South African National Carbon Sink Assessment:

Review of existing policy

section THREE

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Acronyms

AFOLU	Agriculture, forestry and other land-use
ANC	African National Congress
AQA	Air Quality Act
CARA	Conservation of Agricultural Resources Act
CDM	Clean Development Mechanism
CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DOE	Department of Energy
DPW	Department of Public Works
DRDLR	Department of Rural Development and Land Reform
DTI	Department of Trade and Industry
EIA	Environmental Impact Assessment
ERU	Emissions Reduction Unit
GDP	Gross Domestic Product
GHG	Greenhouse Gas Emissions
ha	Hectare
IDP	Integrated Development Plan
IPAP	Industrial Policy and Action Plan
LTMS	Long-term mitigation scenarios
MTSF	Medium Term Strategic Framework
NBF	National Biodiversity Framework
NCCRP	National Climate Change Response Policy
NDP	National Development Plan
NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act
NGP	New Growth Path
NPAES	National Protected Area Expansion Strategy
NSSD	National Strategy for Sustainable Development and Action Plan
REDD+	Reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
SA	South Africa
SPLUMA	Spatial Planning and Land Use Management Act
tC	ton of carbon
tCO2e	ton of carbon dioxide equivalent
TOR	Terms of Reference
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
yr	Year

Introduction

The context of this section

This report addresses Section 5.3 of the Terms of Reference - *Policy Recommendations.* In particular, it *maps existing policies and measures that directly and indirectly affect GHG emissions and removals from the AFOLU sector*. The report is based on an extensive qualitative analysis of 116 national-level policies that may have an impact on terrestrial carbon stocks and GHG emissions from the AFOLU sector. In the second phase of the policy analysis, to be undertaken in the first quarter of 2014, Cirrus will propose new measures and policies that are required to limit GHG emission from the sector and to encourage the implementation of land-use based climate change mitigation activities identified in Section 2 of the National Carbon Sink Assessment.

More broadly, the DEA seeks to contribute to and align with the *National Climate Change Response White Paper's* (NCCRP) mitigation efforts. The *White Paper* (also referred to as the *National Climate Change Response Policy*) proposes measures for achieving South Africa's GHG reduction targets, aiming to decrease emissions by 34% by 2020 and 42% by 2025 compared to a "business as usual" GHG emission trajectory. These targets complement the country's Long Term Mitigation Scenario (LTMS) planning, which aims to follow a "peak, plateau, decline" trajectory, with the level of emissions peaking by 2025, plateauing through to 2035, and declining thereafter. By mapping out policies that are likely to have an impact on national terrestrial carbon stocks and fluxes, this report aims to provide DEA with an understanding of the potential impact of existing policies on GHG emissions from the AFOLU sector and their contribution to national emissions reduction targets.

Results and findings

The analysis highlights the existence of two broad categories of policies that will impact terrestrial carbon stocks: those policies that promote sustainable environmental management and those that call for greater economic growth. With regards the former, South Africa has created strong legislation for environmental protection. This legal framework includes powers to protect natural landscapes, direct and rapid interventions to rehabilitate and restore degraded ecosystems and the enforcement of improved agricultural practices. This body of legislation protects the environment in line with section 24 of the Constitution:

Environment. – Everyone has the right –

1. to an environment that is not harmful to their health or well-being; and
2. to have an environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –

- prevent pollution and ecological degradation;
- promote conservation; and
- secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

The National Environmental Management Act (NEMA) family of policies take a conservative approach to land-use, adopting the precautionary principle, calling for assessments to be undertaken before developments are approved and applying restrictions on the exploitation of forests, woodlands, and sensitive, threatened or vulnerable ecosystems. These values and priorities are captured in legally binding legislation, and are included in frameworks and strategic plans focused on the protected areas network, biodiversity and air quality. The *National Environmental Management Act* (NEMA) and its *Biodiversity Act, Protected Areas Act* and *Air Quality Act* and related frameworks and strategies, are world-class, wide-ranging policies that can provide for significant protection to ecosystems and associated carbon stocks.

Equally, there is a strong drive towards economic growth, job creation and development. This drive has given rise to a number of vision statements and long-term planning documents. In these documents, the "green economy" is largely defined by pursuit of technological solutions to development challenges. Examples of this include cleaner energy production, manufacturing, installations and supply chain development. Land-use is passingly referred to with regards to bio-fuel production to alleviate GHG emissions from traditional fuel use. Environmental objectives are not as clearly articulated as economic priorities in this family of policies.

A key concern noted in this analysis is that NEMA's framework is not widely referenced by or its principles integrated within policies that aim to develop the economy, create jobs and drive infrastructure development. The most influential policies in this regard are the triad of the

New Growth Path, the *National Development Plan* and the *Medium Term Strategic Framework* that prioritize job creation. Policies and plans aimed at economic development will not necessarily lead to environmental degradation. However, when considering the effect of NEMA policies on carbon stocks and GHG emissions, one needs to make careful consideration of other policies that may take precedence due to South Africa's particular socio-economic priorities.

The research demonstrates the extent to which these two overarching objectives, sometimes seemingly at odds with one another, converge in a single policy environment, a domain that is evolving with the introduction of new strategies, plans, bills and amendments that could influence the land-use sector. From this, it becomes evident that there are multiple future paths for land-use change. It was not possible to determine which policies trump others in terms of resources, institutional support and political buy-in. Even if possible, an analysis including institutional support would likely be of use for only a limited time as the policy environment shifts due to the emergence of new priorities, policies and personnel. But what the policies reveal is that many land-use trajectories are possible.

Policies influencing agricultural landscapes

The policies that are most likely to drive agricultural expansion originate from the Presidency, and collectively seek to create agricultural opportunities for over three million individuals. Agricultural expansion is viewed as means of achieving rapid job growth and economic development. If implemented, this could lead to a substantial increase in land under cultivation – potentially increasing total land under production by 20-30%. Policies originating from the Department of Agriculture, Forestry and Fisheries (DAFF) and the Department of Rural Development and Land Reform (DRDLR) have integrated targets and strategic directions that align with these Presidential policies. This demonstrates that the Presidency has successfully originated a strategic direction adopted by these departments.

There is limited legislation that focuses specifically on the impacts of agriculture on natural resources. This could be due to silo behaviours between DAFF, DRDLR and the Minister of Water and Environmental Affairs. Only one Act attempts to incorporate improved cropping techniques into cultivation methods and approaches: the *Conservation of Agricultural Resources Act* (CARA), 1983. Whereas the *National Water Resource Act* and the *Disaster Management White Paper* and attendant legislation provide some opportunity for controlling agricultural practices, greater attention to and application of CARA may result in reduced GHG emissions from agricultural activities that negatively impact on above and below-ground carbon stocks.

A significant body of legislation exists for managing impacts on the natural environment, from land degradation to air pollution. These almost exclusively originate from the *National Environmental Management Act* and its related Acts and Regulations. They make provisions for the oversight and control of listed activities, the conservation of biodiversity, the creation of protected areas, and the long-term, sustainable management of the country's natural resources. In particular, the *Protected Areas Act* and the *Biodiversity Act* both trump all other national legislation when increasing or managing protected areas and biodiversity is concerned. The precedence of these two acts is important to note as a new generation of policy mandates, which privilege the integration of differing policy objectives, will wield their influence in aligning policies across many departments and ministries.

Biofuel production has received considerable policy attention for two principle reasons. It is seen as important component of the green economy and it is perceived as a means for reducing GHG emissions through the substitution of fossil fuels. However, the *Strategic Plan for Biofuel Production* only suggests a pilot-phase of production covering 300,000 hectares over five years. As this is a small fraction of South Africa's land area and will most probably occur on previously ploughed land, it is likely to have a limited effect on the country's terrestrial carbon stocks. Similarly, despite planned expansion of commercial plantation forestry through community-based schemes in the Eastern Cape and KwaZulu-Natal totalling 100,000ha, the net impact on South Africa's terrestrial carbon stock is expected to be limited (100,000ha is 0.08% of the countries surface area). Compared to the grassland systems that contain 33% of the country's national carbon stock (Scholes et al. 2013), this is comparatively limited. Policies promoting plantation forestry are thus considered to have a limited impact on the country's terrestrial carbon stocks.

Policies influencing natural and semi-natural landscapes

In contrast to the agricultural sector, the legal framework governing natural and semi-natural landscapes displays a more robust methodology in its development, allowing for its effective application. The NEMA family of policies has been developed using a traditional policy approach, originating in Green and White Papers, formulated into Acts and Regulations, and in each phase of development, passing Parliamentary approvals. This approach offers the benefits of rigorous oversight and democratic legitimacy. It also seems to have resulted in an internally logical set of policies that work together to achieve shared aims. The *National Environmental Management Act* (NEMA) family including Acts, Regulations, frameworks and strategic plans are key policies that govern natural and semi-natural landscapes.

However, the land-use space is crowded with competing objectives. Despite NEMA's strong legislative precedence, only expansion of the protected areas network appears

to have won broad support across departmental and Presidential plans. The *National Protected Areas Expansion Strategy* (NPAES 2008) seeks to introduce an additional 2.7 million hectares of land into the network by 2013, a quarter of the strategy's 20-year goals. The protected areas network has the potential, if enacted, to be one of the largest contributors to avoiding GHG emissions from land conversion.

Outside of the geographic area encompassed by this network, ecosystem conservation is encouraged rather than enforced through various policy measures, such as tax rebates, conservation agreements, and carbon offsets through the proposed Carbon Tax. This approach may prove insufficient for the protection of terrestrial carbon stocks. For example, savannah covers some 35.8 million hectares of land and is the second most abundant source of terrestrial carbon stocks (Scholes et a. 2013). Despite their scale and importance, they receive less stringent policy attention and protections, which could lead to their continued degradation and attendant losses of terrestrial carbon stocks. Compensation for this loss, through restoration of degraded landscapes, has not benefited from the same development of and adherence to targets such as those found in NPAES.

Aside from this alignment around the *National Protected Areas Expansion Strategy*, proposed infrastructure development, agricultural expansion and housing developments may compete for the same areas of land. One possible approach to mediating between these conflicting goals could be through using land-use plans, mapping and spatial analysis tools. This could result in reductions of terrestrial carbon stocks as compared to a "business-as-usual" scenario.

The review of policies impacting on natural and semi-natural landscapes demonstrates that the legislative approach adopted by the NEMA family of policies has led to the development of a more practicable set of policies. Two key issues emerge; the need for inter-departmental cooperation in setting land-use goals and targets, and the need for policies within a department to be both internally consistent and follow the correct processes for becoming legislation.

Policies that influence the built environment

Policy makers have long viewed an adequate supply of infrastructure services as a basic ingredient for economic development (Calderon et.al 2008). They also expect that the supply of infrastructure would generate employment directly through the actual construction, operation and maintenance requirements but also through indirect multiplier effects across the economy (Kumo 2012). These indirect effects may include, for example, the building of roads leading to an increased connection of people to markets. This in turn can promote agriculture production, leading to increased land conversion.

According to the *National Development Plan*, the South African government's mandate is to create decent work, reduce inequality and eradicate poverty. To achieve this, the government aims to revamp the economy and improve employment rates. It seeks to shift the ways in which economic growth is achieved through support to new industries and technological developments. The NDP, along with other Presidential policy initiatives, outline a medium and long-term vision for achieving this growth, which is heavily reliant on the delivery of new infrastructure.
Although references are made to "sustainable development" in these policies, the term is not clearly defined, and its application to expansion of the built environment remains unclear. Only the *National Development Plan* makes references to existing environmental legislation, which is otherwise largely omitted from the other documents. A key observation is that these policies are expected to result in significant changes in land-use. Due to the broad nature of policy, it is difficult to identify the casual link and impact of built environment expansion on terrestrial carbon stocks. It is, however, reasonable to assume that an expansion of agriculture, industry, mining, roads, urban areas and supporting infrastructure will lead to direct changes in above- and below-ground carbon stocks as well as indirect impacts through increases in natural resource consumption in areas that had not been densely inhabited before.

30 Key policies that may have the largest impact on carbon stocks

The top 30 policies that are likely to have considerable impacts on the release, conservation or sequestration of terrestrial carbon stocks and associated GHG emissions are listed in Table E2 below. These policies demonstrate that in many geographic areas and ecosystems, ministries and departments have their own policy priorities. Some of these promote growth and seek to increase employment, whereas others strive to preserve the natural environment. In some instances, there appears to be limited alignment between pre-existing environmental legislation and the strategic plans and national visions that may result in extensive land-use changes. Because there is no clear hierarchy between policy objectives, policy precedence is difficult to determine. This represents an opportunity to further integrate and adapt policy, notably through approaches highlighted in newly adopted pieces such as the NCCRP.

Table E2. 30 policies perceived to have a relatively greater impact on the maintenance and increase, or decrease of terrestrial carbon stocks and fluxes, if implemented to their full potential

Policy Type	Policy
White Papers	• White Paper on Disaster Management • National Climate Change Response White Paper
Acts	• Conservation of Agricultural Resources Act, 1983 • National Forests Act, 1998 • National Environmental Management Act, 1998 • National Environmental Management: Protected Areas Act, 2003 • National Environmental Management: Air Quality Act, 2004 • National Environmental Management: Biodiversity Act, 2004 • Spatial Planning and Land-Use Management Act, 2013
Regulations	• National Environmental Management: EIA Regulations • National Environmental Management: Environmental Management Framework Regulations
Strategies, Plans and Frameworks	• National Development Plan • Medium Term Strategic Framework • New Growth Path • Strategic Plan for Smallholder Producers • The Strategic Plan for South African Agriculture • Strategic Plan 2012/13-2016/17 for the Department of Agriculture, Forestry and Fisheries • Integrated Growth and Development Plan: Agriculture, Forestry and Fisheries • National Strategy for Sustainable Development and Action Plan (NSSD1) - 2011 -2014 • Strategic Plan for Environment Sector: 2009 - 2014 • National Biodiversity Framework • National Air Quality Management Framework • National Protected Areas Expansion Strategy for South Africa 2008 • Integrated Resource Plan • Industrial Policy Action Plan: 2012/2013 - 2014/15 • Department of Rural Development and Land Reform, Strategic Plan 2011-2014 (amended 2013) • Carbon Tax Policy Paper • National Disaster Management Framework • A Woodland Strategy Framework for the Department of Water Affairs and Forestry 10
Other	• Guidelines Regarding the Determination of Bioregions and the Preparation of and Publication of Bioregional Plans

Broadly, these policies fit into several categories:

- **Policies focused on environmental management:** Acts and Regulations originating from the NEMA cluster, or related Acts that aim to reduce negative impacts on ecosystems, such as the *National Forests Act* and the *Conservation of Agricultural Resources Act*. These are complemented by the *Disaster Management* family of policies – the *White Paper, Act* and *Framework* – which provide for undertaking prevention and mitigation actions for single disaster events or longer-term trends that could lead to a disaster.
- **Presidential policies focused on economic growth:** These include the NDP, NGP and MTSF, supported by IPAP. These promote infrastructure development, expansion of the built environment and view agriculture as a key means to reducing poverty.
- **Departmental strategic plans:** Those from DAFF, which tend to align with mandates from Presidential policies, but that make passing references to the adoption of improved agricultural techniques, restoration or afforestation. By and large, DAFF's plans propose agricultural expansion, notably at the smallholder level.
- **Planning policies:** These policies are focused on providing planning guidelines for land-use change, namely through the use of mapping, land functionality, spatial equity, sustainability and other considerations. This suite of policies is required to mediate between competing land-use objectives.
- **Outlier documents:** These include documents such as the *Strategic Plan for the Environmental Sector* or the *National Sustainable Development Strategy and Action Plan* that originate from the office of the Minister of Water and Environmental Affairs. These policies are intended to impact a broad range of sectors and activities through streamlining sustainability and environmental management.

Several observations can be made about these policies that may have a substantial impact on carbon stocks and GHG emissions from the AFOLU sector. The first is that there is a strong legislative framework favouring a conservative approach to environmental management, land use, and conservation. The legal precedent is strong, rooted in Acts and Regulations. However, policies that promote rapid job growth in the agricultural sector and support significant infrastructure build appear to have been more widely adopted in current departmental and ministerial strategies, particularly that of DRDLR and DAFF. These two departments have considerable influence on the land-use sector, and their alignment with rapid agricultural expansion could lead to conversion of rangelands and grasslands and net increases in GHG emissions due to the turnover of soils, the removal of vegetation and fertilizer usage.

Prominent Gaps in Policy

Limited protections for woodlands

Although woodlands contain a significant fraction of South Africa's terrestrial carbon stock (28%, Scholes et al. 2013), they have not received significant protections. Two factors seem to contribute to this state of affairs. Firstly, the lack of clarity on how to classify woodlands appears to have hampered progress towards more official commitments to the oversight and management of woodlands. *A Woodland Strategy Framework* notes, "The classification system for woodlands forms the basis of much of the other work that needs to be done and it is therefore a very important first step towards progress" (2004). A definition of woodlands is overdue in the sector. Secondly, the *National Forests Act* calls for the Minister rather than a devoted department to determine the area of woodlands to protect. These policy conditions are perhaps exacerbated by the land ownership status of woodlands, which typically fall under communal and private ownership. Unlike many intact forests that benefit from either state ownership or strict land-use provisions, woodlands management will require effective partnership between government entities and landowners and users.

In addition, there appears to be limited attention devoted to understanding the role of woodlands in local, rural energy security. In South Africa, fuel wood extraction, along with fencing and building material collection, represents the largest annual off take of biomass (Lawes et al. 2004). Fuel wood extraction rates range considerably from household to household, from 0.27 to 1.12 tonnes annually, accounting for some 51% of domestic energy use (Lawes et al. 2004). Despite this high level of dependence, the sustainability of supply is not addressed by the Department of Energy (DOE) in its *Revised Strategic Plan 2011/12 – 2015/16*. Neither does it propose interventions to shift fuel wood and charcoal consumption to other sources. This suggests that consumption of indigenous wood sources for heating and cooking may continue unabated.

Limited detail on how improved agricultural techniques will be incorporated in practice

A range of agricultural interventions was referred to in several of the documents reviewed, from climate smart and agro-ecological practices to sustainable agricultural production. Perhaps due to a historical lack of credible research outcomes and conclusions on these interventions to guide policy development, these policies do not provide clear targets or commitments to these practices. This is prevalent in the case of policies promoting agricultural expansion, which do not articulate how expansion will align with proposed improvement to agricultural practices. Moreover, there are few Regulations specifically controlling fertiliser application and use.

Limited reference to the role of AFOLU in mitigating climate change

Emissions reductions from the AFOLU sector could be very important for South Africa to achieve its GHG emissions reduction target of 34% decline as compared to a business-as-usual trajectory by 2020. The AFOLU sector contributes 6% of South Africa's greenhouse gas emissions (Rahlao et al. 2012). Our policy analysis showed that while South Africa has an abundance of legislation on agriculture, no policies explicitly address the reduction of emissions from AFOLU. However, current laws and policies could be used as a legal basis for reducing AFOLU-related GHG emissions.

Limited commitment for protection and improvements of natural and semi-natural landscapes

There are only two policies that set specific targets for improving natural landscapes. They are the *National Sustainable Development Strategy and Action Plan (NSSD1)* and the *Strategic Plan for the Department of Agriculture, Forestry and Fisheries 2012/12 – 2016/17*. These targeted interventions are not substantiated by further details – notably location or detailed biome type. This lack of detail makes it difficult to assess the GHG emissions reduction potential of the proposed interventions. This lack of targets and processes supports the need for a more coordinated policy response.

Policy trade-offs

The policy analysis demonstrates the extent to which many potential land-use futures exist, as policy objectives compete for limited resources and in some cases even the same lands. The resolution of these conflicts likely lies in practical compromises between departments and national, provincial and local governments, notably through thorough application of policies that call for the integration of departmental and ministerial plans. But this process requires trade-offs between policy aims and social, economic and environmental objectives. Several potentially high-impact conflicts or "grey areas" between various policy objectives and principles were identified. These highlight the trade-offs government faces when attempting to

address major social challenges simultaneously. Poverty, marginalisation of rural households, food security, long-term sustainable economic growth and climate change – all compete for policy support and resources. This has important implications for national terrestrial carbon stocks maintenance and increases, as some policies may lead to the release of emissions to achieve social and economic aims.

The analysis highlights three major trade-offs, although there are undoubtedly many others that exist. These include:

Rapid job creation in agriculture versus the sustainable use of ecological infrastructure

One of the South African government's core aims is to address entrenched poverty. Several policies issuing from the Presidency view agricultural expansion as a means of rapid social upliftment and job creation. In the policies reviewed, the rapid creation of employment is an overriding priority. Yet agricultural expansion can lead to the degradation of carbon stocks when pursued in intact ecosystems and when employing ploughing techniques that can lead to soil carbon losses. Several key environmental constraints are not addressed in the *National Growth Plan*, the *New Growth Path* and the *Medium Term Strategic Framework*. Productive agriculture relies on intact ecosystems. The NGP and NDP both recognize that balancing trade-offs will be necessary to achieve their objectives, but do not describe the ways in which they will be mediated and managed. Means for addressing these impacts, notably through improved spatial and land-use planning, is explored in the section 3.2 policy recommendations report

Biofuel production to limit reliance on fossil fuels versus land conversion

Biofuel production has received significant policy support. Although it is not expected that biofuel production will expand significantly over the next five years, government incentives and continued rising oil prices may contribute to growth in the sector. The expansion of biofuels production responds to three government objectives:

- Job creation
- Achievement of the voluntary "peak, plateau, decline" commitments under the United Nations Framework Convention on Climate Change
- Shifting dependencies on oil as price volatility represents a threat to energy security

The *Green Economy Accord* and the *Biofuel Industrial Strategy of the Republic of South Africa* confirm that biofuel production will happen on "fallow land" or "underutilized arable land" respectively. The *Long-Term Mitigation Scenario* further substantiates this by stating that "Biofuels are extended as far as limits of arable land, water, and concerns about biodiversity and food security allow" (2007). Each of these policies state that biofuel production should only take place on lands not intended for agricultural production. This is to avoid diversion of food production or manipulation of food prices. Despite the provisions relating to food security none of the documents takes into account the inherent ecological value of fallow or unproductive lands. The conversion of underutilized land is likely to lead to a net increase of GHG emissions from the disturbance of soil stocks, fertilizer use and removal of pre-existing vegetation cover. Thus the production of biofuels may lead to a net increase of AFOLU-based GHG emissions. The impacts on fossil-fuel displacement have been the subject of much scientific debate, as discussed in Module 8, and will require further scrutiny in the South African context, with a focus on production and supply-chain emissions. A full life-cycle analysis of biofuel production on different land-use types, employing a variety of production techniques, as well as assessing a number of supply-chain opportunities will be necessary to determine the full GHG reduction benefits, if any, and to what sector they should be attributed (AFOLU, energy, etc).

Short-term food security versus ecologically sustainable production

Food security is a priority regularly cited in both Presidential policies and those originating from DAFF and DRDLA. Typically, the issue of food security is presented as one that must be rapidly addressed. The most highly promoted means for achieving this is through the expansion of land under agricultural production, which is viewed as a means for reducing household-level food insecurity. The rapid expansion of agricultural production without the adoption of improved agricultural techniques could damage ecosystem services, not least of all terrestrial carbon stocks. Thus a trade-off between the future resilience of ecosystem services and shorter-term food security may exist.

Conclusions

Several themes emerge from this analysis of policy:

- The NEMA cluster of policies has strong potential to guide improved land-use management, including through control of GHG emissions, provision of principles to guide land-use practices and the establishment of spatial planning tools. However, the positive GHG impacts of the NEMA cluster of policies, as well as the *National Forests Act* and the *National Disaster Management Acts* are reliant on interpretation rather than providing clear guidelines. Their impacts could be limited or substantial depending on the types of regulations, frameworks and strategies that are formulated from them. For example, NEM: Biodiversity Act provides the Minister with the power to create and approve bioregional plans, but the content and process by which they are developed relies on the Minister developing guidelines and regulations. To-date, a number of regulations, guidelines and other supporting policy elements have not been developed to give full effect to NEMA and its subsidiary Acts.
- The analysis demonstrated that the approach used in formulating policy can have important ramifications for the consistency, long-term viability and practical application of objectives. The approach used by the Minister of Water and Environmental Affairs in formulating the NEMA family of policies is a positive example of this. It followed the process of Green Paper to White Paper to Acts and then to frameworks and strategic plans over a number of years and is internally coherent. On the other hand, more ad-hoc policies tend to receive less visibility and traction, perhaps due to their less structured process for development.
- Interdepartmental co-ordination is vital to ensure the successful resolution of conflicting goals and objectives, and should form part of future policy development impacting on the land-use sector. The DEA, DAFF and DRDLR should have a shared vision informed by the Constitution, articulating the ways in which to pursue both environmental and economic growth objectives. Increasing co-operation and alignment can act as a force multiplier enabling the successful application and practical achievement of policy aims. This type of collaboration and integration of strategies and plans is required as part of the *Intergovernmental Relations Framework Act*, and is similarly imbedded in NEMA, providing the legislative mandate for such an approach.
- As a consensus grows around the need for urgent climate change action, and emerging research demonstrates the benefits of land-based climate change mitigation activities, the South African government is presented with the unique opportunity to align and update its policies to more broadly reflect a commitment to preserving and enhancing the nation's terrestrial carbon stocks. To this effect, the second phase of policy analysis provides a series of recommendations, partially based on the findings of this report but also informed by the results from sections 1 and 2.

Module 1 – SECTION 3

Methodology and research framework

1.1 Research mandate

This analysis responds to the Department of Environmental Affairs' Terms of Reference (TOR) for the SA National Carbon Sinks Assessment, section 5.3 Policy Recommendations. Here, the mandate is to Map existing policies and measures that directly and indirectly affect greenhouse gas (GHG) emissions and removals from the agriculture, forestry and land use (AFOLU) sector. This report provides an analysis of over 110 policy documents, which include white and green papers, acts, regulations, as well as national plans, frameworks and strategies that fit within the policy domain. The set of reviewed policies were chosen based on the assumption that they may directly or indirectly influence the size of the national terrestrial carbon stock (with a knock on effect on other related ecosystem services), associated fluxes and the general GHG emission profile of South Africa's AFOLU sector (see Module 2 for a detailed description of the sector).

1.2 Background and rationale to the method of analysis

Two aspects of policy analysis have informed Cirrus's research methodology. Firstly, we identify complexities inherent in the national policy environment, i.e. inter-policy discord and poor alignment, competing aims, misaligned timeframes or important material gaps. Secondly, we adopt an analytical framework that structures the reviewed policy documentation such that each policy element is isolated, clarified and compared to a wider policy environment.

The land-use sector and associated GHG emissions are characterized by their complexity. To understand current carbon stocks and fluxes as well as future potential changes, a broad scope of drivers and determinants need to be considered simultaneously. This is because the country's biophysical template, which determines the general vegetation type observed (rainfall, temperature, soil type, fire regime etc.), has been affected by a range of human related drivers. These drivers range from subtle changes in fire or grazing regimes, to the complete clearing of land for built settlements and infrastructure. This broad set of determinants and drivers means that a vast suite of policies may directly or indirectly affect land-use and associated GHG emissions. Very few of these actually consider climate change per se; but are instead, for example, focused on issues of economic growth, job creation and rural development. For this reason, Cirrus included over 110 policies in its analysis to ensure that potentially high-impact policies - which on the surface may appear unrelated to terrestrial carbon stocks and fluxes – were not excluded from the process.

1.3 Description of methodology

A structured framework approach was adopted for two key reasons. Firstly, it systemises the extraction and organisation of policy information from complex, abundant and multiple sources, helping to distil themes, patterns and important findings (Anderson 2006, Musso et al. 1999, Guess & Farnham 2000, Ritchie & Lewis 2003). The framework approach utilises an index, which allows the researcher to tabulate, order and make sense of large quantities of textual information using different analytical categories. Since Cirrus's analysis encompassed over 110 lengthy policy documents, the framework approach was particularly pertinent. Secondly, the structured framework approach is transparent and repeatable because end users can interrogate findings through the index and references back to original texts. By building traceability and transparency into the research design, objections about the supposed anecdotal or imprecise methodologies of qualitative research (Attride-Stirling 2001) are addressed.

Our analytical process included a number of phases (adapted from Attride-Stirling 2001 and Ritchie & Lewis 2003):

- **Familiarisation:** An initial scoping of policy documents to develop a basic understanding of the themes and ideas that regularly emerge from various texts included in this study.
- **Defining a thematic framework:** The identification of categories for an index or catalogue against which each document is assessed. For this analysis, our categories were shaped by the need to understand the direct and indirect effects of policies on terrestrial carbon stocks and fluxes (see catalogue in attached spreadsheet).

- **Cataloguing:** Thoroughly review each policy document, noting core points and entering them into the catalogue framework. This indexing process creates a "viewing framework" from which the research can begin to identify emerging patterns, similarities or points of discord between different texts. During this stage, new themes may emerge and can be included in the index. This becomes an iterative process, where some documents will be returned to as necessary.
- **Charting:** Once the initial index is complete, the full catalogue is further reviewed for relevance and accuracy.
- **Mapping and interpretation:** After the more laborious parts of the process, the full set of policies entered into the catalogue are assessed for emerging patterns and associations as well as gaps and conflicts between policies relative to their potential impact on GHG emissions. This is the true mapping stage of the process where one further explores the relationships and potential interactions between policies.

1.4 Framework preparation

For this analysis, we developed a working definition of policy with a clear definition of the scope and boundaries of the policy review. Thereafter, an initial list of policy documents was compiled, which was sent to the Department of Environmental Affairs (DEA) for consideration. The set of reviewed policy documents was finalised following the DEA's feedback and are listed in the attached spreadsheet catalogue. The catalogue at once serves as an index in the framework approach, as well as a detailed reference tool for the DEA.

A clear definition of policy aids in guiding decisions about which documents are suitable for inclusion in the catalogue. As Tyler (2009) notes, there is no universally agreed meaning of policy, which may cover the ideas and philosophies that influence the policy development process and the actual concrete decisions taken by governments. Policy may thus include "intentions" and "directions" as well as institutional capacity (Tyler 2009). A broad definition of policy has been adopted that focuses on published documents rather than on speeches, proceedings from conferences, press releases or other types of communications that may relay "intentions" or "directions."

Brooks' (1989) definition of public policy was therefore adopted: "Public policy is the broad framework of ideas and values within which decisions are taken and actions, or inaction, is pursued by governments in relation to some issue or problem." This definition includes the review of strategies and frameworks, green papers and departmental plans as a way to understand the country's policy environment beyond the realm of approved measures such as Acts and Regulations or official government policy described in White Papers.

The boundaries of document collection were defined by two criteria. The first was the decision to limit the analysis to national policy documents. This was determined by the amount of time allocated to the study, and Cirrus's decision to focus largely on a horizontal analysis of policy – that is, across ministries and departments operating at the national level. A key point raised in the TOR and during engagements with stakeholders is the intersection, gaps and conflicts between policies from all relevant departments and ministries. The second was to use informed judgment in determining the relevance of the aspects of a particular policy with regards to its potential impacts, either directly or indirectly, on greenhouse gas emissions and removals from the AFOLU sector. For example, this has resulted in the exclusion of policy related to education. Although an increase in environmental education at the primary or secondary school level might lead to indirect impacts on GHG emissions or sequestration in the AFOLU sector, it was decided that the time horizons for which impacts would be realized were too distant and the relationship too vague, making judgments of causality too risky.

Some definitions of policy include programmes that government may implement that directly derive from policy. At this stage of analysis, however, it was determined that the inclusion of programmes was beyond the scope of the TOR. Nevertheless, Cirrus has generated a non-exhaustive list of programmes that may be part of the analysis of implementation options at a later stage of the SA National Sinks Project.

1.5 Research process

Familiarisation Phase

As part of the methodology's "familiarisation phase", desk-based research was undertaken with a focus on identifying relevant policy in the Parliamentary register of bills and acts, the Government Gazette, and various ministerial and departmental websites. The search spanned multiple ministerial and departmental websites, to ensure that a comprehensive set of policies that could have substantial impacts on greenhouse gas emissions from the AFOLU sector were identified.

A comprehensive approach was adopted - if it appeared that a policy document might impact on greenhouse gas emissions in the AFOLU sector, it was recorded in the catalogue. Initially, Cirrus included 108 policies in the catalogue. It requested that the DEA review and circulate the catalogue to potential interested stakeholders, to determine if any key policies were missing and to obtain general feedback and guidance on the compiled set. Following circulation, no new policies were recommended for inclusion in the catalogue. During the course of analysis, several changes to the catalogue took place:

- Seven policies were considered to have no impact on GHG emissions or reductions from the AFOLU sector.

These were amendments to Acts or Regulations that provided no relevant change to the original legislation. There were several pieces of legislation that are likely to be rescinded if some bills lodged with Parliament are passed; others have been deemed unconstitutional.

- Several additional policies that had originally been identified through the familiarisation phase are not yet available to the public.
- All of the analysis and reports commissioned by the Minister of Environment and Water Affairs to support the drafting of the National Climate Change Response Paper (NCCRP) were deemed irrelevant, given that their core findings had already been integrated into the NCCRP. In addition, they do not meet the working definition of policy adopted for this analysis.
- Eight new policies were added, under a new heading "Additions" at the bottom of the catalogue

Creating a Structured Framework

The catalogue contains thirteen analytical categories. The categories reflect different aspects of the research mandate – "to map policies that directly or indirectly impact greenhouse gas emissions or reductions from the AFOLU sector". For most of these, a narrative description is provided. Each policy logged into the catalogue was analysed against pre-determined categories, detailed below in Table 1.

Table 1. *Analytic Categories used in the Policy Catalogue*

	Description
Principle AFOLU sector impacted by the policy	Based on the nature of carbon stocks and GHG emission in each land-use type, the AFOLU sector was divided into a) Coastal, berg and scarp forests b) grasslands c) woodlands / savannah / thicket d) mosaic small scale farming e) commercial crop agriculture f) plantation forestry g) commercial livestock agriculture, and h) urban / peri-urban development (see Module 2). First, the potential influence of a policy on carbon stocks and GHG emissions in each of these land-use types was noted, followed by a broad, general indication of the influence: P (for preservation of the existing area covered by the land-use type), C (for conversion to an alternative land-use type) or E (for expansion of the land-use type). For example, a policy seeking to support smallholder agricultural production would have checked "C" in both the grasslands and woodlands/savannah/thicket categories, as these would be likely converted to croplands under the policy and "E" under mosaic small-scale farming
Land-Use Activity	Potential land-use activities promoted by the policy are noted. These range from woodland conservation to ploughing, and fire management. Each policy was assessed to determine which, if any, of the activities it promoted.
Policy type	The policy type describes broad policy categories: Acts, Regulations, Strategic Plans, Frameworks, etc.
Purpose of the document	Many policies, notably Acts, explicitly state their purpose. This was either quoted directly, or a summary of the purpose provided in instances when it was less clearly presented.
Key dependencies	Policies may depend on the delivery of future regulations, frameworks, or plans to be effectively realised. Their success may rely on the cooperation of particular departments, the establishment of committees or forums and the delivery of new research. This category seeks contextualise each policy, demonstrating the ways in which policies may rely on further interventions to be fully realised.
Direct emissions	Practically no policy included accurate calculations of GHG emissions or removals. Instead, this is a descriptive review of the types of emissions and removals that could be expected if the policy was implemented. The potential types of GHG emissions or removals as well as the activities that would lead to them are described.
Indirect emissions	Most policies, if implemented, will result in "leakage" or unintended, indirect emissions. This might be, for example, the displacement of fuel wood collection sites from one area to another following the institution of new conservation practices. It could be the use of vehicles and reliance on electricity to run an agricultural operation. However, this category will allow the DEA to consider the full range of potential emissions and reductions associated with a given policy.
Direct effect	The primary intention(s) of policies that impact on terrestrial carbon stocks is discussed. This includes a summary of the types of activities and interventions proposed by the policy. It covers "what can be expected" if the policy is implemented.

	Description
Indirect consequences	The indirect consequences of policies are reviewed, detailing the potential unexpected or unplanned outcomes that may stem from policy implementation. As it is not feasible to assess every potential outcome of a policy within the time constraints of the study, this provides a broad view of the potential indirect effects of policy adoption.
Reference to climate change	This provides insight into the extent to which a given policy clearly refers to "climate change".
Reference to GHG emissions	This provides insight into the extent to which a given policy clearly refers to "GHG emissions".
Are there clear policy targets?	The provision of clear targets, notably in departmental strategic plans, helps to assess the potential impact of a policy; it is also a sound indication of the amount of planning that may accompany certain commitments. In many instances, Acts and Regulations will not be accompanied by targets; this category is more relevant to strategic plans that seek to align with Acts, Regulations and White Papers, and to assess the extent to which adequate planning has been undertaken.
Description of the potential magnitude	The magnitude of a policy is a broad categorization of its potential impact on terrestrial carbon stocks and fluxes. The magnitude is assigned a certain qualitative designation: limited, moderate, substantial, or a range of these (moderate to substantial, for example). The magnitude category is discussed in more depth in this module.

The catalogue includes each step of the policy development framework: moving from the green and white paper drafting phase, to the development of acts, regulations and bills, and the creation of strategies, frameworks and plans to support the implementation of policy aims. Within each category of policy document, the material has been organised in chronological order.

A note on assessing the potential magnitude of a policy

The catalogue's category "Description of the Potential Magnitude of impact" proved to be one of the more difficult categories against which to assess policies. For this reason, the approach to assessing the magnitude of the effect of a particular policy is described more in-depth here, to demonstrate both the complexity of the undertaking and to provide more transparency in how the descriptors were assigned.

The aim of the magnitude category is to provide an estimate of the impact that a particular policy will have on terrestrial carbon stocks as well as GHG emissions from the AFOLU sector. In keeping with the study's qualitative approach, the potential impact magnitude was described as a relative measure, which was described as limited, moderate, or substantial.

In the catalogue, a policy is assigned one of these descriptors or a range in certain cases (for example, "minimal to moderate"). This is complemented by a short written explanation supporting the magnitude description assigned to the policy. The approach allows the reader to gauge a policy's impact relative to other policies and to understand the factors influencing the rating. The use of a range recognizes that a variety of policy outcomes are possible where policies are likely to interact, overlap, contradict or strengthen one another in reality. In this sense, the broad three-point scale recognizes that policies do not exist in isolation, but rather in a system of competing policies, priorities and mandates.

Qualitative descriptions were chosen for a number of reasons. Few policies have narrowly defined targets but rather broad goals such as "the rehabilitation of natural ecosystems." Generally, the lack of detail makes it practically impossible to precisely calculate the impact of each policy. Using the example above, a policy will typically state its broad aims – "the rehabilitation of natural ecosystems" but it will not go so far as stipulating the location and spatial extent of rehabilitation or the land-use type or methodology under concern. These finer details are generally defined as the policy is implemented at a local or provincial scale.

In the literature, our approach to describing the magnitude of a policy's impact is often preferred. As Manski (2013) notes "…the point predictions produced by [quantitative] analysts are achieved by imposing strong assumptions that rarely have foundation. Analysis with more credible assumptions typically yields intervals rather than point predictions." Furthermore, it was noted that intricate models used to predict policy outcomes have often not produced more accurate or robust results than sound expert judgement. For these reasons, a qualitative range or interval approach was adopted, supported by a descriptive explanation.

It is important to note that in this analysis, the estimated magnitude of the effect of a policy assumes that the

policy will be implemented and that there are sufficient resources and capacity for each policy to be implemented. In practice, this assumption will not necessarily hold. A full comprehensive assessment of the impact of policy would include an analysis of required resources and associated allocations and existing capacity. Unfortunately, this analysis is beyond the scope of the current review.

Our impact assessments were based on a broad estimate of the spatial area affected by the policy and the change in carbon stocks or GHG emissions per unit area. The change per unit area is based on the anticipated actions due to the policy and the particular land-use and vegetation type under concern. For example, the *Strategic Plan for the Department of Agriculture, Forestry and Fisheries* aims to rehabilitate 9,500 ha of agricultural land as part of Strategic Goal 2: *Sustained Management of Natural Resources*. This area presents a small fraction of South Africa's total land area (< 0.01%) and the sequestration rates per unit area are likely to be low (<0.1tC.ha^{-1}.yr^{-1}. Farage et al. 2007). Although this policy is certainly laudable, its impact on national terrestrial carbon stocks and fluxes would be estimated to be 'limited'. In comparison, the *National Development Plan* seeks to create over 600,000 new jobs in agricultural production, potentially converting several hundred thousand hectares of previously unploughed grassland into cropland. The turnover of 'virgin grasslands' results in a significant decrease in soil carbon stocks, especially in the cooler, temperate grasslands of KwaZulu-Natal and the Eastern Cape (>40tC.ha^{-1}, Knowles et al. 2007). This would be categorized as a policy with a 'substantial' potential effect.

Charting

As a first step in analysis, charts were used to further distil key data, relationships, differences, discord and misalignment of policies. Some aspects of policies that were charted include:

- Policies with the greatest impact on terrestrial carbon stocks and associated GHG emissions
- Those that would impact agricultural expansion
- Those that influence conservation and restoration activities
- Those promoting expansion of the built environment
- Those that focus on environmental licensing and regulation, land-use and spatial planning
- Clusters of policies
- Major gaps and trade-offs noted in the analysis stage

Mapping and Interpretation

In the final phase, charts, along with a close review of the catalogue's contents, were used to interpret the data and distil findings. The analysis is presented in written, explanatory accounts that provide insights into both individual policies and the broader policy environment.

1.6 What the analysis does not do

The analysis process has resulted in the development of important data, structured in such a way as to ease comparisons between policies, and provide a snapshot of a policy's key contributions to terrestrial GHG emissions and removals. The analysis, however, has its limitations:

- **Due to the nature of some policies, it is difficult to accurately estimate their impact on terrestrial carbon stocks:** The majority of reviewed policies advocate broad changes in land-use practices and provide few clearly defined targets, location-specific objectives or area estimates or maps. In addition, by nature, few policies accurately describe how and when policy objectives will be achieved. In practice, these details are addressed when the policy is implemented. It does, however, mean that the magnitude of the impact of each policy is difficult to estimate with accuracy. A qualitative range-based approach was therefore used to estimate the relative impact of policies on carbon stocks and associated GHG emissions.
- **The scope and impact of many policies, principally Acts, are subject to Ministerial discretion and interpretation:** A number of policies allow for broad ministerial discretion. Ministers are often tasked with the development of standards, regulations, interdictions and are responsible for defining the scope of an Act's application. The magnitude of a policy's impact is therefore contingent on a Minister's approach. If the appointed Minister was to change, the manner in which Acts or Regulations are implemented can be revisited.
- **Policy precedence is not always clear.** The catalogue presents a range of policies with different levels of legal standing. White Papers, Acts and Regulations are legislated measures, approved by Parliament and supported by legal recourse. They often stipulate the development of frameworks for their realisation, as well as strategic plans at a Department level. The orderly flow of policy creation – from Green and White papers to Acts, Regulations and frameworks, down to five year-strategic plans – can be interrupted by the emergence of new policies that fall outside of the typical development process. For example, there are Presidential vision documents such as the National Development Plan as well as cross-sectoral documents such as the National Strategy for Sustainable Development and Action Plan. These will have received approval from Cabinet, but not necessarily from Parliament. Their legal standing is less clear. Some policies will have greater political support than others, backed by more financial, human or technical resources. Some may be a direct reflection of an electoral platform, and therefore are perceived to have strong buy-in from constituents. This complex interplay between legal standing, buy-in, political backing and resources is particularly important when considering the effect of policies on land-use

and associated carbon stocks and fluxes.

- **Some policies are only applicable when certain land-uses are present:** A number of policies are applicable across the entire country, but may only be activated under certain circumstances. For example, The *National Environmental Management Act*'s Environmental Impact Assessment (EIA) Regulations are only relevant in the context that a listed activity requiring an EIA is proposed and requires an audit. It is, however, difficult to predict which activities may be listed or delisted in the future. Neither can one predict the geographic location or extent of changes in land-use (e.g. mining, infrastructure or housing developments). In the EIA example, it is only clear that the regulations present the opportunity to oversee different types of development, and potentially limit their impact or require the implementation of ecological restoration activities. The effect of these measures on carbon stocks or fluxes is unknown.
- **Indirect impacts of policies were considered, but within reason:** Once implemented, policies may lead to unintended consequences and unforeseen outcomes. For example, the construction of a new road running through arable but yet undisturbed grasslands, may lead to an increase in agricultural production due to improved market access. This in turn is likely to lead to a release of soil carbon due to commercial ploughing. Potential first and second order indirect consequences have been noted in the catalogue, but an in-depth scenario modelling exercise is beyond the scope of this analysis.

Module 2 – SECTION 3

The nature of the South African land-use sector

In comparison to other countries in sub-Saharan Africa, where the emphasis is on reducing emissions from deforestation and forest degradation (REDD+), South Africa has limited forest cover because the main conversion of indigenous landscapes had occurred during the 1960s and 70s. Whereas there is certainly still scope for activities that avoid deforestation and landscape degradation, there is significant opportunity to sequestrate carbon through the restoration of grasslands and thicket, as well as to reduce emissions through energy related projects in the established agricultural sector. Here, we briefly introduce the biophysical, socio-economic and historical nature of land-use in the country.

2.1 Biophysical template – the nature of terrestrial carbon stocks

South Africa is a relatively dry country where most areas receive less than 650mm of rainfall per year. Certain pockets along the eastern seaboard may receive over 1000mm rain annually but in general, South Africa is a fairly arid country. This is reflected in the magnitude and distribution of carbon stocks across the country, which is principally determined by annual rainfall, soil type and temperature (Fig 3).

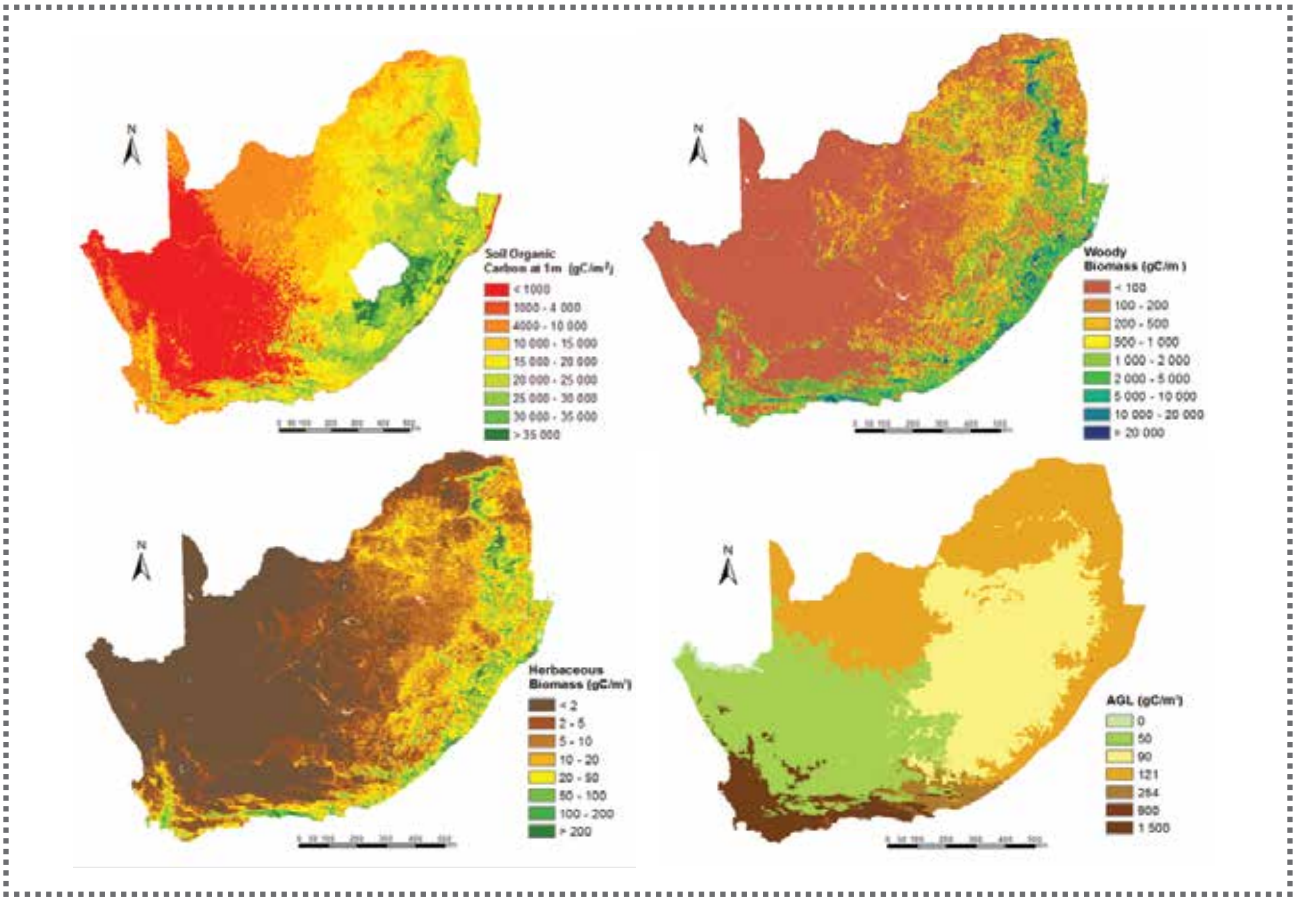

Figure 1. *The components of the terrestrial carbon stock of South Africa. Top left: soil organic carbon to 1m in depth. Top right: the above- and below-ground woody-plant biomass pool. Lower left: above- and below-ground herbaceous biomass pool. Lower right: above-ground litter (Scholes et al. 2013)*

Phase 1 of the National Carbon Sink Assessment focused on understanding the distribution of carbon stocks across the country and provided the first maps of terrestrial carbon stocks at a national scale. As expected, the areas with the highest carbon stocks per hectare are the coastal forests, followed by moist savanna and thicket systems, and then the drier areas of the Northern Cape, western Free State and North-West Province (Fig 3, Scholes et al 2013). Less expected were the estimates of the proportion of the national terrestrial carbon stock that is located in each biome or land-cover type (Fig 4, Scholes et al 2013).

Approximately 30% of the national terrestrial carbon stock is located in grassland ecosystems and a slightly lower amount in the savanna biome (Scholes et al. 2013). In comparison, less than 5% of the national carbon stock is located in indigenous forest and sub-tropical thicket. This result is primarily due to the spatial extent of each vegetation type (Fig 4).

Furthermore, of particular interest in terms of developing national implementation options, is that over 90% of carbon stocks within the grassland and savanna biomes are located in the belowground soil organic carbon pool. Although this is the largest terrestrial pool of carbon in the country, little priority has been placed on it, due to the historical emphasis on forests and REDD+. These results suggest that a better balance of effort is required between grassland, savanna and forest ecosystems. Whereas restoration efforts and current progress with sub-thicket and forest biomes should not be curtailed, equal effort should be placed on maintaining belowground carbon stocks in grassland and savanna ecosystems.

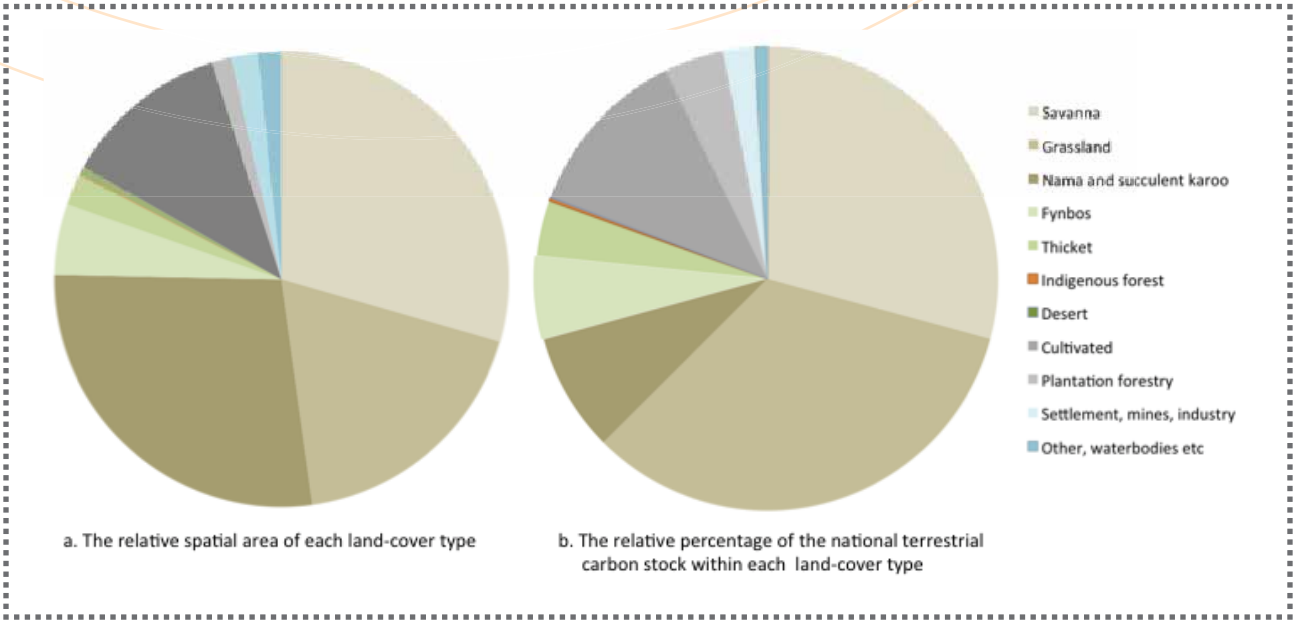

Figure 2. *The relative contribution of each of the principle land-cover types in South Africa in terms of (a) spatial area and (b) terrestrial carbon stocks (input data from Scholes et al. 2013)*

2.2 Socio-economic template – the need for broader inclusivity

Starting with the 1913 Land Act, successive laws and legislation determined that black South Africans were relegated to racially segregated "Bantustans", "homelands" or "native reserves". In these areas, land was communally owned and due to immense population pressures, was soon marked by overgrazing, soil erosion and poor soil fertility. During apartheid, these conditions were exacerbated by various "Betterment" schemes, which concentrated residence and centralised grazing- with disastrous ecological consequences (Bundy 1989).

While a democratically elected government started overturning racialised land legislation in 1994, South Africa still struggles with the legacies of land-use policies initiated during the colonial and apartheid eras. The country is marked by deep inequalities that still need to be addressed. In particular, substantial sections of the country's poor, rural population still live on the most degraded land and have little access to capital, information or the carbon market.

Whereas comprehensive and robust project development, monitoring and reporting frameworks have been created under the Clean Development Mechanism (CDM) and Verified Carbon Standard (VCS), they assume that the implementing agent is well resourced and has access to capital and markets. If implementation is to occur in degraded areas within former homelands and other areas of communal land-tenure, alternative, but just as scientifically robust options need to be created. While opportunities with the established commercial sector need to be realized, they

should simultaneously be balanced with a national program that facilitates projects in communal areas.

2.3 Defining the "AFOLU sector"

As per the TOR provided by DEA, the definition of the agriculture, forestry and other land-use sectors used in this analysis was informed by the UNFCCC paper on Agriculture (2008) and the IPCC AR4 report (2007)[5]. These definitions are broad in the sense that they not only include activities that lead to a change in terrestrial carbon stocks and fluxes in the majority of vegetation and land-use types (e.g. reforestation, afforestation, reducing emissions from forest degradation and deforestation (REDD+), reducing emissions from grassland and soil degradation, reduced tillage and conservation farming), but also refer to land-use related activities that reduce emissions through fossil fuel substitution (e.g. the use of biogas digesters, fuelled by biomass and livestock manure, to generate electricity, or the generation of electricity through biomass-energy units).

The reviewed set of policies is therefore extensive and goes beyond the traditional restricted focus of land-use based climate change mitigation activities that only recognized afforestation, reforestation and REDD+ activities located in forest ecosystems.

5 http://www.ipcc.ch/publications_and_data/ar4/syr/en/contents.html

Module 3 – SECTION 3

Policies affecting natural and semi-natural landscapes

For the purposes of this policy review, we have used the term "natural and semi-natural landscapes" to refer to three broadly indigenous land-cover types - grasslands, woodlands (including sub-tropical thicket), and indigenous forests. As most policy does not differentiate between grasslands and open-savanna ecosystems, we collectively refer to these ecosystems as *rangelands*[6]. Plantations have been considered as an agricultural land-use type for the purposes of this review and are considered in the Agriculture Module. Desert ecosystems are not considered in this review due to their small contribution to terrestrial carbon stocks and fluxes (<0.01%, CSIR 2013 - Section 1 Report).

Indigenous forests cover a relatively small area in South Africa of 857km^2 (CSIR 2013 - Section 1 Report)). This is less than 0.1% of South Africa's land area. Almost three quarters of these forests are conserved either as declared state forests or within formal protected areas. Although the *National Forests Act* includes "woodlands" in its overarching definition of "forests", they are considered as a separate land-cover category in this review due to the distinctly different carbon stocks and fluxes in woodlands compared to forests (see CSIR 2013). Furthermore, woodlands are typically affected by a different set of land-use drivers and agents compared to indigenous coastal and scarp forests.

Natural and semi-natural rangelands cover 582,000km^2 or approximately half of South Africa's total land area. Importantly for this review, they contain over 75% of the country's terrestrial carbon stock (CSIR 2013, Module 2) and yet, are one of the most heavily utilised landscapes in terms of commercial and smallholder livestock production, conservation and tourism (Second National Communication to the UNFCCC). The expansion of commercial and small-holder crop agriculture over the last century has principally occurred within the grassland and savanna biomes due to the suitable climatic and soil conditions for crop production, and it is also the principle biome in which expansion is likely to occur in the future. Policies focussed on expanding small-holder and commercial crop agriculture are therefore likely to affect the present carbon stocks (and fluxes) within existing rangeland systems to some degree.

- The case for restoring and maintaining South Africa's rangeland systems is robust and clear. Rangelands cover a significant fraction of the country's surface and are home to the majority of the population due to their suitability for agriculture and pleasant climatic conditions. As most of South Africa's commercial- and smallholder agriculture is located in rangelands, much of the rural economy and associated jobs and livelihood opportunities are dependent on functioning, intact, productive rangeland systems.
- Despite this dependence (and probably due to it), rangeland systems have been heavily degraded through inappropriate management that leads to desertification or bush-encroachment. Depending on the method of calculation, it is estimated that up to 60% of South Africa's rangelands are degraded, with up to 90% vulnerable to desertification[7]. In addition to observed decreases in biodiversity, ground cover and soil health, degradation depletes the productive capacity of rangelands, which has a direct effect on rural employment and livelihoods as well as downstream economies that are dependent on such areas for cost-efficiently managing water flow and sedimentation. As noted in South Africa's Second National Communication to the United Nations Framework Convention on Climate Change "Overgrazing, desertification, natural climate variability, and bush encroachment are among the most serious problems facing rangelands".

6 "Rangelands" is a collective term for open, productive landscapes ranging from sparse grassland on the drier end of the continuum, to tall grassland and open savanna systems on the wetter end (dense woodland and forest falls outside of the definition

7 Hoffman et al. (1999) Land degradation in South Africa. Plant Conservation Unit, University of Cape Town, Cape Town; Gibson D. J. D. (2006) Land degradation in the Limpopo Province, South Africa. University of the Witwatersrand, Johannesburg.

- The South African government has been proactive in responding to such environmental degradation. It has pioneered several initiatives, such as the Expanded Public Works Program, that address the spread of alien invasive plants, control fire and restore wetland and woodland systems. In addition to restoring ecosystem health and services, these activities provide meaningful employment and skill development opportunities to previously unemployed citizens in rural areas - the Program is often cited in the President's State of the Nation Address due to its success and the considerable impact it has had on employment.

Thirty-nine policies from the catalogue were identified as potentially having an impact on carbon stocks and associated GHG emissions in intact natural and semi-natural landscapes (policies that focus on the potential expansion of commercial or small holder agriculture into areas that are presently natural or semi-natural landscapes are considered in Module 4. Policies that have limited to moderate impacts do not feature prominently in the written analysis. These categories include:

- Legally sanctioned protection of natural and semi-natural landscapes and associated maintenance of current above- and below-ground carbon stocks.
- Fiscal or other incentives to promote participation of private landowners in conservation and the avoided degradation and loss of terrestrial carbon stocks.
- Changes in terrestrial carbon stocks through water and fire management.
- Increases in terrestrial carbon stocks through restoration and rehabilitation interventions.
- Energy policies that may influence the rate at which fuel wood is harvested and the long-term sustainability of forest resources and associated carbon stocks.

Key findings

- The NEMA body of policies provide the legislative framework by which the conservation and sustainable use of natural resources is prioritized, and which adheres to a conservative approach to development in natural landscapes. Close adherence to these policies would lead to substantial protections over and cautious exploitation of the national terrestrial carbon stocks.
- The *National Protected Areas Expansion Strategy* (NPAES) provides ambitious and detailed conservation targets, and enjoys a high level of recognition in other policies. However, there are limited commitments from government regarding the conservation of areas outside of the Protected Areas Network.
- There are few national-scale initiatives that identify which particular areas or landscapes are likely to be impacted by planned expansions of commercial and small grower crop farming and other planned economic activities. Neither is it clear the extent to which planned expansion of the built environment and agriculture in particular will be influenced and mediated by the NEMA body of policies. This suggests that national terrestrial carbon stocks may be reduced due to expansion of economic activity.
- While the protection of rangelands and woodlands receive some attention in policy, the scope and location of interventions are not well defined outside of the NPAES.
- Voluntary contract agreements or biodiversity stewardship programmes hold advantages for landowners through fiscal incentives, and provides a cost effective means for protection and conservation of natural and semi-natural landscapes and associated terrestrial carbon stocks. However, these programmes have not been rolled out across a significant area of land.
- Only two policies have set specific targets relating to the improvements of natural landscapes, and there is very limited information on degraded areas requiring urgent rehabilitation and reclamation. These policies remain very broad and do not specify targeted interventions, making it difficult to quantify the potential carbon sequestration and conservation benefits.
- There is a lack of policies that refer to the unsustainable harvesting of fuel wood as a source of renewable energy, as well as a clear lack of policy addressing this issue.

Each category is considered in a separate section below (4.1-4.4)

3.1 Legally sanctioned protection of natural and semi-natural landscapes

Table 2. Policies Regulating and Controlling Protected Areas

Policy	Activity	Magnitude of impact
National Environmental Management: Protected Areas Act 2003	Protection and conservation of declared protected areas	Substantial
National Environmental Management: Biodiversity Act 2004	Protection and conservation of biodiversity that may fall outside protected areas	Substantial
National Biodiversity Framework 2009	Declaration and establishment of bioregions	Substantial
National Protected Areas Expansion Strategy 2008	Expansion of Protected Areas	Substantial
Guidelines Regarding the Determination of Bioregions and the Preparation of and Publication of Bioregional Plans	Identification and designation of critical biodiversity areas	Substantial
Land-Use Planning and Management Act	Future spatial planning makes provision for ecologically sensitive areas	Substantial
National Environmental Management Act 1998	Protection of ecologically sensitive areas (outside protected areas)	Substantial
National Environmental Management EIA Regulations 2006	Protection of ecologically sensitive areas (outside protected areas)	Substantial
National Environmental Management: Environmental Management Framework Regulations 2010	Protection of ecologically sensitive areas (outside protected areas)	Substantial
NEM: Biodiversity Act Threatened or Protected Species Regulations 2012	Regulating controlled activities to protect threatened or protected species	Substantial
Biodiversity Strategy and Action Plan	Promotion coordination of conservation network	Substantial
Conservation of Agriculture Resources Act 1983	Conservation of degraded land and soils	Substantial
National Parks Act 1967	Protection and conservation within national parks	Substantial
Regulations on the National Forests Act 2009	Regulating activities in forests and plantations	Moderate to Substantial
National Forests Act 1998	Protection of state forests and woodlands	Limited to Substantial

Table 3 Additional policies discussed in promotion of expansion of protected areas

Policy	Activity	Magnitude of impact
National Protected Area Expansion Strategy 2008	Expansion of Protected Areas	Substantial
Woodlands Strategy Framework for the Department of Water Affairs and Forestry 2005	Protection and Rehabilitation of Woodlands	Substantial

There are sixteen national policies that provide statutes for national protected areas as well as protecting species or sensitive ecosystems that may fall outside protected areas. Protected areas are generally subject to strict regulation with provision made for designation of protected areas, appointment of management authorities, preparation of management plans and strict regulation of activities within them. They include a range of designations: special nature reserves, nature reserves, protected environments, specially protected forest areas, forest nature reserves, forest wilderness reserves, mountain catchments and world heritage sites. The majority of protected areas are managed by government conservation authorities.

Less formally protected areas may include private nature reserves, national heritage sites and mountain catchment

areas or conservancies. These areas are regulated in order to conserve biodiversity as well as conserving ecosystem services. These areas are considered less formal as the management of these areas falls under private landowners.

Only a resolution of the National Assembly can exclude a portion of land from a special nature reserve; any declaration of a special nature reserve cannot be withdrawn once approved (Part 2, 19). Nature reserves are bound by less strict de-gazetting principles; on privately owned lands, it suffices for the Minister or MEC, or either of them by order of the owner, to withdraw the listing (Section 3, 24.1). Similarly, for a protected environment, the Minister or MEC can simply withdraw the listing through a declaration in the Gazette (Section 4, 29.a).

It is therefore most likely that above- and below-ground carbon stocks will be maintained in formally protected areas over the long-term. There may be some changes in carbon stocks due to, for example, a potential change in fire management in a particular conservation, but current policy will not directly or indirectly lead to a significant change in terrestrial carbon stocks located in conservation areas.

Conservation Legislation

The *National Environmental Management: Protected Areas Act 2003* is the central piece of legislation for the establishment and management of the protected area network. The *National Environmental Management: Biodiversity Act 2003,* which essentially contains the same underlying objectives as the *Protected Areas Act*, provides a suite of new legal tools for conserving many biodiversity priority areas that may lie outside the protected area network and are likely to remain so. These tools include bioregional plans, biodiversity management plans, as well as the listing of threatened or protected species regulations and regulations on alien invasive species.

The *National Biodiversity Act* provides for the adoption of the National Biodiversity Framework that provides for an integrated, co-ordinated and uniform approach to biodiversity management by all spheres of government, non-governmental organisations, private sector, local communities, other stakeholders and the public (Section 39). It also identifies priority areas for conservation action and the establishment of protected areas provide for regional cooperation and may determine norms and standards for provincial and municipal environmental conservation plans. The Framework identifies thirty-three actions to be undertaken in the next five years in order to implement its strategic objectives, highlighted in the *National Biodiversity Strategy and Action Plan*. It therefore provides an important framework to promote, inform and co-ordinate the short-term efforts of many organisations and individuals involved in conserving and managing South Africa's biodiversity.

The Minister of Water and Environmental Affairs has published the *Guidelines for the Determination of Bioregions,* which contains detailed information determining the boundaries of bioregions, the content to be included in a bioregional plan, the process to be followed in determining a bioregion and publishing a bioregional plan. Furthermore, it states that any such plan must identify a portfolio of critical biodiversity areas required to meet biodiversity pattern and ecological process targets and that these areas should include spatially explicit ecological corridors that need to be managed to ensure connectivity of natural habitat in the landscape.

The *National Biodiversity Act* also provides for the development of biodiversity management plans which may be called by a 'biodiversity management agreement'; the Minister may enter into such an agreement with stipulated bodies 'regarding the implementation of a biodiversity management plan, or any aspect of it' (Section 44). These bodies feasibly include government authorities, organisations and private landowners. In order to encourage persons to enter into such agreements, various income tax benefits have recently been introduced in respect of expenditure incurred in implementing them (see section 4.4 below).

The application and realisation of this set of Acts and associated planning and other mechanisms, provide good opportunity to both maintain large areas of intact natural landscapes that are under clear threat of degradation, as well as provide legal support for the restoration of important biodiversity and ecosystem service areas that have been degraded in the past. As such, these Acts and associated planning mechanisms, provide opportunity to maintain or increase the size of terrestrial carbon stocks above a business-as-usual scenario. It is however difficult to assess the magnitude of their effect on terrestrial carbon stocks and associated fluxes to date without a clear understanding of each case in which they have been exercised.

Further to more recent conservation legislation that provides the overarching legal framework for the protection of natural and semi-natural landscapes, the *Conservation of Agriculture Resources Act 1983 (CARA)* may also indirectly affect carbon stocks in agricultural landscapes. The regulatory tools inherent in this Act include the imposition of directives and control measures to control alien invasive species, prevent soil erosion, protect wetlands, regulate grazing capacity and prevent veld fires. Throughout our analysis of policies, CARA has rarely been cited by government departments. The most prominent citation of this Act has only been by the Department of Water Affairs for the reliance of protection of ecosystem services through the control of alien invasive species.

Land-Use Planning

Future land-use planning is entrenched in several national policies, for example, the *Land-Use Planning and Management Act,* 2013. When municipalities prepare integrated development plans, municipalities have to ensure they are aligned with a broad array of biodiversity plans prepared by conservation authorities, such as the *National Biodiversity Framework*, bioregional plans, biodiversity management plans and environmental frameworks.

Restrictions and Control Legislation

The *National Environmental Management Act* and associated *Environmental Impact Assessment (EIA)* framework aim to regulate and limit environmentally harmful activities. Environmental Impact Assessments are used to evaluate and constrain the potential harmful effects of land development activities - housing developments, industrial areas, agricultural activities, exotic plantations, road construction and so forth. Together, the *Environmental Management Act* and the *EIA* for the *Environmental Management Framework,* which enables authorities to assess all the possible impacts a potential development may have on any area's environmental attributes (sensitivity, extent, significance and interrelations) before approving such developments. This set of legislation and mechanisms can restrain the conversion of land and the potential release of biomass and soil carbon into the atmosphere, although it is principally focused on the conservation of biodiversity and rare and endangered ecosystems.

Key Findings

Although a substantial set of policies exist, there are few clear commitments on the expansion of formal conservations areas beyond the current network. Likewise, there are few clear references to which particular areas would be targeted by policy aimed at expanding the economy. It is however, reasonable to assume that many of the proposed activities (expansion of commercial and smallholder agriculture, expansion of mining, expansion of urban and peri-urban areas) may occur in what are presently natural and semi-natural rangelands.

Although the *National Forests Act* calls for the protection of woodlands, a target for protection must be defined by the Minister. In addition, the Minister may declare certain threatened or endangered woodlands as protected areas, as per section 12(1)(C) of the NFA, though this provision has not enjoyed widespread application. Beyond the legislative framework provided by the NFA only two policies that actively promote the protection of woodlands and grasslands –the *Woodlands Strategy Framework* for the Department of Water Affairs and Forestry (2005) and the *National Protected Areas Expansion Strategy* (2008). The *Woodlands Strategy* articulates the importance of prioritising woodlands due to their contribution to rural households and ecosystem services. The *National Protected Areas Expansion Strategy* (2008) identifies Lowveld savanna, Highveld grasslands, and grassland and woodland ecosystems in general to be the least protected biomes. These latter two policy documents are however only framework and strategy documents, and do not legally enforce the regulation and management of these biomes. The review noted that few policies include clear references or targets focussed on the protection of 'woodlands' and 'rangelands'.

3.2 Incentives promoting the participation of private landowners and communities in conservation

Table 4. *Policies incentivising the conservation of natural and semi-natural landscapes outside of formally protected areas.*

Policy	Activity	Magnitude of impact
White Paper National Climate Change Response	Offset Agreement	Substantial
National Protected Area Expansion Strategy 2008	Contractual Agreements	Substantial
Carbon Tax Policy Paper 2013	Offset Agreements	Substantial
Municipal Property Rates Act 2004	Property Tax Reductions	Limited to Substantial
Revenue Laws Amendment Act 2008	Income Tax Reductions	Limited
National Forests Act 1998	Community Forestry Participation	Limited
The Policy and Strategic Framework for Participatory Forest Management	Community Forestry Participation	Limited

There are seven policies that promote the participation of private landowners in protecting and conserving natural and semi-natural landscapes through fiscal incentives.

The NCCRP includes the potential development of a GHG offset trading platform as well as payment for ecosystem services. This platform is supported by the *Carbon Tax Policy Paper (2013),* which details how carbon taxes will be introduced and phased in as a greater low-carbon economy strategy. The Paper notes the exclusion of the AFOLU sector from carbon tax requirements for the first phase 2015 – 2019; however the sector may potentially be included in the tax's proposed offset scheme. Emissions reduction units (ERUs) could be generated through a number of land-use activities, ranging from restoring rangeland, woodland and forest ecosystems, to the avoided degradation of these same types of ecosystems. Prior experience in the development of such projects for validation through the Clean Development Mechanism (CDM), Verified Carbon Standard (VCS) or Gold Standard (GS), has shown that high transaction costs, general awareness and perceived risk have limited the roll-out to date. If these issues could be addressed in a new proposed offset scheme, it could strongly encourage such activities in the sector.

Voluntary contractual agreements with private landowners is a mechanism through which the total area under appropriate conservation management practices can be expanded in cost-efficient manner without purchasing additional land or expanding the country's formal protected area network. They often form part of biodiversity stewardship programmes that aim to conserve important biodiversity areas and rare ecosystems through providing financial incentives to land-owners to manage land in a manner that ensures conservation goals are met (NPAES, 2008). They have the potential to create a win-win scenario in that the country is able to realize its conservation goals in a more cost-efficient manner while landowners are able to increase and diversify their revenue streams.

The *Municipal Property Rates Act (2004)* states that no property tax can be levied on special nature reserves, national parks or nature reserves which are not developed or used for commercial, business or agricultural or residential purposes (Section 17). The property tax exclusion encourages private and communal landowners to convert land of high conservation value into forms of protected areas in order to avoid escalating property tax liabilities.

The *Revenue Laws Amendment Act (2008)*[8] makes provision for income tax incentives granted to landowners who agree to manage their land in a manner that leads to long-term conservation of biodiversity. Landowners are incentivised to conserve landholdings through both tax incentives and its associated penalties; if found in violation of the biodiversity management agreement, a fine equal to the tax deduction from the previous year is levied (Section 57.1d). In a similar manner to the *Municipal Property Rates Act*, further tax provisions are afforded to those that convert land into a protected area status for a minimum of thirty years, or land declared a national park or nature reserve (Section 37C, 4 and 5).

Further to this, an additional mechanism for the conservation of forests is provided through the development of community forestry, which is highlighted in the *National Forests Act (1998)* as well as the *Policy and Strategic Framework for Participatory Forest Management*.

Each of these policies and associated mechanisms has the potential to improve the management of natural and semi-natural landscapes across the county and in turn lead to the additional sequestration of carbon in soils and biomass, as well as halt the release of stored carbon into the atmosphere that may have occurred during the degradation of these ecosystems. The realisation of these mechanisms will be further explored during Sections 2 and 3 of the National Carbon Sinks Assessment when implementation models are considered.

3.3 The potential impact of water and fire management on carbon stocks and fluxes

Table 5. *Water and fire management policies*

Policy	Activity	Magnitude of impact
White Paper on Disaster Management 1999	Fire Management and Prevention	Substantial
Conservation of Agriculture Resources Act 1983	Clearing of Alien Species	Substantial
National Disaster Management Framework 2005	Fire Management and Prevention	Limited to Substantial
National Veld and Forest Fire 1998	Fire Management and Prevention	Limited to Moderate

8 The Revenue Laws Amendment Act 2008 seeks to amend the 1962 Income Tax Act in order to make provisions for environmental conservation and maintenance.

Policy	Activity	Magnitude of impact
Disaster Management Act 2002	Fire Management and Prevention	Limited to Moderate
The National Water Act 1998	Protection of ecosystems near water resources	Limited
Policy on Exemptions from the Duty to Prepare and Maintain Firebreaks	Fire Management	Limited

Policies aimed at promoting fire management include a cluster of disaster management policies (*White Paper on Disaster Management, Disaster Management Act, National Disaster Management Framework*), the *National Veld and Forest Fire Act* (1998) as well as the *Conservation of Agriculture Resources Act* (CARA) (1983). The *National Veld and Forest Fire Act* is closely linked with CARA, which contains specific provisions for the prevention and control of veld fires.

CARA has the potential to play a significant role in the conservation of natural and semi natural landscapes as it outlines controls and regulations of alien invasive species. While some alien invasive species provide commercial opportunities (e.g. black-wattle plantations), the generally prescribed management intervention is one of permanent removal of alien invasive plant species. This is principally due to the detrimental affect of alien invasive trees on water services. In terms of a demarcation of area for commercial ventures of alien invasive species, water use licenses must be issued for stream flow reduction activity under the *National Water Act (1998)*. The inter-relationship between the *National Water Act* and CARA are therefore important for the appropriate management of natural and semi-natural landscapes.

The net effect of these policies on terrestrial carbon stocks and fluxes is not necessarily clear. The clearing of alien invasive trees will lead to a release of sequestered carbon stocks into the atmosphere. However, the restoration of degraded and previously ploughed land as well as efforts to halt erosion, will likely lead to the sequestration of carbon in soils and biomass. Without a clear understanding of the spatial areas concerned, understanding the net effect of the policies on South Africa's terrestrial carbon stocks is difficult.

3.4 Increasing terrestrial carbon stocks through land restoration activities

Here, we focus on policies that may lead to the restoration of indigenous forests and woodlands. The expansion of commercial exotic plantations is considered elsewhere in the agricultural module.

Of particular note, the *National Strategy for Sustainable Development and Action Plan* (NSSD1) has set a target to rehabilitate 3.2 million hectares of land affected by degradation by 2014. However, the policy does not go as far as identifying particular areas or programs through which the rehabilitation would be realised. There is, however, a clear mandate to "strengthen land care, woodlands conservation, habitat rehabilitation, ecosystem rehabilitation, reforestation and other conservation farming programmes.", which in turn is likely to increase the size of both below- and above-ground carbon stocks (P.22)

In a similar manner, the *Strategic Plan 2012/2013-2016/2017* for DAFF has set a target of rehabilitating 32,280 hectares of degraded rangeland and areas that have been infested by alien invasive species. In addition, the Plan calls for the rehabilitation of 9,500 hectares of agriculture land (P. 77). Although the plan does not stipulate where the particular location of restoration efforts will be, it can be reasonably assumed that much of the area is likely to be in what is considered natural and semi-natural rangeland ecosystems.

Table 6. *Policies that promote the restoration of land*

Policy	Activity	Magnitude of impact
National Strategy for Sustainable Development and Action Plan (NSSD1) - 2011 -2014	Rehabilitation of degraded Land	Substantial
National Development Plan 2030	Restoration of the thicket biome	Substantial
A Woodland Strategy Framework for the Department of Water Affairs and Forestry	Rehabilitation of woodlands	Substantial
National Biodiversity Framework 2009	Reducing degradation	Substantial

Policy	Activity	Magnitude of impact
Integrated Growth and Development Plan for Agriculture, Forestry and Fisheries 2012	Forest restoration programmes	Substantial
Strategic Plan 2012/13-2016/17 for DAFF 2012	Indigenous forest rehabilitation	Substantial
National Environmental Management Act 1998		Substantial
NEM: EIA Regulations		Substantial
Conservation of Agriculture Resources Act 1983	Restoration and reclamation of eroded land	Limited to Substantial
National Forest Act	Rehabilitation and reforestation and sustainable forest management	Limited
National Disaster Management Framework 2005	Rehabilitation of degraded land	Limited
Human Capital Development Strategy: Environmental Sector 2009-2014	Improvement of conservation management	Limited
Draft Climate Change Sector Plan for Agriculture, Forestry and Fisheries	Promotes efficient forestry practices	Limited
Draft National Water Resource Strategy II	Conservation and rehabilitation of lands supporting catchments, wetlands and river system health	Limited

In instances where land has been degraded by environmental incidences, the *National Environmental Management Act* (1998) makes provision for the remedy and rehabilitation of land. Such a remedial or rehabilitation event may trigger certain EIA regulation requirements (P.32), for example, a rehabilitation action plan. The impact of such requirements on terrestrial carbon stocks may, however, be limited due to their limited spatial scope.

The Conservation of Agriculture Resources Act stipulates that the Minister may undertake control measures to restore or reclaim eroded land as well as clearing invasive or alien plant species. The Act does not however contain restrictions on land types in which control measures may be applied. Again, it is reasonable to assume that much of the rehabilitation would occur in natural and semi-natural landscapes.

The recommendations from the *Woodland Strategy Framework* may lead to improved woodland management systems across the country's woodland systems. Rehabilitation and maintenance activities, potentially carried out through a partnership between LandCare, Working for Woodlands and the Expanded Public Works Program could increase woodland cover and associated carbon stocks. *The Woodland Strategy Framework* is therefore considered an important policy in terms of first sequestering additional carbon during the restoration process and then maintaining terrestrial carbon stocks over the long-term.

There are numerous policies that make a passing reference to rehabilitation; these include the *National Development Plan*, the *National Biodiversity Framework,* the *National Forests Act*, *Human Capital Development Strategy* and the *Draft National Water Resource Strategy II*. However, they provide little detail or discussion about potential land rehabilitation activities and are therefore not considered as important as the policies described above.

3.5 Renewable energy policy

Table 7. *Policies relating to renewable energy*

Policy	Activity	Magnitude of impact
White Paper on Energy Policy 1998	Increase of Renewable Energy from Biomass	Substantial
Integrated Resource Plan 2010	Increase of Renewable Energy from Biomass	Substantial

Policy	Activity	Magnitude of impact
White Paper on Renewable Energy 2003	Increase of Renewable Energy from Biomass	Moderate to Substantial
Department of Energy Revised Strategic Plan: 2011/12 - 2015/16	Increase of Renewable Energy from Biomass	Limited to Substantial
Green Economy Accord	Dissemination of Improved Cook Stoves	Limited

A key goal of government is to diversify South Africa's energy supply. This goal is conveyed in a number of policies, which stipulate government's intention to introduce 10,000 GWh of renewable energy into the national grid by 2014. At present, 9% of South Africa's energy mix is renewable energy, largely in the form of fuel wood where 65% of poor households rely on open fires for heating and cooking (*White Paper on Energy Policy*). This source of energy is however not necessarily sustainable due to potential over-harvesting.

Government acknowledges the degradation of woodlands caused by unsustainable harvesting practices in the *White Paper on Renewable Energy*. The White Paper includes the intention to conserve woodlands through the provision of alternative forms of energy to rural communities including paraffin, liquid petroleum gas (LPG) and other renewable energy alternatives such as mini-grid systems, gel fuel, solar cookers and solar water heaters.

The *Integrated Resource Plan,* which was published in 2010 (a later date relative to the initial communication of government's intentions regarding renewable energy targets), makes little reference to rural communities' reliance on fuel wood. The same applies for the *Department of Energy's Revised Strategic Plan 2011/2012 – 2015/2016*. The *Green Economy Accord (2011)* however aims to roll out improved cook stoves, which may indirectly relieve pressure on woodlands. An analysis of the policies listed above indicates that the significant reliance of rural communities on fuel wood is not included in many recent important policies. As the policies generally aim at uplifting the rural poor through the provision of services, they could provide substitutes for fuel wood collection, reducing pressure on woodlands, but there are few direct references to direct sustainable woodland management interventions.

Module 4 – SECTION 3

Policies affecting agricultural landscapes

Land under agricultural production represents the fourth largest land-cover type in South Africa covering approximately 144,000km^2 (Scholes at al. 2013, see Module 3). Historically, the expansion of commercial agriculture has been a significant driver of changes in the terrestrial carbon stock through both the removal and combustion of above-ground biomass as well as the release of soil carbon stocks into the atmosphere following the ploughing and turn-over of soils.

In this module, we review the potential influence of policy on terrestrial carbon stock in four different types of agricultural landscapes:

- Commercial crop farming
- Commercial livestock farming
- Commercial exotic plantation forestry
- Small-scale agriculture – The term 'small holder' is not used consistently in policy. The Department of Agriculture, Forestry and Fisheries' *Strategic Plan for Smallholder Support* defines a smallholder in terms of his/her linkages to a market economy. It promotes the definition of smallholders as individuals who "produce food for home consumption, as well as sell surplus produce to the market" (1). In comparison, the *National Development Plan* adopts a definition linked to the size of land under cultivation. It classifies farmers according to the size of their land holdings. Subsistence farmers are those that own 0.5 ha or less. Small-scale holders are split into two categories: those with over 0.5 ha to 5 hectares of land, and those that have more than 5 hectares. For the purposes of this review, we have adopted the term 'small-scale agriculture' to refer to all small-holder and subsistence farms i.e. those that are not large commercial concerns.

Fifty-two policies were identified as potentially having a direct or indirect influence on terrestrial carbon stocks and associated GHG emissions in agricultural landscapes (Appendix 1). Grouped by the overarching measures presented in each policy, some policies figure in multiple categories. The policies are listed in order of the perceived magnitude of their influence on carbon stocks and associated emissions. It should be noted that this is a relative magnitude measure of each policy when compared to others, not in relation to the country's national carbon stock. Policies that have limited impacts do not feature prominently in the written analysis. Emerging categories include policies that:

- Promote an increase in the area under commercial agriculture (excl. plantation forestry)
- Promote plantation forestry
- Support sustainable agricultural production
- Are focused on Land Reform and facilitating an increase in the expansion of agriculture
- Establish controls and restrictions on land-use and support improvements in spatial planning
- Promote alternative land-use options that may convert or displace agricultural land

4.1 Key findings

- Many of the priority Presidential policies promote substantial agricultural expansion. Due to the nature of broad policies, there are limited specifics on the type of agriculture and whether it will follow 'conservation tillage' practices when implemented. Agricultural expansion without improved cropping techniques could result in substantial decrease in soil carbon stocks.
- Only one of the Acts reviewed, the *Conservation of Agricultural Resources Act (1983)*, attempts to introduce cultivation techniques that may reduce soil turnover (conservation tillage) and the associated release of existing soil carbon stocks into the atmosphere. It is however not regularly referenced in strategic plans promoting agricultural expansion, and thus has limited visibility. A lack of enforceable legislation governing cultivation practices may be an issue if reducing GHG emissions from the agricultural sector is a priority (especially during the anticipated expansion of the area under agriculture in the next 10-20 years).
- Many policies call for improved spatial planning and controls on activities that impact ecosystems and the environment. Properly implemented, these may limit areas under which agriculture can expand or the types of agriculture that can be practiced. This would likely

yield net-positive benefits for conservation of national terrestrial carbon stocks.

- Poorly managed farms, leading to land degradation, soil nutrient depletion and irreversible losses of critical ecosystem services, could qualify as contributing to natural disasters; thus the *Disaster Management White Paper* and attendant legislation provide a legal basis for potentially monitoring these farms.
- Most policies that promote improved agricultural techniques or enforce spatial planning discipline tend not to originate from the Department of Agriculture, Forestry and Fisheries (DAFF). Improved agricultural practices seem secondary to other objectives and not necessarily complementary to this department's expansion targets. This may have implications for terrestrial carbon stocks, which may be reduced under DAFF's current agricultural expansion proposals.
- In a number of cases, similar geographic areas are targeted by policies that promote the expansion of the area under cultivation and a significant body of existing legislated policies that aim to manage impacts on the natural environment and protect natural resources. In these instances, it is not possible to assess impacts on national terrestrial carbon stocks, due to conflicting land-use objectives. However, this does highlight the opportunity for Government to promote further integration and alignment of departmental and ministerial plans and strategies.
- The *Protected Areas Act* and the *Biodiversity Act* appear to have precedence over all other national legislation when increasing or managing protected areas and biodiversity is concerned. The precedence of these two acts may be crucially important when potential conflict between agricultural growth and the protection of biodiversity is considered.
- Although biofuel production is promoted in numerous policies, its expansion is only likely to affect a small part of the national area that is currently under cultivation and should only have a limited impact on the loss of national terrestrial carbon stocks.

4.2 Policies promoting increases in commercial and small-scale agriculture

Table 8. *Policies promoting increases in the area under commercial and small-scale agriculture (excluding plantation forestry)*

Policy	Activity	Magnitude of impact
New Growth Path	Increase the area under agricultural production; support the land reform process; support plantation forestry	Substantial
National Development Plan	Promotion of the expanded protected areas strategy, increase land under agricultural production; improve spatial planning; improve agricultural techniques such as composting; support the land reform process	Substantial
Industrial Policy Action Plan: 2012/2013 – 2014/15	Increase agricultural production, including biofuels and commercial forestry	Substantial
Medium Term Strategic Framework: 2009 – 2014	Increase land under agricultural production and plantation forestry, and growth of the agro-processing industry	Substantial
The Strategic Plan for South African Agriculture	Rapid expansion of land under agricultural production	Substantial
Strategic Plan for Smallholder Producers	Support new smallholder producers by 2020, including in the former homelands. Limited to marginal commitment to agro-ecological agriculture	Substantial
Department of Rural Development and Land Reform, Strategic Plan 2011-2014 (amended 2013)	Expansion of small-scale agricultural production	Substantial
Integrated Growth and Development Plan: Agriculture, Forestry and Fisheries	Agricultural expansion, mediated by improved farming techniques, including conservation agriculture, soil rehabilitation	Moderate to Substantial
Strategic Plan 2012/13-2016/17 for the Department of Agriculture, Forestry and Fisheries	Agricultural expansion, notably of small-scale farmers, complemented by conservation of agricultural lands, limited rehabilitation of rangeland and soils, and support of climate-smart agriculture	Substantial
White Paper on Renewable Energy	Production of biofuels	Moderate to Substantial
Department of Energy Revised Strategic Plan: 2011/12 - 2015/16	Increase in biofuel production	Limited to Substantial

Policy	Activity	Magnitude of impact
Draft Climate Change Sector Plan for Agriculture, Forestry and Fisheries	Support expansion of biofuel production; promotes adoption of "climate smart" agricultural techniques; improved spatial planning	Limited to Moderate
Integrated Strategy on the Promotion of Entrepreneurs and Small Enterprises	Expansion of small-scale agriculture and of agro-processing capacity,	Limited to Moderate
Biofuels Industrial Strategy of the Republic of South Africa	Expansion of the biofuels industry	Limited to Moderate
Long-term Mitigation Scenarios	Increase in biofuel production	Limited
Green Economy Accord	Increase in biofuel production	Limited
National Climate Change Policy Response White Paper	Increase in biofuel production	Limited (with regards to biofuel production)

The seventeen policies in Table 8 promote the expansion of agriculture. While is it is difficult to predict the reality of future implementation of this set of policies, the first eight in Table 8 are anticipated to have a significant impact on expanding the area under agricultural production. From these seventeen policies, important themes emerge.

The Presidency has developed the most prominent policies promoting agricultural expansion:

- The New Growth Path (NGP)
- Of which the Industrial Policy Action Plan (IPAP) is an enabling policy
- The National Development Plan (NDP)
- The Medium Term Strategic Framework (MTSF)

These policies focus on improving economic growth, rural development, food security and job creation. Agriculture is viewed as a means of achieving these objectives. Other than an overarching focus on promoting smallholder production, there is limited detail to these plans, both in terms of their location and the crops that will be grown. The policies do not identify what farming practices should be promoted as part of the expansion, and do not articulate how their objectives align with existing environmental or spatial planning policies.

The MTSF is a planning reference for all spheres of government, including national departments. Its vision and objectives are to be integrated into various departmental strategic plans (MTSF, 1). Critically, the MTSF is concerned with job creation and economic growth, following the 2008 economic crisis (MTSF, 2). A major focus area is growth in the agricultural sector, downstream food processing and the timber value chain (MTSF, 3). Small-scale agricultural production is promoted, notably as a means of reducing food insecurity. It seeks to provide 140,000 households per annum with agricultural starter packs, and limit non-agricultural developments on prime arable lands. This would theoretically impact some 700,000 households over five years. The Plan states a commitment to "supporting local and sustainable food production" (MTSF, 38).

In a similar manner, the NGP includes broad figures for job creation in the agricultural sector but limited reference to the particular type of agriculture. It seeks to create 300,000 job opportunities for small-scale farmers by 2020, and supports commercial agricultural expansion, as well as development of local food gardens. The *Strategic Plan for Smallholder Producers* aligns with the NGP. In this document, it appears that "sustainable" refers to the financial sustainability of a farm and not soil health or other environmental considerations - water supply, soil erosion, land degradation or ecosystem services.

The *Industrial Policy Action Plan* is firmly focused on the creation of agro-processing jobs and industries, supporting soybean production, the rooibos and honeybush tea industries, fruit and vegetable canning, general food processing and maize milling. Only its objective of promoting the organic food sector indicates the possibility of adopting cultivation processes that may improve soil organic material and associated soil carbon stocks.

Of the set of reviewed policies, only the NDP integrates considerations of natural resource management, improved cropping techniques and promotion of the *National Protected Areas Expansion Strategy*. Although it seeks to improve spatial planning approaches, it does not directly address the ways in which agricultural growth balances with the expansion of protected areas and conservation zones. It seeks to create some 643,000 jobs in agricultural production and includes provisions for the expansion of woody crops (avocado, grapes and citrus farms) over some 21,000 hectares as well as plans to irrigate some 500,000 ha of agricultural land.

These plans are complemented by three key policies developed by DAFF and one from the Department of Rural Affairs and Land Reform. These are:

- The Strategic Plan for South African Agriculture
- Strategic Plan for Smallholder Producers
- Strategic Plan for the Department of Agriculture, Forestry and Fisheries
- Strategic Plan for the Department of Rural Affairs and Land Reform

All four of these policies call for the rapid growth of the land area under agricultural production. *The Strategic Plan for the Department of Rural Affairs and Land Reform* seeks to create 500,000 rural farming jobs over 10 years, redistribute over 1.1 million hectares of land as part of its land reform commitments, and further survey and register 300,000 hectares of state land. This is complemented by the creation of 67,929 food gardens and 39 agri-parks.

Both the *Strategic Plan for South African Agriculture* and the *Strategic Plan for the Department of Agriculture, Forestry and Fisheries* seek to encourage sustainable agricultural practices, including soil conservation and rehabilitation, composting, improved crop rotations, and conservation agriculture. Similarly, the *Strategic Plan for Smallholder Support* notes these types of interventions – but only devotes two lines of text to "conservation agriculture" and "eco-agriculture" production support. It relegates the advancement and promotion of these activities to future policy development. In the absence of further details on timing and mechanisms, it is difficult to understand the extent to which these practices would be implemented across both commercial and small-scale production. Part of the difficulty in interpreting the scope and applicability of the various strategic plans is a lack of targets by which to assess the impact of the interventions. Among the abundance of policies dedicated to biofuel production, only the *Biofuels Industrial Strategy of the Republic of South Africa* provides any clear targets; with an expected 300,000 hectares under cultivation for its pilot phase.

Collectively, these policies seek to create agricultural opportunities for over three million individuals. If implemented, this could lead to increases in land under cultivation well into the millions of hectares – potentially increasing total land under production by some 20 – 30%.

In terms of identifying gaps and conflicts in land-use policy, there appears to be substantial overlap or 'conflicts' both between policies and within the existing legislative framework. For example, several policies promote different types of land-use in the same areas (expanding agriculture, mining, urban and conservation areas). This may well be addressed during implementation when a balance between goals and priorities in a number of policies could be struck, but as is, the text in standing policies shows considerable opportunity for improved policy integration.

The potential effect on terrestrial carbon stocks and associated GHG emissions

The establishment of new cultivated land in areas that were previously natural or semi-natural landscapes, typically leads to a release of sequestered carbon into the atmosphere. Existing vegetation cover is usually cleared, releasing the carbon stored in biomass. Cultivation also eliminates the possibility of further long-term biomass accumulation of herbaceous and woody cover. In a similar manner, ploughing and the turnover of soils allows sequestered soil carbon to be released into the atmosphere. As the soil is re-tilled every year or second year, there is little chance for carbon stocks to reach the same levels after the first ploughing event. In general, about 50% of organic carbon from the top 0-30cm of soil is released into the atmosphere following ploughing in dry land cropping systems. For irrigated crops, orchards and vineyards, and sugar cane it is generally less (20%, 20% and 40% respectively). These percentage carbon loss figures should be seen as a general estimate that will change depending on the particular soil and climatic factors as well as agronomy techniques employed.

The policies considered above promote the expansion of areas under agriculture, but provide few details on the agricultural methods or principles that should guide expansion. Although it is reasonable to assume that the realization of this set of policies will result in a net release of soil carbon stocks into the atmosphere, it is difficult to estimate the magnitude of the net effect on the national terrestrial carbon stock. If implementation occurs in areas that have been previously ploughed or degraded, the magnitude of the effect is likely to be low and even neutral. If, however, implementation occurs in intact natural ecosystems, for example the higher, altitude temperate grasslands of KwaZulu-Natal, the Eastern Cape and the eastern Free State, ploughing of virgin soils will result in a significant initial decrease in soil carbon. In light of emerging research and the Government's increased focus on climate change, this presents DAFF with the opportunity re-articulate its commitment to the legislated agricultural production principles found in CARA. The department may want to consider reviewing and updating its policies, with a focus on promoting planning and technologies that will reduce soil carbon losses and promote soil health by means that still meet employment and food security goals. More detailed recommendations for this are found in the section 3.2 Policy Recommendations Report.

4.3 Policies promoting increases in plantation forestry

Table 9. Policies promoting an increase in the area under plantation forestry

Policy	Activity	Magnitude of impact
Strategic Plan 2012/13-2016/17 for the Department of Agriculture, Forestry and Fisheries	Agricultural expansion, notably of small-scale farmers, complemented by conservation of agricultural lands, limited rehabilitation of rangeland and soils, and support of climate-smart agriculture	Substantial
Draft Strategy Framework for Forestry Enterprise Development	Support of small-scale commercial forestry	Moderate to Substantial
Forest Sector Transformation Charter	Support of plantation forestry	Limited to Moderate
Policy and Strategic Framework for Participatory Forest Management	Improved inclusion of communities in forest management	Limited to moderate
Framework for the National Forestry Programme	Expansion of plantation forestry activities	Limited
Forestry 2030 Roadmap	Afforestation of 100,000 ha of land, support of rehabilitation and conservation, improved mapping and land use planning to facilitate woodland / forest conservation	Limited

Plantation forestry in South Africa covers an area of 17,000km^2 and contains approximately 4% of the national terrestrial carbon stock (Scholes et al. 2013, Module 2). It receives extensive policy attention likely due to the industry's contribution to the economy (1.2%) and job creation in rural areas where few other employment opportunities exist (170,000 people currently employed nationally).[9] An overarching theme is the inclusion of previously disadvantaged persons and communities in the sector. Guiding principles are inclusion, improved levels of participation and a more equitable distribution of economic benefits. Means of achieving this include provision of extension services, insurance, inputs, pest and disease management, fast-tracking afforestation licensing, small-grower certification and training. These types of interventions are found in varying degrees across all policies.

Six policies promoting the development of plantation forestry were identified. These make reference to large-scale commercial concerns as well to smaller-scale undertakings in the form of woodlots or community-managed forestry efforts. The policies are reasonably aligned with one another – some of the targets vary considerably, but there is frequent cross-referencing in the policies' texts.

The establishment of plantations (afforestation) typically leads to a significant increase in both above- and below-ground biomass (tree root) carbon stocks. The influence of afforestation on organic carbon stocks is less clear. A study by Berthrong et al. (2012) in a part of South America with a similar rainfall regime to South Africa indicated that the influence of afforestation on soil carbon stocks is significantly affected by rainfall (mean annual precipitation). The afforestation of dry grasslands tends to lead to a net increase in soil organic carbon stocks, whereas the establishment of plantation in wet grasslands tends to lead to a decrease in soil carbon stocks.

There are further considerations when estimating the net effect of afforestation on carbon stocks. First, is an assessment of the type of land-cover being replaced – the establishment of plantations on degraded or previously cultivated land will significantly increase carbon stocks whereas the replacement of indigenous forests, woodlands or temperate grasslands, will result in a lower net increase. Second, as a plantation is harvested in a cyclical manner, the net increase in carbon stocks should be calculated as the average stock over the growing period, not the stock at the end of the growing period.

9 Integrated Development Plan

The realisation of the policy goal of expanding plantations and woodlots by 50,000 to 200,000 hectares (a 3-12% increase on current area of plantations) will lead to a net increase in the size of terrestrial carbon stocks but as highlighted above, the net effect may not be as high as first presumed and may need to be assessed at a site-specific scale to understand the effect of the factors highlighted above.

4.4 Policies focused on land reform

Table 10. *Policies focused on Land Reform, facilitating increases in agriculture*

Policy	Activity	Magnitude of impact
National Development Plan	Promotion of the expanded protected areas strategy, increase land under agricultural production; improve spatial planning; improve agricultural techniques such as composting; support the land reform process	Substantial
Medium Term Strategic Framework: 2009 – 2014	Increase land under agricultural production and plantation forestry, and growth of the agro-processing industry	Substantial
Integrated Growth Plan for Agriculture, Forestry and Fisheries	Supports the NDP, MTSF and Green paper on Land Reform	Substantial
Land Reform: Provision of Land and Assistance Act, no 126 of 1993 (including its amendments up to 2008)	Land reform and distribution, potentially leading to increases in agricultural production	Moderate to Substantial
Department of Rural Development and Land Reform, Strategic Plan 2011-2014 (amended 2013)	Expansion of small-scale agricultural production	Substantial
Green Paper on Land Reform	Land redistribution, potentially leading to increases in agricultural production	Limited to Moderate

The State generally views land redistribution, restitution and tenure reform as critical to unlocking the agricultural potential of South Africa. Land reform is viewed as central to encouraging agricultural expansion among previously disenfranchised persons. This is achieved both through the redistribution and restitution of land and improving security of tenure. The major drivers of land reform are the NDP and the *Medium Term Strategic Framework (MSTF)*. The *Green Paper on Land Reform* is regarded as having limited to moderate impact as it is likely to be revised prior to being released as a White Paper; it is difficult to predict what these changes might be. Nonetheless there is strong alignment and coherence between the leading land reform policies.

The MTSF asserts that it aims to "…ensure land reform (redistribution and restitution) is more coherently linked to the creation of livelihoods for the poor and that strategically located land is released for the most appropriate use without delay." (19). This objective is also affirmed in the NDP, which views land reform, job creation and increased agricultural production as key drivers in improving the rate of rural development (44). Opening up communal lands will allow for the expansion of lands under cultivation. The *Integrated Growth Plan* aligns with the MTSF and NDP; the Department of Rural Development and Land Reform views land reform as underpinning a sustainable transformation of the rural economy.

The *Land Reform: Provision of Land and Assistance Act*, supports the state's land reform objectives. Through a trading entity, it oversees the acquisition, redistribution, and leasing process, and allows for the provision of funding and support to cover the costs of acquisition and distribution. The Act seeks to ensure improvements on land, which can include agricultural production. Through the disbursal of grants, subsidies or other financial incentives, the Minister can encourage activities on that land, including for "acquisition, maintenance planning, development or improvement of property…" (10.b.iii of 2008 Amendment).

The overriding principle of land reform and redistribution is the improvement of rural livelihoods. Strengthening land tenure and security is expected to lead to increased cultivation practiced by a wide range of farming actors, including subsistence, small-scale, and commercial farmers. The NDP confirms that "As long as these farmers [black farmers in communal areas] (especially women farmers) do not have secure tenure they will not invest in the land and agricultural production will not grow at the rate and pattern required for growth in employment" (225).

As described in the MTSF, the land reform process will be targeted at the most "suitable" lands, likely grasslands for their crop yield potential and location in favourable climatic conditions. This change in land-use would lead to significant

releases of soil carbon stocks and further removal of woody biomass in grassland systems. Depending on the pace, scale, location and uptake of agriculture during the reform process, this could lead to the emission of very high amounts of greenhouse gases.

4.5 Policies promoting sustainable landscapes and associated agricultural production

Table 5.6. *Policies Promoting Sustainable Agricultural Production*

Policy	Activity	Magnitude of impact
National Climate Change Response White Paper	Supports conservation efforts; improvements in agricultural production, notably for protecting soil health	Substantial
National Biodiversity Framework	Improved conservation efforts and soil rehabilitation; improved spatial and land-use planning; improved grazing regimes	Substantial
National Development Plan	Promotion of the expanded protected areas, increase land under agricultural production; improve spatial planning; improve agricultural techniques such as composting; support the land reform process	Substantial
Conservation of Agricultural Resources Act (CARA), 1983	Improved agricultural practices	Substantial
Strategic Plan 2012/13-2016/17 for the Department of Agriculture, Forestry and Fisheries	Agricultural expansion, notably of small-scale farmers, complemented by conservation of agricultural lands, rehabilitation of rangeland and soils, and support of climate-smart agriculture	Substantial
National Strategy for Sustainable Development and Action Plan (NSSD1) – 2011 -2014	Promotion of improved agricultural techniques: conservation agriculture, composting, permaculture ; but also promote expansion of land under conservation ; promotion of biofuels	Substantial
Integrated Growth Plan for Agriculture, Forestry and Fisheries	Supports the NDP, MTSF and Green paper on Land Reform	Substantial
Policy on Agriculture in Sustainable Development	Improved agricultural techniques, including composting, reduced fertilizer use, conservation tillage, soil rehabilitation, and improved spatial planning	Limited

Eight policies within the reviewed catalogue broadly support various forms of 'sustainable' agricultural production, called "conservation agriculture", "climate smart agriculture" and "sustainable agriculture". More detailed definitions and descriptions of what these terms refer to is limited. However, most of the policies proposed a broad common set of activities:

- Protection of soil health, including the use of conservation tillage
- Rehabilitation of rangelands and soils
- An increase in organic composting
- Reduced dependence on chemical fertilizers
- Improved cropping techniques, broadly called conservation agriculture, sustainable agriculture or climate smart agriculture
- Improved grazing regimes

For some policies, improved agricultural techniques are not an overriding priority. For others, it is a critical means for achieving the policy's core objectives. The *National Climate Change Response White Paper*, the *Conservation of Agricultural Resource Act*, the *Policy on Agriculture in Sustainable Development*, the *National Biodiversity Framework*, and the *National Strategy for Sustainable Development II* all prioritise conservation and responsible natural resource use. Improved management of landscapes, including land under cultivation, is key to their vision. However, each of these documents has its limitations:

- *Policy on Agriculture in Sustainable Development:* This is a discussion document that is over a decade old. It provides an outline of what a policy might look like, but remains in its early inception phase. It has not been updated since its first drafts. It may have lost buy-in due to its inactivity.
- *Conservation of Agricultural Resources Act (CARA):* Despite its potentially substantial impact, the DAFF's strategic and integrated plans only makes passing reference to CARA. This is a legislated policy. By law, its provisions are binding and must be adhered to. However, it appears to have limited influence in guiding departmental strategic plans.

- *The National Climate Change Response White Paper (NCCRP):* The White Paper seeks to integrate its objectives into existing programmes and policies. But its priorities for supporting agricultural techniques as a strong climate change adaptation strategy do not feature strongly in departmental strategies and objectives. To date, this has not been prioritized in the Department of Agriculture's planning. This may merely be an issue of timing and the required period required to visit policies following the publication of the NCCRP.
- *The National Biodiversity Framework (NBF):* The Framework seeks to partner with the private sector actors involved in agricultural production to try to reduce degradation of natural ecosystems. Similarly, it seeks to ensure that DAFF adopts measures to reduce alien invasive vegetation. Neither of these commitments is accompanied by spatial or temporal targets.
- *The National Strategy for Sustainable Development II (NSSD):* The strategy notes in its Action Plan that it intends "Reforming agricultural legislation to support sustainable farming practices" (p. 24). It recognises that there is a significant gap in legislation in promoting improved farming practices. Despite being published in advance of either the *Integrated Plan* or *Strategic Plan*, it is not cited in either of these documents.

The Integrated Growth and Development Plan: Agriculture, Forestry and Fisheries (Integrated Plan), the *Strategic Plan 2012/13-2016/17 for DAFF* (Strategic Plan), and the *Strategic Plan for Smallholder Support* all make provisions for improved agricultural techniques, for example:

- The *Strategic Plan* calls for the rehabilitation of 9,500 hectares of agricultural land in its annual performance plan; this is complemented by the goal of launching one natural agricultural resource management strategy in one municipality. Introductory statements from both the Minister and Deputy Minister for the Department support improving agricultural techniques to respond to climate change; however there is limited discussion around this in the strategic plan itself.
- The *Integrated Plan* promotes an intervention that will fund and implement "Soil rehabilitation and forest restoration programmes…" (p. 56). Similarly, it commits to "Implement production efficiency models in line with conservation agriculture." and "Greater awareness and use of sustainable practices".
- The *Strategic Plan for Smallholder Support* simply notes that "…government will increasingly seek to build…a coherent focus on conservation agriculture and agro-ecological agriculture. "

Although these policies address improved agricultural techniques, there is limited alignment between these policies. The legislation in the field is limited to CARA, which appears to not have influenced DAFF's current strategies. Plans that call for wide-sweeping changes in agricultural policy – the NCCRP, the NDF and the NSSD – rely on the cooperation of DAFF; but in turn, these aims have not fully integrated into DAFF's plans as yet. It is worth noting that CARA, the *National Biodiversity Framework* and the *National Sustainable Development Strategy* are not mentioned in DAFF's strategic and integrated plans. In contrast, policies promoting agricultural expansion – the NGP, the *Medium Term Strategic Framework*, and the *Industrial Policy Action Plan* feature prominently in DAFF's plans.

The promotion of conservation agriculture, climate smart agriculture and sustainable agriculture, will most likely lead reduced negative impact on the size of the national terrestrial carbon stock in a number ways:

- An increase in soil carbon stocks of cultivated land following an increase in composting and conservation tillage practices.
- An increase in above and below ground carbon stocks following the restoration of rangeland systems used for commercial and small-scale livestock production.
- The avoided degradation of rangeland systems, and associated release of sequestered carbon into the atmosphere. This would be done through the adoption of appropriate grazing and burning regimes. It should be noted that the over 65% of South Africa's terrestrial carbon stock is located in natural and semi-natural grassland, savanna and thicket ecosystems (CSIR 2013, Module 2). Within these ecosystems, over 90% of the total carbon stock is located in soils.
- The restoration and sustainable management of rangeland systems may be one of the principle ways in which South Africa's national terrestrial carbon stock can be maintained over the long-term.

However, for these benefits to be realized, and the potential of rangelands to contribute to the management of South African terrestrial carbon stocks, future amendments to policies or new policies should improve clarity on spatial and temporal targets.

4.6 Policies that control certain land-use practices and promote improvements in spatial planning

Table 11. Policies that promote spatial planning and control certain land-use practices

Policy	Activity	Magnitude of impact
Spatial Planning and Land-Use Management Act	Improvements in spatial planning and land-use management	Substantial
Strategic Plan for the Environment Sector: 2009-2014	Increase land under conservation; improve spatial planning, improve agricultural techniques	Substantial
National Environmental Management Act	Potential control and restrictions on the location, extent and type of agriculture practiced, including offset or remediation efforts	Substantial
National Environmental Management Act: EIA Regulations	Potential control and oversight of the types, location and intensity of agricultural production permitted. Including limiting production within areas targeted by environmental management frameworks	Substantial
National Biodiversity Framework	Improved conservation efforts and soil rehabilitation; improved spatial and land-use planning; improved grazing regimes	Substantial
Guidelines Regarding the Determination of Bioregions and the Preparation of and Publication of Bioregional Plans – NEMA: Biodiversity Act of 2004	Improved land-use and spatial planning that address natural resource conservation and biodiversity preservation, could limit the scope, location and intensity of agricultural production	Substantial
NEMA: Air Quality Act	Potential control of and restrictions on land-use activities that release GHG emissions	Substantial
National Development Plan	Efforts to expand the protected areas strategy, as well as increase land under agricultural production; improved spatial planning; improved agricultural techniques such as composting; support to the land reform process	Substantial
National Environmental Management Act: Environmental Management Framework Regulations	Spatial Planning improvements, leading to development of Environmental Management Frameworks may restrict methods, intensity and location of agricultural production	Moderate to Substantial
Disaster Management White Paper	Potential to limit land degradation trends, which may impact on location, type and intensity of agricultural production	Limited to Substantial
Disaster Management Act	Potential to limit land degradation trends, which may impact on location, type and intensity of agricultural production	Limited to Substantial
National Disaster Management Framework	Potential to limit land degradation trends, which may impact on location, type and intensity of agricultural production	Limited to Substantial
Draft National Water Resource Strategy II	Potential reduction in amount of land made available for plantation forestry activities	Limited to Moderate

This body of policy seeks to limit inappropriate land-use practices and promote more comprehensive land-use planning. Comprised of fourteen policies, they provide for improved spatial planning discipline, propose frameworks through which to analyse, manage and restrict adverse land-use impacts, and take into consideration the impacts of various activities on ecosystem services and downstream users. The majority of them are legislated Acts, Regulations and Frameworks and therefore are legally enforceable.

The cluster of *National Environmental Management Act* policies (NEMA) is particularly significant:

- The National Environmental Management Act
- The National Environmental Management Air Quality Act (NEMA:AQA)
- The National Environmental Management Environmental Impact Assessment Regulations (NEMA:EIA)
- National Biodiversity Framework (NBF), mandated by the Biodiversity Act (NEMA:BA)
- Guidelines Regarding the Determination of Bioregions and the Preparation of and Publication of Bioregional Plans (Guidelines, mandated by NEMA: BA).
- National Environmental Management Act: Environmental Management Framework Regulations

They make provisions for controls, oversight, licensing, the issuing of permits and environmental auditing. Published listings detail activities requiring permissions prior to being undertaken. NEMA and its sub-Acts focus on a core principle, namely that the degradation of ecosystems and the attendant harm to biodiversity should be avoided, and where they cannot be, be minimised or remedied (2.4.a.i). Sustainable development and conservation of biodiversity and ecosystem services are paramount.

NEMA calls for the use of environmental management tools to achieve its objectives. These include the use of Environmental Impact Assessments, Environmental Management Frameworks, and Bioregional Plans. In all instances, the purpose is to provide opportunity for pro-active integrated environmental management – assessing projects against predefined criteria, assessing risks, evaluating alternatives and providing for remedial activities where required. The "duty of care" is placed on the individual or entity responsible for natural resource degradation. In some instances, activities will not be authorized until provisions for remedial or restoration activities are agreed to.

The implications of the NEMA family of legislation are significant. Depending on their interpretation and application, they could lead to increased controls and oversight of agricultural production. For example, under NEMA:AQA, greenhouse gases may be regulated – agricultural practices such as excessive fertilizer use, ploughing and unrestricted grazing that lead to additional GHG emissions, may be restricted or subject to licensing. Bioregional Plans as well as Environmental Frameworks are used to balance development priorities (e.g. the need to expand areas under cultivation - Section 5.3) with ensuring ecosystem health and associated ecosystem services are maintained.

This family of policies is supported by other policies that also seek to improve spatial planning discipline. The *Spatial Planning and Land-Use Management Act* seeks to establish improved planning processes, bringing more uniformity to land-use activity applications, assessment, approval and authorization. It also seeks to "…provide a framework for policies, principles, norms and standards for spatial development planning and land use management." The conservation of biodiversity and ecosystem services is considered a viable land-use activity under the Act. The Act dovetails with the NEMA family of policies, and may rely on their environmental provisions quite substantially.

Moreover, the cluster of disaster management policies may additionally influence the location, scope and intensity of agricultural practices. These include the *White Paper on Disaster Management*, the *Disaster Management Act*, and the *National Disaster Management Framework*. This cluster of policies stresses the importance of practicing pro-active risk assessments and implementing early risk mitigation measures. This applies not only to preparing emergency response measures for high-profile disasters, such as fatal mudslides, flash floods or fires, but also in addressing disasters that have the potential to gradually build in significance. In the *Disaster Management Act*, a disaster is deemed:

According to the *National Disaster Management Framework*, under Key Performance Area 2, environmental hazards such as land degradation, deforestation and loss of biodiversity are included in risk assessments as per international best practice for hazard classification (2.1.7). Climate change could be designated as a risk, linked to severe instances of land degradation, soil nutrient depletion and erosion or loss of critical biomes that support ecosystem services. The results of risk assessments could lead to updates of national, provincial and local disaster management plans. These updates could include provisions for limiting soil erosion, land degradation and natural resource exploitation trends. This legislation could be used to limit the location, scope, intensity and types of proposed changes in land-use, for example the conversion of intact natural and semi-natural landscapes to cultivated lands or built environments.

These types of interventions are reiterated in national level presidential and departmental plans. The NDP promotes the development of a national spatial framework –already encapsulated in the *Spatial Planning and Land-Use Management Act* to a certain extent. It recognizes the need to take natural resource depletion into consideration when planning human settlements – including biodiversity and water catchment threats, and areas disproportionately impacted by climate change.

The *Strategic Plan for the Environment Sector: 2009 – 2014* prioritizes the development of six provincial level bioregional plans, as well as environmental management frameworks. This requires that 66% of provinces adopt bioregional plans. These plans are a practical first step in developing an improved understanding of the location of important biological resources. These "templates" will enable effective decision-making when determining whether the location, intensity, and type of development are suitable to a region. They could also influence the types of agricultural and other land-use practices that may be enforced.

In addition, the set of water policies have broad implications for agricultural production, notably plantation forestry. The *White Paper on a National Water Policy for South Africa* seeks to ensure that sectors that use substantial amounts of water need to apply for water use permits. Enforcement measures may be undertaken in instances when users exceed permit limits. It is expected that users pay for the full economic cost of water, which will vary from area to

area and include a levy over and above operating costs. In some areas these costs are likely to act as a disincentive to the expansion of agriculture. The benefits of supplying water to alternative land-uses will be considered, to the potential disadvantage of agricultural producers.

The broad principles outlined in the *White Paper* were translated into the *National Water Act*, which requires that agricultural producers report water usage. Afforestation is classified as a Stream Flow Reduction Activity, and is thus required to apply for a water use license and subject to additional regulation. This is further affirmed in the *Draft National Water Resource Strategy II*, which describes efforts to regulate the location of afforestation activities.

The NEMA and Disaster Management family of policies could be used to improve responses to potential land degradation and exploitation. This could be achieved through spatial planning, risk assessments, environmental authorizations, permitting and licensing. The extent to which they have been effectively adopted is, however, beyond the scope of this policy mapping exercise.

The NEMA family of policies presents extraordinary potential to avoid the degradation of intact ecosystems and the associated release of biomass and soil carbon into the atmosphere – essentially 'REDD++' which includes both forest and non-forest ecosystems. This set of policies may not necessarily increase the size of terrestrial carbon stocks but may be fundamental in limiting the further release of greenhouse gases into the atmosphere.

Many of the policies are already Acts or Regulations, with an established legal status. These policies present an opportunity to regulate the use of land and natural resources across South Africa, with associated benefits to terrestrial carbon stocks. It should be noted though, that this set of policies does not seek to limit the expansion of agriculture but rather intends to ensure that development is undertaken in an efficient and appropriate manner that does not lead to environmental degradation.

4.7 Policies supporting land-use options that could compete for arable land

Table 12. *Policies promoting land-use options that could compete for arable land*

Policy	Activity	Magnitude of impact
National Environmental Management Act: Protected Areas Act, 2003	Increase areas under protection, leading to potential reduction of arable areas available for agricultural expansion	Substantial
National Environmental Management Act: Biodiversity Act, 2004	I Increase of areas under protection, leading to potential reduction of arable areas available for agricultural expansion	Substantial
National Climate Change Response White Paper	Supports conservation efforts; improvements in agricultural production, notably for protecting soil structures	Substantial
A Woodland Strategy Framework for the Department of Water Affairs and Forestry	Could lead to restrictions on agricultural activities in certain woodland areas	Substantial
Strategic Plan for the Environment Sector: 2009-2014	Increased land under conservation; improved spatial planning, improved agricultural techniques	Substantial
National Biodiversity Framework	Improved conservation efforts and soil rehabilitation; improved spatial and land-use planning; improved grazing regimes	Substantial
Strategic Plan 2012/13-2016/17 for the Department of Agriculture, Forestry and Fisheries	Agricultural expansion, notably of small-scale farmers, complemented by conservation of agricultural lands, limited rehabilitation of rangeland and soils, and support of climate-smart agriculture	Substantial
Integrated Growth Plan for Agriculture, Forestry and Fisheries	Supports the NDP, MTSF and Green paper on Land Reform	Substantial
National Protected Areas Expansion Strategy	Expansion of the protected areas network, including into arable lands	Substantial
Regulations on the National Forests Act, 2009	Potential restrictions on woodland conversion in areas suitable for agricultural production	Limited to Substantial
National Forests Act	Potential restrictions on woodland conversion in areas suitable for agricultural production	Limited to Substantial

Policy	Activity	Magnitude of impact
Forestry Roadmap	Afforestation of 100,000 ha of land ,support to rehabilitation and conservation, improved mapping and land use planning to support woodland / forest conservation	Limited

This section covers the nine most prominent policies of the reviewed set that, if fully implemented, would mediate and inform the expansion of agriculture, particularly in ploughed areas in South Africa, by applying sustainable development principles. Protection of biodiversity and conservation of important biomes and ecosystem services is prominent in national policy. The NEMA family of policies and the *National Forests Act* have historically formed the legislative foundation from which all frameworks, strategies and plans around environmental conservation have originated. More recently, the *National Climate Change Response White Paper* and the *National Development Plan* align with this legislative base, promoting advances in biodiversity protection and conservation efforts. In addition, the *Strategic Plan for the Environment Sector*, the *Integrated Growth and Development Plan: Agriculture, Forestry and Fisheries*, and the *Strategic Plan 2012/13-2016/17 for the Department of Agriculture, Forestry and Fisheries* each integrate conservation to some degree into their objectives.

The legislative context:

- The Protected Areas Act
- National Protected Areas Expansion Strategy
- The Biodiversity Act
- National Biodiversity Framework
- The National Forests Act
- Regulations on the National Forests Act
- A Woodland Strategy Framework

The *Protected Areas Act* and associated *Expansion Strategy* are focused on increasing the amount of land under formal conservation. There are strict safeguards around the authority of the Act; the *Protected Areas Act*'s provisions for the management *or development* of protected areas prevails if found to be in conflict with any other national legislation (7.1.a). Amongst other guiding principles, the Act requires that a representative sample of South Africa's naturally occurring ecosystems, habitats and species be protected (17.e).

In the *Expansion Strategy*, 42 biodiversity focus areas for expansion have been targeted. According to the *Strategy*, "These are large, intact and unfragmented areas suitable for the creation of or expansion of large protected areas." Under the *Expansion Strategy*, several substantial grassland areas are targeted for protection. These include:

- Vaal Grassland covering Gauteng and the North West
- Mpumalanga Mesic Grasslands
- Northeast Escarpment in Limpopo
- The Southern Berg Griqualand
- Free State Highland Grasslands
- Drakensburg and Midlands
- Thukela
- Tankwa Cederberg Roggeveld
- Boland Koggelberg
- Vrolijkheid

The *Expansion Strategy* seeks to include 2.7 million hectares into new protected areas in its first five-year phase, ending in 2014. This is one quarter of its total protected areas target, to be reached by 2029. Of this, grasslands account for slightly over 1 million hectares of the five-year expansion target, and 4 million hectares in the 20-year target. This may have important consequences for the proposed expansion of cultivated land in these areas.

The *Biodiversity Act* aligns with the *Protected Areas Expansion Strategy*. It provides for "the management and conservation of biological diversity within the Republic…" (2.a.i). Like the *Protected Areas Act*, the *Act* supersedes other national legislation with regards to the management of biodiversity (8.1.a). The South African National Biodiversity Institute (SANBI) is responsible for advising the Minister on the location and content of bioregional plans (see section 5.7 above). As described in the *National Biodiversity Framework*, resources will be dedicated to supporting delivery of the *Protected Areas Expansion Strategy*.

Similarly, the *National Forests Act* poses limits on the location of cultivation activities, including grazing. Natural forests receive strong protection, but due to their limited range are unlikely to limit agricultural expansion significantly. However, the *Act* allows for the Minister to determine a "minimum area of each woodland type to be conserved."(Chapter 2, 3.4). The *National Forests Act* provides a definition of woodland: "a group of indigenous trees which are not a natural forest, but whose crowns cover more than five per cent of the area bounded by the trees forming the perimeter of the group." (Chapter 1). This has sweeping implications for woodland conservation, notably in Combretum and Terminalia woodlands in the Limpopo Province, Acacia Woodlands on the southern KwaZulu-Natal and Trachonanthus woodlands in the Northern Cape and Northwest Province.

The question of woodland conservation is taken up in a *Woodland Strategy Framework* including management practices that reduce woodland degradation. It calls for the Minister to declare the areas of woodland to be conserved and proposes that this be streamlined with efforts to expand

the protected areas network. Furthermore, it calls for the rehabilitation of woodlands, community-based woodland management, and promotion of sustainable forest use systems.

The NCCRP, the *Strategic Plan for the Environment Sector* and the NDP integrate aspects of these legislative mandates into their objectives. There are three focus areas where NEMA and the cluster of Forestry Acts overlap, namely on the Protected Areas network, ecosystem restoration and conservation outside of protected areas. If a policy promotes these activities, it is likely to have implications for agricultural expansion. This alignment is detailed Table 13 below.

Table 13. *Policy alignment with NEMA and Forest Act policy groups*

Policy	Does it support the Protected Areas Network?	Does it support Ecosystem Restoration?	Notable gaps and targets
National Climate Change Response White Paper	No. There is no mention of the network.	Yes. Notably the thicket biome – though this is unlikely to influence agricultural production. No targets.	Yes. But no targets.
Strategic Plan for the Environment Sector	Yes.	Yes. But no specific biome mentioned. No targets.	
National Development Plan	Yes.	Yes. Notably the thicket biome – though this is unlikely to influence agricultural production. No targets.	No.
Integrated Growth and Development Plan: Agriculture, Forestry and Fisheries,	No. There is no mention of the network.	Supports forest restoration, but no targets.	Promotes research into woodland and forest cover to support conservation planning efforts.
The Strategic Plan 2012/13-2016/17 for the Department of Agriculture, Forestry and Fisheries	No. There is no mention of the network.	Yes. Rehabilitation of 50,000 ha of forest, woodlands and agricultural lands over 5 years.	
Forestry Roadmap	Yes.	Yes. Rehabilitation of forests and woodlands. No target.	Promotes research into woodland and forest cover to support conservation planning efforts.
National Strategy for Sustainable Development and Action Plan	Yes.	Yes. It seeks to restore some 3.2 million hectares of degraded land by 2014.	Yes. It promotes expansion of conservation activities outside of the formal network, with both the formal and informal conservation areas to cover some 9% of total land mass by 2014.

The extent to which these policies commit to the *National Protected Areas Expansion Strategy (NPAES)* is an indicator of the extent to which the policy has political support. However, as there are currently limited targets for ecosystem restoration *outside* of the protected areas network, there is opportunity to set clear targets that can be integrated into greater governmental planning and MRV requirements, such as the President's Outcomes Approach. Similarly, multi-sectoral policies such as the NCCRP present the opportunity to integrate policy objectives and targets to deliver on conservation and restoration opportunities outside of the national protected areas network.

The set of policies that aim to expand areas under formal conservation are likely to lead to the long-term maintenance of above- and below-ground carbon stocks – essentially avoiding emissions through degradation and conversion to cultivated land. As the policies expressly aim to conserve large, continuous areas of intact land, it is unlikely that the policies will lead to the restoration of degraded or ploughed land and an associated increase in carbon stocks either in soils or biomass. If implemented effectively, these policies are most likely to reduce land conversion due to agricultural expansion. This will lead to avoided land-use transformation, and retain existing terrestrial carbon stocks in both soils and above and below ground vegetation cover.

Module 5 – SECTION 3

Policies influencing built environments

For the purposes of this review, "built environments' are considered as areas that are predominantly covered by buildings, roads and other permanent structures created by human beings. This includes areas covered by provincial and municipal roads, bridges, electrical grids, telecommunication, buildings, water reticulation, dams, sanitation plants, built storm water systems and pavement. This module outlines policies that are focussed on changing the area covered by built environments. Such a change will result in a proportional decrease in the area covered by an alternative land-use type and possibly result in a change in terrestrial carbon stocks.

Twenty-three policies from the catalogue were identified as potentially resulting in an expansion in the area currently covered by built environments. The order in which policies are listed is determined by the perceived spatial area that the policy is likely to affect. This measure of 'relative magnitude' needs to be seen in context of the influence of one policy relative to other polices in the set, not relative to the size of the national carbon stock. Any policy alone is likely to have a very small impact on the size of the national terrestrial carbon stock.

Key findings

- There is a significant emphasis in policy to expand the economy and infrastructure. These expansions are anticipated to result in the expansion of the built environment and the conversion of land in general, leading to the release of emissions from terrestrial carbon stocks.
- The policies that promote expansion of the economy and infrastructure provide little clarity on the sustainable development aspects of potential built environment expansion. The term 'sustainable' is often used, but is not defined or expanded upon.
- Aside from the NDP, the policies do not cite a significant body of existing legislation that requires adherence to sustainable development principles.
- Some policies, particularly focused on the protection of natural landscapes, include exception clauses that allow for the expansion of built environment projects that are of national or provincial strategic importance in previously protected areas, which could lead to a net-release of terrestrial carbon stocks.
- Land reform policy includes the possibility of prospecting for mining, which could result in the conversion of natural, semi-natural and agricultural landscapes to mining operations.

5.1 Policies that may lead to expansion of the built environment

Although built environments only cover 2% of South Africa's surface area (CSIR 2013), they are home to approximately 49 million South Africans. Although urban areas offer advantages in terms of providing dwellers with basic services in a more cost-efficient manner, they do have a clear impact on land-use through demand for water, food, energy and other goods and services.

Urban sprawl is furthermore linked to the loss of biodiversity and the pollution of land, water and air. Limited services in overcrowded areas are associated with negative health outcomes and accelerated environmental degradation, mostly as a consequence of the collection of local resources for energy and localised pollution. It is estimated that up to half of all informal dwellings in South Africa can be classified as vulnerable to environmental factors (National Climate Change Response).

Table 14. *Policies promoting [affecting] expansion of the built environment*

Policy	Activity	Magnitude of impact
National Development Plan 2030	Development of Transport Corridors, Development in Rural Areas	Substantial
Medium-Term Strategic Framework 2009 – 2014	Massive build of economic infrastructure	Substantial
The New Growth Path: The Framework	Development of Improved Infrastructure	Substantial

Policy	Activity	Magnitude of impact
Industrial Policy Action Plan: 2012/2013 - 2014/15	Up scaling of Industrial Development	Substantial
White Paper: National Climate Change Response Strategy	Responsible expansion of the Built Environment	Substantial
National Strategy for Sustainable Development and Action Plan (NSSD1) - 2011 -2014	Upliftment of communities	Substantial
National Environmental Management Act 1998	Providing authorisations for development of industrial activities	Substantial
National Biodiversity Framework	Escape clause which in special circumstances may lead to construction of capital projects	Substantial
Strategic Plan for South African Agriculture 2001	Development of Rural Infrastructure	Substantial
Strategic Plan for the Department of Rural Affairs and Land Reform	Development of Rural Infrastructure	Substantial
Policy on Agriculture in Sustainable Development 2002	Development of Rural Infrastructure	Substantial
Mineral and Petroleum Resources Development Act 2002	Promoting economic growth and mineral and petroleum resources development	Substantial
Integrated Resource Plan 2010	Expansion of grid electricity	Moderate to Substantial
Land Reform: Provision of Land and Assistance Act 1993	Development of low income housing estates	Moderate to Substantial
Municipal Property Rates Act, 2004	Industrial expansion in support of housing developments	Limited to Substantial
National Disaster Management Framework 2005	Storm water management	Limited to Substantial
Department of Energy Revised Strategic Plan 2011/12-2015/16	Expansion of grid electricity	Limited to Substantial
Integrated Strategy on the Promotion of Entrepreneurs and Small Enterprises 2005	Developments of small business (agro-processing sectors)	Limited to Moderate
Water Services Act 1997	Development of services (sanitation)	Limited
National Forests Act 1998	Escape clause which in special circumstances may lead to construction of capital projects	Limited
National Parks Act 1967	Escape clause which in special circumstances may lead to construction of capital projects	Limited
Transformation of Certain Rural Areas 1998	Potential for prospecting of mines and minerals	Limited
Policy Principles and Guidelines for Control of Development Affecting Forests	Escape clauses for capital projects of provincial strategic importance	Limited
Long-Term Mitigation Scenario	Greening of Cities	Limited

Infrastructure has long been viewed as vital to economic development by both academics and policy makers (Calderon et.al, 2008). It is also expected to generate employment directly through the actual construction, operation and maintenance requirements but also through indirect multiplier effects across the economy (Kumo, 2012). These indirect multiplier effects may include for example, the building of roads or the expansion of land under crop agriculture that may in turn affect terrestrial carbon stocks in various ways.

The Presidency has developed the most prominent, broad and potentially high-impact policies promoting the expansion of the built environment, notably, the *New*

Growth Path, *The National Development Plan* 2030, and the *Medium-Term Strategic Framework* (*MTSF*), and the *Industrial Policy Action Plan (IPAP)* which acts as a policy supportive of the *New Growth Path*. These policies largely respond to the need to promote economic growth, rural development, food security and employment creation.

The *MTSF* is a planning reference for all spheres of government, including national departments. Its vision and objectives are to be integrated into various departmental strategic plans. The MTSF is concerned with job creation and economic growth following the 2008 economic crisis. A major focus area is outlined in the Strategic Priority 2 "Massive Programme to build economic and social infrastructure". This includes programmes to:

- Strengthen manufacturing, mining, clothing and textile, automobile and components sectors;
- Further growth of agricultural, mining, tourism and other services
- Revamp electricity infrastructure
- Expand pipelines for liquid fuels
- Expand public transport infrastructure (including Bus Rapid Transit systems)
- Expand water infrastructure
- Provide low cost and affordable housing
- Deliver universal access to basic services by 2014
- Provide physical infrastructure in rural areas (agriculture and production services in association with land redistribution and restitution, schools, health, water, energy and recreational), and
- Maintain existing infrastructure

The IPAP is aimed at mobilising the required support for strengthening the growth of the industrial sectors identified in the MTSF. The *New Growth Path* plans to implement improved infrastructure for rural market access, and investments in spatial development, notably the rural economy. It also plans to establish transport corridors for road, rail and ports which will open up rural areas to improved trade routes. This may have a multiplier effect on agricultural growth and natural resource demands, leading to further pressures on land. The *New Growth Path* regularly refers to "sustainable" growth and employment, though this is not qualified with references to the concept of either sustainable development or well-known policy documents such as the *National Framework for Sustainable Development.*

The *National Development Plan 2030* promotes the expansion of the built environment, infrastructure development and growth of businesses. The opening up of the Waterberg for mining, expanding the line to Richard's Bay, and exploring drilling for coal, seam and shale gas reserves, and upgrades to freight corridors is anticipated to result in the conversion of virgin or fallow land for industrial purposes. The Investment in public infrastructure will be equal to 10% of national GDP.

Furthermore the *Department of Energy's Revised Strategic Plan* states that it aims to establish 150,000 new grid connections and 10,000 off grid connections per year in an aim to provide access to energy in rural communities. The *Integrated Resource Plan* also aims to provide greater access to electricity through renewable sources, however both these policies lead to the expansion of the grid electricity which will require the development of support and infrastructure to provide energy to consumers.

The *Long Term Mitigation Scenario*, which is a key component of the development of the NCCRP also refers to the greening of cities, however there is very limited information regarding the targeted intervention of this project.

The *Mineral and Petroleum Resources Development Act 2002*, promotes economic growth and mineral and petroleum resources development in the Republic. The objectives of this act may be achieved through possible conversion of woodlands, savannah and thicket for mining exploration and development. The Act requires these developments to be undertaken in accordance with NEMA regulations and the Act also provides for the provision of remediation of the environmental degradation caused by the development of mining operations. However the overall effect is that the development of mining operations places significant pressures on land and generally has an overall negative impact on the environment, even though these mines are required to drive the economy. There are also other policies that allow for this inclusion, as well as, for example, policies related to land reform. The *Transformation of Certain Rural Areas (1998)*, for example, allows for the prospecting of mining and minerals once land has been transferred to the state. This may also lead to further pressures on land.

A key observation is that all these policies are expected to result in significant changes in land-use. Due to the broad nature of these policies, it is difficult to identify the causal link and impact of built environment expansion on terrestrial carbon stocks. It is however, reasonable to assume that an expansion of agriculture, industry, mining, roads, urban areas and supporting infrastructure will lead to direct changes in above- and below-ground carbon stocks as well as indirect impacts through increases in natural resource consumption in areas that had not been densely inhabited before.

Many policies clearly include planning elements (e.g. bioregional planning) but in general, these have not been exercised as yet. Once such planning is complete, a more accurate estimate of the impact of built environment related policies could be made. As an initial indicator of the potential effect in the interim, Section 1.4 of the National Carbon Sink Assessment does map current anticipated land-use change in the agriculture, mining and built environment

sectors. This analysis is not based on policy directives but on planning already taking place within government, parastatals and the private sector focusing on the next 10-15 years.

Another key observation arising from the analysis of the policies above is the 'exception clauses' associated with policies protecting and conserving natural landscapes. The *National Forests Act (1998)* for example includes a clause that states "...natural forests may not be destroyed except in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social and environmental benefits." It refers to infrastructure projects of national and provincial strategic importance. Where forests are affected by such projects, it must be proven beyond doubt that these are in the strategic national or provincial interest and proven beyond doubt that no feasible alternative is available. An off-set agreement must also be established thereafter to offset the loss of biomass associated with the expansion. Similar exception clauses can also be found in the *National Parks Act*, the *National Biodiversity Framework* as well as the *National Environmental Management Act*.

Module 6 – SECTION 3

The most influential policies

Thirty policies were identified that have the potential to have *substantial impacts* on the release and reduction of emissions from the AFOLU sector. These were chosen according to their magnitude, which was assigned based on their geographic scope and the AFOLU sectors they impact. These have been discussed in modules 3, 4 and 5. With thirty policies that potentially could have very significant impacts by increasing or reducing GHG emissions, there is a high level of complexity involved in mapping impacts. The sheer number of policies, many of them accompanied by limited targets or planning, further illustrates the extent to which a wide array of land-use trajectories and rates of land-use change are possible.

The policy environment around land-use is a contested space. This module demonstrates the following:

- In many biomes there is a tension between policies originating from different ministries and departments. Often these tensions are rooted in silo approaches, which lead to different land-use trajectories. These different visions stem from two major objectives: to promote growth and increase employment, and to preserve the natural environment.
- Reconciling environmental and economic objectives is another set of policies – those mediating land-use change through improved controls, planning and oversight. This third space of policy is soon to be overwhelmed by new legislative frameworks and planning measures as discussed in section 7.3.
- Alignment between pre-existing legislation and the strategic plans and national visions that are most likely to result in extensive land-use change is not always clear.
- There is no clear hierarchy between policy objectives, and thus policy precedence is difficult to determine.

Through graphical representation, this module maps critical elements and dynamics between these policies. Table 15 lists the policies, broken down by policy type.

Table 15. *The 30 policies with potentially the greatest impact on removals and reductions of greenhouse gas emissions from the AFOLU sector*

Policy Type	Policy
White Papers	• White Paper on Disaster Management • National Climate Change Response White Paper
Acts	• Conservation of Agricultural Resources Act, 1983 • National Forests Act, 1998 • National Environmental Management Act, 1998 • National Environmental Management: Protected Areas Act, 2003 • National Environmental Management: Air Quality Act, 2004 • National Environmental Management: Biodiversity Act, 2004 • Spatial Planning and Land-Use Management Act, 2013
Regulations	• National Environmental Management: EIA Regulations • National Environmental Management: Environmental Management Framework Regulations

Policy Type	Policy
Strategies, Plans and Frameworks	• National Development Plan • Medium Term Strategic Framework • New Growth Path • Strategic Plan for Smallholder Producers • The Strategic Plan for South African Agriculture • Strategic Plan 2012/13-2016/17 for the Department of Agriculture, Forestry and Fisheries • Integrated Growth and Development Plan: Agriculture, Forestry and Fisheries • National Strategy for Sustainable Development and Action Plan (NSSD1) - 2011 -2014 • Strategic Plan for Environment Sector: 2009 - 2014 • National Biodiversity Framework • National Air Quality Management Framework • National Protected Areas Expansion Strategy for South Africa 2008 • Integrated Resource Plan • Industrial Policy Action Plan: 2012/2013 - 2014/15 • Department of Rural Development and Land Reform, Strategic Plan 2011-2014 (amended 2013) • Carbon Tax Policy Paper • National Disaster Management Framework • A Woodland Strategy Framework for the Department of Water Affairs and Forestry 10
Other	• Guidelines Regarding the Determination of Bioregions and the Preparation of and Publication of Bioregional Plans Development control guidelines • National Forest Conservation Planning

Key points:

- The policies fit into several broad categories: NEMA family policies (10 total), Presidential "vision" policies (4), agricultural policies namely from DAFF and DRDLR (6), Disaster Management Policies (2), natural forest protection policies (2) climate change and environmental protection policies originating from the Minister of Water and Environmental Affairs (3) and other (3).
- Of the most influential policies, eight are Acts. All but two originate from the NEMA family of policies, which are supported by two regulations: The NEMA: EIA Regulations and the NEMA: Environmental Framework Regulations.
- Outside of the NEMA family, the Ministry of Water and Environmental Affairs has the most forward thinking land management policies, but they are not successfully streamlined or integrated into the sectors from which cooperation is greatly needed, notably the Department of Agriculture, Forestry and Fisheries and the Department of Rural Development and Land Reform. This gap is most notable as the policies correctly observe that cooperation across multiple government departments will be critical for effective implementation.
- DAFF largely supports the expansion of agriculture backed by broad commitments to agro-ecological cropping, climate-smart agriculture, sustainable agriculture or other similar techniques.
- Three major Presidential policies focus on improving economic conditions in South Africa, reducing poverty, establishing jobs and harnessing agriculture as one of several means to achieve this. The texts show a weak to moderate commitment to ensuring that environmental considerations are applied to these interventions.
- Seven policies show strong potential to be tools for mediating between land-use expansion and natural resource conservation aims. They provide a platform from which improved spatial and land-use planning can be realized. These present a strong legislative framework with a powerful though perhaps underutilized legal status.
- Multiple policies compete for arable lands. Should government prioritize streamlining policy objectives through, say, application of mandates in the NCCRP, it could greatly reduce these potential conflicts between agricultural expansion, conservation, and land-use planning functions. Individual departments are currently advocating for their own spatial-planning functions, policies and mapping expertise. If these functions are replicated across different departments, this may further entrench silo behaviour.
- Given the strong focus on agricultural expansion as a solution to rural poverty, food security and job creation, it is likely that the country will experience a net increase in emissions associated with crop production. These emissions would stem from soil disturbance and biomass removals.
- Within the limitations of this study, it is very difficult to predict how these policies will interact. A particular difficulty is predicting which policies will most influence land-use and land-use change in South Africa.

6.1 Policy dynamics

Competition for spatial and land use planning control

Figure 3 below is a simple overview of the "push and pull" dynamics between the most influential policies – those that advocate for rapid land-use change and those that actively promote conservation and responsible natural resource management. The figure also illustrates the third cluster of policies that attempt to mediate these objectives.

Policies that are meant to "mediate land-use change trends through improved planning and controls" do not feature prominently in policies leading to accelerated land-use change. Instead, the major policies promoting agricultural and industrial expansion have their own proposed measures and propose new spatial planning tools to support their core objectives. This may serve to hamper and even override the six pre-existing policies that require improved controls and environmental management (see Figure 3 below). A number of policies advocating for accelerated land-use change have identified gaps in spatial planning and ways in which to respond to these gaps. These are illustrated in Table 16.

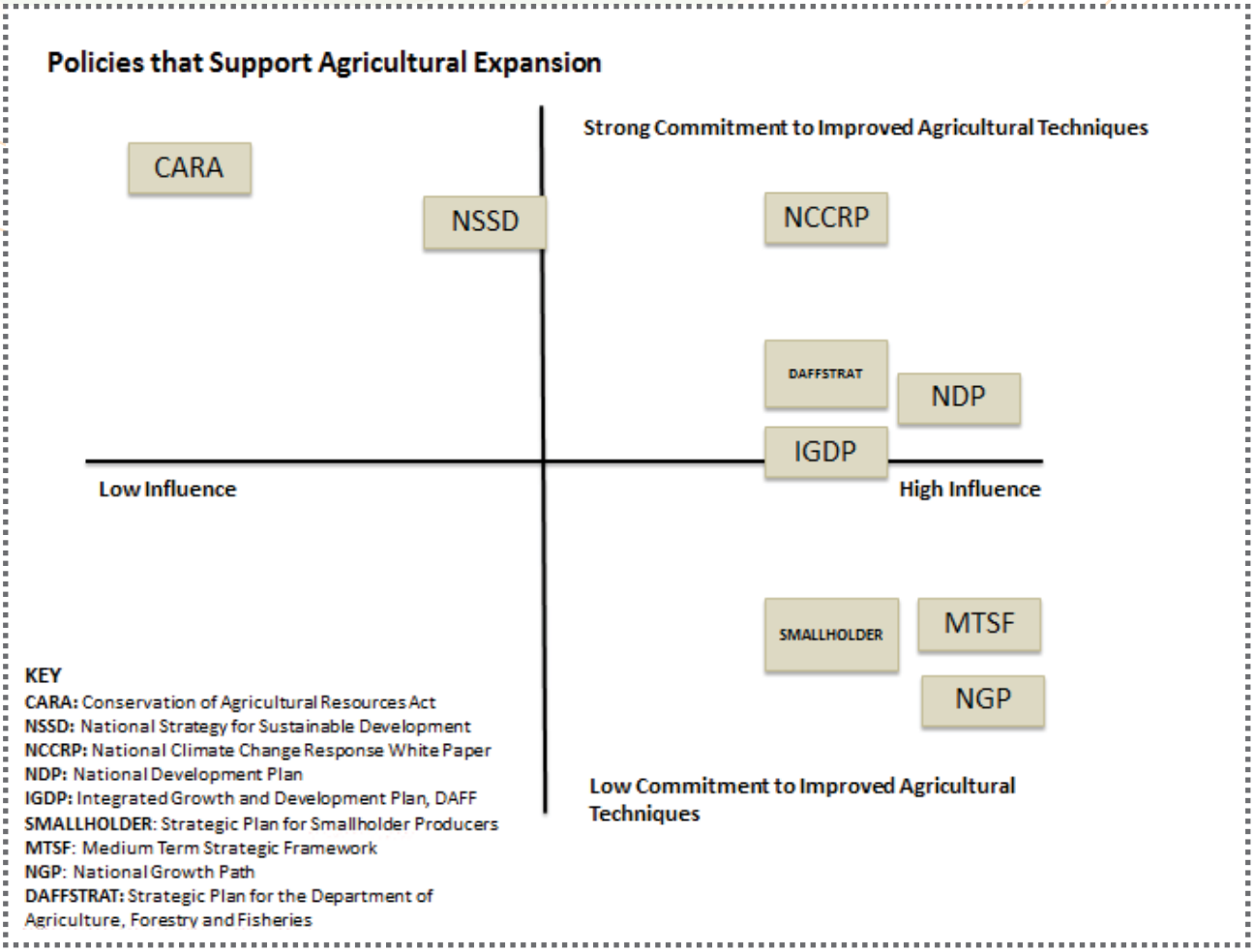

Figure 3. Dynamics between policies impacting on land-use and land-use change

Table 16. Perceived gaps and proposed responses to spatial planning and land-use management

Policy	Reference to spatial planning	Types of gaps and response measures identified
NDP	Gaps	• Spatial divides only serve to increase inequalities and hamper inclusive growth • Opportunities in agricultural production are not fully realized due to weak infrastructure support • Land-reform has not adequately harnessed agricultural potential • Mechanisms for mediating land-use competition are weak and the tensions around this issue "…are becoming increasingly acute as natural resources are depleted" (p. 265) • It is unclear in the Constitution which sphere of government is responsible for spatial planning • Private-sector investment drives spatial planning • The Spatial Planning and Land Use Management Act does not adequately address all planning issues
	Response	• Develop new spatial norms and standards, as well as a national spatial framework and vision • Streamline funds into one fund for spatial restructuring • Update the planning systems, which are fragmented and disjointed, so as to improve coherence and coordination • Include communities in spatial planning exercises • Create a national observatory responsible for tracking spatial data and analysing it • Improve effectiveness of land markets in support of the rural poor • Reform land-use management • Develop binding spatial contracts to provincial and municipal levels
MTSF	Gaps	• Spatial development is not sensitive to locally-specific conditions and needs
	Response	• Spatially reference all massive programmes that promote the development of economic and social infrastructure • Review the National Spatial Development Perspective • Service delivery will be spatially targeted • Use a spatial development framework to coordinate planning efforts across spheres of government
NGP	Gaps	• It is Imperative to overcome the apartheid-era spatial planning inequalities and injustices • Spatial disparities undercut rural development
	Response	• Develop a spatial perspective that improves economic growth through improved housing, infrastructure and job growth planning • Develop a spatial economic strategy
Strategic Plan for DRDLR	Gaps	• Need to improve land administration system • Insufficient spatial equity
	Response	• Develop ten rural development and land reform policies and twelve pieces of legislation by 2014 • Promote the development of an integrated land and planning administration system • Improve delivery of the Chief Director: National Geo-Spatial Information, including provision of annual maps charting land-use change due to development • Facilitating rural access to land and development of spatial-planning policies through its Chief Directorate: National Land-Use Management, Spatial Planning and Spatial Information Systems

Policy	Reference to spatial planning	Types of gaps and response measures identified
IGP for DAFF	Gaps	• Mentions the need for spatial analysis, notably to provide information about the location of arable lands • Notes that "the lack of integrated spatial planning is hampering the growth of the Agriculture, Forestry and Fisheries Sector as well as the effectiveness and success of support programmes and interventions by government"
	Response	• Develop a spatial, commodity-specific production plan • Include a spatial economic development plan • Develop a Spatial Decision Support System • Develop an IGDP Spatial Implementation Plan
Strategic Plan for DAFF	Gaps	• Develop a Spatial Analysis of Agriculture, Forestry and Fisheries
	Response	• Requires improved maps to better understand where key interventions and programmes should take place
Strategic Plan for Smallholder Development	Gaps	• Must improve land-use planning practices, so as to better identify and subdivide productive land and allocate this to farmers
	Response	• Improve area-based district and sub-district level planning to improve agricultural output • Undertake district-level planning for agricultural expansion in support of smallholders

What becomes apparent by comparing the response measures proposed by these policies is that there is a strong awareness of the need to introduce greater spatial planning vision, principles and controls into land-use decision-making. But only the NDP makes clear reference to existing policies; it states that the *Spatial Planning and Land Use Management Act* by itself, is insufficient for dealing with all types of potential land-use change. It seeks to develop a national level framework for spatial planning. Similarly, no other policy considers pre-existing environmental measures that significantly contribute to coordinated, pre-project analysis of land-use planning. Instead, most proposed responses for dealing with various perceived gaps, is the creation of departmental level spatial-planning functions to support local-level planning ventures, decision-support tools and mapping expertise. The Department of Rural Development and Land Reform proposes to singlehandedly introduce 10 new policies and 12 pieces of legislation by 2014, all dealing with land reform and planning issues. The abundance of proposed fragmented measures – all undertaken in a vacuum of existing environmental legislation – threatens to add new complexities, redundancies and uncertainties into land-use planning and change.

Moreover, these omissions raise important questions about the adoption rate of existing policies that aim to mediate the types, scope and intensity of land-use change. For example, the *National Environmental Management Act* is premised on several core principles, one of which is that the degradation of ecosystems and the attendant harm to biodiversity should be avoided, and where they cannot be, be minimised or remedied (2.4.a.i). This is all in the interest of promoting sustainable development, including the promotion of conservation and the sustainable use of natural resources (preamble). NEM: EIA and NEM: BA propose the use of environmental management frameworks and bioregional plans respectively. These frameworks were developed with the intention of identifying the sorts of activities that are acceptable in pre-defined areas, regardless of the department from which the proposed interventions originate. They were not created *for* the Ministry of Water and Environment Affairs, but rather to provide guidelines and oversight measures for all developments significantly impacting land. These frameworks, if applied rigorously, have the potential to block the implementation or meaningfully amend the conditions under which development will be allowed. This governs all activities that are judged to have a long-term detrimental impact on the environment. Irrespective of the level of priority assigned to the activity by a given department or Ministry, these frameworks should be able to curb or influence land-use.

Perhaps the major shortcoming of the NEMA family is that the burden of responsibility falls on the Minister of Water and Environmental Affairs to voluntarily initiate bioregional plans and environmental frameworks. In the absence of these frameworks and plans, business-as-usual is likely to take place, with little consideration given to the emissions associated with land-conversion and soil disturbances. Although the NEMA legislation provides for pro-active land-use management oversight, it remains at the discretion of the Minister to actively employ these two tools. Unlike EIAs for example, which *must* be undertaken for listed activities, the Minister is not obligated to create bioregional plans or environmental frameworks.

6.2 Limited policy integration

The dynamics presented in Figure 3 are particularly interesting when considering how policies "leading to accelerated land-use change" are informed by "policies promoting responsible natural resource management." In an integrated policy environment, the development of new strategies and plans would likely be informed by pre-existing policies, contextualized in the larger legislative environment. Instead, what we find in the land-use change space is an absence of planning that adequately acknowledges historical legislative precedence.

Table 17 illustrates this point. All major policies that cluster around the objective of transforming land to meet economic growth demands have minimal to no reference to the rich legislative framework promoting sustainable development. This suggests that the policies pushing for land conversion have not taken adequate account of the potential legislative restrictions, norms and controls to which they may need to adhere. So while certain key concepts emerge in some of these texts - addressing climate change, agro-ecological cropping, sustainable development – the legislative instruments promoting them are excluded. These omissions are not due to the absence of a convention of cross-referencing relevant pieces of legislation. Rather, it is due to a perceived legislative preference for growth-promoting policies and a bias towards referencing the most current policies. All of the following: *The* Strategic *Plan for the Department of Rural Development and Land Reform*, the *IGDP,* the *Strategic Plan for Smallholder Producers*, and the *Strategic Plan for the Department of Agriculture, Forestry and Fisheries* make reference to at least one of the following documents: *The National Development Plan 2030, the Medium Term Strategic Plan, the New Growth Path* or *The Industrial Policy Action Plan*. But only 3 of 10 policies that are likely to lead to accelerated land-use change make reference to policies such as the *NEM: Protected Areas Act* and its subordinate strategy or the *NEM: Biodiversity Act* and its framework.

Policies leading to accelerated land-use change were reviewed to determine which, if any policies supporting responsible natural resource use and conservation they referenced in their own text. These references are marked by an "X". Below, it becomes clear that only 3 of 10 policies leading to land-use change make reference to the policies regarding environmental management.

Table 17. *Reference to leading natural resource use legislation in policies that promote land-use change.*

		POLICIES SUPPORTING RESPONSIBLE NATURAL RESOURCE USE AND CONSERVATION								
		NEM: BA	NEMA: PAA	NEM: AQA	NSSD	WOODS	DISMAN	NCCRP	CARA	NFA
POLICIES LEADING TO ACCEDELRATED LAND-USE CHANGE	NDP		X					X		
	MTSF				X			X		
	NGP									
	DRDLR									
	IGDP									
	SMALLHOLDER									
	IPAP									
	IRP									
	STRATAGRI									
	STRATDAFF								X	X

Key: ***NEM: BA*** *National Environmental Management: Biodiversity Act.* ***NEM: PAA*** *National Environment Management: Protected Areas Act.* ***NEM: AQA*** *National Environment Management: Air Quality Act.* ***NSSD:*** *National Strategy for Sustainable Development.* ***WOODS:*** *Woodlands Strategy Framework.* ***DISMAN:*** *Disaster Management Framework.* ***NCCRP:*** *National Climate Change Response White Paper.* ***CARA****: Conservation of Agricultural Resources Act.* ***NFA:*** *National Forestry Act.* ***NDP:*** *National Development Plan.* ***MTSF:*** *Medium Term Strategic Framework.* ***NGP:*** *New Growth Path.* ***DRDLR:*** *Strategic Plan for the Department of Rural Development and Land Reform.* ***IGDP:*** *Integrated Growth and Development Plan, DAFF.* ***SMALLHOLDER:*** *Strategic Plan for Smallholder Producers.* ***IPAP:*** *Industrial Policy Action Plan.* ***STRATAGRI:*** *The Strategic Plan for South African Agriculture.* ***STRATDAFF****: Strategic Plan for the Department of Agriculture, Forestry and Fisheries.*

6.3 Policy precedence

It is unclear which policies take precedence in contested land areas. An Act may have a strong legislative mandate, but a lack of buy-in from the policies and strategies that in theory devolve from it. Whilst measures like Bioregional Plans and Environmental Management Frameworks could act as strong mediating forces, it is unclear the extent to which these tools are *drivers* of land-use planning as opposed to *options* that have been underutilized to date. Nothing illustrates this better than policies intended to expand agricultural production, Figure 4.

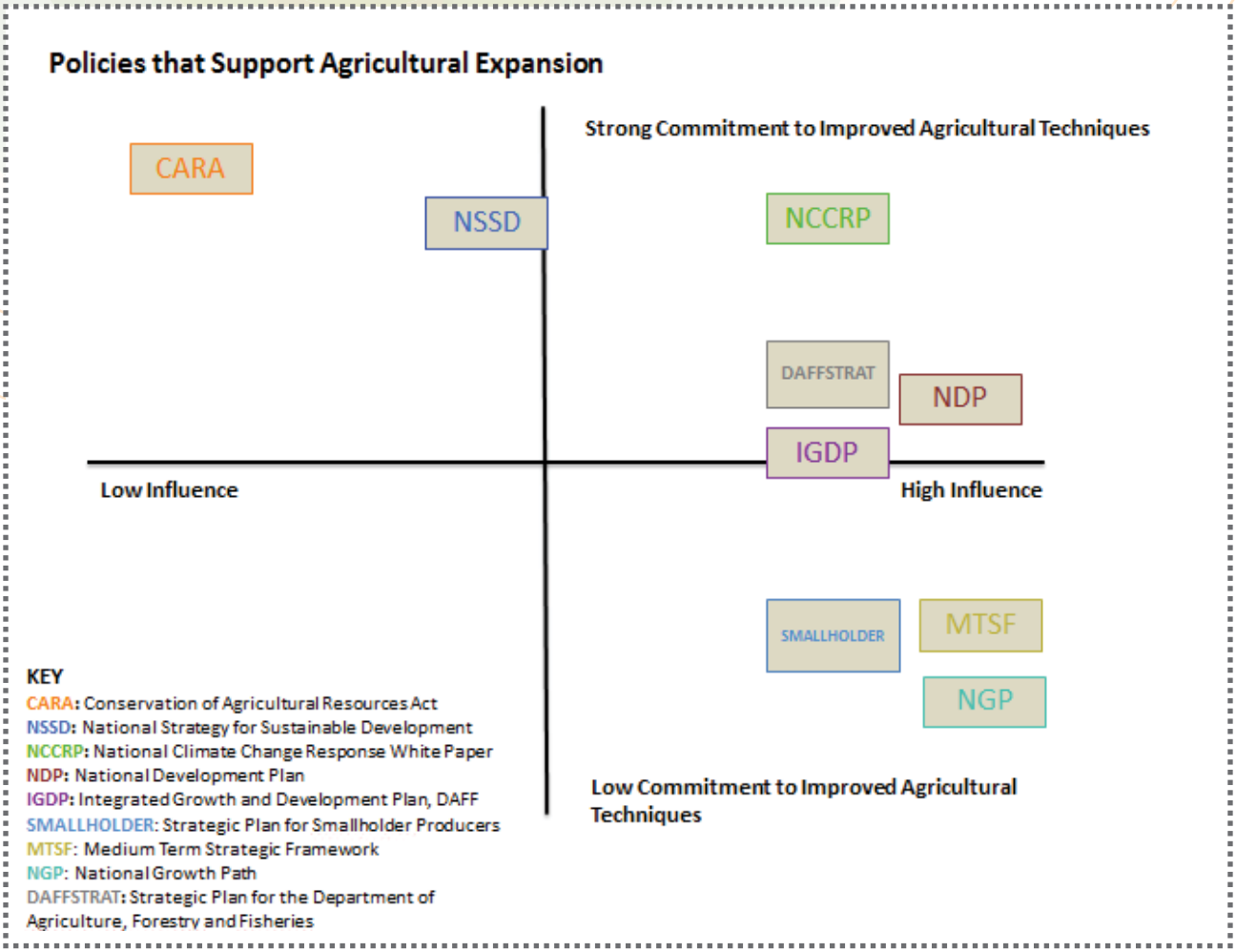

Figure 4. *The level of political buy-in and commitment to improved agricultural techniques demonstrated by multiple policies that impact on the expansion of agriculture*

Figure 4 shows that the only Act that promotes environmentally friendly agricultural techniques – CARA – has both the lowest influence and the highest commitment to improved agriculture. Similarly the *National Sustainable Development Strategy (NSSD)*, approved in 2008, receives little attention in major policies promoting agricultural expansion. Three presidential policies – the NDP, MTSF and NGP – have significant political buy-in, but no firm legislative underpinning in the form of Acts or Regulations. This brings into focus the some underlying elements of the current policy environment: Government vision policies inform many of the objectives and principles presented in agricultural and rural development strategic plans. In turn, these strategic plans have limited visible alignment to pre-existing environmental legislation.

Module 7 – SECTION 3

Conflicts and trade-offs between policies

The policy analysis presented in module three to six identifies several potential conflicts or "grey areas" between policy objectives and principles. In some cases, contradictory aims are found within a single policy paper. These contradictions highlight the types of trade-offs government faces when attempting to address several social and environmental challenges simultaneously e.g. rural poverty, food security, long-term sustainable economic growth, ecological sustainability and climate change. In terms of understanding the impact of policy on terrestrial carbon stocks and associated GHG emissions, it is important to be aware of these contradictions and trade-offs, for if one was to advocate a particular policy, the outcome may differ from that initially anticipated.

The most prominent set of trade-offs relevant to this study are between environmental preservation and sustainability and the push for social and economic well-being. While there is a growing understanding that long-term social and economic well-being is dependent on the sustainable use of ecological infrastructure, most present policies see these as conflicting goals where economic well-being should be prioritized over ecological sustainability if need be. Greater application of and reference to the planning and strategy integration requirements outlined in both NEMA and the NCCRP could provide an immediate pathway for resolution of these potentially competing objectives.

The NEMA group of policies underpin the environmental management framework and aim to adhere to the precautionary principle. Within NEMA there are contradicting aims of the preservation of natural resources and economic development. For example under NEMA, the environmental, social and cultural impacts of a proposed development must be assessed, with the purpose of "maximizing benefits" and mitigating or proposing alternatives for perceived negative impacts (23.1.b). Similar provisions are made for the *NEM: Air Quality Act* concerning provisional licenses where the licensing authority can amend a license "if it is necessary or desirable to accommodate demands brought about by impacts on socio-economic circumstances and it is in the public interest to meet those demands (46.1.c)". Yet in both clauses, restrictions are waived when social and economic development is perceived to outweigh environmental preservation.

These compromises are well known in most countries, but the *National Biodiversity Framework* clearly articulates the ways in which these tensions are exposed to marginal guidance:

"…in some cases, trade-offs have to be made when a development application is approved or not approved. There is currently no framework to guide decision-makers about how to weigh up biodiversity considerations against more immediate socio-economic considerations. The framework for trade-offs should take threatened ecosystems and critical biodiversity areas into account. (45)"

This module presents three prominent, frequent trade-offs that emerged during the review of policies that may affect terrestrial carbon stocks and fluxes. It is not an exhaustive list but focuses on issues pertinent to changes in land-use practices and associated carbon stocks and GHG emissions.

Trade-off 1: rapid job creation in the agriculture sector versus sustainable development

One of the South African government's central aims is to overcome entrenched poverty. Several Presidential policies view agricultural expansion as a means of rapid social upliftment and job creation in rural areas. This is highlighted in several key guiding documents:

Table 18. Policies that focus on rural job creation and economic development

Document	Environmental considerations	Indications that economic growth is a priority
Strategic Plan for the Department of Rural Development and Land Reform	• Ensure environmental sustainability (this is not contextualized)	• By 2014, increase rural job access • Reduction of poverty through increased access to land • By 2014, increase infrastructure build in rural areas to support sustainable livelihoods • Recapitalization and technical support to rural farmers to drive agricultural growth • Resolution of outstanding land tenure issues to incentivize agricultural production
Medium Term Strategic Framework	• Environmental sustainability will be considered with regards to delivery of Strategic Priority 2: Massive programme to build economic and social infrastructure • Natural resource management is considered a priority area • Makes reference to implementing the National Framework for Sustainable Development, supporting water conservation and a response to climate change impacts	• Strategic Priority 1: "Speed up economic growth and transform the economy to create decent work and sustainable livelihoods" (author's emphasis) • Halve poverty and unemployment by 2014 relative to 2004 statistics • "Fast track" programmes such as government infrastructure build that deliver quick employment opportunities • Accelerating the implementation of IPAP • As part of its Strategic priority 3, promote an "Aggressive implementation of land reform policies"
New Growth Path	• "Environmental outcomes" tagged as an indicator of the success of the policy generally, but outcomes are not qualified • It seeks to create a new green economy	• Employment creation is the policy's "top priority" • "Very short run" and "short to medium term" opportunities to create jobs are presented, including in direct employment programmes and the agricultural value chain • More than double the number of jobs by 2020 • 250,000 new jobs a year in various infrastructure opportunities through to 2015 • Rural development achieved through tourism and agriculture
National Development Plan	• Support of the National Protected Areas Expansion Strategy • Support of sub-tropical thicket and other biome restoration interventions • Improved farming methods • Support of preserving critical ecosystem services	• In its efforts to eliminate poverty by 2030, employ 1 million people in public works by 2015 • Strengthen policies that promote active labour markets • "In the short term, the economy needs to grow jobs." • Rapid expansion of freight and road corridors to drive economic growth
Biofuels Industrial Strategy	• The use of biodiesel itself is considered an environmental benefit	• Biofuel production acts as a "bridge from the first economy to the second economy" • Production to be focused on former homelands • "Biofuels production in South Africa is about rural development and provision of opportunities to the rural poor."

The list of policy documents in Table 18 illustrates the potential conflicts and trade-offs between promoting job creation and ecological sustainability. The policies assume that projections for job creation and economic growth are in fact compatible with responsible natural resource use and generally superficially acknowledge environmental concerns. It does not appear that the targets have been "tested" against certain important factors, for example, the impact of rapid agricultural expansion on water resources, soil erosion and soil health. Whereas these issues may well be addressed during the implementation of the policies, at present they are not addressed in the standing text. In the main, environmental resource management appears to stand "outside" the economic sphere, as a separate consideration. The necessity of healthy ecosystem services in an economic context receives little to no attention in the policies presented in Table 18. The manner in which job creation will impact on the South Africa's natural resource base is one worth future consideration, notably given the opportunity to create and maintain jobs that help sustain the environment.

However, the concept of trade-offs is brought up in both the NGP and the NDP. The NGP notes two relevant trade-offs that must be balanced in order to achieve its aims:

- Between present consumption and future growth, since that [future growth] requires higher investment and savings in the present"
- Between the present costs and future benefits of a green economy"

Despite mentioning these trade-offs, the NGP does not detail how to prioritize between present consumption and investment into a greener future. Similarly, the NDP recognises the need to negotiate these trade-offs to achieve its 2030 vision. It gives responsibility to "strong leadership" and "individual behaviour change" to navigate the trade-offs, affirming that "strategic planning" should be employed to identify and manage them.

Trade-off 2: biofuel production to limit reliance on fossil fuels versus land conversion

Biofuel production receives significant policy support. As detailed in Module 4 – Agriculture, there are seven policies promoting the expansion of the biofuels industry. Although the initial impact of biofuel production on GHG emissions from the AFOLU sector is considered moderate due to a proposed pilot phase being limited to some 300,000 hectares, this should not exclude the possibility that biofuel production could expand over the long term.

The expansion of biofuels production responds to three key government objectives:

- Job creation
- Achievement of the voluntary "peak, plateau, decline" commitments under the United Nations Framework Convention on Climate Change (UNFCCC)
- Shifting dependencies on fossil fuels as price volatility represents a threat to energy security

The *Green Economy Accord* and the *Biofuel Industrial Strategy* restrict production to areas of "fallow land" or "underutilized arable land". The Long-Term Mitigation Scenario (LTMS) further supports this approach by affirming that "Biofuels are extended as far as limits of arable land, water, and concerns about biodiversity and food security allow" (p. 19). Whereas this demonstrates common agreement that biofuel production should not impact food production or influence food prices, it does not consider the impact of biofuel production on the conversion of indigenous rangeland systems for biofuel production or the impact on ecological infrastructure and associated ecosystem services. Nor does the policy explore the use of second and third generation biofuels.

The trade-off presented in this scenario is the following: National GHG emissions from fuel use are reduced through the adoption of biofuels, which may result in an increase in GHG emissions following the ploughing of underutilized lands. The conversion of underutilized land is likely to lead to an increase of GHG emissions from the turnover of soils and removal of pre-existing vegetation cover. It is recognized that many studies fail to take into consideration the additional GHG emissions caused by land-use change when considering the net GHG emissions of biofuel production (Searchinger et al 2008). In a study of US biofuel production systems, Searchinger et al. (2008) noted that even if the corn-ethanol production cycle is assumed not to emit GHGs, the conversion of land alone results in a net increase of GHG emissions over 30 years. It is therefore important that the calculation of the net reduction in GHG emissions due to biofuel use take a full life-cycle approach, looking across the entire supply chain, and including GHG emissions associated with land use conversion.

Trade-off 3: short-term food security versus the sustainable use of ecological infrastructure and biodiversity conservation

Many policies in South Africa address food security as a principle objective. The priority here is of the rapid resolution of household level food insecurity and hunger. The most popular proposed measure for overcoming food insecurity is the expansion of land under agricultural production. This is achieved through support of both commercial and smallholder production. Partially, this may be due to the notion that even if South Africa generates a surplus of food, this does not guarantee that households are food secure. Therefore, much of the focus is on ensuring the affordability and accessibility of nutrient-rich food supplies to poor households. There is some acknowledgement of the fact that environmental service provision and proper natural resource management are important contributors

to sustained food production levels and security over time. However, the policies listed in Table 19 below demonstrate that:

- DAFF recognizes that efforts to date aimed at improving cropping techniques have been "successful but not sufficient." It has requested support from the FAO in the development of a comprehensive response to conservation agriculture. The department proposes several types of interventions – from promoting drought resistant crop types to agro-ecological practices – but few accurate figures, targets or planning accompany these.
- Few policies that promote a strong response to food insecurity describe how this may be undertaken through improved conservation agriculture techniques.
- Adoption of sustainable, agro-ecological or climate-smart agriculture or further research into climate change impacts on agriculture is often articulated as a side activity to promote at some point in the future.
- The *Policy on Agriculture in Sustainable Development* is over a decade old. Due to its age and its lack of progression towards becoming a white paper, the policy is unlikely to have a meaningful impact. Therefore only the *Environment Sector Strategic Plan* (ESSP) outlines a credible response to integrating climate change adaptation and ecosystem management into food production. The ESSP does however rely on other government departments for implementation due to their food security mandates (DAFF and DRDLR).

The major trade-off presented is one where rapid expansion of agricultural production is pursued in the near term as a "quick fix" to food security but whereby the farming methods promoted are likely to lead to soil nutrient depletion, soil erosion, and land degradation. This scenario exposes households to greater risks of food insecurity in the long-term, as important ecosystem services are eroded. Transitioning towards a combination of ecologically sustainable agriculture will require substantial resources to train small-growers in new agricultural techniques and to ensure a high rate of adoption. The viability of this transition in terms of costs and required capacity versus available resources are not discussed in these documents.

Table 19. *Policies that promote food security and their support of improved agricultural techniques*

Document	Food Security Support	Eco-Agricultural, Climate Smart or other "environmentally friendly" agricultural production techniques
Medium Term Strategic Framework	• Protecting agricultural land from "encroachment by other developments" • Provision of inputs, tools and extension services to farmers • Intensification of food security programmes	• Supports "sustainable" food production • Mentions the National Sustainable Development Strategy, but no clear alignment with it • Improved irrigation
New Growth Path	• Food security promoted by expansion of commercial agriculture and managing price volatility of major food commodities	• None
National Development Plan	• Food security considered an "enabling milestone" to achievement of the 2030 vision • Committed to the launch of a food security campaign • Food production and expansion levels a key component of security, but also social grants, nutritional services and access to jobs through the expanded public works programmes	• The role of climate change in food security needs further attention • Improvements in sustainable agriculture required, notably as commercial agriculture expands. • Soil conservation, improved tillage promoted • Improved irrigation
Strategic Plan for the DRDLR	• Increase food production, equitable access to land and tenure reform to reduce food insecurity • Promotion of home gardens and agri-parks to promote food security	• Ensure environmental sustainability (this is not contextualized)

Document	Food Security Support	Eco-Agricultural, Climate Smart or other "environmentally friendly" agricultural production techniques
Environment Sector Strategic Plan	• Food security can contribute to development of a Green Economy • Food security listed as responsibilities of DAFF and DRDLA	• Improve soil conditions, support biome restoration and manage water as critical components of food security • Promote sustainable development consideration into food production • Shift focus to the role that healthy ecosystems play in promoting climate change adaptation • Managing air pollution to support food security • Food security closely linked to environmental health • Improved agricultural techniques: composting
Strategic Plan for the Department of Agriculture, Forestry and Fisheries	• Eradicate food insecurity • Improved distribution of food and access to poor families • Improved production systems at the household level • Proposed publication of national food security policy, supported by a strategy • Improved extension services and support to smallholder farmers	• Improved irrigation • Rehabilitation of forest and agricultural land • Recognizes that a "challenge" is introducing climate-smart and conservation agriculture into farming practices • Committed to developing a comprehensive approach to agro-ecological production • 1 pilot study in 1 municipality to be undertaken targeting conservation agriculture
Integrated Growth and Development Plan for the Department of Agriculture, Forestry and Fisheries	• Agricultural sector's role includes addressing food security • Support both commercial farmers and smallholders in increasing food production, including provision of inputs and support services	• Promotes conservation agriculture as a means to reducing stresses on ecosystem services • Climate change recognised as a threat to food security • Recognizes that its efforts to promote protection of environmental services has been "successful but insufficient" • Diversification into climate resilient crops • Rainwater harvesting • Improved grazing regimes
Policy on Agriculture in Sustainable Development	• Food security is an overarching objective of the plan • It should be integrated into national policies and plans • Expansion of agricultural production can provide a rapid response to hunger and poverty • Promote rapid delivery of new technologies to support agricultural production	• Communities should be empowered to meet basic food needs in ways that are compatible with natural resource management • Biodiversity must be protected to ensure long-term food security • Production methods should sustain ecosystem services
Strategic Plan for Smallholder Support	• Aligned with Outcome 7, the policy seeks to promote food security for all • Increase number of smallholders producing food • Provide technical and financial support to smallholder producers • Promote market access and infrastructure development	• Committed to building a focus on conservation and agro-ecological farming practices

Module 8 – SECTION 3

Prominent gaps in policy

South Africa is a dynamic country with many competing demands compounded by silo approaches to addressing these demands. It is also currently experiencing a rapid phase of policy development. Although this rapidly evolving policy environment has led to some conflicts, policies like the NCCRP strongly advocate for mainstreaming and alignment of policies to mediate and resolve such conflicts.

During the development of the catalogue and consequent analysis, Cirrus identified several prominent gaps in policy relating to the AFOLU sector greenhouse gas emissions and removals. These gaps demonstrate key considerations that have received limited attention or are missing entirely from inclusion in policy. On the one hand, there exists an abundance of legislation that can play a significant role in protecting and conserving national terrestrial carbon stocks. The *GLOBE Climate Legislation Study 2011* praises South Africa for taking a lead in its comprehensive legislation dealing with climate change[10]. On the other hand, the role of AFOLU in both contributing to and potentially helping to mitigate and adapt to climate change has not featured as prominently as it could

This module therefore specifically aims to describe gaps that were identified during the policy review and analysis. These gaps do not identify shortcomings in terms of the successful implementation of the policy but merely any gaps pertaining to the limited reference to or integration of the AFOLU sector generally. Means for addressing these gaps are discussed in detail in the 3.2 policy recommendations report.

As a note, Cirrus takes cognisance of the fact that existing legislation central to the protection and conservation of South Africa's natural landscapes and biodiversity were promulgated in the 1990's and early 2000's. It was at this time that a first consensus on climate change was reached in South Africa. Therefore, a limited reference to climate change may simply be due to the short time period in which it has been brought onto the government's agenda.

One of the key action plans identified in the *National Climate Change Response Policy* is the need to review existing legislation in order to align it with the outcomes of the NCCRP in order to meet our international climate change commitments. The Government is finalizing this process, and results are intended for publication in the second quarter of 2014.

Key findings

There were a significant number of gaps identified, grouped under the following broad themes and with the following key findings. Approaches for addressing these gaps are discussed at length in the 3.2 policy report focused on recommendations. The gaps include the following:

- Limited specific content around woodlands:
- There is a lack of a clear definition for the classification of woodlands
- There is also a lack of clear targeted interventions for the protection of woodlands,
- There is a lack of reference to the reliance on fuel wood by rural communities in energy policies
- Limited reference to 'climate-smart' agriculture, 'Agro-ecological' or other improved agricultural practices:
- There is a general lack of reference to these terms or explanation of what they entail
- There is a lack of tangible plans and targets to implement improved agricultural practices
- There is very limited reference to inclusion of 'climate-smart' or 'agro-ecological' practices in the massive scale up of agriculture production envisaged for the country in the near term
- There is very limited reference to the impact of fertilisers, especially in a greenhouse gas context
- Limited commitments from government for protection and improvements of natural and semi-natural landscapes:
- There is very limited commitments for the protection of areas that fall outside the Protected Areas Network
- There is a lack of commitment to implementing rehabilitation efforts to benefit degraded natural and semi-natural landscapes
- Lack of inclusion of the AFOLU sector's contribution to climate change in policy
- There is limited reference to the emissions from the AFOLU sector
- There is limited reference to the role of the AFOLU sector in mitigating climate change
- There is limited consideration of the Costs of including AFOLU in an offset mechanism

10 Kemantha Govender, 6 December 2011, www.SANews.gov.za accessed 28 July 2011.

8.1 Limited specific content around woodlands

Lack of Definition

There is a significant lack of specific content around woodlands despite their strong contribution to the national terrestrial carbon stocks. The first example is the *National Forests Act (1998),* which is the central piece of legislation providing for the protection of woodlands. Its definition of woodlands is unrefined and not in keeping with international best practice. It makes provisions for the Minister to declare a certain area of woodlands to be protected, but it is not a legally binding mandate. Moreover, it fails to present clear targeted interventions to protect woodlands. Another example is the *Forestry Roadmap 2030*, which states that "Woodlands cover the bulk of forest land in the country covering 29 – 42 million hectares, depending on the classification system used." Although the *Forestry Roadmap2030* includes this statement, it does not provide the definition of woodlands or a commitment to a particular classification system. *A Woodland Strategy Framework* correctly observes that "The classification system for woodlands forms the basis of much of the other work that needs to be done and it is therefore a very important first step towards progress" (p. 15). That this progress is flagging 15 years after the promulgation of the NFA 1998 is indicative of the limited political attention assigned to woodland management, conservation and sustainable resource exploitation.

Lack of Reference to the Reliance of Rural Communities on Fuel wood

In South Africa, fuel wood extraction, along with fencing and building material collection, represents the largest annual off take of biomass (Lawes, Obiri, Eeley, 238). Fuel wood extraction rates range considerably from household to household, from 0.27 to 1.12 tonnes annually, accounting for some 51% of domestic energy use (Lawes et al 239).

The *National Forests Act (1998)* is the central piece of legislation providing for the protection of woodlands. However, both its lack of a credible definition and of clear targeted interventions to protect woodlands may potentially result in further deforestation of these landscapes.

It has been outlined in module 3 (Natural and semi-natural landscapes) that important energy policies originating from the Department of Energy that address renewable energy do not sufficiently address the reliance of rural communities on fuel wood for energy[11]. This could lead to both deforestation and land degradation and the concomitant release of greenhouse gas emissions. The *White Paper on Energy Policy (1998)* and the *White Paper on Renewable Energy (2003)* highlight the issue of unsustainable harvesting of fuel wood. According to the *White Paper on Energy Policy*, 65% of South African households consume fuel wood for energy. It already raises the issue that woodlands are depleted as it further states "Increasing amounts of coal, paraffin and LPG are used in areas where fuel wood has become scarce" (p. 30). The *White Paper on Renewable Energy* states that "although presently 9% of SA's energy mix is renewable energy, largely in the form of fuel wood, this is harvested in an unsustainable manner." Although these policies reference the dependencies on fuel wood, neither of these policies provides any functional reference to targeted interventions to address this problem.

Policies originating from Presidency, such as *The New Growth Path*, *the National Development Plan 2030*, *The Medium-Term Strategic Framework* and the *Industrial Policy Action Plan* aim to address this issue through the provision of access to basic energy services and through the upliftment of rural communities. None of these policies however discuss or consider the potential impacts that this may have in terms of a shift in fuel wood harvesting practices and charcoal production .The *White Paper on Energy Policy (1998)* states that the provisions of access to basic energy services may not necessarily alleviate reliance on fuel wood for energy, especially cooking and cultural related purposes. It further states that behavioural changes cannot be expected through the provision of one energy alternative, but possibly through a diverse variety of alternatives (p. 23).

It further states that "Government will facilitate the production and management of woodlands through a national social forestry programme for the benefit of rural households, where appropriate" (p. 80). There is however not much detail provided as to how this may provide protection for woodlands, and this may not guarantee behavioural changes in deforestation as communities may continue relying on fuel wood for traditional cooking practices.

Therefore, numerous policies exist that have the potential to protect woodlands. However, they largely fail to do so in two ways:

- Not addressing the issue of rural community reliance on fuel wood for heating, cooking and construction purposes
- Not providing credible, time-bound commitments and associated targets for the management and protection of woodlands.

These policies, as well as prominent gaps identified are listed in the table below.

11 The Integrated Resource Plan 2010, Department of Energy Revised Strategic Plan 2011/12-2015/16 and the Green Economy Accord

Table 20. Policies with Limited References to Content around Woodlands

Policy	Prominent Gap Identified
Forest Sector Transformation Charter	• No oversight of charcoal production methods and extraction rates • No oversight on whether wood / charcoal is harvested / produced locally or across border in neighbouring countries
National Climate Change Response Paper 2011	• No analysis of how fuel wood or charcoal extraction and production rates contribute to climate change • No mention of National Forests Act or Woodland Protection • No clear commitment to halting woodland degradation
Integrated Resource Plan	• Distinct lack of reference to reliance on fuel wood and charcoal as primary source of energy in rural communities
Regulations on the National Forests Act 2009	• There are no regulations concerning woodlands access or use, although they may be able to protect them through S17 and S18.
Policy and Strategic Framework for Participatory Forest Management	• Allocation of state land may miss the opportunity to integrate natural forest and woodland management on communal lands
Draft Strategy on Forest Enterprise Development	• No provisions foreseeing charcoal and fuel wood extraction rates and impacts
Department of Energy Strategic Plan	• Distinct lack of reference to reliance on fuel wood and charcoal as primary source of energy in rural communities
National Framework for Sustainable Development	• Lack of reference to charcoal use, only brief references to substitutions of LPG and other fuel types for fuel wood
Forest Criteria	• Lack of reference to degradation of land associated with basic, rural needs notably for fuel wood, building materials or charcoal production.
White Paper on Renewable Energy 2003	• References the unsustainable harvesting of fuel wood, but no targeted interventions to manage deforestation of woodlands
Department of Energy Revised Strategic Plan: 2011/12 - 2015/16	• Limited reference to reliance on fuel wood for energy by rural communities
Green Economy Accord	• Limited reference to reliance on fuel wood for energy by rural communities

8.2 Limited reference to planning around climate-smart or agro-ecological practices

Three agriculture-focused themes were identified as lacking in clear policy provisions. These include:

- The limited reference to 'climate-smart' or 'agro-ecological' practices
- Very limited reference to the inclusion of 'climate-smart' or 'agro-ecological' practices in the large scale up of agriculture production envisaged for the country in the near term
- Very limited reference to the impact of fertilisers, especially in a greenhouse gas context

Policies Lacking Tangible Plans and Targets

Several policies identified in module 4 (agriculture) support improvements in agriculture production; these include the Integrated Growth and Development Plan for Agriculture, Forestry and Fisheries, Strategic Plan 2012/13-2016/17 for the Department of Agriculture Forestry and Fisheries, The Strategic Plan for Smallholder Support and the Climate Change Sector Plan for Agriculture, Forestry and Fisheries.

Improvements of agriculture fall under the broad terms of conservation agriculture, climate smart agriculture, sustainable agriculture and agro-ecological practices. The proposed activities associated under these terms may potentially lead to substantial emission reductions through protection of soil structures, rehabilitation of soils, and composting, reduced dependence on fertilisers, improved cropping techniques and improved grazing intensities. The intentions of these policies were, however, not supported by concrete targets. Neither were any of the improved agricultural practices defined; it remains unclear what these techniques entail, whether they have been tested for suitability under South African conditions, and what it would require to roll them out across the country. No single policy details the ways in which agricultural expansion plans will successfully integrate improved cropping techniques, or if that is even an expectation. The limited scope of targets

or lack thereof indicates shortcomings in credible planning around improved agricultural techniques. Furthermore, these policies made limited reference to the *Conservation for Agriculture Resources Act (CARA) 1983*. Despite its potentially high impact, CARA is only made passing reference to in the Department of Agriculture, Fisheries and Forestry's strategic and integrated plans. This is a legislated policy. By law, its provisions are binding and must be adhered to. However, it appears to have limited influence in guiding departmental strategic plans.

Lack of Integration of 'Climate-Smart' Agriculture Practices in Future Planning

The policies listed above also articulate the government's intention to expand agriculture production in order to achieve economic growth. The *Rural Development and Land Reform Strategic Plan*, as well as the *New Growth Path*, *The Medium Term Strategic Plan* and *The New Growth Path* all articulate this vision for agriculture expansion; however few of these policies truly consider how the scale-up of agriculture production will be implemented. Unfortunately, few of these policies are adequately integrated into existing legislative frameworks. This could pose some interesting problems around prioritizing conflicting land-use objectives. Additionally, there is limited discussion of the ways in which more sustainable agricultural practices – from soil conservation to organic methods – will feature in expansion trends. Regardless, it is unclear whether or not Presidential mandates are intended to supersede existing legislation.

Lack of Reference to Fertiliser Use Impacts

The analysis of policy from the agriculture sector highlighted a significant gap regarding information on fertiliser use in general. Few of the policies address the significant global warming potential associated with fertiliser use as well as their impact on the environment. The *National Water Resource Plan* does not provide enough details on how fertiliser use will be regulated. The *National Fertiliser and Feeds Bill* makes provision for the regulation of the importation, sales and registration of fertiliser products, but no details are provided as to its environmental impacts in a climate change context. Cirrus was unable to find a policy that provides guidelines on the amounts of fertilisers allowed or controls on its application in agricultural fields.

Climate-smart agriculture techniques have the potential to reduce the reliance on harmful fertilisers and can play a significant role in the reduction of greenhouse gas emissions from the AFOLU sector. The limited reference to the impacts of fertilisers in general demonstrates that policy still requires substantial revisions for sustainable cropping practices to become a leading agricultural priority.

A summary of prominent gaps identified in policies regarding the limited reference to 'climate-smart' agriculture practices is listed in the table below.

Table 21. *Prominent Gaps Identified in Policies relating to Climate-Smart Agriculture*

Policy	Prominent Gaps Identified
Rural Development and Land Reform Strategic Plan	• There are no clear references to adopting ecologically friendly, sustainable food production systems, or committing to conservation and biodiversity protection. • This is interesting as these activities could add considerable new jobs to the rural economy. • There are no figures or targets qualifying what are meant by improved agricultural production.
New Growth Path 2010	• No review of what "sustainable" means, how this might apply to agricultural production
National Climate Change Response 2011	• No real discussion around improved fertilizer use and only passing reference to the adoption of improved agricultural techniques
National Water Resource Plan	• There is not enough detail around the ways in which fertilizer use will be regulated, controlled or monitored
National Fertiliser and Feeds Bill 2012	• No information regarding the environmental impacts of fertiliser use or guidance on allowable quantities per given area of land or crop type

8.3 Limited commitment for protection and improvements of natural and semi-natural landscapes

South Africa's policy and legislative framework for biodiversity is well developed, providing a strong basis for conservation and sustainable use of biodiversity. The central piece of legislation for the establishment of the protected areas network is the *National Environmental Management Protected Areas Act (2003)*. The *National Environmental Management Biodiversity Act (2004),* which essentially contains the same underlying objectives, provides for the protection of biodiversity outside the protected areas network.

The *Biodiversity Act* provides a suite of new legal tools for conserving biodiversity that may fall outside the protected areas network and is likely to remain outside it. These tools include the *National Biodiversity Framework*, *National Biodiversity Strategy and Action Plan, Guidelines for Bioregional Planning*, *Biodiversity Management Plans* and the *Threatened or Protected Species Regulations*. Whilst all these new legal tools provide an important framework to promote, inform and co-ordinate efforts for conservation, these policies provide no other references to conservation areas which may fall outside protected area networks. Therefore it may be very difficult to gauge which landscapes could possibly be impacted by future expansion of the economy.

The improvement of natural and semi-natural landscapes may potentially refer to, for example, the rehabilitation and reclamation of degraded soils or areas, reforestation, restoration of biomass and vegetation and removal of alien invasive species. The policy analysis presented in module 3 highlighted that there were numerous policies which intend to undertake improvements of natural and semi-natural landscapes, however many of these policies were not substantiated by concrete targets or clear targeted interventions. These policies include the *National Development Plan*, *A Woodland Strategy Framework for the Department of Water Affairs and Forestry*, *National Biodiversity Framework*, the *Integrated Growth and Development Plan for the Department of Agriculture Forestry and Fisheries*, the *Strategic Plan for the Department of Agriculture, Forestry and Fisheries 2012/13-2016/17* and the *Climate Change Sector Plan for the Department of Agriculture, Forestry and Fisheries*. There are only two policies that have set specific targets relating to the improvements of natural landscapes; the *National Sustainable Development Strategy and Action Plan (NSSD1)* and the *Strategic Plan for the Department of Agriculture, Forestry and Fisheries 2012/12 – 2016/17*. Regrettably, these targets are however not substantiated by any further details pertaining to the targeted interventions – notably location or detailed biome type. This lack of detail makes it impossible to assess the greenhouse gas emissions reduction potential of these proposed interventions.

The lack of concrete targets and plans for the improvement of natural and semi-natural landscapes demonstrates the need for the revision of these policies in order to include improved action plans and targets.

8.4 Lack of reference to land-use sector in policy

The policy analysis presented a limited reference to the potential sources of emissions that originate from the land-use sector and its associated activities. Greenhouse gas emissions associated with land-use activities are a major source of global greenhouse gas emissions, of which deforestation forms a large part. The most significant of these include plantation forestry and land clearing, especially for agricultural expansion. These are some of the most important anthropogenic activities that lead to deforestation (Rahlao, et. al., 2012).

As highlighted in section 11.3 above, the policies that focus on agricultural expansion do not consider the potential impacts this may have on greenhouse gas emissions from the sector. The *National Development Plan 2030* for example, makes reference to the 'sustainable' expansion of the agriculture sector, but does not provide a definition for sustainability. The same applies for the *Integrated Development Plan* and the *Strategic Plan for the Department of Agriculture, Forestry and Fisheries*. Both these policies introduce the fact that the agriculture sector may be particularly vulnerable to the impacts of climate change, yet there is no discussion about the agriculture sector's potential negative impact or contribution to the effects of climate change. Measuring the emissions from this sector may therefore be particularly important in future.

The expansion of the agriculture sector may therefore potentially lead to a significant release of greenhouse gas emissions. A selection of gaps identified in policies in this regard is listed in the table below.

Table 22. Prominent gaps identified in policies pertaining to the emissions from the land-use sector

Policy	Prominent Gaps Identified
Strategic Plan for the Environmental Sector	• There are no provisions made to establish the GHG emissions profile of projects that impact on the land-use sector • No reference to assessing the land-use emissions associated with the EIA / EIM evaluation process, or expanding the protected areas into parts of the country where concentrations of greenhouse gas in vegetation is high
National Development Plan	• There is a lack of references to the environmental impacts of the strategy, the ways in which these would be managed and monitored over time what "sustainable" growth means and how the targets for job creation may or may not be impacted by climate change
National Framework on Sustainable Development	• There is no direct mention of emissions from land-use change and how this could impact climate change vulnerability and adaptation responses. This appears to be a prominent gap in a document focused on sustainable development.
Integrated Growth and Development Plan for the Department of Agriculture Forestry and Fisheries	• This policy mentions that agriculture is particularly threatened by Climate change, but there are no details provided as to how agriculture may potentially contribute to climate change or how measuring emissions from the sector may become particularly important
Strategic Plan for the Department of Agriculture, Forestry and Fisheries	• This policy mentions that agriculture is particularly threatened by Climate change, but there are no details provided as to how agriculture may potentially contribute to climate change or how measuring emissions from the sector may become particularly important

Land-use based emission reductions may potentially be important for South Africa to achieve its relative greenhouse gas emission reduction target of 34% by 2020. The AFOLU sector contributes 6% to the national greenhouse gas emissions, with forests as a marginal stock (Rahlao, et. al., 2012). From the policy analysis, it was found that South Africa has an abundance of legislation on agricultural land use but that it does not necessarily provide for the inclusion of climate change mitigation. Nevertheless, these policies can play a significant role in mitigating the impacts of climate change from the AFOLU sector.

An example of this is the family of disaster management policies. According to the Framework, under key performance area 2, environmental hazards such as land degradation, deforestation and loss of biodiversity are included in risk assessments as per international best practice for hazard classification (2.1.7). Therefore, climate change could be designated as a risk, linked to severe instances of land degradation, soil nutrient depletion and erosion or loss of critical biomes that support ecosystem services. However, although there is some reference to the issues of drought and impacts on agriculture, it does not provide information on the various ways in which loss of biomass resources (and associated release of greenhouse gases) may aggravate climate change trends. It also does not consider the ways in which the loss of ecosystem integrity may engender further natural disaster risks. Addressing these gaps, the disaster management cluster of policies could potentially be used to improve responses to land degradation and exploitation.

Furthermore, there is very limited reference to ecosystem-based adaptation. For example, the *Guidelines on Bioregional Planning* makes no reference to ecosystem based adaptation, or more generally to the ways in which biodiversity conservation supports efforts to mitigate and adapt to the effects of climate change. Land reform policy also lacks reference to the potential impacts presented by climate change, which is an important consideration for intended land-use changes. The *Strategic Plan for the Department of Rural Development and Land Reform*, for example, lacks reference to climate change, which may potentially have a significant impact on food security and production potential.

Policies that have limited reference to AFOLU sector in mitigating climate change are listed in the table below.

Table 23. Policies that have limited reference to AFOLU sector in mitigating climate change

Policy	Prominent Gaps Identified
White Paper on Disaster Management	Lack of reference to various ways in which the loss of biomass resources (and associated release of greenhouse gases), may aggravate climate change trends. It also does not consider the ways in which the loss of ecosystem integrity may engender further natural disaster risks. Climate change is not explicitly considered a risk, and potential mitigation and adaptation programmes in the land-use sector are not discussed
National Parks Act 1967	The lack of references to climate change misses the opportunity to highlight the importance of the park network in acting as a net carbon sink and providing an important environmental service.
Land Reform: Provisions of Land	The sale of State land does not seem conditional on an environmental assessment of the conservation land in question, its importance as a biome or other considerations which would reflect important characteristics of the land.
Disaster Management Act	The definition of "disaster" is quite vague, and it's difficult to ascertain the extent to which progressive, constant environmental degradation qualifies as a disaster.
New Growth Path	There is no reference to the ways in which climate change might impact on rural, small scale agricultural production, or how improved agriculture techniques could help farmers adapt to climate change, or how the strategy might aggravate land degradation trends
Guideline on Bioregional Plans	There is no reference to ecosystem based adaptation, or generally to the ways in which biodiversity conservation supports efforts to mitigate and adapt to the effects of climate change.
Strategic Plan for the Department of Rural Development and Land Reform	Lack of reference to climate change or to the potential impact this would have on food security and production potential.

The *National Climate Change Response White Paper* and the *Carbon Tax Policy Paper* do not analyse the cost of developing offsets in different sectors, and the ways in which this may work to the detriment of the land-use sector. Due to the complexities in project development auditing that land-based carbon offset projects face, the costs of development may be significantly higher than more traditional, energy-based projects. This could limit the contribution of land-use projects to the proposed offset mechanism. This should be considered in greater depth, given the AFOLU sector's potential contribution to both mitigation and adaptation.

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