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THE ROLE OF PLANTATION FORESTRY FOR PROMOTING SUSTAINABILITY IN SOUTH AFRICA

By Struan R. Robertson

About this publication

This paper is part of a series commissioned by the Green Economy Coalition (GEC) to assess opportunities for transitioning to a sustainable low-carbon economy in South Africa. It assesses opportunities in the plantation forestry industry and the role the sector can play in promoting sustainable outcomes in terms of reaping socio-economic benefits and safeguarding positive environmental spillover benefits in carbon sequestration, substitute habitat, and conservation.

The GEC is the largest global alliance of organisations working on a green economy. The membership spans Asia, Africa, South America, North America and Europe and represents a wide range of interests including the poorest, the environment, business, the United Nations, research and government. Despite its diversity, the coalition is committed to accelerating the transition to green and fair economies. In South Africa, Trade & Industrial Policy Strategies (TIPS) and the African Centre for a Green Economy (African Centre) are active members of the coalition.

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Key findings

- The plantation forestry industry in South Africa is not sufficiently transformed and although the sector provides welcome employment in rural areas, this work is unskilled and semi-skilled.
- Despite improvements in silvicultural practice, better field rationalisation, and increased Mean Annual Increment (MAI), declines in absolute forest coverage and production, in part due to recapitalisation challenges, have increased South Africa's reliance on imports of wood, fibre, and pulp and paper products.
- The plantation forestry sector is facing upstream inefficiency challenges related to water use licensing delays and high rates of carbon emissions by the two biggest industry players. In addition, downstream inefficiencies in saw milling, and wood and paper recycling, are disproportionately increasing the demand for industrial timber.
- There is a trend in the sector toward shorter rotation eucalyptus instead of longer rotation pine. This is attenuating the environmental spillover benefits associated with plantation forests such as substitute habitat, carbon sequestration and protecting forest-located biodiversity.

Key recommendations

- Land claims on plantation forestry lands need to be expedited to improve co-determination in the sector, and the data gap, in terms of the number of claims settled recently, must be resolved through increased transparency and reporting by government. Community engagement and partnerships present better opportunities for skills transfer and should be promoted.
- Uncertainties around land tenure rights must be clarified to promote investment and capitalisation in the sector. Water use licence delays must be resolved, and the backlog eliminated. Government should also consider providing financial support for environmental impact assessments (EIAs) to be conducted.
- Downstream inefficiencies need to be resolved so that the optimal amount of industrial timber is produced and not wasted once it leaves the plantation. By-products from the harvesting process and from debarking, sawmilling, and planing should feed into biofuels and biomass-electricity generation to reduce the overall emissions of firms that are vertically integrated across the value chain.
- Government must promote initiatives that create new afforestation perhaps in shorter rotation crops in the medium term to meet local demand, while also supporting incentives that aid the preservation of longer rotation crops on existing plantation stands.



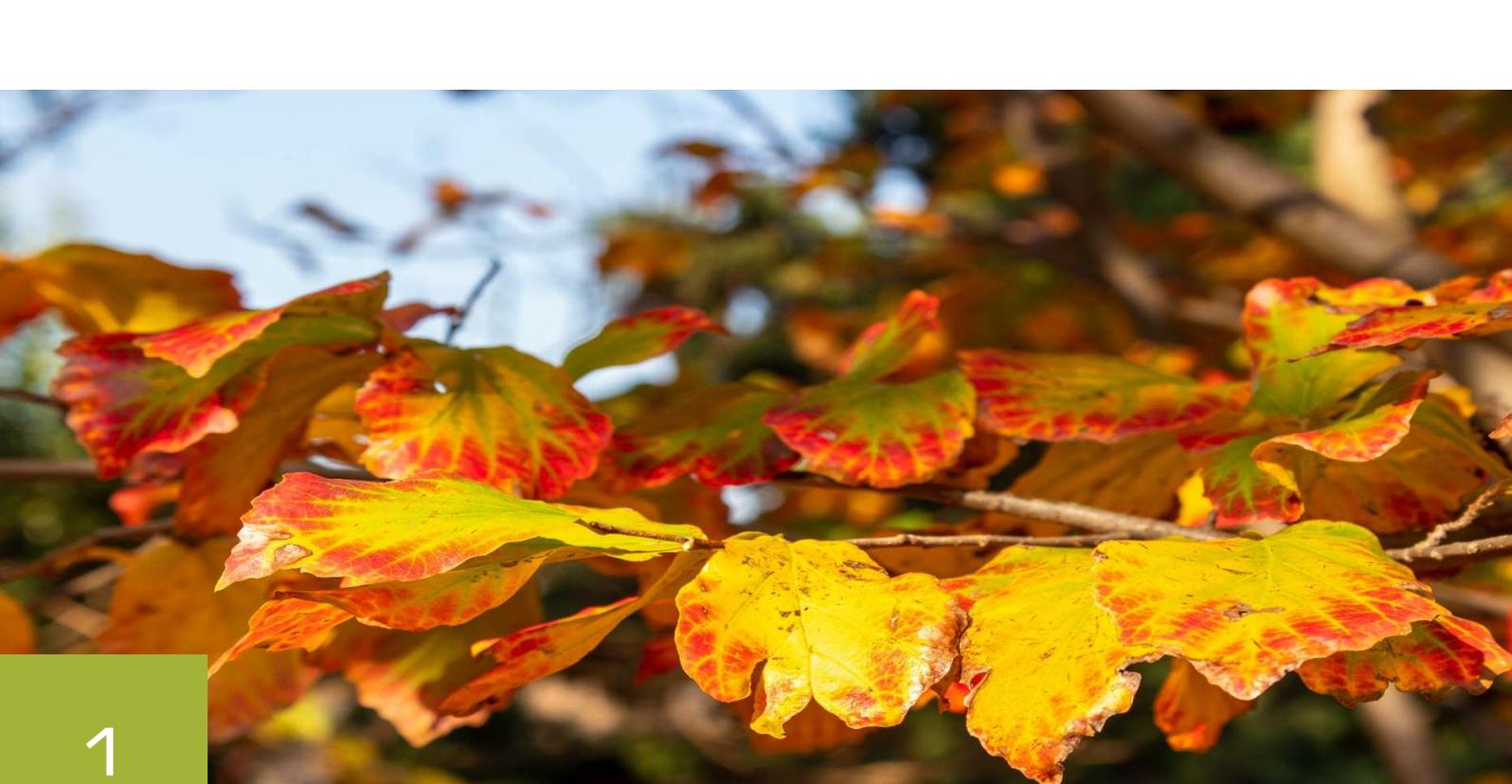
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Abbreviation

AsgiSA	Accelerated and Shared Growth Initiative for South Africa
B-BBEE	Broad-Based Black Economic Empowerment
BUSA	Business Unity South Africa
CHP	Combined Heat and Power
CRLR	Commission on the Restitution of Land Rights
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DRDLR	Department of Rural Development and Land Reform
dti	(the) Department of Trade and Industry
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessments
FIETA	Forest Industries Education and Training Authority
FSC	Forestry Stewardship Council
GDP	Gross Domestic Product
ICFPA	International Council of Forest and Paper Associations
IDC	Industrial Development Corporation
ILO	International Labour Organization
MAI	Mean Annual Increment
PRASA	Paper Recycling Association of South Africa
R&D	Research and Development
RLRAA	Restitution of Land Rights Amendment Act No. 15 of 2014
SAFCOL	South African Forestry Companies Limited
SETA	Sector Education Training Authority
SFRA	Stream Flow Reduction Activity
NWA	National Water Act No. 36 of 1998
EIA	Environmental Impact Assessment
WOW	Who Owns Whom



Introduction

The transition to sustainable development has been acknowledged as the pathway to alleviate the socio-economic ills that continue to trouble many societies the world over without causing irreversible damage to ecological systems and the biosphere¹. Sustainable development represents an opportunity for countries to charter a new trajectory that improves social welfare and economic development in innovative ways, which are also ecologically sustainable.

Pursuing sustainable development pathways is particularly pertinent for developing economies. Indeed, the option to pursue the kind of development that characterised early and recent industrialisation (i.e. fossil fuel- and natural resource-intensive growth) is not advisable. South Africa, in line with international trends, is committed to achieving sustainable development through managing its resources in ways that

benefit people and ensure long-term environmental sustainability. This is in keeping with the right to an environment that is not harmful to human health or wellbeing and to the right to have the environment protected for the benefit of present and future generations, which are both enshrined in the Bill of Rights (RSA, 1996).

The better management of natural resources in sectors, such as agriculture, forestry and fisheries, presents opportunities for sustainable development in South Africa. The forestry sector is key. South Africa is a lightly forested country, but the plantation forestry industry contributes significantly to the economy and direct employment in rural areas, and indirectly through industrial jobs downstream in the value chain. Consequently, this paper assesses the sustainability of the plantation forestry industry, as well as those aspects of the downstream value

¹ More than ever societies face the challenge of balancing the need to address poverty, social inequality, and a lack of economic opportunities with the real physical limitations imposed on expansionary style development by the finite nature of natural resources and various biological carrying capacities.

chain that impact on efficiency concerns in the production of industrial timber in plantation forestry.

Forests cover about 1.3 million hectares, occupying around 1% of the country's land surface area. Importantly, more than half of known terrestrial plant and animal species live in forests. What is more, plantation forest can support about half of those species, especially less ecologically specialised plants and animals.² Plantation forests also demonstrate a lower impact on soil quality and less erosion than agriculture if situated in areas where similar habitat (i.e. forest and woodland) preceded the establishment of plantation forests. Forestry also often requires the use of less fertilisers and pesticides, compared to other horticultural activities, which is consequently less damaging to soils.

The plantation forestry sector also plays a key role in the South African economy. It supports an entire value chain in wood and paper products manufacturing. In 2015, the commercial forest products industry as a whole contributed R31.1 billion to South Africa's gross domestic product (GDP) and wood products accounted for 9% of overall exports (DAFF, 2017). The industry is well developed with impressive downstream manufacturing specialisation in pulp and paper, sawmilling, wood chipping, and furniture manufacturing. Local companies, such as Mondi and Sappi, are global players in the pulp and paper business.

Nevertheless, despite these advantages, the coverage of plantation forests in South Africa decreased from 1 333 562 ha in 2005 to 1 273 357 ha in 2010 (DAFF, 2015). Although this figure has improved more recently, the longer-term trend toward declines in coverage persists, which sees coverage peaking at 1.52 million hectares in 1996, compared to the current approximately 1.3 million

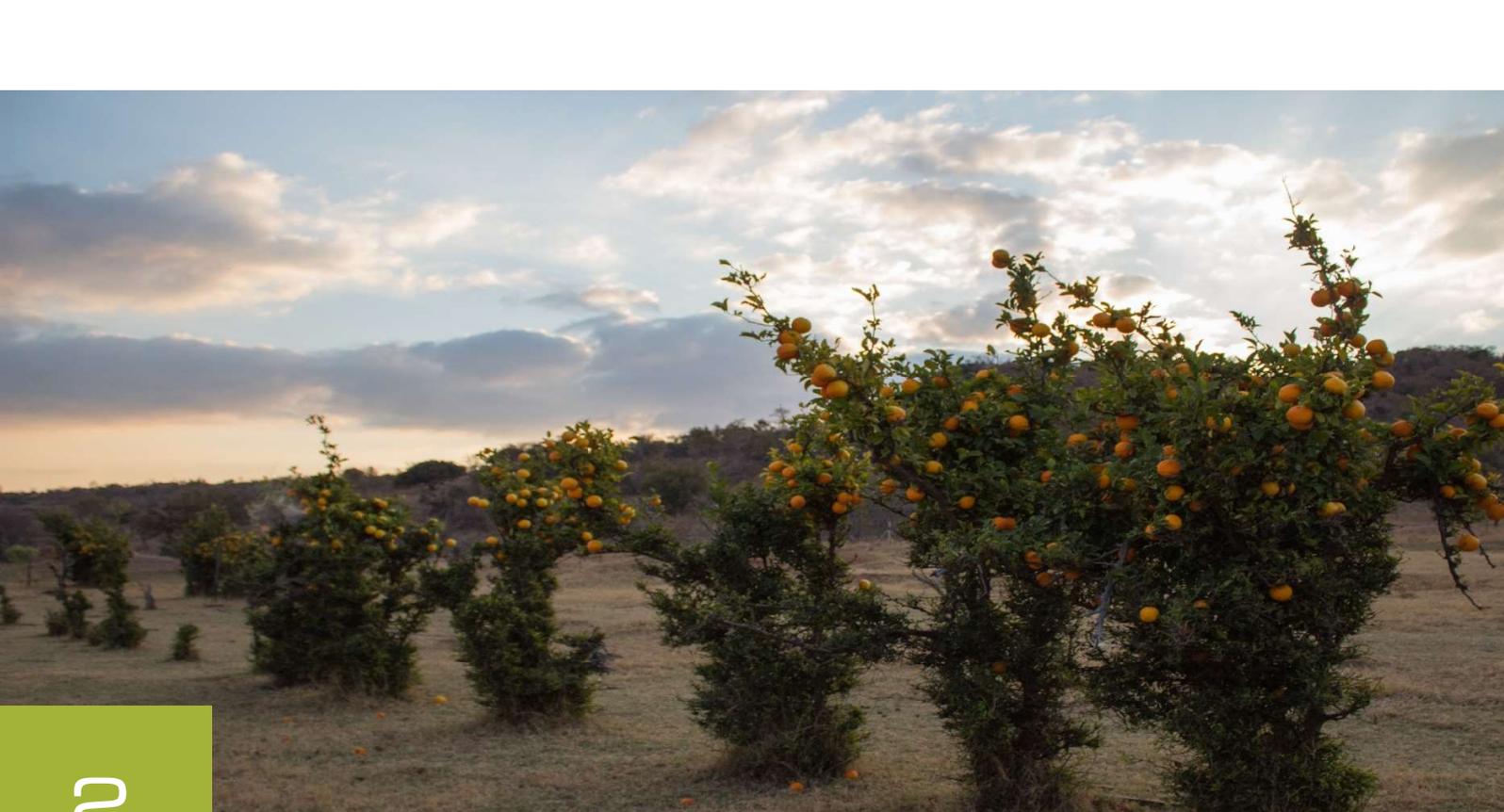
hectares (Ledger, 2017). This decline was worsened by the global economic downturn and the weakened financial position of firms in the industry and was also associated with a reduction in the use of longer rotation softwood species (i.e. pine), which are incidentally better for the environment albeit not as preferred as indigenous forest. This not only reflects changing trends in plantation forestry but could also imply a new financial reality in the industry which favours shorter rotation eucalyptus to yield a quicker return on investment (i.e. eight years) as opposed to a more-lengthy return, with longer rotation pine species (i.e. 20 years and more).³

Consequently, how does plantation forestry in South Africa support opportunities for sustainable development? In other words, how does plantation forestry create sustainable employment, contribute to economic growth, uplift rural communities, preserve natural resources, provide substitute habitat, and contribute to carbon sequestration while also using land, water, energy, carbon, and timber resources most effectively?

A three-pronged approach is used to assess the sustainability of the plantation forestry industry in South Africa. The social value (i.e. social sustainability) of plantation forestry is analysed in Section 2 through the potential of the industry to provide sustainable jobs and contribute to the socio-economic development of rural communities. The role of land-based issues in plantation forestry is assessed in Section 3. These include the use of land resources, the management practices, the impact of the industry on its surroundings, and the environmental spillover benefits of plantation forestry. The role of inputs, i.e. water, energy, carbon, and industrial timber, is discussed in Section 4. This relates to the fundamental aspects of growing and maintaining plantation forests. Section 5 concludes.

² Plantation forests also affect their surrounding locales. Indeed, plantation forests form corridors of vegetation between fragmented patches of indigenous forest allowing for the easier movement of animals between forested areas. This is a positive environmental spillover benefit of plantation forestry and supports biodiversity in surrounding locations even though the activity of farming trees presents reduced scope for biodiversity within planted areas, due to industrial processes and the presence of alien tree species.

³ In the plantation forestry industry, the rotation period for a given tree species is analogous with the waiting period for the return on investment.



Social Sustainability in the Plantation Forestry Industry

The first measure of sustainability in the plantation forestry industry focuses on the socio-economic costs and benefits from existing establishments and potential new afforestation. The forestry industry can contribute to the overall sustainability and cohesiveness of society by fostering rural economic upliftment and development, and by creating economic opportunities in rural, and sometimes remote, areas where other avenues of economic empowerment remain scarce. These benefits include secure employment, skills development, and improved livelihoods.

Forests occupy the first position (i.e. raw material input) within the industrial timber processing value chain. This means that the industry contributes to social sustainability on a societal scale by providing direct and indirect opportunities for economic activity and sustainable employment across the industrial timber, and pulp and paper value chains. Moreover, the plantation forestry industry is important from

a social standpoint because it contributes to the development of rural communities which helps reduce rural-urban inequality.

2.1. Diagnostic: Land reform, outgrower schemes, and social opportunities

Plantation forestry promotes economic growth, job creation, and rural development in the form of economic livelihoods primarily in historically poor and underdeveloped regions. For large plantation companies, opportunities exist for ownership transformation via redistribution of the land-based means of production and outgrower schemes (see Boxes 1 and 2). Moreover, as the value chain is more vertically integrated at a firm level than agriculture for example, especially in pulp and paper, opportunities for up-skilling and career mobility exist along the value chain. This is because in producer-driven value chains individual firms

bear increased responsibility for the impact of their production on their workers and the environment. However, this up-skilling and social mobility is most likely the reserve of a lucky few as forestry work requires a low-skilled workforce and is largely laborious.

Establishing plantation forestry requires the identification and security of land rights in areas of existing and proposed plantation forest coverage. Indeed, additional land suitable for growing and maintaining plantation forests is principally in the Eastern Cape (60 000 hectares available and 10 000 hectares of wattle⁴ jungle available for conversion) and KwaZulu-Natal (40 000 hectares available) provinces (Genesis, 2005). Potential sites are generally in traditional areas where establishing operations can be made more difficult by communal land rights, requiring community negotiation and consensus. The Forest Charter⁵ has been essential in resolving conflicts over land uses and in integrating forestry and agricultural uses of land within a landscape context (Forest Sector Charter Council, 2017). This landscape approach⁶

means that communities can still access forested lands to harvest food and medicinals from forests while the harvesting of industrial timber continues.

Furthermore, where land rights are individually based, both land reform beneficiaries and the forestry industry have had extremely successful mutually beneficial outcomes in the settlement of land claims, compared to those in agriculture for example. Indeed, the success rate of plantation forestry land claims, according to Michael Peter of Forestry South Africa⁷, is close to 95%. However, this is less significant as it was reported to the Portfolio Committee on Rural Development and Land Reform that settled land claims in the industry amounted to around 11% only (Maphoto, 2012). It is hard to judge whether 95% success in the 11% of claims settled is satisfactory. The lack of availability of data on land reform claims organised by geographic location as well as by sector compounds this problem. Regardless, Box 1 outlines the benefits of land reform for local communities in plantation forestry and how the supply of industrial timber has been safeguarded.

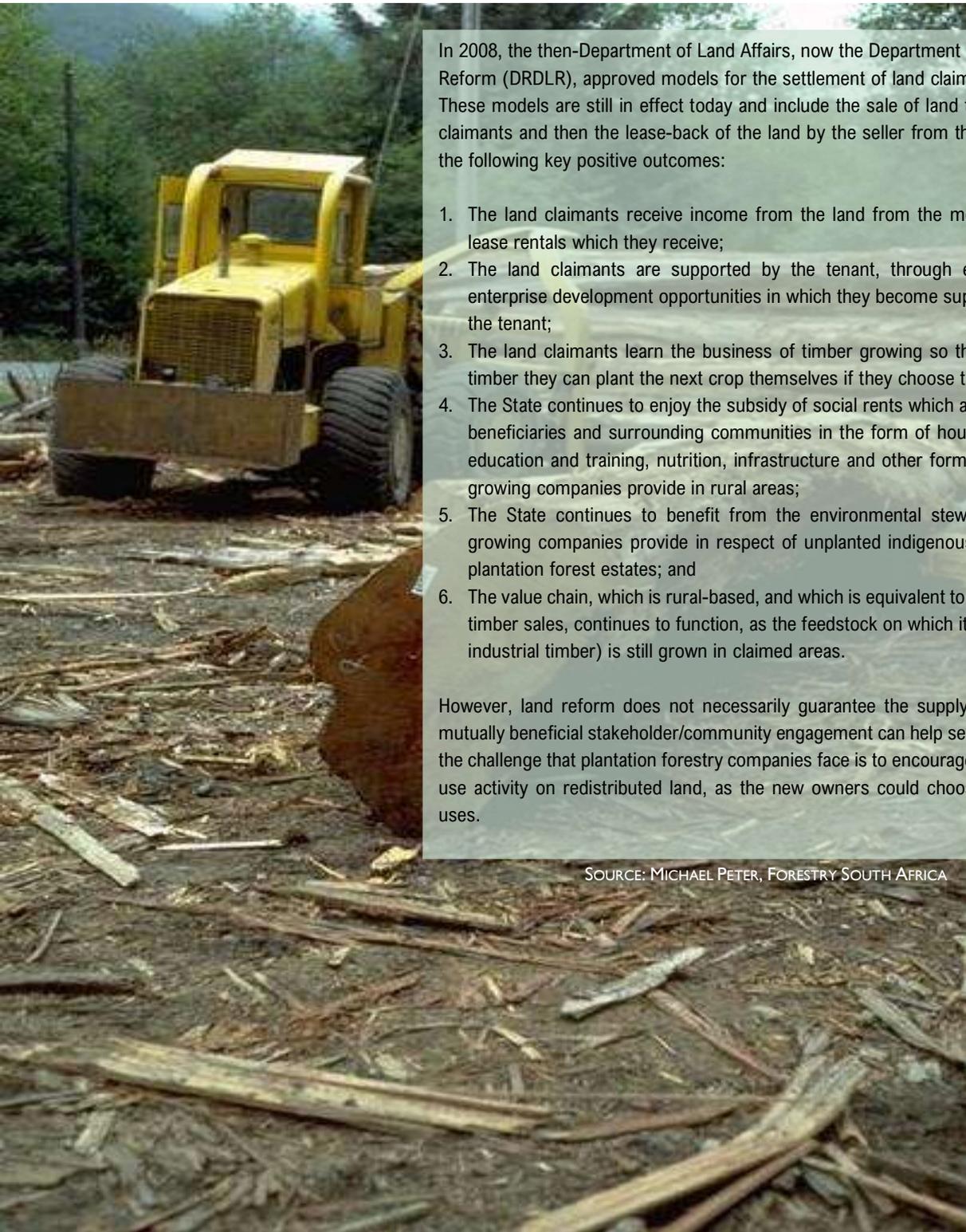
⁴ Wattle refers to several species of acacia native to Australia which have become highly invasive in South Africa in the absence of gall-inducing insects that lay their larvae in the seeds of the tree, which has the effect of sterilising seeds, as is commonly the case, albeit via a different mechanism, with African species of acacia. Indeed, all species of acacia produce seeds in excessive abundance.

⁵ This is a Broad-Based Black Economic Empowerment (B-BBEE) initiative, which aims to promote black empowerment in the forestry sector through engagement with all stakeholders with the aim "to extend economic opportunities and benefits of the forest sector to previously disadvantaged black groups" (Forest Sector Charter Council, 2017). It is governed by the Forest Sector Charter Council, which reports to the Ministers of the dti and DAFF.

⁶ Also termed an integrated management approach. It aims to ensure that multiple concerns, including nature conservation, agriculture and other land uses, such as plantation forestry, are considered in the management of land resources. Implementing a landscape approach implies balancing the relative ecological, social, and commercial interests of the land so that, in the case of plantation forestry for example, multiple outputs are attained from the use of the land, including the conservation of natural habitat, the supply of industrial timber, and the preservation of access to wild foodstuffs and medicinals for local communities.

⁷ Interview and email correspondence with Michael Peter of Forestry South Africa.

Box I: Land reform in South African plantation forestry



In 2008, the then-Department of Land Affairs, now the Department of Rural Development and Land Reform (DRDLR), approved models for the settlement of land claims over plantation forestry land. These models are still in effect today and include the sale of land to the State for transfer to land claimants and then the lease-back of the land by the seller from the claimants. This has achieved the following key positive outcomes:

1. The land claimants receive income from the land from the moment of transfer, through the lease rentals which they receive;
2. The land claimants are supported by the tenant, through employment opportunities and enterprise development opportunities in which they become suppliers of goods and services to the tenant;
3. The land claimants learn the business of timber growing so that after the second rotation of timber they can plant the next crop themselves if they choose to do so;
4. The State continues to enjoy the subsidy of social rents which are paid to the claimants, tenure beneficiaries and surrounding communities in the form of housing, employment, health care, education and training, nutrition, infrastructure and other forms of support, which plantation-growing companies provide in rural areas;
5. The State continues to benefit from the environmental stewardship role which plantation-growing companies provide in respect of unplanted indigenous and riparian zones within the plantation forest estates; and
6. The value chain, which is rural-based, and which is equivalent to 5.4 times the value of industrial timber sales, continues to function, as the feedstock on which it depends (i.e. plantation-grown industrial timber) is still grown in claimed areas.

However, land reform does not necessarily guarantee the supply of industrial timber, and only mutually beneficial stakeholder/community engagement can help secure access to the land. Indeed, the challenge that plantation forestry companies face is to encourage forestry as the preferred land-use activity on redistributed land, as the new owners could choose to employ the land in other uses.

SOURCE: MICHAEL PETER, FORESTRY SOUTH AFRICA

As of 2016, Sappi were assisting several land reform beneficiaries (communities) with the management of their plantations (as described in Box 1). This involved 51 land reform projects with the average farm size of 218 ha amounting to about 11 118 ha (Sappi, 2016). In a similar vein, Sappi has additional programme options if the Land Court were to award the land as well as the timber to land reform beneficiaries. These include assistance with management of plantation forests, technical advice, or purchase agreements for the industrial timber depending on the level of expertise and management skills of land reform beneficiaries. Sappi has also anticipated the need for transformation in the industry and since 2008 had sold a quarter of its land to the empowerment group Lereko Property Consortium (Sappi, 2008).

Since 2014, and the resurgence of the national land debate, however, the looming threat of potential changes to land-related policy has caused uncertainty over long-term business operations and the security of committing the initial outlays of capital required in the plantation forestry industry. The issue of land rights is notably pertinent for potential expansions of plantation forests as, in some cases, suitable areas for establishing plantation forests are spread out over many small individual stands.

The introduction of the Restitution of Land Rights Amendment Act No. 15 of 2014 (RLRAA)⁸ and then its invalidation by the Constitutional Court in 2016 effectively halted the settlement of all existing claims prior to the implementation of the RLRAA, even though the Court instructed the Commission on the Restitution of Land Rights (CRLR) to expedite the settlement of those prior claims. The freeze on settlement proceedings is because the CRLR knows that there are a reported 200 000 new claims which were registered under the new RLRAA and that should the Court reconsider its decision to strike down RLRAA, the CRLR will then

have settled existing claims which may be in competition with some of the new 200 000 registered claims. Consequently, this creates a great deal of tension for plantation forestry growers and the land claimants involved as failure to address both the old and the new claims may potentially result in unrest and disruption/damage to industrial timber farming operations.

In addition, according to industry representation, the DRDLR has been inconsistent in its dealings with industry stakeholders, as illustrated by the developments on the policy of Strengthening the Relative Rights of People Working the Land⁹ (the so-called 50/50 policy) and the Regulation of Land Holdings Bill. Forestry South Africa along with AgriSA and other key stakeholders contributed to work streams established by the DRDLR Minister and made extensive recommendations for improvements and alternative mechanisms to address the challenges cited in both the policy and the draft legislation. These were accepted, and new policy and legislation were developed. In 2016, however, new processes were started by the DRDLR, which ignored or actively rejected the work done by the previous work streams, some of which had already been endorsed by the Minister. Industry argues that government having an inconsistent or unjustifiable policy in areas, like tenure security for current land owners, and limitations on farm size as well as on foreign ownership, will have a massive discouraging effect on both current and future investors in plantation forestry in South Africa.

Stakeholder co-operation is therefore vital to establish viable small plantations as land reform could lead to the dismantling of scale plantations and opportunities for new afforestation that exist with smallholders. Therefore, developing plantation forestry has to involve communities, the resolution of land rights, and the socio-economic empowerment of small grower start-ups and black

⁸ The Act aimed to extend the cut-off period to 30 June 2019, allow claims for redistribution for persons dispossessed under Betterment schemes, and controversially to expedite prior claims without guaranteeing that such pre-1998 claims will be finalised.

⁹ Termed thus as the policy seeks to get all farmers to cede 50% of their land to farmworkers. The policy controversially aims to reverse the outcome of the 1913 Natives Land Act by strengthening farm workers' rights to be involved in the co-determination of agricultural land, and in its most sweeping aim to compel farm owners to cede 50% of the land to workers/dwellers who have worked and lived on the farm for 50 years.

entrepreneurs, especially women, which will help foster the conditions necessary to secure the production of industrial timber as well as present opportunities for restitution of past injustices against black Africans. This is particularly critical to scale operations down for establishing commercially viable plantation forests on smaller pieces of land, as shown in Box 2. For example, initiatives, such as Sappi's Project Grow, support opportunities for rural economic development by empowering people with the know-how to get started in the forestry industry.

In the B-BBEE¹⁰ industry Forest Charter, the BBE¹¹ scorecard indicators, in terms of ownership, reflect that the forestry sector scores 9.75 points for a target of 20; for enterprise development the industry scores 12.9 for a target of 20; and for socio-economic development, 6.87 for a target of 5 (BUSA, 2017). Results for employment equity (5.82 out of 15) and skills development (6.89 out of 15) are even less encouraging. The aim of the Charter is to develop black ownership in the industry, support skills development and rural development, and empower local communities. Looking at the Who Owns Whom database (WOW, 2017), which consists of firm disclosed (i.e. reported) data, out of 24 forestry companies, 13 had BEE ratings. One company scored 6 points¹², and the remaining 12 had scores of 4 and below. Despite the obvious data gaps, given that the industry is highly concentrated, BEE compliance in even 12 firms is not necessarily a sign of transformation at the corporate level nor of co-determination within the industry. Indeed, altogether, these results suggest that the industry is not that transformed despite the efforts by companies to encourage stakeholder engagement, community development, and knowledge transfer through the small grower schemes.

Plantation forestry already provides close to 160 000 permanent, contract, and informal

workers with employment, representing 1.4% of national total employment (DAFF, 2017). Direct employment accounted for some 70 000 workers in 2012 (Forestry South Africa, 2012). Meanwhile, the sub-sector supported livelihoods in the form of family incomes for between 534 000 and 692 000 mostly rural South Africans. Evidently, the industry contributes to social cohesion and has helped to foster rural development. Furthermore, plantation forestry contributes to developing rural communities by providing employment in the form of low- and semi-skilled employment, after which the workers are able to improve and add to their skills.



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However, the plantation forestry industry makes extensive use of contractors who provide employment for about 30 000 workers. Furthermore, a large part of the workforce is temporary and seasonal. In addition, workers view jobs in forestry as avenues of “last resort” because of the largely unskilled nature of the majority of the work and thus recruitment even in areas of high unemployment is sometimes difficult for forestry companies (Forestry South Africa, 2012). These

¹⁰ B-BBEE or Broad-Based Black Economic Empowerment is a measure designed to empower black including Indian and coloured (a South African term for a mixed-race person) South Africans at the broadest level.

¹¹ BEE or Black Economic Empowerment refers to the management and equity requirements that are designed to empower black, Indian, and coloured South Africans.

¹² The scores are allocated from level 1 to 9. A score of 5 or above denotes non-compliance and firms in this bracket are entirely dependent on the private sector. A score of 4 or less denotes compliance and allows a firm to access preferential government financing opportunities and government tenders..

factors do diminish the quality of employment in the industry somewhat.

This is particularly relevant in the areas that have been proposed for new afforestation in South Africa which lie in the Eastern Cape and KwaZulu-Natal provinces¹³, which are mainly in rural, and sometimes remote, underdeveloped communities where other opportunities for economic engagement are scarce. Downstream processing, which takes place close to the plantations, can provide additional employment opportunities and social development for rural communities in manufacturing, craftsmanship, and logistics support. Indeed, the presence of forestry companies might benefit rural economic development indirectly through supporting small towns and villages by proving incomes that circulate in the local economy, and by providing the raw materials for craft and cottage industries to emerge, and not necessarily through direct upliftment.

Nevertheless, the high rate of Forestry Stewardship Council (FSC) certification among existing plantation forests in South Africa bodes well for the conditions of employment within the plantation forestry industry and thus for the social sustainability of the industry. FSC approval requires that forestry companies support indigenous peoples' rights, empower workers economically, and respect labour laws in accordance with International Labour Organization (ILO) standards. Consequently, FSC approval helps to ensure the economic development of rural communities. Therefore, the better management of existing plantation forests in accordance with FSC standards and the eventual goal of 100% FSC certification in South Africa can help secure opportunities for sustainable jobs.

Private initiatives, such as Sappi's Project Grow (See Box 2), and public initiatives, such as the

Forest Charter, are important drivers of social sustainability in the South African forestry sector. Indeed, the Forest Charter focusses on engaging youth in rural and disadvantaged communities to enter plantation forestry, bringing fresh innovation to the industry and helping to inspire black entrepreneurs (Forest Sector Charter Council, 2017).

However, the problem of a lack of capital funding mechanisms that match the realities of forestry is one of the most important challenges faced by smaller, emerging forestry participants, which is also strongly motivating the move to shorter rotation crops. Indeed, none of the existing agricultural support programmes are designed to provide funding to enterprises that need to invest now and incur costs for the next seven years or so, with a payback only at the end of this period (Ledger, 2017). This makes longer rotation stands difficult to establish and a generally unattractive option for smaller farmers.

The conversion of wattle jungles into smallholder wattle forests is another economic development opportunity. In 2005, the then Department of Water Affairs and Forestry published guidelines in the form of the Wattle Jungle Conversion Programme for the conversion of wattle jungles¹⁴ into smallholder wattle forests¹⁵, which can benefit poor communities which apply for a community-based operating licence (Genesis, 2005). This programme continues to expand. Furthermore, the programme is proving to be beneficial for job creation given the labour-intensive nature of the wattle management process (DAFF, 2015). It is expected to take at least 25 years to clear these wattle jungles and replace them with properly managed smallholder wattle forests. A total of 1 209 jobs¹⁶ were created by this programme in the 2011-2012 financial year alone (Parliamentary Monitoring Group, 2012). However, the value of this programme seems misaligned with the macro-

¹³ Plantation forestry opportunities are largely fully exploited in other provinces with forest-growing potential such as Mpumalanga and Limpopo.

¹⁴ Read in conjunction with footnote 4. Wattle (Australian acacias) run wild if left unmanaged and invade new territories creating jungles of densely populated trees.

¹⁵ These would be rationalised plantation establishments as opposed to jungles, but still use wattle as the feedstock.

¹⁶ 104 were in Eastern Cape, 14 in Limpopo and Mpumalanga plantations, 101 were in Western Cape, and 50 were in KwaZulu-Natal.

level policy agenda to fight alien invasive species and enhance water conservation as it legitimises wattle forests, which are highly invasive, hostile to indigenous flora, and water thirsty. The programme does not emphasise replacing the wattle altogether with either pine or eucalyptus, but merely managing the wattle invasions.

In addition, enhanced downstream linkages to value chains could improve the socio-economic benefits of plantation forestry in South Africa. Indeed, the “better management” of resources should imply that South Africa gets maximum impact for poverty alleviation, employment creation, and earned incomes for each environmental unit used. Consequently, the biggest, highest-value component of the local forestry sector is the export of dissolving pulp, mostly to the Asia-Pacific rim, where it is processed (Ledger, 2017). Thus, opportunities for local processing and manufacturing need to be investigated to assess whether any of this activity could be localised. There are also other opportunities associated with enterprise development in forestry, such as in beekeeping, edible mushrooms (and other herbs) and (in the case of wattle) animal fodder. These all have the potential to improve social outcomes if properly exploited, which is another argument for a landscape management approach envisaged by the Forest Charter.



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However, there are also socio-economic costs associated with plantation forestry. Indeed, forests that are not managed according to a landscape approach, which are most of the established commercial and state-owned forests, do not

provide local communities with opportunities to hunt, fish, and gather edible medicinal plants from forested lands. This is a loss to indigenous communities which would otherwise benefit from such opportunities to supplement their nutritional needs, and infringes on communities’ traditional relationship with the landscape. Commercial forest operations also deny communities access to sites of recreational and cultural significance, such as mountain trails, rivers, and other water sources and commercialise these for eco-tourists willing to pay a fee.

Furthermore, there are additional costs associated with plantation forestry related to precluding the use of the land for other appropriations, such as agriculture, game parks, human settlement, or cultural heritage which implies lost opportunities (i.e. an opportunity cost) in terms of food, incomes and jobs associated with wildlife tourism, space for social and economic development of the land, and the economic, social, and venerable contribution heritage sites provide to society. Hence there exists a real trade-off between using land for plantation forests to extract commercial and economic benefits at the expense of communities’ self-sufficiencies related to the land and the exclusion of other users inherent within awarding the use of land to commercial companies.

2.2. Recommendations

Industry, in partnership with DAFF and the DRDLR, must prioritise transformation in ownership in the plantation forestry industry via expedited processing of land reform claims, and regulations that advance co-determination in the plantation forestry sector for industry and forestry workers. Furthermore, the data gap for recently settled land claims must be resolved. Greater transparency in land claims which are lodged and verified, with details of settled or rejected claims organised by sector and made publicly available.

Industry, in partnership with DAFF and the Department of Education, must encourage further emphasis on employment equity and skills

development to empower local communities and graduates from those communities via government study grants and Forest Industries Education and Training Authority (FIETA) Sector Education Training Authority (SETA)-supported apprenticeships and training opportunities.

The Wattle Jungle Conversion Programme must be expanded, and the pace of expansion strengthened, as the initiative presents opportunities for employment and skills development, which could help workers enter the plantation forestry industry.

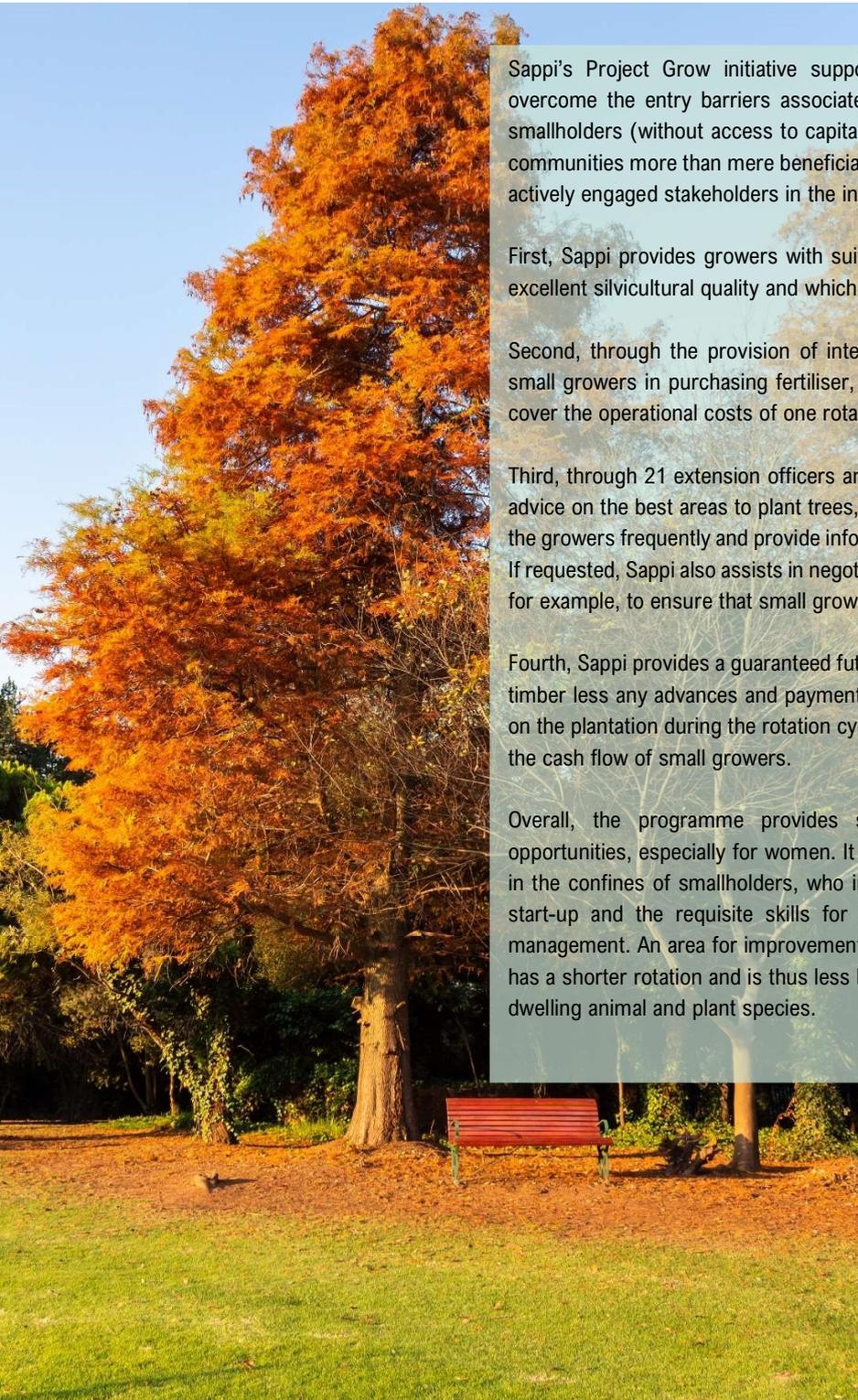
Additional initiatives from DAFF, in partnership with the dti, are required to support individual farmers dealing with wattle invasions to harvest and eradicate wattle as a kind of bumper-crop for several rotations, which could augment supply of industrial timber downstream in wood, and pulp and paper value chains.

Expertise and support are needed for the duration of these wattle removal initiatives to tackle reoccurrence of the invasions, as the seeds are difficult to remove from infected areas where landowners are dealing with wattle invasions. The tree seedlings (and later saplings)¹⁷ are difficult to kill without eradicating all other vegetation (i.e. herbicides required are highly deleterious).

Land reform outcomes are highly beneficial to land claimants, who are historically disadvantaged, and local communities as they provide rents and earned income. Land reform claims must be expedited, especially for public land where stands are unplanted. Furthermore, new afforestation, if done via small grower schemes, could help to encourage small-scale enterprise in the industry and empower black entrepreneurs, especially women.

¹⁷ A young tree. Wattle trees produce an abundance of seeds which in the absence of natural insect enemies nearly all germinate in the presence of sunlight.

Box 2: Sappi's Project Grow: An Initiative Supporting Small Growers



Sappi's Project Grow initiative supports small growers and entrepreneurs by helping them overcome the entry barriers associated with tree growing. Project Grow supports the entry of smallholders (without access to capital) to enter the industry and derive livelihoods, making local communities more than mere beneficiaries of plantation forestry through employment or rents, but actively engaged stakeholders in the interests of the industry. This entails four offerings.

First, Sappi provides growers with suitable land with sponsored eucalyptus seedlings that are of excellent silvicultural quality and which will produce the best yields.

Second, through the provision of interest-free and subsidised-interest rate loans, Sappi assists small growers in purchasing fertiliser, and harvesting and transport equipment. These loans also cover the operational costs of one rotation cycle (generally around eight years).

Third, through 21 extension officers and two managers, Sappi dispenses technical know-how and advice on the best areas to plant trees, soil preparation, fertilising and planting. These officers visit the growers frequently and provide information on aspects such as weeding and making fire breaks. If requested, Sappi also assists in negotiating with contractors, in areas like long-haul transportation, for example, to ensure that small growers are treated fairly.

Fourth, Sappi provides a guaranteed future market and pays a market-related price for the industrial timber less any advances and payments made in preceding years to small growers for work done on the plantation during the rotation cycle, less those payments made in previous years to stabilise the cash flow of small growers.

Overall, the programme provides socio-economic benefits, supplying much-needed rural opportunities, especially for women. It also contributes to the preservation of natural forest capital in the confines of smallholders, who initially lack the capital outlays and silvicultural cultivars for start-up and the requisite skills for forestry planting, cultivation, and ongoing good forestry management. An area for improvement is the programme's reliance on growing eucalyptus, which has a shorter rotation and is thus less beneficial in terms of supplying substitute habitat for forest-dwelling animal and plant species.

SOURCE: SAPPI, 2017A



3

The Role of Land and Land-Related Issues in Plantation Forestry

The second measure of sustainability concerns land and land-related issues in the plantation forestry industry. This concerns competition over land, the management of plantation forests, the impact of forestry on its surroundings, and the environmental benefits of providing substitute habitat for animal and plant life, carbon sequestration, as well as the conservation of areas of ecological value, such as wetlands and riparian zones within planted areas. Put simply, this is about the durability and growth of afforested land (in terms of both quantity and quality).

The role of land and related issues in the operation of plantation forests are important to sustainability because the industry depends on primary growing and harvesting of industrial timber. This entails providing a steady supply of industrial timber to numerous downstream processing operations. Furthermore, such activities have notable positive socio-economic spillover benefits, particularly in rural areas (see Section 2). These issues are also crucial from a socio-environmental perspective, with clear benefits in terms of carbon

3.1. Diagnostic: Improved performance intensity per hectare amid absolute declines in coverage

The key point when addressing land issues in the plantation forestry industry is that the land available on which to establish operations is scarce and the opportunities for new afforestation are few. Plantation forests, which do not require irrigation, rely on 750 mm of annual rainfall to be established successfully (Ledger, 2017). Put differently, only 16% of South Africa's land surface is climatically suitable to plantation forestry (Genesis, 2005). Large portions of this are, furthermore, not topographically suitable for plantation forestry because of steep inclines and mountainous terrains, which constrain accessibility. Consequently, plantation forests in South Africa account for a mere 1% of the land surface area, highlighting the need for them to be run properly (DAFF, 2016).¹⁸ Evidently, plantation

¹⁸ In terms of agricultural activities, most of South Africa's land surface (69%) can only sustain grazing and, accordingly, livestock farming is the country's largest agricultural sector (WWF, 2010). A meagre 3% of land is considered fertile while only 12% can support rain-fed agricultural crops.

forestry requires climates with sufficient rainfall and topographies that allow adequate accessibility to afforested areas in terms of growing and harvesting operations.

As a result, competition with agriculture, and hence food security, is inherently limited by the climatic and topographical requirements¹⁹ of plantation forestry, which is an issue of some significance when considering that South Africa's population is forecast to increase to 82 million by the year 2035 (WWF, 2010). Thus, plantation forestry only competes with open savannah, indigenous forest, agriculture, and other land uses to the extent that such areas suitable for afforestation could be used for other purposes. The scope for the trade-off between forestry and other land uses is consequently physically limited, albeit still important.

From an environmental perspective, forestry activities perform well in terms of natural capital conservation.²⁰ Different appropriations of land bear different impacts on water use and the long-term quality of the soils in terms of erosion and fertiliser use. Indeed, plantation forestry uses less water than agriculture as a sector, but not in terms of water intensity per hectare (see Section 4), and requires less use of chemical fertilisers and pesticides while also presenting reduced risk of soil erosion between harvesting cycles of tree crops (Brockerhoff et al., 2008; Parrotta, 1992) (as a result of the biomass falling from the trees and covering the ground as well as the long periods between harvesting).²¹ While plantations do have higher rates of soil erosion from surface run-off than natural habitat, such as bushveld, open grasslands, and thicket, plantation forestry can be seen as a sustainable option in the use of land. Although at a site-level, a plantation may be more

water intensive, the overall impact of the sector is less ecologically damaging in its long-term effect on national water use and its impact on soil quality.

Overall, South Africa's plantation forestry industry performs well in terms of natural resource preservation and forest management. Indeed, the rate of FSC certification²² is remarkably high at 85%, which is the highest percentage of FSC certified plantation forest in the world (Ledger, 2017). Indeed, FSC certification has gone from strength to strength since the first certificate was awarded to South African Forestry Companies Limited (SAFCOL) in 1996 (SA Forestry, 2014).

This high degree of certification is aided by the dominance of large firms in the industry, which both own extensive plantations and are also major buyers of industrial timber from smaller growers. This bodes well for the preservation of natural capital in the industry. Indeed, thanks to the FSC certification process, much of South Africa's plantation forests, including uncertified plantation forests, are sustainably managed through the Chain of Custody principle, which requires large buyers to only "buy from sustainably managed forest operations" (DAFF, 2015). South African plantation forestry "management practices and research" are globally competitive and production yields continue to increase due to "better site species matching, advances in cloning techniques and more general application of cloning to planting practices, better silvicultural practices and planning, and increased efficiency in processing" (Genesis, 2005).

¹⁹ Greater technical scope exists for expanding agriculture than does for plantation forestry.

²⁰ Land in its broadest sense as a form of natural capital can possess attributes that either improve its value or detract from it. Water availability and use, as well as the composition of soil and the degree to which it has been burdened by chemical pesticides and fertilisers, consequently affects the value of land. As these factors are not static but variable and are affected by use, this is an efficiency concern.

²¹ However, if biomass is collected from the forest floor this can increase nitrogen depletion of the soil and increase the risk of soil erosion from surface run-off between rotation cycles.

²² This certification means, among other things, that plantation forestry operations are conducted to reduce the environmental impact of business operations, conserve sites of ecological importance within plantation territories, such as wetlands and riparian zones, and reduce industry pressure on surrounding indigenous forest. Consequently, FSC certification ensures the implementation of good forestry management practices, socially responsible relations with forestry workers and communities within the locus of forestry operations, and responsible environmental practices.

However, as already noted, a trade-off exists between the advantage of concentration of certification and chain of custody, which guarantees the quality of plantation forests on the one hand, and the impact of this degree of concentration on ownership structure, black empowerment opportunities, and market competition on the other (see Section 2). Generally, industry analysis reveals that it is more difficult for large firms to address transformation issues, which seems reflected in this sector, perhaps amplified even further by the degree of concentration in the market. This is an important trade-off and South Africa should balance the interests of social progress with advancing a better FSC rating.

In areas where it is both possible and appropriate to use land for plantation forestry, this bodes well for the industry as a potentially good choice of land and water resource appropriations (see Section 4) as compared to other land uses, such as agriculture. However, as land suitable for forestry is also often suitable for agriculture, trade-offs would have to be made again in respect of food security concerns and opportunities for self-subsistence of rural communities. Therefore, land that may have been used for agriculture or left as natural habitat must, if afforested, represent the best, most efficient, use of such land. These technical factors limit the possibility to further expand plantation forestry in South Africa.

Despite the declines in coverage of forests in the industry, noted in the introduction, especially since the 2007-2009 crisis, new afforestation is gaining momentum. By 2012, more than “8 000 ha of virgin land [had been] planted since the signing of the Forest Charter in 2009” (DAFF, 2015), which has mainly benefited rural communities. The Forest Charter aims to support the preservation of forested areas as sources of amenities (such as food, energy and shelter) for local communities through stakeholder engagement and addressing deforestation and conflicts over land use (Forest Sector Charter Council, 2017).

To improve the Mean Annual Increment (MAI)²³ and rationalise site planting, industry has adopted improved planting practices and/or switched to shorter rotation crops, increasing yields of industrial timber between 5% and 10% (Genesis, 2005). There has been a general shift from longer rotation pine to shorter rotation eucalyptus. The advantage of this approach is that eucalyptus grows about twice as fast and produces double the yield per hectare than pine. The disadvantage is that eucalyptus is more water thirsty, is hostile to other plant species, and provides a less suitable form of substitute habitat than does pine.

In 2016, the Department of Water and Sanitation (DWS) attempted to halt this trend by publishing regulations that would require a punitive 30% reduction in overall plantation area for growers changing from pine to eucalyptus. Industry reports that the DWS has agreed to rescind these regulations to safeguard the domestic supply of industrial timber, however, this had not happened as of May 2017 (Interview with Michael Peter)

This trend negatively impacts the ability of plantation forestry to provide substitute habitat that supports animal and plant life, helps preserve forest coverage (and ecological corridors) and hence the survival of forest-dependent animals and plants. The general shift from longer rotation pine to shorter rotation eucalyptus bodes badly for the substitutability effect of plantation forestry on fauna and flora as these are negatively impacted during harvesting, which is obviously more frequent with shorter rotation crops.

This shift, especially among small growers, is driven by the search for more immediate returns on investment in plantation forestry and reduces the ecological benefits associated with plantation forestry as substitute habitat. Indeed, shorter rotations allow less time for sub-canopy flora to develop, which support animal and birdlife (Brockerhoff et al., 2008). Moreover, eucalyptus is biochemically hostile to many species of plants as

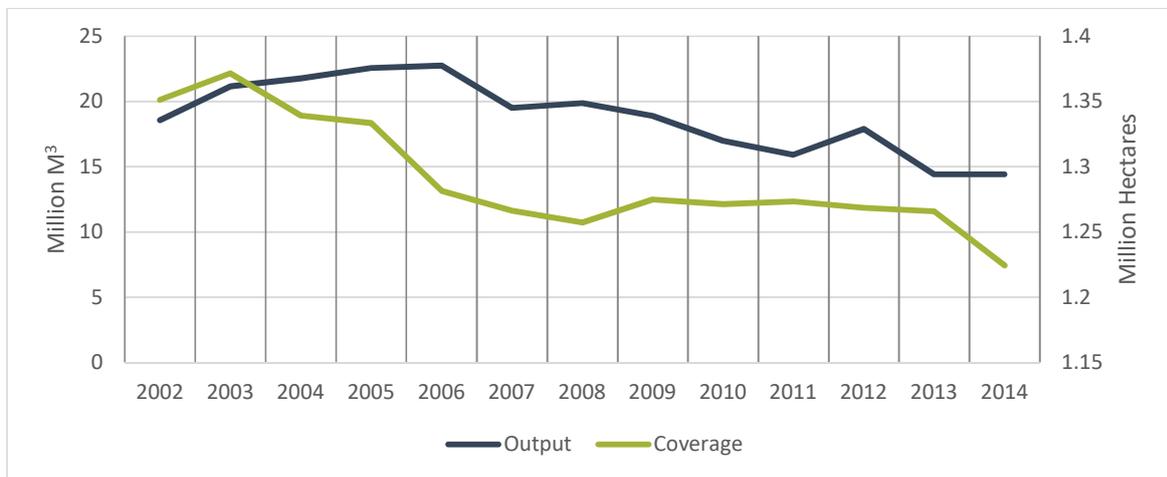
²³ This is defined as the volume of wood growing on one hectare during a year (m³/ha/year) on average since the plantation forest has been established.

it leaches tannins into the ground through its root system. This is relevant to proposed expansions in plantation forestry as new operations are likely to be undertaken by small growers who have an increased financial incentive toward planting shorter rotation crops for sooner returns.

Another problem is the rapidly growing demand for dissolving pulp, used mainly for textile

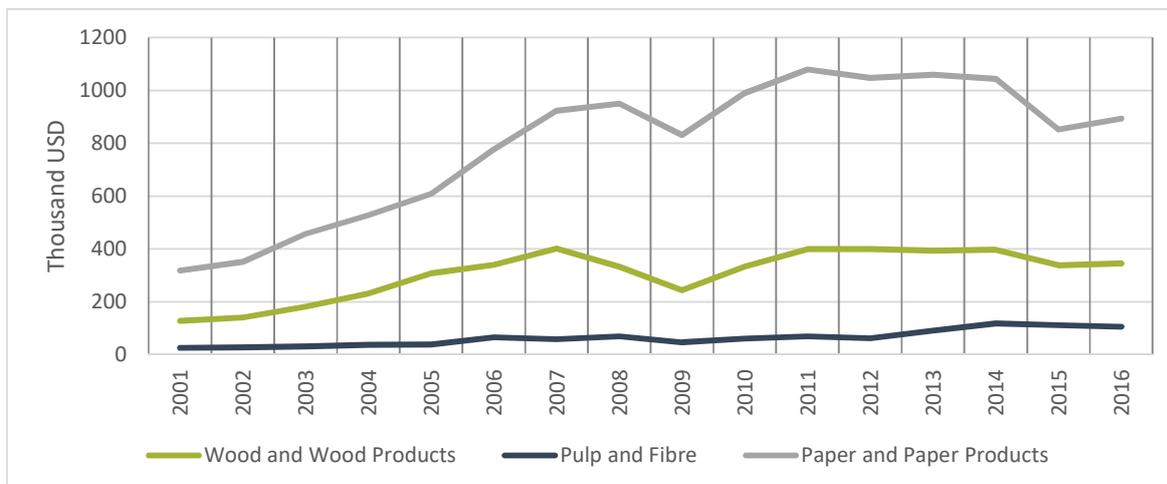
manufacture, in the international market. This demand is growing more rapidly, and the market is more valuable than that of timber, which is the main product of longer rotation softwood plantations. Sappi, for example, has sold or converted most of its softwood plantations. The result is that market preference is going to drive a shift to shorter rotation plantations.

FIGURE I: PLANTATION COVERAGE (RIGHT AXIS) AND INDUSTRIAL TIMBER PRODUCTION (LEFT AXIS) IN SOUTH AFRICA



SOURCE: FAO, 2016; FORESTRY SOUTH AFRICA, 2017

FIGURE 2: SOUTH AFRICAN IMPORTS OF WOOD, PULP, FIBRE, AND PAPER PRODUCTS IN DOLLAR TERMS



SOURCE: TRADE MAP, 2017

Figures 1 and 2 highlight the opportunity to develop more plantation forests to meet local demand and create further opportunities for

expansion in downstream industries. Moreover, if this trend were to continue, South Africa would risk becoming a net importer of industrial timber, at least in the medium term. This need not be the case as the forestry, logging, and related services sector in South Africa shows encouraging profit margins and returns on capital increasing from -11% to 15% and 54% to 67%, respectively, between 2010 and 2015 (Statistics South Africa, 2017), which opens up resources for research and development (R&D), adaptation to more sustainable processes, and potential expansion. Indeed, despite the necessity to be cautious, opportunities remain to reverse the trend towards continued declines in coverage and encourage future new afforestation by streamlining land-related and water regulations.

Moreover, in 2005, 28% of government-owned forested area remained unplanted compared to an industry norm of just 4% (Genesis, 2005). According to Michael Peter, this is still the case. This results in untapped economic opportunities, potential soil erosion on unplanted stands, and a loss of the environmental spillover benefits forestry provides. With state-owned plantation forests, the rehabilitation of unplanted stands and improved management practices would further reduce inefficiencies in the plantation forestry sector.

In addition, according to industry roleplayers, DAFF forests are in poor condition and inadequate forest management practices limit potential yields of industrial timber going forward. This is an unfavourable situation, especially for plantation forests as a form of substitute habitat because DAFF supports the establishment of longer rotation pine forests. The constraints facing state-owned forests arise from a lack of fiscal resources and qualified staff to re-capitalise them.

3.2. Recommendations

DAFF in partnership with the dti and the Department of Environmental Affairs (DEA), must prioritise the preservation of existing longer-rotation pine plantations through measures that incentivise investment in pine forests with the option to recoup a limited portion of capitalisation required OR alternatively through improved access to financing, repayable on harvesting and sale.

The decision to shift between different genera (such as from pine to eucalyptus) should be subject to DEA approval, and conducted in line with an assessment of industry association's data on the firm reported composition of South African plantation forests. This should be in terms of the respective coverage for pine, eucalyptus, wattle etc. The dti could also introduce a tax incentive, via the relevant arms of government, to reward longer rotation over shorter rotation crops to reverse the trend toward eucalyptus.

Expedited approvals for proposed expansions in plantation forestry in the Eastern Cape and KwaZulu-Natal provinces, conducted via small grower schemes and short rotation eucalyptus, at least in the medium term, could help satisfy the increased demand for hardwood that is coming from growth in the pulp and paper industry, and overseas demand. Expanding coverage in shorter rotation eucalyptus on sites of new afforestation could thus safeguard existing longer rotation pine plantations from the trend toward conversion to shorter rotation crops.

The DAFF in partnership with the DEA could continue to seek a higher percentage of FSC certified plantation forest in South Africa by making FSC certification a statutory requirement and setting a compliance date. Furthermore, unplanted stands must be rehabilitated and forest management practices on DAFF plantations must be improved OR these must potentially be privatised if it can be shown that DAFF lacks the capacity to source the requisite skills and capital

necessary to reconstitute optimal operations at its plantations within a reasonable period.

DAFF should implement the public-private partnership models, which industry and the erstwhile Accelerated and Shared Growth Initiative for South Africa (AsgiSA) in the Eastern Cape proposed to DAFF, to improve management on state owned plantations. These models avoid the need for state-owned plantations to receive fiscal support and would ensure that communities which have claimed these areas from DAFF have strategic partners to provide capital, skills, and technology in the same way as described in Box 1.

Plantation forestry management should invest more in recreational use facilities for their plantation forests to develop as a way to involve surrounding communities in the preservation of the plantation forestry industry and as part of their corporate-social responsibility profile.

Consequently, improvements in silvicultural practices (see Section 4) and the MAI have not increased the yield per hectare to the degree to which would be required to compensate for overall declines in coverage and production²⁴, which has meant that demand for wood products in the value chain has not been satisfied by domestic supply. Figure 1 shows that between 2002 and 2014 both the production of industrial timber (from 18 million to 14 million m³) and the coverage of plantation forest (from 1.3 million to 1.2 million hectares) have declined. Figure 2 shows that South Africa's reliance on imports of wood and wood products, pulp and fibre, and paper and paper products increased between 2001 and 2016.

²⁴ Overall coverage and production have declined despite the limited small-scale expansions in plantation forestry and productivity gains in terms of the improved silvicultural practices and increases in the MAI.



4

Production Inputs in the Plantation Forestry Industry

The third measure of sustainability concerns production inputs in the plantation forestry industry, such as water and energy. This also relates to the climate change impact of the industry and the efficiency in the use of industrial timber further downstream in the value chain. This is about using the essential inputs necessary to produce industrial timber efficiently in the production process, limiting carbon emissions in the production process, and assessing how efficiently industrial timber is being used downstream, because inefficiency downstream would create less than optimal use of industrial timber and imply a need to produce more timber than necessary.

The efficient use of water in the production of industrial timber is important because South Africa is a water scarce country and water is a key input in this industry as timber is a water-thirsty crop. Moreover, the efficiency of the end product (i.e. industrial timber) is also dependent on using energy optimally. This is important for building competitiveness and reducing carbon emissions. In addition, efficiency in the growing, harvesting, processing and delivery of industrial timber is

important first for the input efficiency of downstream manufacturing operations – and second, to ensure that, from the perspective of plantation forestry, water and energy resources are used optimally and carbon emissions are kept down. Industrial timber needs to be used efficiently in downstream processing to ensure that it is not wasted, which would require a more than optimal level of supply from plantation forests.

4.1. Diagnostic: Water licensing, silvicultural practices and other efficiency concerns

Water is the main input in the production of industrial timber and the management of water in the industry in South Africa is highly regulated. The plantation forestry industry is classified as a Stream Flow Reduction Activity (SFRA) under the National Water Act No. 36 of 1998 (NWA), the only industry to be classified as such, and as a source of alien invasive species under the Conservation of Agricultural Resources Act No. 43 of 1983. As a result, plantation forests require water use licences to operate or be established and a comprehensive environmental impact assessment (EIA) must be

completed before operations commence for potential new afforestation.

Water management in the industry remains problematic. The process of obtaining water licences to initiate plantation forestry operations is “onerous and lengthy” to complete and may burden opportunities in plantation forestry in South Africa (Ledger, 2017). Water licensing constraints mean that economic opportunities are likely to result in a lengthy process of approvals involving several parties, which drives up the administrative burden, especially for small growers.



Water is the main input in the production of industrial timber and the management of water in the industry in South Africa is highly regulated

In addition, most plantations in South Africa, although not in possession of water use licences, are deemed to be operating legally (Interview with Michael Peter). This arises out of the fact that most plantations were established prior to 1972 when an Afforestation Permit System was introduced, and before water use licences, under the current NWA, were introduced in 1998.²⁵

The NWA was meant to regularise existing water use on plantation forests, but this process is still ongoing between industry and the DWS. Regardless, proposed areas for new afforestation must, in accordance with water use licensing policy, be shown to be suitable to the establishment of plantation forestry. The component resources of

plantation forestry, i.e. land and water, need to be safeguarded through the reasonable application of existing statutory requirements, given that the industry has already experienced declines in coverage and relies on water thirsty crops. Regulations should aim to ensure that the industry remains sustainable and that inputs are used optimally, and not stifle economic opportunities through the inflexible application of laws.

The current water licensing regime is considered as prejudicial by the industry, especially as it is the only water use activity classified as a SFRA. Plantations cover a mere 1.25% of land covered by agriculture and the industry uses only 3% of national water reserves as opposed to the 62% consumed by agriculture (DWS, 2015).

Nevertheless, progress has been made in the management of water use licences. The DWS has been working to reduce application backlogs. Compared to the 389 water licences that were issued between 2000 and 2009, in 2010 1 164 licences were issued and the department made progress in catching up the backlog (DAFF, 2015). An additional 76 were issued in 2011 leaving a further backlog of 549 that year, 30 were issued in 2012, none in 2013 and 2014, and 116 in 2015 leaving a backlog still in place (DWS, 2016).

Furthermore, DAFF in partnership with the dti has provided funding to conduct EIAs of about 1 200 ha identified with afforestation potential in the Eastern Cape (DAFF, 2015). This initiative aims to facilitate a more efficient issuance of water use licences and afforestation permits and further reduce the delay in receiving licences.

In addition, the trade-off between expediency of water licensing on the one hand, and engagement with local communities and relevant government departments on the other means that issues around water and land must be considered in a

²⁵Existing plantations established before 1972 are considered legal and may be registered and licenced. Plantations established between 1972 and 1999, if established in accordance with a valid afforestation permit, are also legal and may be licenced (Sappi, 2017b). As a result, most of the plantations are legal because the NWA recognised “existing water use”. In the absence of a water use licence, operations are only illegal if plantations were left unplanted during the two-year grace period after 1998 or have subsequently been left unplanted and “existing water use” has ceased.

measured and meaningful way. Moreover, the suitability of forestry in an area would be pertinent to show that yield will warrant water use. Given that companies operate in both the timber growing and timber processing industries, water use by companies exceeds the rainfall and ground water required to simply grow timber alone. Adequate protection is required so that areas of ecological importance are not left under the control of companies which may have a perverse incentive to encroach on wetland and riparian zones. The tree roots of alien species, such as pine and eucalyptus, reach deep and can affect the water table and stream-flow levels if planting is done irresponsibly, which would place greater pressure on South Africa's already scarce water resources.

Considering the effects of climate change on deforestation and desertification, plantation forests can help insulate indigenous habitat against fringe effects of global warming at the edges of forested areas. Nevertheless, climate change also puts this industry in jeopardy as the climatic conditions favourable to plantation forestry become increasingly scarce. The increased drying-out of parts of the country and the effects of climate change may reduce the land surface area available in South Africa on which plantation forestry can be established and maintained. This presents a challenge for the industry.

From a climate change perspective, the industry shows mixed outcomes. The industry should theoretically have a positive profile. The growing and harvesting of trees within the industry itself is considered a carbon neutral activity as new tree crops replace those that are harvested (DEA, 2014). New afforestation and replanting of vacant stands should produce further benefits in terms of carbon sequestration.

However, the value chain is highly vertically integrated, and the largest players in the industry, Sappi and Mondi, are huge CO₂ emitters. This means companies fail to improve their efficiency across the value chain to the detriment of their own

emission profile. Indeed, Mondi's Scope 1 (i.e. direct) and Scope 2 (i.e. indirect) emissions for its South African operations in 2016 were 988 585 (733 832 in 2013) and 1 090 547 (693 211 in 2013) tonnes CO₂, respectively (CDP, 2016; 2013). Sappi's emissions at a global level for Scope 1 and 2 were 3 790 638 (4 539 831 in 2013) and 1 276 138 (1 700 923 in 2013) tonnes CO₂, respectively, in 2016. Using a rough estimate of 25% of its operations being based in South Africa, this gives 947 660 (2 620 570 in 2013 for South Africa) and 319 035 (1 127 718 in 2013 for South Africa) tonnes CO₂ emitted. Mondi scored an A (87 B in 2013)²⁶ in 2016, which is the best category, and Sappi scored a B (78 C in 2013), which is the third best category, according to information disclosed by the companies. Evident from the data is that, although Mondi is still an absolutely smaller CO₂ emitter, Sappi has made significantly better efficiency gains in terms of CO₂ emissions, reducing Scope 1 and 2 emissions by 64% and 72%, respectively, as compared to Mondi, which increased its level of emissions in these categories by 35% and 57%, respectively, between 2013 and 2016.

Moreover, the declines in coverage seen in the industry and the change to shorter rotation crops means that less carbon is being captured and less frequently.

In addition, while there is relatively little electricity consumed in the primary (i.e. timber growing and harvesting) stage of the industry, as compared to the downstream value chain (i.e. energy-intensive sawmilling, pulp and paper production), the equipment used to harvest and transport the timber for processing and delivery, and the processing itself, may use fossil fuels or electricity generated from unsustainable sources, which attenuates the positive environmental benefit of carbon sequestration.

Nevertheless, firms in the downstream value chain have achieved major efficiencies in their consumption of fossil fuels and water, relative to

²⁶ Note that the ratings schedule changed between 2013 and 2016.

their production output, and their development of bio-based energy (Interview with Michael Peter). Indeed, many large processors are net producers of renewable energy and some are even registered independent power producers. Mondi is an example, as 100% of its electricity requirements are supplied onsite by way of combined heat and power (CHP) technology. The technology results in savings of more than 30% of primary energy compared with conventional electricity generation (Mondi, 2011). Sappi is also prioritising renewable energy, cogeneration options, and increasing its self-sufficiency. Importantly, Sappi, through its biomass-derived energy project at its Ngodwana mill, sources biomass from local plantations, which is then used as fuel for its boilers to produce steam at the mill and for electricity generation (Sappi, 2017b).

All in all, according to a cost-benefit assessment by Genesis Analytics (2005), the net climate change-related benefit to society from plantation forestry was R89.3 million in 2003. The carbon sequestration effect of afforestation in South Africa is consequently estimated to outweigh the costs associated with the negative aspects of plantation forestry. These negative aspects include stream-flow reduction, CO₂ emissions produced by transport operations in plantation forestry, and other externalities associated with plantation forestry (i.e. wastage of industrial timber, reduced water quality from the use of chemical fertilisers and pesticides, and the poisoning of soils through the use of chemical fertilisers and pesticides). Considering the carbon sequestration effect of plantation forestry, the industry would be eligible for a carbon credit under the proposed carbon tax if the permanence of operations and projects in question can be determined (Promethium Carbon, 2014). However, in practice, this may be difficult to obtain as the sequestering effect will be seen to derive mainly from new afforestation and/or reforestation and not the running of existing plantations.

With timber production (i.e. sawmilling industry), about 38% of the average tree is lost in the harvesting process and left on the forest floor to

rot, another 34% is lost as by-products (i.e. wood shavings and cut-offs) in the sawmilling process, which equates to only 28% of the tree being used for final timber production (PelletPower, 2017). This is a huge lost opportunity as the bark, other plantation waste, and wood shavings could be used more efficiently as sources of renewable power generation and fuel. The cross-utilisation of these waste products in the value chain could improve overall energy efficiency and make the sector more energy independent and carbon neutral.



plantation forests can help insulate indigenous habitat against fringe effects of global warming at the edges of forested areas. Nevertheless, climate change also puts this industry in jeopardy as the climatic conditions favourable to plantation forestry become increasingly scarce.

Inefficiencies in plantation forestry itself have also been of concern. A 1996 DWS White Paper highlighted inefficiencies in the production of industrial timber and poor yields due to poor silvicultural practices (i.e. lack of improvement in the genetics of feedstock) and poor forest management practices. By 2005, however, according to a report by Genesis Analytics (2005), much of the gains from improved pine and eucalyptus cultivars had already been achieved.

Improved silvicultural practices in the plantation forestry industry in South Africa over the last three decades or so have improved the rate of timber recovery remarkably. Indeed, the industry harvests 85% more industrial timber per hectare than in 1980 (Interview with Michael Peter). On silvicultural research, the industry collaborates

through the Institute for Commercial Forestry Research, internal research initiatives in larger companies, and in partnership with the University of Pretoria, the University of Stellenbosch, and the Nelson Mandela Metropolitan University.

Although silvicultural improvement to feedstock is experiencing diminishing returns in terms of further improvement to yields, gains are still possible through molecular-level breeding as opposed to more traditional practices. This avenue presents opportunities to breed for specific traits, like specific timber properties or the resistance to certain pests and diseases (which cause massive losses annually), as well as breeding for sterility, to reduce the environmental impact of plantation species invasions into natural habitat.

As already noted, industry reports that efforts continue to be made with new advances in molecular-level manipulation of the genetics of feedstock and tremendous gains have been made since 1980. However, with wattle yields and silvicultural practices, the crop is inherently unresponsive to genetic improvement. Given that plantation forests in South Africa do not actively cultivate wattle, and wattle jungles are invasions across the landscape, the industry is doing well in silvicultural improvement.

Downstream efficiency is crucial to ensure that the optimal amount of timber is produced upstream. According to the Industrial Policy Action Plan (IPAP) 2014/15 – 2016/17 (the dti, 2014), inefficiencies in downstream processing of industrial timber increase demand for raw timber and lead to wastages, especially in the sawmilling industry, which is characterised by small firms with little bargaining power and outdated equipment that is wasteful of raw timber.

Downstream processing inefficiencies in the sawmilling sector mean that raw industrial timber is not being used in the most efficient way. Indeed, timber recovery rates in this sector are below 50%, compared with an international benchmark standard of 60% (Ledger, 2017). This stems from the old age of sawmilling equipment (generally

around 40 years old) and the reduced ability of small sawmilling firms to afford recapitalisation (due to a lack of funds).

Furthermore, improved recycling of wood products would yield additional pulp for the production of paper and supply repurposed timber in the value chain, and thus improve efficiency in the use of industrial timber. According to the Paper Recycling Association of South Africa (PRASA, 2017), the situation is positive in South Africa and improving, as the paper recovery rate rose from 38% in 2001 to 66% in 2015, in part due to industry initiatives, but mainly due to the actions of workers in the informal sector. Furthermore, this recovery rate is above the international average of 58% reported by the International Council of Forest and Paper Associations (ICFPA, 2015); however, it is still only two thirds of the way towards complete recovery of paper which is 100% recyclable.

4.2. Recommendations

Water use licence applications must continue to be processed more expeditiously to avoid time-consuming administrative backlogs. There should be increased state-backed and/or facilitated financing opportunities for EIAs. Thus, the declines in plantation forestry, noted earlier, can be mitigated by more expeditious water licencing procedures and through government-supported EIA processes.

DAFF in partnership with DWA, and other relevant national agencies (e.g. South African Weather Service) could draft meteorological and topographical maps (i.e. GIS maps) that pre-identify possible sites for new afforestation in the country and make provisions for water licencing and environmental impact assessments to be expedited for start-ups at these locations. Plantation forests should be treated differently depending on where they are located, and priority should be given to allow the establishment of tree farming in areas where the impact on water levels will be reduced.

Wattle jungles should be meticulously converted in the long-term to pine or eucalyptus forests which use less water resources and present less risk of invasion into unplanted lands, allowing for several intermediate rotations of wattle in the interim phase to account for the wattle seeds that will germinate. Moreover, gall-inducing insects should potentially be introduced to more areas in South Africa to control the wattle invasions and render seeds infertile.

Continued research into silvicultural techniques, via improved support and collaboration among government and commercial research wings, must emphasise disease and pest resistance. Silvicultural practices involving genetic modification must continue, and plantation forest stands should be further rationalised to increase yields. Furthermore, forest planting practices and planning must minimise the edge effects associated with climate change and establish greater single areas of tree coverage (inclusive of indigenous forest and woodlands).

DAFF in partnership with the dti, and other government agencies, as well as the Industrial Development Corporation (IDC), should sponsor recapitalisation initiatives to improve efficiency across the whole value chain. Through the actions of industrial finance institutions, such as the IDC, technology and equipment in downstream processing of industrial timber must be upgraded, especially in sawmilling to improve input efficiency.

Inefficiencies in downstream processing operations using industrial timber as an input must be resolved, through upgrading of capital equipment, improved milling practices, and expanded use of by-products such as bark and wood shavings in other applications, enforceable through a waste tax on unused biomass. This will reduce the demand for timber and help promote longer rotation crops.

Industrial timber supply must be used efficiently (see previous recommendation) so that the yields

from plantation forests contribute to the maximum economic benefit of society. Therefore, not only must existing plantation forests be managed better to produce maximum yields, and provide much needed supply of timber, these better yields must run through the course of the value chain with less wastage to improve the efficiency of the sector and reverberate the benefit of better practices back upstream and throughout the economy.



Wattle jungles should be meticulously converted in the long-term to pine or eucalyptus forests which use less water resources and present less risk of invasion into unplanted lands

The introduction of a carbon tax credit, via the relevant arms of government, to reward the carbon sequestration effect of existing plantation forestry above and beyond “restoration of sub-tropical thicket, forests and woodlands” and “small scale afforestation” currently catered for in the proposed legislation could aid in the preservation of forestry resources (National Treasury, 2016).

DAFF in partnership with industry stakeholders and associations must implement an industry-level plan for integrating waste and biomass across the sectoral value chain to further promote energy self-sufficiency, electricity cogeneration, and utilisation of biomass waste. In addition, nation-wide, government-led policy initiatives, supported by government waste removal services, that regulate the separation of household and business waste to reduce landfill tonnage and better facilitate recycling in South Africa, especially for paper and wood products, should be implemented.



Conclusion

This paper examined the plantation forestry industry in South Africa, an important industry for an entire value chain in wood, and pulp and paper products. Moreover, the industry demonstrates positive environmental spillover benefits for carbon sequestration, substitute habitat, and cultural development, as well as creating opportunities for economic growth and employment.

Important trade-offs were evident between policy support for plantation forestry on the one hand and promoting land and water efficiency, improved rural development outcomes and conservation of natural capital on the other. Plantation forests must represent the best use of the land if implemented/established, and should not jeopardise food security, community access to traditional lands, or compromise water security in South Africa.

Despite major improvements in silvicultural practices over the last three decades, further rationalisation of field planting, and increases in the MAI, declines in both coverage and production have led to increased reliance on imports of wood, fibre, and pulp and paper products. Furthermore,

the increased demand for pulp and paper and a preference for a shorter timescale on the return on investment is leading a trend from longer rotation pine to shorter rotation eucalyptus. This is threatening the value of plantation forestry for the industry's environmental spillover benefits.

Producing adequate supplies of industrial timber is being hampered by certain upstream inefficiencies in the regulatory environment, which is not always conducive to land tenure and expansion (i.e. new afforestation), because of policy uncertainty on land rights and delays in water use licensing. In addition, industrial timber is being used wastefully in several downstream industries. This threatens to compromise the integrity of the raw material industry in the form of plantation forestry and diminishes any efficiency (i.e. intensity) gains achieved on plantation forests.

Attention needs to be given to how water use licences could be expedited in such a way that takes into consideration water security concerns while also advancing plantation forestry, which is facing challenges, but that nevertheless has the potential to contribute to economic development, livelihoods, and to contribute to environmental sustainability through carbon sequestration,

substitute habitat, and improved biodiversity outcomes for forest-dwelling animal and plant life. Moreover, the data gap on transformation in the sector needs to be addressed through better reporting by the Land Court on the number of land claims logged, verified, and settled or rejected. Uncertainties about land-related policies should be clarified to not discourage investment or further worsen the trend toward shorter rotation eucalyptus.

Plantation forestry presents opportunities for sustainable growth in the South African economy. Despite the trade-offs in foregoing other land uses

or the social and environmental value of those various other land uses, and the water security challenge such a water-thirsty industry would arouse²⁷, the industry should be supported to secure a domestic supply of industry timber, support value-adding downstream industries, and contribute to rural development. This must entail appropriate government regulation and follow-through in data gathering and publication, and engagement between industry and government on the one hand and industry and local communities on the other.

²⁷ That is, given the scarcity of water resources in South Africa.

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This policy paper reviews the role of plantation forestry for promoting sustainability in South Africa

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Trade & Industrial Policy Strategies (TIPS)

234 Lange Street | Nieuw Muckleneuk | Pretoria | South Africa

Tel: +27 12 433 9340

Website: www.tips.org.za

Green Economy Coalition (GEC)

86-86 Greys Inn Rd | London | United Kingdom

Tel: +44 20 3463 7399

Website: www.greeneconomycoalition.org