing of non-perennial crops	
		0111	01110	Growing of cereals (except rice), leguminous crops and oil seeds	
		0112	01120	Growing of rice	
		0113	01130	Growing of vegetables and melons, roots and tubers	
		0114	01140	Growing of sugar cane	
		0115	01150	Growing of tobacco	
		0116	01160	Growing of fibre crops	
		0119	01190	Growing of other non-perennial crops	
	012			Growing of perennial crops	
		0121	01210	Growing of grapes	3.B2 Cropland
		0122	01220	Growing of tropical and subtropical fruits	
		0123	01230	Growing of citrus fruits	
		0124	01240	Growing of pome fruits and stone fruits	
		0125	01250	Growing of other tree and bush fruits and nuts	
		0126	01260	Growing of oleaginous fruits	
		0127	01270	Growing of beverage crops	
		0128	01280	Growing of spices, aromatic, drug and pharmaceutical crops	
		0129	01290	Growing of other perennial crops	
	013			Plant propagation	
		0130	01300	Plant propagation	
	014			Animal production	
		0141	01410	Raising of cattle and buffaloes	3.A: Livestock
		0142	01420	Raising of horses and other equines	
		0143	01430	Raising of camels and camelids	
		0144	01440	Raising of sheep and goats	
		0145	01450	Raising of swine/pigs	
		0146	01460	Raising of poultry	
		0149	01490	Raising of other animals	
	015			Mixed farming	
		0150	01500	Mixed farming	
	016			Support activities to agriculture and post harvest crop activities	
		0161	01610	Support activities for crop production	3.C: Aggregate Sources and Non-CO2 emission sources on land;
		0162	01620	Support activities for animal production	
		0163	01630	Post-harvest crop activities	
		0164	01640	Seed processing for propagation	
	017			Hunting, trapping and related service activities	
		0170	01700	Hunting, trapping and related service activities	
02				Forestry and logging	
	021			Silviculture and other forestry activities	
		0210	02100	Silviculture and other forestry activities	3.B1 Forest land
	022			Logging	3.D1 Harvested wood products
		0220	02200	Logging	
	023			Gathering of non-wood forest products	
		0230	02300	Gathering of non-wood forest products	
	024			Support services to forestry	
		0240	02400	Support services to forestry	

6.3.8 Biennial Update Report

South Africa's approach to climate change mitigation balances the country's contribution as a responsible global citizen, with the economic and social opportunities presented by the transition to a lower-carbon economy. AFOLU provides numerous opportunities for mitigation actions. These actions and their wider co-benefits should be determined and monitored in order to assess mitigation potential within the AFOLU sector.

The country's National Climate Change Response White Paper, published in October 2011, states that the mitigation actions shall:

1. Be needs-driven and customised: Mitigation approaches, policies, measures, programmes, interventions and actions shall meet the special needs and circumstances of those communities and people that are most vulnerable. These approaches shall also be tailored to the specific actor, organisation, sector or sub-sector concerned. In this regard the AFOLU sector has to track mitigation actions within the various sub-sectors such as agriculture and forestry. These actions need to be measured in order to determine the viability and applicability of the approaches to mitigation in the AFOLU sector.
2. Promote GHG-reducing technologies: Mitigation approaches shall promote the development, application, dissemination and transfer of GHG emission-reducing technologies, practices and processes. The AFOLU sector provides a number of unique opportunities to promote and implement GHG emission-reducing technologies. In this regard a clear understanding of the AFOLU sector emissions is vital to track the potential for mitigation opportunities within the sector.
3. Have significant outcomes: Mitigation approaches that are cost-effective and provide substantial GHG emission reductions shall be prioritised. Monitoring mitigation actions in the AFOLU sector will allow data users to analyse the financial viability and GHG emission reductions.
4. Be developmental: Mitigation actions that result in economic growth and job creation, or benefit public health and alleviate poverty, shall take precedence over those approaches with no co-benefits. This study has indicated that it is vital to include both mitigation and adaptation components when monitoring data in the AFOLU sector. Selected indicators as part of the adaptation focus, include national development programmes and strategies. These programmes have a strong socio-economic focus. Mitigation actions in the AFOLU sector will need to be monitored in the context of the socio-economic needs and priorities where these align to agricultural development, the forestry sector and land use management.

South Africa recognises that these mitigation actions need to simultaneously build and maintain the country's international competitiveness, as well as its social, environmental and economic resilience to adverse effects of climate change. In this regard South Africa's first Biennial Update Report highlighted specific mitigation actions that need to be monitored in terms of the AFOLU sector as detailed in Table 20 below.

Table 24: BUR Mitigation and Financing Indicators

BUR: mitigation focused	Indicator	Mandated Action	Department/ Directorate
BUR - IV Mitigation actions	Working on fire programme: <ul style="list-style-type: none"> - Amount of land being managed in accordance with high quality fire and land management customs; - The impact per hectare of land converted to this management customs on emissions being mitigated; - Financial implications; - Social implications 	The National Environmental Management Amendment Act (Act No. 62 of 2008). National Veld and Forest Fire Act (1998)	DEA: Environmental Programmes directorate. DAFF branch: Forestry
	Afforestation projects as per the LTMS: <ul style="list-style-type: none"> - Amount of hectares currently planted in response to commercial afforestation; - Financial implications; - Social implications 	National Forests Act (1998)	DAFF branch: Forestry
	Working for land: <ul style="list-style-type: none"> - Amount of hectares applying bush encroachment thinning; - The impact per hectare of land being thinned from bush encroachers; - Financial implications; - Social implications 	National Environmental Management Biodiversity Act (Act 10 of 2004) National Environmental Management Act (Act 107 of 1998) The Constitution of the Republic of South Africa Act (Act 108 of 1996) Environment Conservation Act (Act 73 of 1989)	DEA: Environmental Programmes directorate.
	Domestic institutional arrangements related to the AFOLU sector	The National Environmental Management Act (NEMA), (Act No. 107 of 1998) Agricultural Research Act (1990)	DEA: Climate Change and Air Quality Directorate DAFF: Policy Research Support Directorate
	Mitigation actions implemented	General Notice: 115 of 2013 National Environmental Management: Air Quality Act, 2004. The 2012 National	DEA: Climate Change and Air Quality Directorate

BUR: mitigation focused	Indicator	Mandated Action	Department/ Directorate
		Framework for Air Quality Management in the Republic of SA.	
	CDM Projects	The National Environmental Management Act (Act 107 of 1998).	Department of Energy: Designated National Authority.
BUR – VI Tracking of support received in AFOLU sector	Financial	Bilateral	Policy directive: The NCCRWP states that: “Government will create a transitional tracking facility for climate finance mechanisms and climate responses that will monitor and coordinate existing climate finance flows.” DEA: Climate Change and Air Quality Directorate National Treasury: International & Regional Economic Policy. Development Bank of South Africa
		Multilateral	
		Private	
	Technology	Bilateral	Policy directive: The NCCRWP states that: “Government will Enable the local development finance institutions to create and implement long-term climate-resilient investment programmes. This includes project development, financial and risk insurance products, technical assistance and capacity-building within their mandates.
		Multilateral	
		Private	
	Capacity	Bilateral	
		Multilateral	
		Private	

The mitigation indicators as defined by the BUR pertaining to AFOLU, effectively bridge the gap between IPCC 2006 indicators and the need to acknowledge wider developmental aspects in the AFOLU sector. The socio-economic context of the AFOLU sector should be monitored in order to build a holistic M&E system. This report identifies specific adaptation indicators which have been selected in order to review socio-economic progress related to the AFOLU sector. AFOLU adaptation indicators are contextualised and monitored in terms of identified developmental programmes and strategies such as the National Development Plan.

6.4 Adaptation related indicators for AFOLU

In discussing an M&E system for the AFOLU sector a holistic approach to indicators should be taken. In this regard such a system should include adaptation related indicators. These indicators will be examined to understand development trends linked to climate change impacts and related potential adaptation actions.

However, these indicators will not be monitored as individual indicators, but rather grouped to provide an overview of the role of the agricultural sector in achieving national development objectives. In addition, measuring progress in the AFOLU sector pertaining to mitigation actions are linked to improved agricultural practices, job creation and sustainable sector growth. These aspects have a socio-economic context which must be taken into consideration within the developmental context of South Africa.

6.4.1 Millennium Development Goals

The effects of a changing climate poses significant risks for achievement of development targets, such as the Millennium Development Goals (MDGs). In formulating the AFOLU M&E, MDG's formed part of the analysis process. Table 21 provides an overview of the MDGs, the relevant indicators in terms of the AFOLU sector as well as a description of the developmental context of the MDGs related to the AFOLU sector.

Table 25: Millennium Development Goals Adaptation Indicators

Reference	Goals (only specifically relevant to AFOLU Sector)	Indicators (only specifically relevant to AFOLU Sector)	Direct link to AFOLU sector – developmental context	Where this is currently monitored/collected?
Broad socio economic development				
Millennium Development Goals	Goal 1: Eradicate extreme poverty and hunger	1.1 Proportion of population below \$1.25 (PPP) per day ¹ 1.2 Poverty gap ratio 1.3 Share of poorest quintile in national consumption 1.4 Growth rate of GDP per person employed 1.5 Employment-to-population ratio 1.6 Proportion of employed people living below \$1.25 (PPP) per day 1.7 Proportion of own-account and contributing family workers in total employment 1.8 Prevalence of underweight children under-five years of age 1.9 Proportion of population below minimum level of dietary energy consumption	<p>Increased food production</p> <ul style="list-style-type: none"> increased food consumption for subsistence farming households. More diverse food production Higher-quality diets. <p>For farming households:</p> <ul style="list-style-type: none"> Increased production increased income through markets increased consumption and household assets. <p>For non-agricultural households:</p> <ul style="list-style-type: none"> Increased production Reduced prices for agricultural products Increased consumption or reduction in share of income spent on food. <p>Increasingly profitable agriculture:</p> <ul style="list-style-type: none"> Potential to economically empower women farmers. <p>Broader economic improvements through dynamic agriculture:</p> <ul style="list-style-type: none"> Increased public expenditures on water and sanitation, health, energy sectors 	Stats SA and Department of Social Development
	Goal 3: Promote gender equality and empower women	3.1 Ratios of girls to boys in primary, secondary and tertiary education 3.2 Proportion of seats held by women in national parliament		Stats SA and Department of Social Development

			<ul style="list-style-type: none"> • Reduced time burden on women for domestic tasks. 	
Goal 5: Improve maternal health	<p>3.3 Maternal mortality ratio</p> <p>3.4 Proportion of births attended by skilled health personnel</p> <p>3.5 Adolescent birth rate</p> <p>3.6 Antenatal care coverage (at least one visit and at least four visits)</p> <p>3.7 Unmet need for family planning</p>	<ul style="list-style-type: none"> • Increasingly profitable agriculture: • Potential to economically empower women farmers. 	<ul style="list-style-type: none"> • Greater and more diverse food production: • Higher-quality diets. • Improved health. 	Stats SA and Department of Social Development
Goal 6: Combat HIV / AIDS, malaria and other diseases	<p>6.1 HIV prevalence among population aged 15-24 years</p> <p>6.2 Proportion of population aged 15-24 years with comprehensive correct knowledge of HIV/AIDS</p> <p>6.3 Proportion of population with advanced HIV infection with access to antiretroviral drugs</p> <p>6.4 Incidence and death rates associated with malaria</p> <p>6.5 Proportion of children under 5 sleeping under insecticide-treated bed nets</p> <p>6.6 Proportion of children under 5 with fever who are treated with appropriate anti-malarial drugs</p> <p>6.7 Incidence, prevalence and death rates associated with tuberculosis</p> <p>6.8 Proportion of tuberculosis cases detected and cured under directly observed treatment short course</p>	<ul style="list-style-type: none"> • Greater and more diverse food production: • Higher-quality diets. • Improved health. 	<ul style="list-style-type: none"> • More dynamic agricultural sector: • Increased income. • More resources to devote to health services. 	Stats SA and Department of Social Development
Goal 7: Ensure environmental sustainability	<p>7.1 Proportion of land area covered by forest</p> <p>7.2 CO2 emissions, total, per capita and per \$1 GDP (PPP)</p> <p>7.3 Consumption of ozone-depleting substances</p> <p>7.4 Proportion of fish stocks within safe biological limits</p>	<ul style="list-style-type: none"> • More productive agricultural technologies: • Withdrawal of agriculture from marginal, sensitive environments. 	<ul style="list-style-type: none"> • Agriculture practices can be both direct causes of and important immediate solutions to environmental degradation. 	Stats SA and Department of Social Development

	<p>7.5 Proportion of total water resources used</p> <p>7.6 Proportion of terrestrial and marine areas protected</p> <p>7.7 Proportion of species threatened with extinction</p> <p>7.8 Proportion of population using an improved drinking water source</p> <p>7.9 Proportion of population using an improved sanitation facility</p>	<ul style="list-style-type: none"> • More profitable agricultural sector. 	
<p>Goal 8: Develop a global partnership for development</p>	<p>Official development assistance (ODA)</p> <p>8.1 Net ODA, total and to the least developed countries, as percentage of OECD/DAC donors' gross national income</p> <p>8.2 Proportion of total bilateral, sector-allocable ODA of OECD/DAC donors to basic social services (basic education, primary health care, nutrition, safe water and sanitation)</p> <p>8.3 Proportion of bilateral official development assistance of OECD/DAC donors that is untied</p> <p>8.4 ODA received in landlocked developing countries as a proportion of their gross national incomes</p> <p>8.5 ODA received in small island developing States as a proportion of their gross national incomes</p> <p><u>Market access</u></p> <p>8.6 Proportion of total developed country imports (by value and excluding arms) from developing countries and least developed countries, admitted free of duty</p>	<p>Expanding global agriculture trade increases need for formal trading partnerships and rules:</p> <ul style="list-style-type: none"> • Capital requirements for comprehensive agricultural development • Significant increases in development assistance offered to the agriculture sector. <p>More profitable agricultural sector:</p> <ul style="list-style-type: none"> • Expectation of better governance and provision of public goods by governments to sustain the benefits from agriculture in the long term. 	<p>Stats SA and Department of Social Development</p>

		<p>8.7 Average tariffs imposed by developed countries on agricultural products and textiles and clothing from developing countries</p> <p>8.8 Agricultural support estimate for OECD countries as a percentage of their gross domestic product</p> <p>8.9 Proportion of ODA provided to help build trade capacity</p> <p><u>Debt sustainability</u></p> <p>8.10 Total number of countries that have reached their HIPC decision points and number that have reached their HIPC completion points (cumulative)</p> <p>8.11 Debt relief committed under HIPC and MDRI Initiatives</p> <p>8.12 Debt service as a percentage of exports of goods and services</p>		
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6.4.2 NDP Related Adaptation Indicators

The National Development Plan (NDP) is South Africa's guiding development strategy, outlining a robust growth direction and a move towards a low carbon economy. The NDP is cognisant of the major role agriculture can play in sustaining development and growing rural economies of scale. In this regard the AFOLU M&E system, specifically with regards to sector development on a rural scale, must take the NDP into consideration.

Table 26: NDP Related Adaptation Indicators

NDP Focus	Indicators related to the AFOLU Sector
Transforming the economy and creating sustainable expansion for job creation means that the rate of economic growth needs to exceed 5 percent a year on average.	Increasing exports, focusing on those areas where South Africa already has endowments and comparative advantage. These include mining, construction, mid-skill manufacturing, agriculture and agro-processing, higher education, tourism and business services.
An Inclusive and integrated rural economy	Creating more jobs through agricultural development. This is based on effective land reform and the growth of irrigated agriculture and land production.
	Providing basic services that enable people to develop capabilities to take advantage of opportunities around the country. This will enable them to contribute to their communities through remittances and skills transfer.
	Developing industries such as agro-processing, tourism, fisheries and small enterprises where potential exists.
Differentiated rural development strategy	Agricultural development based on successful land reform, employment creation and strong environmental safeguards. To achieve this, irrigated agriculture and dry-land production should be expanded, with emphasis on smallholder farmers where possible. To this end, established agricultural industries must be enabling partners.
	Quality basic services, particularly education, health care and public transport. Well-functioning and supported communities enable people to seek economic opportunities. This allows them to develop their communities further through remittances and the transfer of skills, which will contribute to the local economy.
	In areas with greater economic potential, industries such as agro-processing, tourism, fisheries (in coastal areas) and small enterprise development should be developed with market support. Special focus to enhance skills and capabilities of rural women entrepreneurs with access to land and finance.
As the primary economic activity in rural areas, agriculture has the potential to create close to 1 million new jobs by 2030. This is a significant contribution to the overall employment target.	Expand irrigated agriculture. Evidence shows that the 1.5 million hectares are under irrigation (which produce virtually all South Africa's horticultural harvest and some field crops). These can be expanded by at least 500 000 hectares through the better use of existing water resources and developing new water schemes.
	Make use of underused land in communal areas and land-reform projects for commercial production.
	Pick and support commercial agriculture sectors and regions that have the highest potential for growth and employment.

NDP Focus	Indicators related to the AFOLU Sector
	Support job creation in the upstream and downstream industries. Potential employment will come from the growth in output resulting from the first three strategies.
	Find creative combinations between opportunities. For example, emphasis should be placed on land that has the potential to benefit from irrigation infrastructure. Priority should be given to successful farmers in communal areas, which would support further improvement of the area; and industries. Areas with high potential to create jobs should receive the most support. All this will increase collaboration between existing farmers and the beneficiaries of land reform.
	Develop strategies that give new entrants access to product value chains and support from better-resourced players.
Creating jobs in agriculture will not be easy. It will require credible programmes, sound implementation, significant resources and stronger institutions, such as agriculture departments in local and provincial government.	The effectiveness of extension officers depends on performance, capacity and level of priority given by provincial agricultural departments.

The NDP provides an overview of relevant socio-economic considerations in terms of the AFOLU sector. In measuring the progress of the NDP from a national perspective, the AFOLU sector will need to align socio-economic development priorities across its various sectors with the NDP. This will provide an overview of the role of the AFOLU sector in achieving the developmental goals of the NDP.

7 Key AFOLU indicators for M&E

The purpose of the South African AFOLU Climate Change M&E system would be to effectively monitor indicators to track climate change impacts and drivers as well as interventions. The system's goals are to improve the quality, process, transparency and reliability of AFOLU climate change data.

The first step in determining key indicators is to identify requirements for monitoring based on *inter alia* critical sectors to be assessed. The following key documents or AFOLU data users were identified:

- South African National GHG Inventory (2010);
- IPCC Guidelines for National Greenhouse Gas Inventories (2006);
- The National Climate Change Response White Paper (NCCRWP);
- South Africa's Second National Communication; and
- South Africa's First Biennial Update Report.

The NCCRWP outlines a combination of actions that are required in order to meet the National Climate Change Response Objective. The paper suggests that indicators should include mitigation potential and-, incremental and direct cost of measures. Indicators should also include the broader impact on socio-economic development indicators (such as employment and income distribution), international competitiveness, the cost to poor households and any negative consequences for key economic sectors. For these reasons, the indicator section of this report covers both mitigation and adaptation related indicators.

In order to effectively manage climate change responses the NCCRWP suggests the following:

- A monitoring system for gathering information (with bottom-up inputs where possible) and providing progress reports on the implementation of adaptation actions;
- Identification of key role-players involved in monitoring and measuring these indicators. Also detailing how these role-players will share and report information on observed climate change.

The National GHG Inventory (2010) of South Africa, followed the Tier 1 approach of the IPCC 2006 Guidelines for the AFOLU sector. The IPCC 2006 guidelines on AFOLU present methods and data for Tier 1 inventories. These methods are generally also applicable to Tier 2 inventories, but include replacing the default data with national data as part of a Tier 2 estimation. Tier 3 methods in the AFOLU section of the IPCC are not described in detail, but rather good practice in application is outlined. The National Inventory follow a tier 1 approach in terms of the indicators and details are given regarding improvement from tier 1 to tier 2.

The selection of key AFOLU M&E indicators for climate change mitigation was informed by section "5.2.2 Key sources" as detailed in the AFOLU chapter of the South African National GHG Inventory (2010). The key indicators were selected based on the amount by which each category contributed to the total AFOLU GHG emissions. The highest contributions of emissions came from three sources: Livestock, Land and Aggregated sources & non-CO₂ emission sources on land. Consequently, these have been selected as the three key mitigation indicators that need to be monitored within the AFOLU sector.

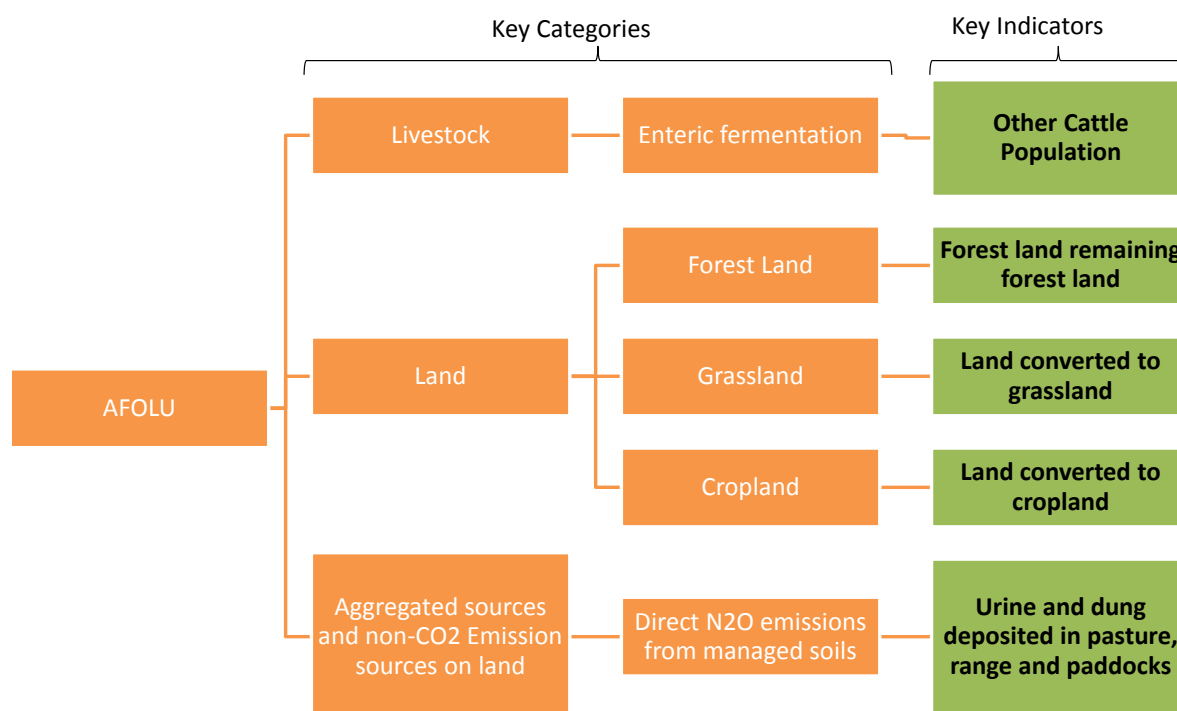


Figure 13: Key mitigation indicators for AFOLU M&E Indicators based on the National GHG Inventory (2010).

In developing a robust and holistic monitoring system, this study recognises the importance of monitoring adaptation related data and efforts. Based on the project team’s approach in this regard, key baskets of adaptation indicators have been outlined in Figure 14 below.

AFOLU Adaptation indicators relate to the social and economic environment of agriculture, forestry and other land use. This is contextualised in strategic documents such as the National Development Plan (NDP) and development initiatives such as the “Working for” programmes. Therefore it is suggested that the development goals linked to the following strategies and programmes be measured:

- “Working For” programmes (Fire, Land, Afforestation projects as per LTMS);
- National development priorities as outlined in NDP vision for 2030; and
- Five of the eight Millennium Development Goals link to the AFOLU sector.

The development objectives per programme / strategic document will be grouped to provide an overview of the role of the agricultural sector in achieving national development objectives. As a result a “basket” of indicators will be monitored as illustrated in Figure 10. This will enable the M&E system to track vulnerability or resilience appropriate to national circumstances and priorities.

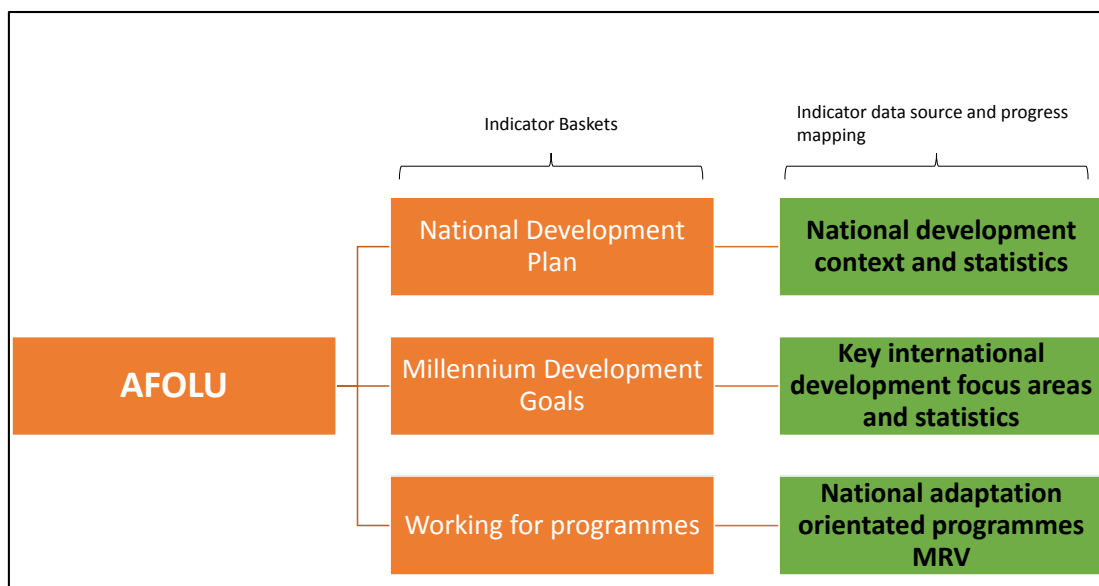


Figure 14: Key Adaptation indicators for AFOLU M&E.

The National Climate Change Response Monitoring and Evaluation System Framework informed the selection of indicators for the AFOLU M&E system. This Framework follows a tiered approach in tracking transition to a lower-carbon economy.

A range of national and international studies pertaining to monitoring emissions in the AFOLU sector were referred to further inform prioritisation of indicators. In addition, mandates were mapped taking the diverse nature of the AFOLU sector into account. Findings were grouped as high-level/key indicators and IPCC 2006 indicators.

The key indicators are based on South Africa’s National GHG inventory. These indicators provided the context in which current data practices were assessed. The IPCC 2006 indicators were used to determine gaps in current data collection practices by comparing it to the National GHG inventory. Specific adaptation indicators, grouped in terms of strategy or programme, have also been added to the AFOLU M&E system. This process is further illustrated in Figure 15 below.

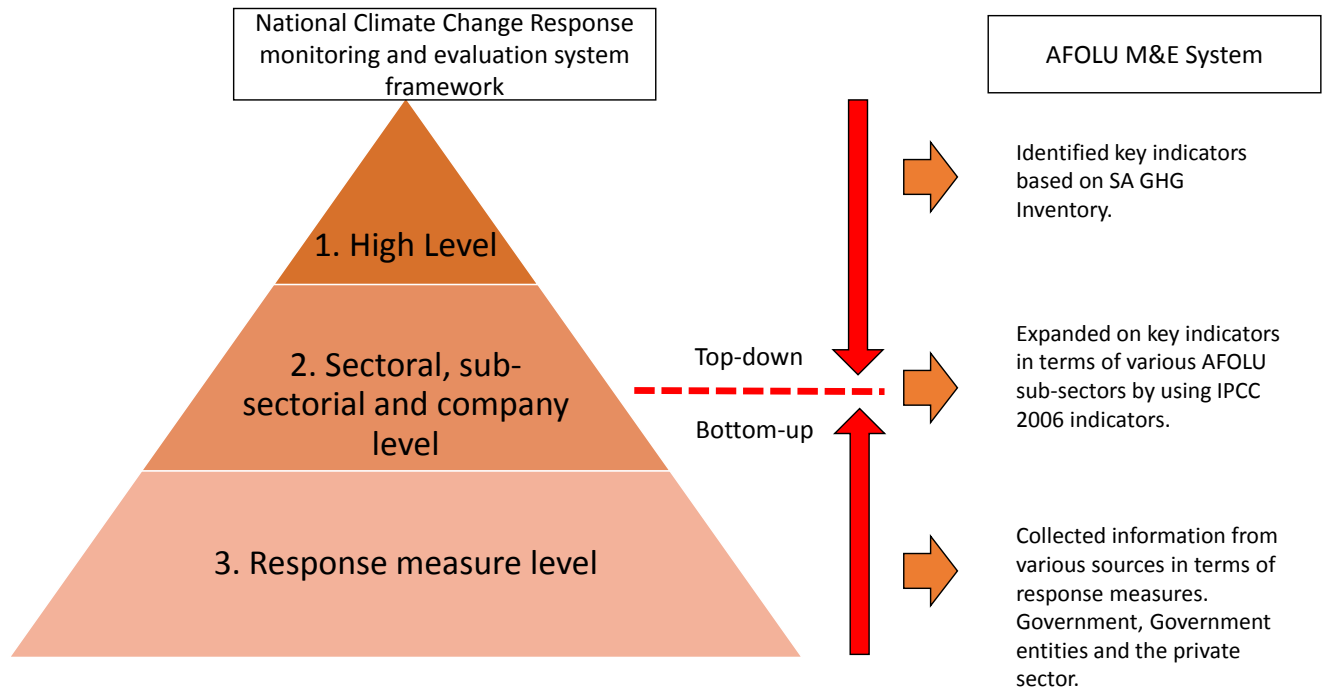


Figure 15: Aligning AFOLU M&E approach to National Climate Change Response Monitoring and Evaluation System Framework

It is evident that the key AFOLU sector indicators identified and defined in this study is aligned to the National Climate Change Response Monitoring and Evaluation system framework. This will ensure that the development and the implementation of the AFOLU M&E system will contribute effectively and constructively to the current national monitoring and evaluation activities within the DEA.

8 AFOLU M&E Cost and Viability Assessment

The AFOLU M&E cost and viability assessment pertains to the implementation of an M&E system that will support the collection, collation and dissemination of data as per the suggested indicators. The viability of this system is dependent on an approach which allows for continuous improvement. We therefore propose that in order to ensure the sustainability of the AFLOU M&E system, the development thereof should be approached in phases. This is illustrated in Figure 16 below. Such a phased approach implies that the M&E system builds on existing data collection methods whilst growing the necessary internal capacity and momentum to extend into further detail.

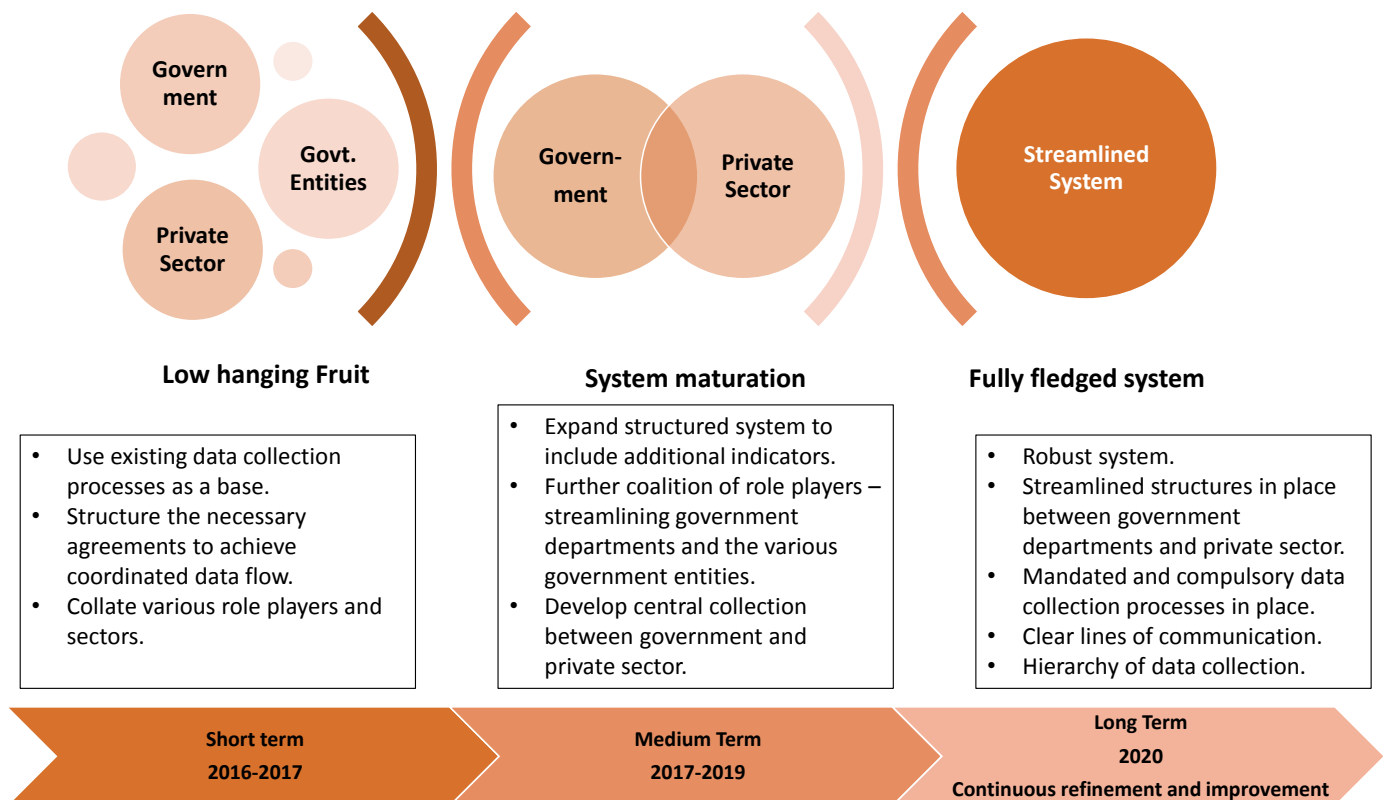


Figure 16: Proposed phased approach to AFOLU M&E System

The objective of the AFOLU M&E system is to:

- Streamline data collection and continuously improve on the way data is collected;
- Share information which would assist in the development of practical adaptation and mitigation strategies for the sector through analysis, benchmarking and trending of data;
- Build an archive of historic data related to the AFOLU sector; and
- Grow the AFOLU knowledge base in both the government and private sectors.

These objectives of the AFOLU M&E system are aligned to the principles set out for such a system in the draft Strategic Plan prepared for the climate change response monitoring and evaluation system for

AFOLU⁷. Table 27 below illustrates the link between the Strategic Plan principles and the objectives of the proposed AFOLU M&E system as per this study.

Table 27: Relationship between proposed AFOLU M&E system objectives and AFOLU MRV Draft Strategic Plan

AFOLU MRV Draft Strategic Plan 2014: Principles	Proposed AFOLU M&E System alignment to principles
Build on existing knowledge and systems.	✓ The proposed AFOLU M&E system acknowledges the importance of using existing processes as a development basis. Because of this, current data collection practices must be optimised and improved on to support structured data processing.
Start with a simple approach and ‘best available’ data.	✓ This study proposes a phased approach to the implementation of the AFOLU M&E system. This approach suggests that “low hanging fruit” be maximised. In other words, existing operational systems must be used and improved. This should be done through formal agreements on data collection: who collects, who submits, to whom, and by when. Clear communication on requirements and timelines for data requirements is vital. It would also be beneficial to provide the context for data collection to illustrate the holistic value of the AFOLU M&E process.
Avoid duplication in seeking data and information to monitor the indicators of the climate change M&E system for the AFOLU sector.	✓ The proposed AFOLU M&E system is based on the mandate mapping which was an objective of this study. This mapping gives a clear picture of mandated data custodians in both the private and government sector. The M&E system is based on maximising these structures and streamlining communication across these various departments and entities.
Seek out, and enhance linkages and synergies between, research outputs and environmental policy and good practices in the land sector.	✓ The proposed AFOLU M&E system acknowledges a wide range of potential and existing contributors to the AFOLU body of knowledge. Therefore the M&E system proposes the formalisation of existing data collection structures as well as the inclusion / recognition of additional data sources. Facilitating data collection across a wide range of stakeholders will ensure that data is holistic in nature and subsequently beneficial to numerous industries and departments.
Communication and profiling of end-user specific benefits and products, as well as their impact on national adaptation and mitigation interventions.	✓ The proposed M&E system proposes a communication liaison officer to enable and develop relations within the AFOLU sector. Such a position will streamline data collection but also enable wider use of the collated data across sectors and departments. In addition, this position will package data in such a way that it is user-friendly.

The alignment between the principles of the MRV Strategic Plan and the proposed AFOLU M&E system will ensure ease of implementation. In order to implement the first phase of this proposed system for AFOLU M&E, there are three key components which need to be taken into consideration:

⁷ Draft Strategic Plan: Climate change response monitoring and evaluation system of AFOLU 2013-2015; South Africa Land Sector MRV Capacity Building Project, November 2014.

1. A structured, web-based data platform, including archiving. This system should be a centralised data receiving point for all the various role-players currently collecting AFOLU related data.
2. Human resources to assist in the data collation process. A dedicated team will be the most effective way of driving and coordinating the process of obtaining and synthesising the data.
3. A systematic method of data processing in order to disseminate information in a practical format.

The following sections will elaborate on these components.

8.1 Cost and viability methodology applied

The cost and viability assessment for the AFOLU M&E system was based on the three system components identified. These components were broken down into implementation requirement, which were subsequently costed. Figure 17 further illustrates the methodology followed in this regard.

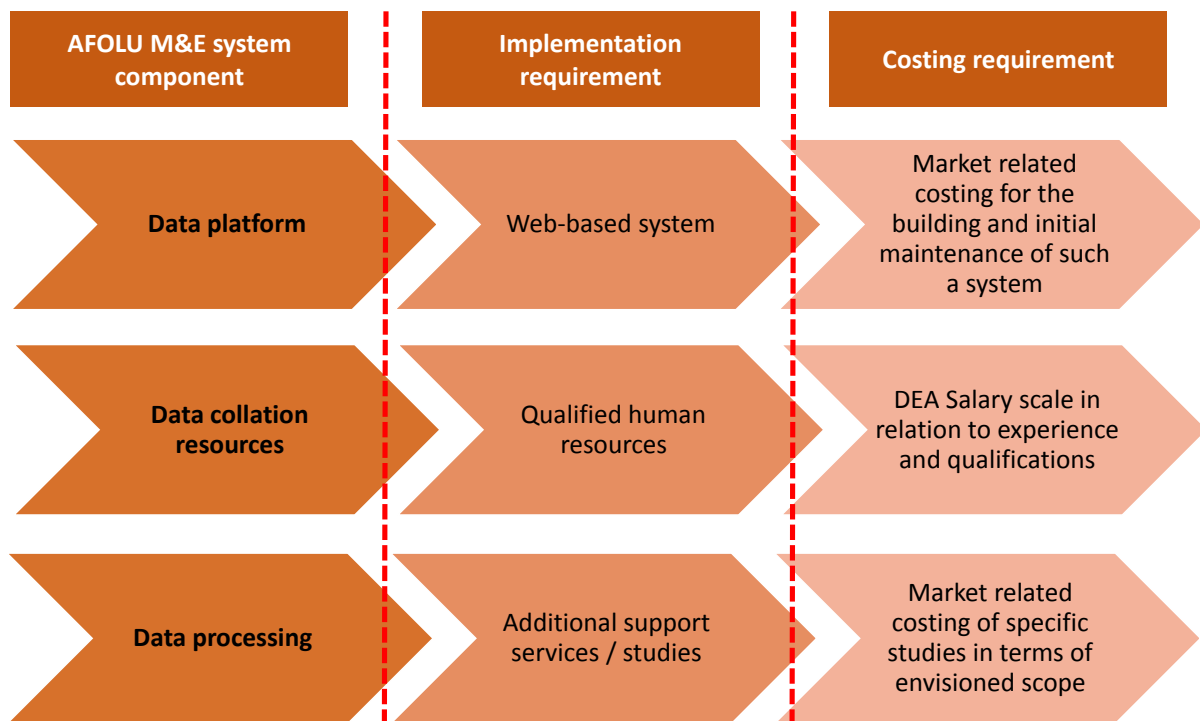


Figure 17: AFOLU M&E Cost and Viability Methodology

8.2 Components of the AFOLU M&E cost and viability assessment

The AFOLU M&E system components are the building blocks for the first phase – low hanging fruit / short term strategy – of the phased approach to building the M&E system. These include: infrastructure to support data collection; human resources to drive collection and collation as well as processes by which data is utilised and disseminated.

The proposed M&E system should build on existing capacity and current data collection practices within the AFOLU sector and the DEA. This will ensure a sound foundation from which to expand and mature.

8.2.1 AFOLU M&E Data Platform

To effectively streamline the collection of data, it is suggested that a web-based system be developed. Subsequently, all relevant parties will submit data to DEA through an interactive system. This will ensure homogenous formatting and data output. Such a data platform will serve as a centralised point of contact for data and information provision. The system will feed into a data processing structure which will include quality control and the monitoring of information received.

It is suggested that the current network be utilised for day to day operations of the AFOLU M&E. However, a managed network should be investigated for archiving purposes. In addition, some form of “cloud storage” could potentially streamline inter-department communication and data sharing.

A central web-based file management for sharing and accessing information should mirror the existing file management system and allow for access control. There are numerous options available in this regard and the DEA will need to select a service provider.

Version control should be managed through defined file naming and quality management processes to be finalised within the AFOLU M&E system. The system should allow for electronic audit trail procedures to monitor access and use.

The advantages of such a data collection platform include the following:

- **Increased efficiency** – being able to report and function in an organised manner with all data stored and readily usable.
- **Time efficient** – once data is stored and filed it becomes easy to locate and extract the required information.
- Data management provides an opportunity to **simplify** the convergence of diverse and varied sources of data for use in different national and international reports.
- Data management allows for **effective record keeping** which will become increasingly important in terms of international technical and financial support within the context of climate change and the dynamic nature thereof.
- A data management system **preserves and protects data**.
- Through a structured and well managed data management system it becomes **easier to share and transfer data** between the various departments and key stakeholders identified within the context of international reporting.

DEA should not be responsible for the primary data collection process. As the custodians of the AFOLU M&E system, DEA is responsible for the collection of data from various sources as a user and then to collate data in terms of the identified key and detailed indicators.

In terms of archiving, the following should be kept in mind:

- How much data needs to be archived? Or how long should historical data be stored for?
- What is the growth rate of data and how is this managed?
- How often should a backup be done?
- What are the archiving requirements for the various national and international reports?
- Who will be responsible to manage and implement the necessary archiving system?

The goal of data archival is to preserve the data and associated information for future users. This will allow future users to fully understand and use the data independent of the original data producer and independent of foregoing reporting processes and final reports.

Automating the data archiving process and using purpose-built archive systems will allow production systems to run better, use less resources, and reduce overall storage costs. Production performance is unaffected by information growth. Backup and recovery runs faster, disaster recovery is less costly, and systems are easier to manage. Data moved into archives is stored at a much lower cost.

Once in the archive system, information remains online and accessible. Original content is preserved to ensure complete, reliable integrity for the life of the archived information. This information would feed into the National Climate Change Response Database and could also be used in informing updates, where relevant, for example the National Land Cover Data set.

The archiving system should include the following:

- Reports submitted.
- Official data.
- Methodologies, assumptions used in National GHG inventory calculations.
- Reports from which the data has been extracted.

Importantly, the AFOLU data and related data processes should be linked to the M&E System within the Climate Change Branch of DEA.

In terms of cost and viability, the following is applicable:

Table 28 Cost and viability of the AFOLU M&E platform.

<p>Cost and viability consideration.</p>	<ul style="list-style-type: none"> • Development of an electronic, web-based and interactive system. • System to include web-based portal and archiving structure. • Estimated cost for the web-based system is R 2 million. <p>The viability of such a system lies in the centralisation and automation of AFOLU data from various sources in a time-effective manner. It provides a platform to build the AFOLU knowledge base. In addition such a system will enable easier data sharing across a wide range of stakeholders.</p>
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8.2.1.1 Data requirements

Data requirements should be developed as part of the short term focus. Existing data practices should be used as a benchmark to define data requirements. Typical challenges in terms of data collection, based on the assessment of mandates and existing data collection practices could include⁸:

- Data quality generally has not been systematically assessed. It is therefore difficult to evaluate the quality of data within some datasets;
- A lot of the data required is within the private sector through voluntary industry associations. The issue of confidential data is one which is becoming more pressing, particularly in light of production of various agri-environmental inputs such as fertilizers and pesticides;
- Some data is too aggregated, some too site-specific (particular for the processing phase, where figures might be plant-specific) – the right balance between practicality and accuracy is required to compile data on a national and sector level;
- Guidance is needed to deal with data gaps. Clear and consistent data input requirements and procedures need to be established and implemented in the various AFOLU sectors;
- Baseline emissions factors from different farming systems need to be established and better descriptions of agricultural land management practices and their emission impacts are needed.

In order to address these challenges, data requirements could include (but will not be limited) the following criteria:

- **Specific:** The proposed indicators provide a clear and concise definition of the information required.
- **Measurable:** Data must be measurable, in other words it must be concrete and definitive expectation with regards to the various indicators must be communicated.
- **Relevant:** Data must be relevant to the indicator and to the category.
- **Timeous:** Time-sensitive and time-relevant information is critical to contribute to the practical use and application of the data.

Clear communication of AFOLU categories and indicators is essential. The need for more information on data would link to interdepartmental communication or the needs of the data platform.

8.2.2 Data Collation

In order to effectively collate the data from the web-based system, there are specific human resource requirements. These include an administrative position which would be responsible for the coordination of the data collection. Such coordination will include sending notifications to all relevant parties regarding the collection of data and the timeframes, as well as forwarding questionnaires pertaining to the various indicators. In addition two positions should be allowed for the processing of the data. This includes the formatting of data and the collations of data pertaining to the various indicators from different data sources. The DEA will not collect primary data. The proposed human resource structure pertains to the collation and processing of data, once received from the various data custodians.

⁸Based on similar findings in FAO report: (Sessa, Not stated)

The following diagram illustrates the human resource hierarchy linked to the AFOLU M&E system.

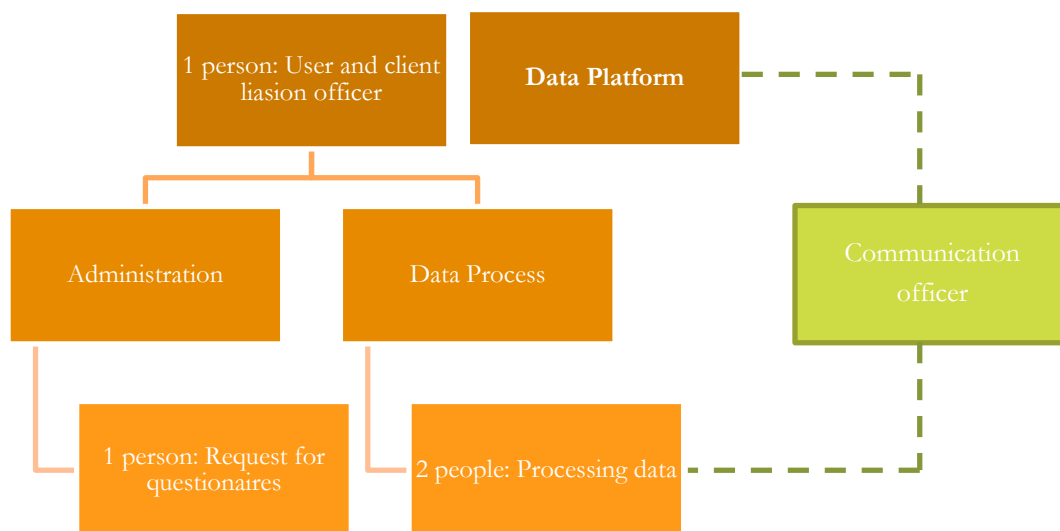


Figure 18: AFOLU M&E Data processing human resources

In terms of documenting data – this process will continuously feed into the data collection process whereby varying departments and stakeholders are requested to provide raw/completed data. Criteria for data collection include the following:

- Which indicator or indicator basket should be collected,
- Measurement type,
- Data type,
- Operational definition,
- The quality of measurement/data,
- Who, how to collect, when, and where.

Taking the above into consideration, key issues for determining and integrating data requirements and formalising data collection systems across government and private sectors should include the following:

- Know the legal, ethical and other obligations regarding data, towards data collection participants, colleagues, research funders and institutions.
- Implement good practices in a consistent manner.
- Assign roles and responsibilities to relevant parties in the various reporting and functional phases.
- Design data management according to the needs and purpose of the AFOLU sector and the international reporting context.
- Incorporate data management measures as an integral part of the reporting cycle.
- Implement and review data management throughout.

The team described in the table below should take the following into account:

Table 29 Cost and viability for human resources suggested for the AFOLU M&E system.

<p>Cost and viability consideration</p>	<ul style="list-style-type: none"> • 5 permanent positions based on the DEA salary scale: • 1 candidate user and client liaison officer: post/salary level 11 Salary: R532 278 • 2 candidates processing data: post /salary level 7
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	<p>Salary: R 273 222/pa</p> <ul style="list-style-type: none"> • 1 candidate request for questionnaires: post/salary level 13 Salary: R 148 000/pa Total: R1 226 722 / pa • 1 candidate communication officer: post/salary level 11 Salary: R532 278 <p>Total cost of 5 permanent positions is R 1 759 000.</p> <p>Dedicated resources will ensure that data is collected and coordinated timeously. A dedicated team will enhance the functionality of a web-based system by processing and packaging data for ease of use.</p>
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8.2.3 Data Processing

As mentioned, one of the objectives of the AFOLU M&E system should be to build the knowledge base pertaining to the various AFOLU components. In this regard, once data has been received the enhanced value thereof lies in analysis, benchmarking and trending of the data. This will enable both the DEA as well as all relevant parties, to pro-actively track and understand changes within the sector. Information of this nature will enable a common understanding pertaining to practical mitigation and adaptation to drive the sustainable management of emissions within the sector. Data processing should include the following:

- The context of data collection: project history, aim, objectives and hypotheses.
- Data collection methods: sampling, data collection process, instruments used, hardware and software used, scale and resolution, temporal and geographic coverage and secondary data sources used.
- Dataset structure of data files, study cases, relationships between files.
- Data validation, checking, proofing, cleaning and quality assurance procedures carried out.
- Changes made to data over time since their original creation and identification of different versions of data files.
- Information on access and use conditions or data confidentiality.

The following diagram illustrates the various action outputs as a result of processing data in the AFOLU M&E system. Data will be used to understand climate change impacts in the AFOLU sector. It will also assess and define appropriate and sustainable adaptation and mitigation options. In addition data could provide an overview of climate finance, where possible. The communication officer will ensure that feedback of trends, analysis, benchmarking and reporting from AFOLU M&E system will provided to the various AFOLU sectors and data providers.

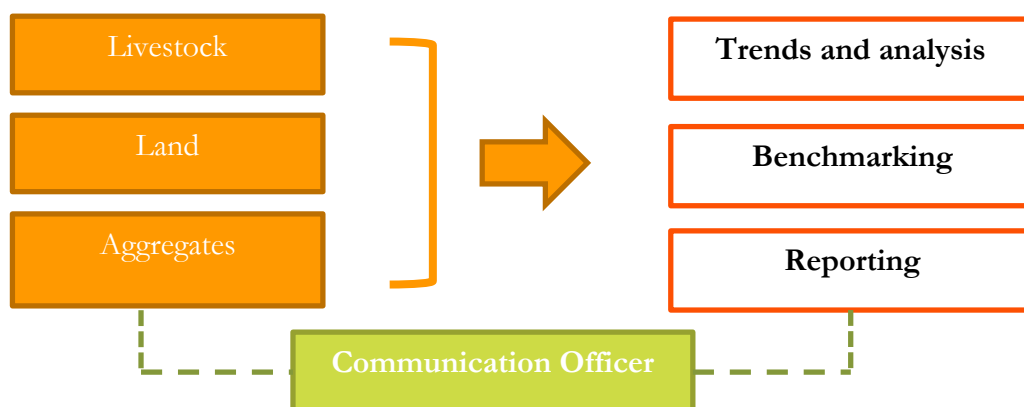


Figure 19: Data processing outputs from the AFOLU M&E system.

As part of data processing, data sharing is of critical importance in monitoring and evaluation. In this regard the data management system of the AFOLU sector should allow for ease of access to information and for streamlined means in which to share data. The benefits of data sharing include:

- Encourages scientific enquiry and debate.
- Promotes innovation and potential new data uses.
- Leads to new collaborations between data users and data creators.
- Maximises transparency and accountability.
- Enables scrutiny of research findings.

As mentioned earlier, the value of the data is not only in monitoring, but also in the evaluation thereof. This implies data should be made available in order for all interested data users and stakeholders to make use thereof and draw sector-wide conclusions. An example of a data use could be research.

However, in sharing data the following good practices should be kept in mind: synchronisation, version control and access restrictions to ensure that the information reaches and are used by the intended people.

Table 30 Cost and viability of data processing.

<p>Cost and viability consideration</p>	<p>Independent consulting:</p> <ul style="list-style-type: none"> • Standardised reporting templates. • External review and quality control. • Stakeholder consultation on trend analysis. <p>These could be separate outsourced consulting arrangements.</p> <ul style="list-style-type: none"> • Costing approximately: R200 000 - R400 000 per study <p>The viability of the AFOLU M&E system will depend on the system’s capacity and ability to continuously improve. The diverse nature of the AOFLU sector and the rapid pace at which climate information develops improved practices are but two of the variables that will continuously challenge findings within this sector. In this regard the AFOLU M&E system must be able to respond effectively to these variables. Flexibility through maturation of the system is critical to ensure its viability.</p>
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	The costing for the second and final phases of the system approach as per Figure 13 will be developed over time. Once the short-term phasing is underway, it will be possible to provide more detailed costs pertaining to further development of the system.
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Currently, data collection within the AFOLU sector is constrained due to challenges in executing legal mandates. Information is collected in an uncoordinated manner which makes it difficult to effectively and holistically analyse the sector. Without sufficient and relevant data there are limited options for monitoring, benchmarking and trend analysis. To ensure that the right data is received, at the right time and that the right processes are in place to peruse this information, a structured system comprising of an automated web-based portal as well as a team of skilled professionals is required. However, the value of such a system will depend on its continuous improvement.

8.2.3.1 Co-benefits of data sharing

The ultimate aim of the AFOLU M&E system is to provide a sound basis from which to monitor and guide climate change and climate change activities across the various AFOLU categories. This study recognises the important role of the AFOLU sector in contributing to the national GHG inventory and in contributing to industry and category specific climate change mitigation and adaptation initiatives.

Compiling, packaging and sharing data in a user-friendly format will encourage sector and industry communication, cooperation and collaboration. This will strengthen individual sector / departmental climate change efforts as well as collective AFOLU sector initiatives. Such cooperation and collaboration could encourage the following, not only within the DEA but across all relevant sectors and institutions:

- Increased citizen awareness and interaction which will enhance and support data collection efforts.
- Improved research as quality data is timeous and more accessible – this will ensure the continuous growth of the AFOLU sector body of knowledge.
- Strengthened inter-department and inter-sector communication and cooperation as data sharing allows for the crossing of boundaries of disciplines and institutions.
- Monitoring of progress to a low carbon and climate resilient AFOLU sector.

8.3 Summary of AFOLU M&E costs for short term implementation

Table 31 provides a summary of the proposed costs pertaining to the initial implementation, short-term approach, of the AFOLU M&E system. The proposed timeline as per Figure 16 spans from 2016-2017, a 12 month period.

Table 31: Summary of the total AFOLU M&E system costs - short-term implementation

M&E system requirement	Proposed cost (approximate)
Development of an electronic, web-based and interactive system	R 2 000 000
Human resource requirement	R 1 226 000
Additional project roll-out – consulting fees	R 1 000 000
TOTAL	R 4 226 000

8.4 International Case Studies linked to the proposed AFOLU M&E System

International case studies were used to compare the proposed AFOLU M&E system with current practices in other countries. In this regard specific aspects of M&E systems were analysed.

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) published a paper on “Monitoring and Evaluating Adaptation at Aggregated Levels: A Comparative Analysis of Ten Systems” during July 2014. The purpose of the paper was to provide an introduction to the various approaches and experiences in designing and implementing M&E systems for adaptation. This was developed through an in-depth comparison of ten aggregated M&E systems, which were compared according to context, processes and content. Of these M&E examples, the United Kingdom (UK) and Kenya provided recommended recommendations for adaptation as well as mitigation. It was for this reason that both the UK and Kenyan recommendations are included in the table below.

Table 32 Recommendations from the M&E Systems developed by the UK and Kenya (GIZ July 2014) and the links with the South African AFOLU M&E System.

Recommendations	The UK Adaptation Monitoring and Evaluation Framework	The MRV+ System under Kenya’s National Climate Change Action Plan	Link with the South African AFOLU M&E System
Policy Context	<ul style="list-style-type: none"> The UK Climate Change Act (2008) is a legally binding framework for climate change mitigation and adaptation. A requirement of the Act is for the Government to commission a UK-wide Climate Change Risk Assessment (CCRA) every five years. The CCRA provides a basis for monitoring preparedness for climate change in the UK. 	<ul style="list-style-type: none"> Kenya’s National Climate Change Response Strategy is a national framework that is supported by the National Climate Change Action Plan (NCCAP) for 2013 – 2017. Under the NCCAP, a National Performance and Benefit Measurement Framework (NPBMF) has been developed to monitor, evaluate and report results of mitigation and adaptation actions. This includes the synergies between adaptation and mitigation and the related socio-economic benefits. 	<ul style="list-style-type: none"> The National Climate Change Response White Paper (NCCRWP) states that a system and capacity for measuring, reporting and verifying climate change responses should be implemented.
Institutional Arrangements	<ul style="list-style-type: none"> The Department for the Environment, Food and Rural Affairs (Defra) coordinates UK Government policy on adaptation. 	<ul style="list-style-type: none"> The MRV+ system will be integrated into existing institutional M&E structures, such as the National Integrated Monitoring and Evaluation System (NIMES), overseen by the 	<ul style="list-style-type: none"> Similar to Kenya, the AFOLU M&E system will be integrated into the South African Climate Change M&E system.

	<ul style="list-style-type: none"> The Committee on Climate Change (CCC) is an independent, statutory body that reports to Parliament on progress made in preparing for climate change. The Adaptation Sub-Committee (ASC) of the CCC provides independent expert advice to the Government on its preparation of the climate change risk assessment. 	<p>Monitoring and Evaluation Directorate (MED) within the ministry of Devolution and Planning.</p> <ul style="list-style-type: none"> The MRV+ system will draw on information that has already been gathered by ministries, departments and agencies (MDAs) as part of its standard M&E. 	<ul style="list-style-type: none"> The system also aims to build on existing data resources and to strengthen departmental relationships, as relevant in Kenya.
<p>Establishment process</p>	<ul style="list-style-type: none"> The framework was initiated in 2010 and completion is expected during 2015 (5 year process). The development of this system is part of an ongoing learning process supported by a series of technical, peer reviewed studies and progress reports. 	<ul style="list-style-type: none"> The NCCAP has been developed over 20 months through a rigorous and transparent process involving expert analysis and stakeholder consultations. The NPPMF was designed and led by a team of consultants who followed a two-step process. Step 1 involved a review of existing practices, including data generation, indicators and reporting mechanisms used in Kenya, as well relevant literature. Step 2 covered the design of the system, building on existing M&E structures and processes, and the development of associated guidance materials, indicators and a capacity development plan. 	<ul style="list-style-type: none"> This report suggests a phased approach for the South African AFOLU M&E system. Similar to Kenya, South Africa's Climate Change M&E system is based on the same two-step process as described in Figure 9 of this report.
<p>Implementation process</p>	<ul style="list-style-type: none"> Climate change readiness will be monitored and evaluated through an iterative, cyclical process of assessment, planning and reporting with each cycle building on the previous one. 	<ul style="list-style-type: none"> The MRV+ process has three main stages: (1) measurement, monitoring and evaluation; (2) verification; and (3) reporting. 	<ul style="list-style-type: none"> The AFOLU M&E system will be closely linked with the South African M&E system process as detailed in Figure 9 of this report which covers measurement, monitoring, evaluation.

		<ul style="list-style-type: none"> As much as 100 people will need to be involved in setting up and running the MRV+ system, noting that not all roles will be full time posts and therefore not all staff will have to be new. It is envisaged that it will take up to three years before the system is fully operational. 	<ul style="list-style-type: none"> Trend analysis, benchmarking and reporting are also suggested to be included as part of the AFOLU M&E process (Figure 19).
<p>Resources needed</p>	<ul style="list-style-type: none"> The ASC team comprises of six staff members (economists and analysts) which support the six CCC committee members. The CCC committee members are mostly academics appointed by Ministers on a part-time basis (two-days a month). The costs of running the ASC are approximately £ 650 thousand a year (+/- R 12,500). In addition the ASC will have spent around £ 500 (+/- R 9,600 between 2011 and 2014 for research to develop indicators and undertake the analysis for the annual progress reports. 		<ul style="list-style-type: none"> This report suggests that five permanent staff should be hired for the AFOLU M&E system to be effectively managed.
<p>Lessons to date</p>	<ul style="list-style-type: none"> The approach of the UK to M&E of climate adaptation is based on the climate risk management framework. The linkages between mitigation and adaptation are explored whenever possible. 	<ul style="list-style-type: none"> Building the system on existing M&E processes helps to streamline departments, however Kenya's existing systems are currently under performing. Therefore there is a danger that institutional weaknesses may be amplified by the additional burden of the M&E adaptation system. The data quality needed for the M&E adaptation system is unknown and there are difficulties in finding datasets with continuous coverage. 	<ul style="list-style-type: none"> This report also speaks towards the links between climate change adaptation and mitigation. The AFOLU M&E system also aims to build on existing data resources and to strengthen departmental relationships with respect to data sharing.



		<ul style="list-style-type: none">• Different data storage systems from different government departments hamper data and information sharing.• A thorough review of existing M&E structures, current capacities and needs, and regular stakeholder consultation has helped to develop a system that is relevant to Kenya.	
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9 Institutional Arrangements for the AFOLU M&E System

During the course of this document reference has been made to both collecting and sharing information. These independent processes converge in the proposed institutional arrangements suggested in light of the AFOLU M&E system. The AFOLU M&E system requires information from the various role-players after which it acts as a processing agent before disseminating this information. Information can be shared in a myriad of ways as depicted in the mandate mapping section in Figure 12. In order to ensure that there are supporting internal functions in place the following section will look at and propose institutional arrangements to coordinate and guide the dissemination of information in the AFOLU Sector.

Figure 20 illustrates the interrelationship between the AFOLU M&E system components and the institutional arrangements. The AFOLU M&E system pertains predominantly to the collection, collation and evaluation of data. Once in a reporting format, this information can be shared with government departments or the private sector. To do this specific institutional arrangements need to be in place in order to guide the qualitative and quantitative treating of information as well as the sharing of this information. It is important to understand *what* information is to be shared (data, results, reports etc.); with *whom* this data will be shared and *how* regularly data will be shared.

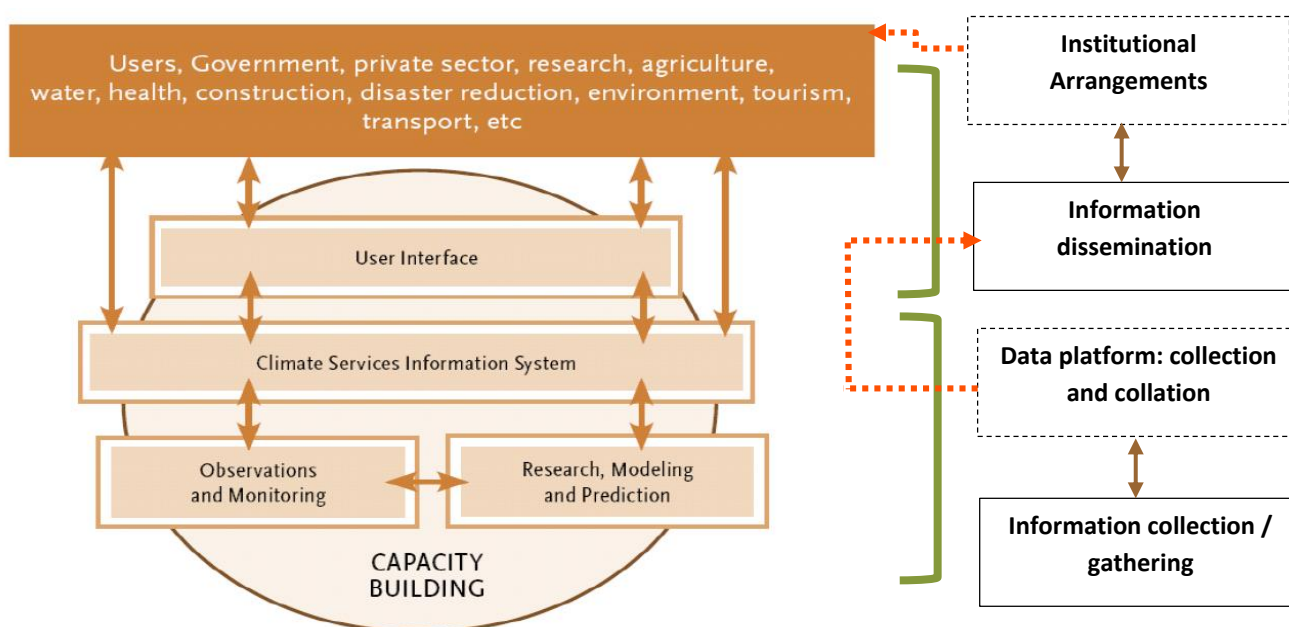


Figure 20: Context of institutional arrangements in terms of data collection and dissemination

Given the increased frequency of GHG reporting and other National Communications, effective institutional arrangements will be even more important for the synthesis of AFOLU data in accordance with the UNFCCC.

Institutional arrangements will need to be adapted to the particular requirements of sector reporting, as well as to the national circumstances of non-Annex I Parties. The level of support should build on existing institutional arrangements, if appropriate and relevant.

Therefore the AFOLU sector should allow for the maturation of the proposed M&E system and all related activities thereto within the DEA and within the context of existing government relations and systems. The cooperation and coordination between the various levels of government should be optimised to ensure streamlined data collection and facilitating opportunities for knowledge sharing. Given the interdisciplinary nature of climate change and especially within the context of AFOLU, regular reporting and informed sectoral trending will strengthen the overall national climate change policymaking processes by:

- Enhancing coordination and inter-sector/ interagency dialogue;
- Raising awareness among various stakeholders, including both private and public institutions; and
- Facilitating consultation and establishing relationships among various stakeholders.

9.1 Institutional Arrangements on a National Level

In terms of the National Climate Change Response White Paper (NCCRWP) the following institutional arrangements are considered necessary for the implementation of the various aspects of this policy:

- Executive national coordination.
- A capacity for Research, Development and Innovation coordination. This should be aligned with the institutional arrangements of the national science and technology system which is championed by the Department of Science and Technology.
- A capacity for coordinating adaptation and mitigation actions.
- A system and capacity for measuring, reporting and verifying climate change responses. This capacity would need to be aligned to the international system that is currently being negotiated. In all likelihood it would require that carbon emissions and their reductions be measured. This will include financing, technology and capacity building initiatives that underpin reductions and mitigation as well as adaptation programmes.
- A capacity for facilitating and promoting the use of carbon trading and off-set schemes.
- A means of monitoring and evaluating Government policies, strategies and legislation to ensure alignment.

To ensure proper coordination on climate change issues, the following cooperative structures and mechanisms for information sharing, Table 22, are suggested to support the implementation of the NCCRWP:

Table 33: National support mechanisms in relation to the NCCRWP

MECHANISM	MANDATE/OBJECTIVE
Inter-Ministerial Committee on Climate Change	The strategic, multi-faceted and cross-cutting nature of climate change response activities necessitate the formation of a coordination committee at Executive (Cabinet) level. This will ensure coordination of actions and alignment of all actions with national policies and legislation. To this end, an Inter-Ministerial Committee on Climate Change shall exercise oversight over all aspects of the implementation of this policy.
FOSAD Clusters and Outcomes Based Monitoring	The national climate change response actions shall be guided by the relevant Forum of African Directors-General (FOSAD) clusters based on the different elements of their mandate. South The Economic Sectors and Employment Cluster shall continue to provide strategic leadership on all climate change issues that have a strong bearing of economic growth and employment creation. In addition they shall continue to provide strategic leadership on all infrastructure related aspects of this policy. The International Cooperation Cluster shall continue to provide strategic leadership on international engagements as they relate to climate change.
Intergovernmental Committee on Climate Change (IGCCC)	In order to operationalise cooperative governance in the area of climate change, the Intergovernmental Committee on Climate Change (IGCCC) has been established. The aim is for the committee to foster the exchange of information, consultation, agreement, assistance and support among the spheres of government with respect to climate change and government's response to climate change.
Provincial and Local Government cooperation	<p>Climate Change impacts on all levels of Government, and a vertical cooperation mechanism is required to ensure enhanced government coordination and policy alignment. The Ministerial political (MINMEC) and technical (MINTECH) structures as set up through the Intergovernmental Relations Act facilitate a high level of policy and strategy coherence between the three spheres of government. These should be used to guide Climate Change work across the three spheres. Several technical working groups meet regularly to discuss and advise on issues of biodiversity and heritage, impact management, pollution and waste management, and planning and reporting and a working group that deals with cross-cutting issues (i.e. Working Group 3). These technical groups would coordinate a climate change response and feed directly into the MINTECH and ultimately to MINMEC.</p> <p>SALGA as a body mandated to support, represent and advise local government action will continue to actively participate in the inter-governmental system. This will ensure the integration of climate adaptation and mitigation actions into Integrated Development Plans as well as massively up-scale public education, awareness, media and information on climate change.</p>
Partnering with Stakeholders	The National Committee on Climate Change (NCCC) has been set up to ensure consultation with stakeholders from key sectors impacted by and/or impacting on climate change. The Committee advises on matters relating to national responsibilities with respect to climate change. In particular in relation to the United Nations Framework Convention on Climate Change, the Kyoto protocol and the implementation of climate change related activities. The National Economic Development and Labour Council (NEDLAC) should have climate change as a key component of its agenda. NEDLAC is considered as the forum where government comes together with organised business, organised labour and organised community groupings on a national level. This platform will ensure that climate change policy implementation is balanced and meets the needs of all sectors of the economy.

The AFOLU M&E System must maximise opportunities to make use of the various information sharing streams. Sharing information grows the body of knowledge, but it also increases an awareness around the AFOLU sector and the data collection processes linked thereto.

9.2 Institutional Arrangements on a Departmental Level

The DEA has an existing organisational system in place (as depicted in the mandate mapping section, Figure 12). These address various facets of climate change on a national level. However, as mentioned in the cost and viability assessment, the collection of data and the utilising thereof requires a dedicated team. The objective of the proposed AFOLU M&E system is centred on collating and compiling all necessary data. This is done to provide a holistic and detailed overview of mitigation and adaptation within the various sub-sectors of agriculture, forestry and land use related activities.

Effective institutional arrangements are important for the presentation of information in a consistent, transparent, complete and timely manner. It is crucial that, based on its national circumstances, capabilities and capacities, a country sets up sustainable institutional arrangements. This will allow for the smooth and regular development of the AFOLU M&E system on a continuous basis.

The UNFCCC Institutional Arrangements toolkit suggests that all relevant roles and responsibilities can be clustered as per Figure 21 below.

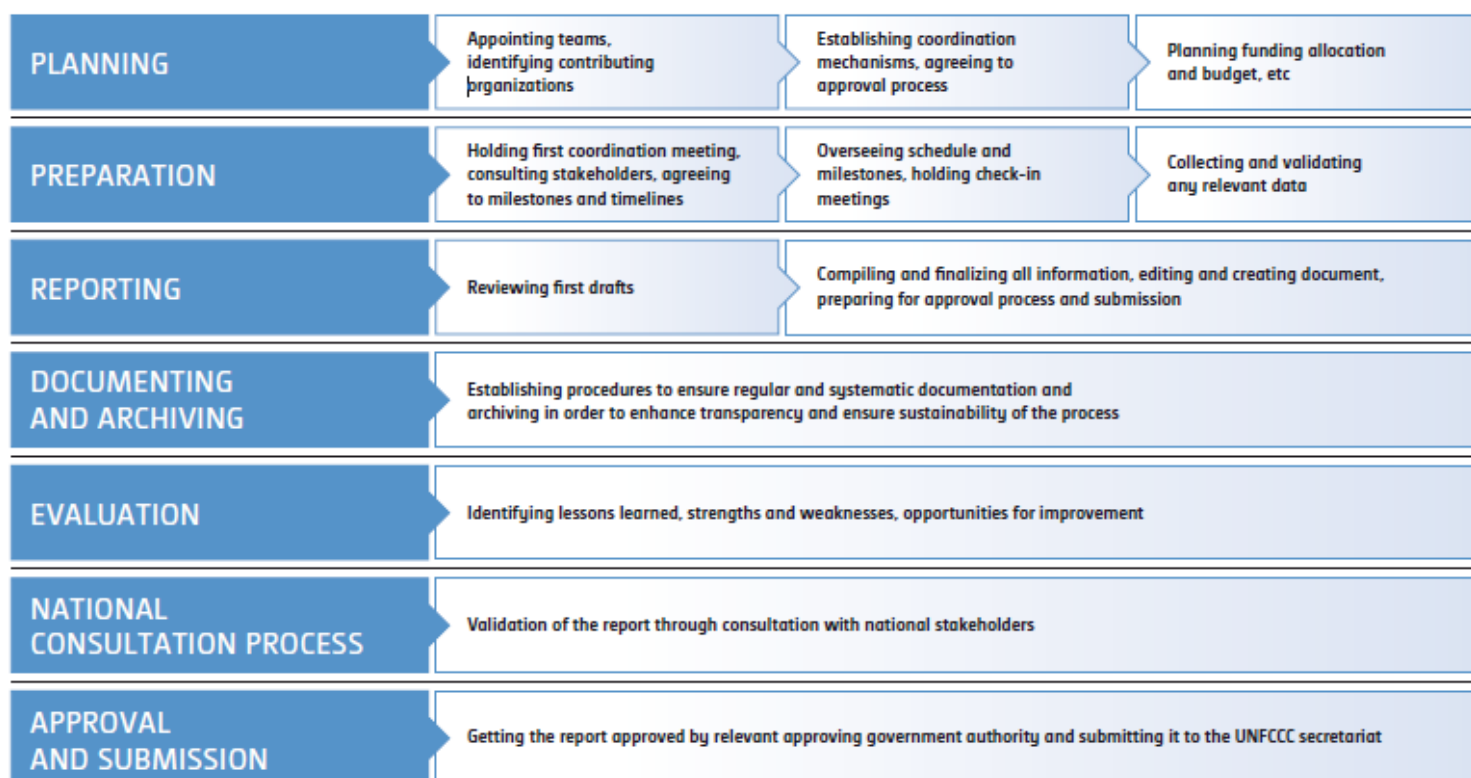


Figure 21: Key stages of Institutional Arrangements as per the UNFCCC.

Given the interdisciplinary nature of climate change and specifically the varied nature of AFOLU, holistic data collection can strengthen the national climate change policymaking process through the following:

- Enhancing coordination between the various sectors affected as well as the varying government levels;
- Raising awareness among various private (e.g. labour unions) and public (e.g. inter-department committees) institutions;
- Creating a platform for constructive discussions and grassroots awareness with non-government organisations;
- Facilitating the integration of climate change issues across a wide range of sectors and departmental focus areas; and
- Facilitating consultations and establishing relationships among a varied stakeholder base.

9.3 Stakeholder Engagement

Based on the mandate mapping and the interactive nature of data collection and data sharing, it is evident that stakeholder engagement plays a major role in the compilation of data. Institutional arrangement will manifest through constructive and focussed stakeholder engagement.

Stakeholder engagement is specifically relevant to the AFOLU M&E system to ensure that all relevant departments and sectors are adequately informed on a) the reasoning behind data collection; b) the context of the AFOLU sector in terms of GHG emissions and c) the requirements for data collection.

Any kind of engagement with stakeholders provides an opportunity to not only share information with regards to the AFOLU sector, but to also obtain information vital to recording practical and relevant data based on experiences or implemented adaptation and mitigation strategies.

Importantly thus that stakeholder engagement should not only be a “checkbox” exercise but should allow for a constructive platform where information can be shared on both sides, ultimately contributing to the robust and relevant nature of the content provided in the various international reports.

In this regard the following principles, as per Figure 22 below, should be kept in mind when planning for and embarking on stakeholder engagement as part of the AFOLU M&E system:

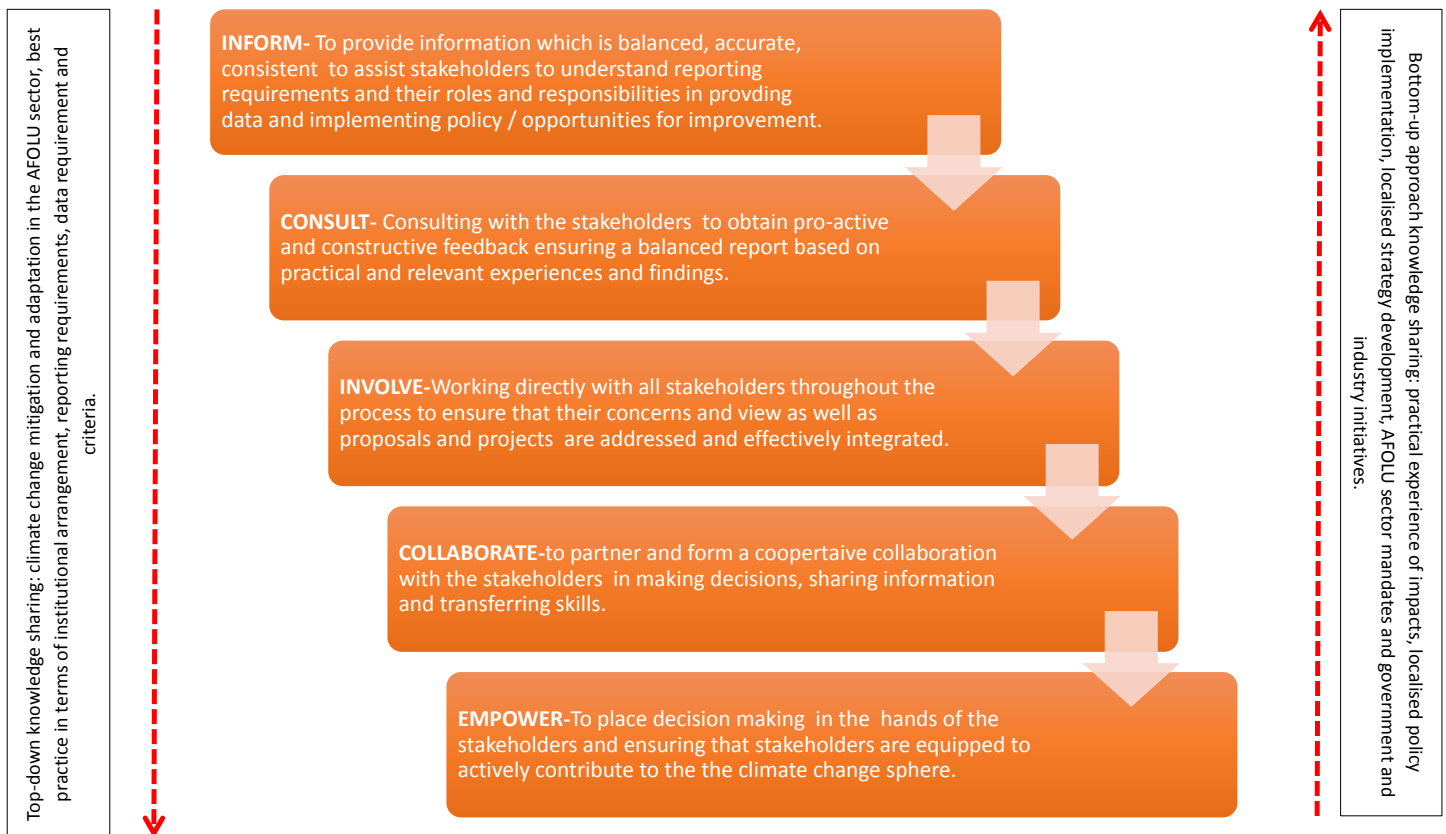


Figure 22: Stakeholder engagement within the AFOLU M&E system

In addition, the following key aspects should be kept in mind with regards to stakeholder engagement as part of the institutional arrangements:

- Engaging a broad range of stakeholders is important adequately collect data pertaining to all AFOLU indicators.
- It is important that clear roles and responsibilities be defined throughout the engagement, in order to ensure multi-stakeholder processes produce effective results and provide useful knowledge to those involved.
- Identifying incentives for continuous engagement of stakeholders is recommended.
- Countries are increasingly engaging nongovernmental organization groups and the private sector, which provides access to information and raises awareness of reporting activities.

10 Recommendations for this study

The AFOLU sector plays a key role in South Africa's understanding of emissions, climate change impacts and the potential mitigation and adaptation opportunities. However, effective monitoring and evaluation is required to realise the potential of information currently collected and to further enhance this process. Therefore, the following recommendations in terms of the AFOLU M&E system can be made:

- The DEA is not responsible nor mandated to act as the primary data collector on a number of the indicators discussed in this report. There are various government departments and government entities mandated to collect specific data required to populate the necessary IPCC indicators. The DEA should act in a coordinating capacity to ensure that data collection occurs timeously, within a structured framework and are disseminated to required end-users.
- Mandated data collection should be structured and formalised. Existing data collection practices with regards to the AFOLU sector is not coordinated effectively. This process of data collection does not allow for adequate data benchmarking, trending or continuous improvement. In this regard it is suggested that data collection processes must be formalised through an agreement between the DEA and relevant parties. This agreement must stipulate the data required linked to the relevant categories and indicators and provide sufficient guidance in terms of the data requirement criteria.
- There is real value in creating an AFOLU data analysis platform for the various climate change information users. Such a platform will ensure streamlined data collection, providing a context for data requirements as well as enabling ease in terms of further data collation.
- Align M&E of adaptation with decision-making processes and embed it in existing M&E structures. M&E should be integrated into existing development structures and procedures as much as possible. This study proposes that a similar approach in terms of the phased implementation be followed with regards to the AFOLU M&E system as is suggested in the national climate change monitoring and evaluation system. In addition, make use of existing practices to feed into the AFOLU M&E system with regards to *inter alia* reporting and communication.
- Phased implementation of the AFOLU M&E system is critical to the sustainability of the system. Factors such as time and resource constraints must play an important role in determining the level of ambition of a system. Incrementally developing a system which is pragmatic, simple, and allows for flexibility will ensure that lessons learnt can be easily integrated into the operations of the system. Case studies have also shown that developing such a system in phases encourages buy-in and can create momentum for stakeholder engagement. Opting for small and light approaches can make sense if there is a sense of urgency to get started on M&E of adaptation if resources are limited and if there is an openness to learn and possibly adjust the system over time.
- Build in flexibility. The AFOLU M&E system, although not novel in terms of M&E, it will require time for all stakeholders to adjust to this type of formalised data collection and reporting. With so much need for learning and interactivity, the AFOLU M&E system must allow for flexibility at all levels (goals, processes, indicators, stakeholders, methodologies etc.).

- Explore synergies between adaptation and mitigation. In order to ensure a holistic AFOLU M&E system, the monitoring of data must include adaptation related indicators and efforts. Ensuring this synergy between these areas will enable greater learning in terms of climate change impacts and actions. This in turn will ensure that in both mitigation and adaptation related data collection all necessary aspects for consideration are covered.

- The proposed AFOLU M&E system has been carefully aligned to both the National climate change monitoring and evaluation system as well as the DEA's AFOLU sector M&E strategic framework document. In terms of data requirement and the integration of processes as suggested with regards to the dedicated M&E team, the following principles from the national climate change monitoring and evaluation system must be kept in mind:
 - Simplification – minimising burden on participants and duplication of requirements;
 - Relevance to South Africa and building on existing systems – building on the systems, processes and institutions already in place;
 - Timeliness – set up to meet reporting deadlines and to respond in a timely manner;
 - Accuracy – delivering good quality information;
 - Transparency – a system that is transparent and accountable to stakeholders;
 - Stakeholder-guided – fully involving stakeholders in the design and implementation;
 - Using findings to influence – ensuring that the system produces information that is used to influence policy, practice, research and negotiations;
 - Phased approach – implementing the system over a number of years to allow learning-by-doing and continuous improvement;
 - Standardisation – using technically common and well-known approaches where possible and appropriate to improve comparability of information.

Annexure A: Interviews and Communications

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Competition Commission	2015-05-25	Themba Mathebula	ThembaMa@compcom.co.za
Stats SA	2015-06-08	Tshepo Pekane	012 310 8191 tshepop@statssa.gov.za
South Africa Land Sector MRV Capacity Building Project: Steering Committee meeting	2015-07-01	Chairperson: Mr. Brian Mantlana	BMantlana@environment.gov.za

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